# SECTION 12 - EVALUATION OF ALGORITHM PERFORMANCE

## 1. BACKGROUND

One of the responsibilities of the Demand Estimation Sub Committee (DESC) is to provide a summary of the NDM Algorithm Performance in the preceding year. UNC requirement 'H 1.8.1 (d)' states "DESC will submit to all parties a summary of the Committee's analysis of the performance in the Preceding Year of the End User Categories and Demand Models (applicable in the Preceding Year)".

The analysis is completed once a year in the Autumn, following completion of the gas year and Xoserve performs this role as the common demand estimation service provider.

The implementation of Project Nexus on 1st June 2017 introduced a revised NDM Supply Meter Point Demand formula, meaning some of the original Algorithm Performance measures became redundant. At the DESC meeting on 15th November 2016, the group reviewed four proposed strands of analysis which would help assess the accuracy of the estimated allocations derived by the revised formula. These analysis strands are as follows:

Strand 1 – Weather Analysis

Strand 2 – Unidentified Gas Analysis

Strand 3 – NDM Daily Demand Analysis

Strand 4 – Reconciliation Analysis*

*Up to now there has been insufficient Class 3 read data available to perform this Strand of analysis and so it is not included here this year, however the provision of Class 3 read data is improving and we hope to be in a position to include this additional Strand in future Algorithm Performance assessments.

## 2. NDM SUPPLY METER POINT DEMAND FORMULA

The revised NDM Supply Meter Point Demand formula (effective from 1st June 2017) used for estimating NDM daily demand is shown below:

$SPD_t = ((AQ/365) \times ALP_t \times (1 + (DAF_t \times WCF_t)))$

where:

AQ = Annual Quantity

$ALP_t$ = Annual Load Profile

$DAF_t$ = Daily Adjustment Factor ($WVCE_t$ / $SNDE_t$)

$WCF_t$ = Weather Correction Factor ($CWV_t$ – $SNCWV_t$)

In addition to the revised demand formula, 1st June 2017 also saw the introduction of Unidentified Gas or UIG. UIG forms part of daily gas allocation and is calculated as the balancing figure to ensure that within in each LDZ, total input matches total output. UIG is derived as follows:

Total LDZ Energy – (Shrinkage + DM Energy + Total LDZ NDM Energy) = UIG

## 3. STRAND 1: WEATHER ANALYSIS

When interpreting the various strands of Algorithm Performance, it is relevant to recall the weather conditions that prevailed during the gas year being analysed.

The Composite Weather Variable (CWV) is a single measure of daily weather in each LDZ and is a function of actual temperature, wind speed, effective temperature and seasonal normal effective temperature. From 1st October 2020 the CWV calculation has changed to also include actual and seasonal normal solar radiation, however as this assessment is for Gas Year 2019/20 the CWVs analysed here refer to the calculation relevant at the time. Further detail on the computation of the CWV can be found in Section 11 of the NDM Algorithms Booklet.

The SNCWV is the Seasonal Normal value of the Composite Weather Variable for the LDZ for the day.

The Weather Correction Factor (WCF) represents the difference between the CWV and the SNCWV for the LDZ and Gas Day.

Please note that in order to derive the weather charts and summaries depicting a national view of weather, 'GB CWV' and 'GB SNCWV' values have been derived using weightings based on LDZ throughput.

A selection of weather related charts are presented below: Figures S12.1.1 to S12.1.12 are bar charts showing the national monthly average CWV for each specific month, ranked coldest to warmest over the past 50 years. Figure S12.1.13 shows the national daily average CWV values for the entirety of gas year 2019/20 and how they compare to SNCWV. Figures S12.1.14 to S12.1.25 show daily observed CWV values compared to SNCWV, across each LDZ for the gas year.

A monthly weather summary for each individual month in the relevant gas year is provided below:

October 2019 was cooler than the current seasonal normal overall, ranking as the 18th coldest October over the past 50 years. There was a mixture of warmer and cooler days in the first half of the month, however most gas days were cooler than Seasonal Normal during the second half of the month. CWV deviation from SNCWV across all days in October 2019 ranged from -2.32 to +0.7.

November 2019 was noticeably cooler than the current seasonal normal overall and ranked 16th coldest over the past 50 years. Most of the individual days were cooler than normal however there was a warm spell from 23rd to the 28th. CWV deviation from SNCWV across all days in November 2019 ranged from -2.79 to +1.91.

December 2019 was warmer than the current seasonal normal overall and ranked as the 11th warmest December over the past 50 years. Despite cooler periods from 1st to 5th and 11th to 18th, CWVs were consistently warmer than normal. CWV deviation from SNCWV across all days in December 2019 ranged from –2.81 to +1.81.

January 2020 was much warmer than the current seasonal normal overall and ranked as the 2nd warmest January over the past 50 years, only cooler than January 2007. Only 4 gas days in January 2020 were cooler than normal, namely 19th to 21st and 28th. CWV deviation from SNCWV across all days in January 2020 ranged from -0.89 to +2.95.

February 2020 was warmer than the current seasonal normal and ranked as the 11th warmest February in the past 50 years. There were two cold spells in February: 10th to 12th and 25th to 29th, however all other days were warmer than normal. CWV deviation from SNCWV across all days in February 2020 ranged from -1.31 to 2.88.

March 2020 was fractionally warmer than the current seasonal normal overall and was ranked as the 21st warmest March in the last 50 years. Spells of cooler than normal weather at the beginning of the month namely 1st to 6th, and the end of the month, 27th to 31st were offset by generally warmer than normal weather in the middle of the month. CWV deviation from SNCWV across all days in March 2020 ranged from -1.94 to -2.15.

April 2020 was significantly warmer than the current seasonal normal resulting in it being ranked as the 3rd warmest April in the past 50 years, behind only April 2007 and April 2011. Despite April 1st and 2nd being cooler than seasonal normal, there was a spell of very warm weather stretching from the 3rd up to and including the 27th. April 5th to 12th stood out as particularly warm when compared to normal. CWV deviation from SNCWV across all days in April 2020 ranged from -1.19 to +4.87; the largest deviation seen across the Gas Year.

May 2020 was also warmer than the current seasonal normal, ranking as the 9th warmest May in the past 50 years. There was a mixture of warmer and cooler days in the first half of May, however from 17th May onwards, all gas days were warmer than normal. CWV deviation from SNCWV across all days in May 2020 ranged from -2.46 to +2.66.

June 2020 was marginally cooler than seasonal normal overall and was ranked as the 17th warmest June in the past 50 years. Most of the individual days throughout the month were very similar to seasonal normal, with a cold period from the 4th to the 12th. CWV deviation from SNCWV across all days for June 2020 ranged from -1.74 to +1.51.

July 2020 was cooler than seasonal normal overall, ranking as the 16th coldest July over the past 50 years. Each of the individual days throughout the month were very similar to seasonal normal with most days being slightly cooler than normal. CWV deviation from SNCWV across all days in July 2020 ranged from -0.81 to +0.24.

August 2020 was slightly cooler than the current seasonal normal overall and ranked as the 19th warmest August over the past 50 years. CWV deviation from SNCWV across all days in August 2020 ranged from -1.44 to +0.33.

September 2020 was also cooler than the current seasonal normal overall, ranking as the 18th coldest September in the last 50 years. There was a spell of cold weather towards the end of the month between the 23rd and 30th. The CWV deviation from SNCWV across all days in September 2020 ranging from -2.81 to +1.00.

Overall, the first quarter (October'19 to December'19) of gas year 2019/20 was generally cooler than the current seasonal normal whereas the second and third quarters (January'20 to June'20) were generally warmer. The fourth quarter of gas year 2019/20 (July'20 to September'20) was generally cooler than the current seasonal normal. Several days throughout the summer saw the CWV reach the maximum cut off value.

Confidence interval analysis has been performed on the observed WCF values during Gas Year 2019/20. The confidence intervals were calculated for each month and LDZ based on five years of historic WCF data from Gas Years 2014/15, 2015/16, 2016/17, 2017/18, & 2018/19. The 95% confidence interval has been calculated by using the mean and standard deviation over the five years listed and these intervals can be used to identify when the WCF is regarded as unusual.

Figures S12.1.26 to S12.1.37 are line charts showing the observed WCF during Gas Year 2019/20 for each LDZ, compared to the upper and lower confidence intervals. Figure S12.1.38 is a table showing the percentage of daily WCF values which fall within the confidence intervals for each LDZ and Month combination. In assessing this table, the months of April 2020 stands out, with the number of daily WCF values within the derived confidence intervals being less than 95% in 11 of 13 LDZs. As previously stated, April 2020 was much warmer than current seasonal normal overall, with large periods of the month being significantly above seasonal normal. April to September 2020 show the most deviation from normal, whereas January to March are consistently within the confidence intervals across most LDZs.

**Figure S12.1.1 – 50 Year GB CWV Ranking – October**

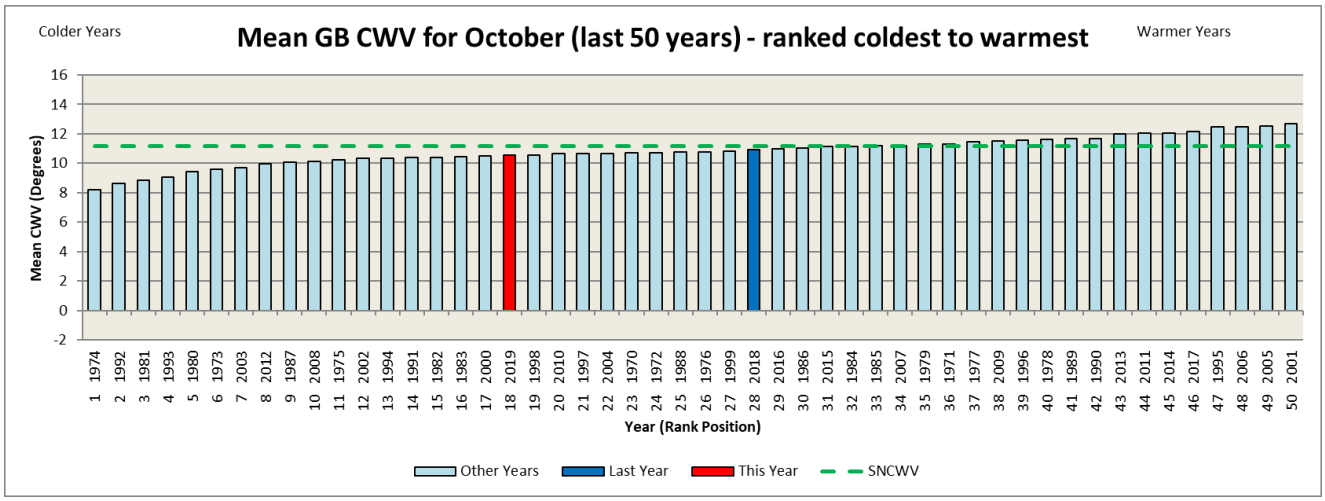



**Figure S12.1.2 – 50 Year GB CWV Ranking - November**

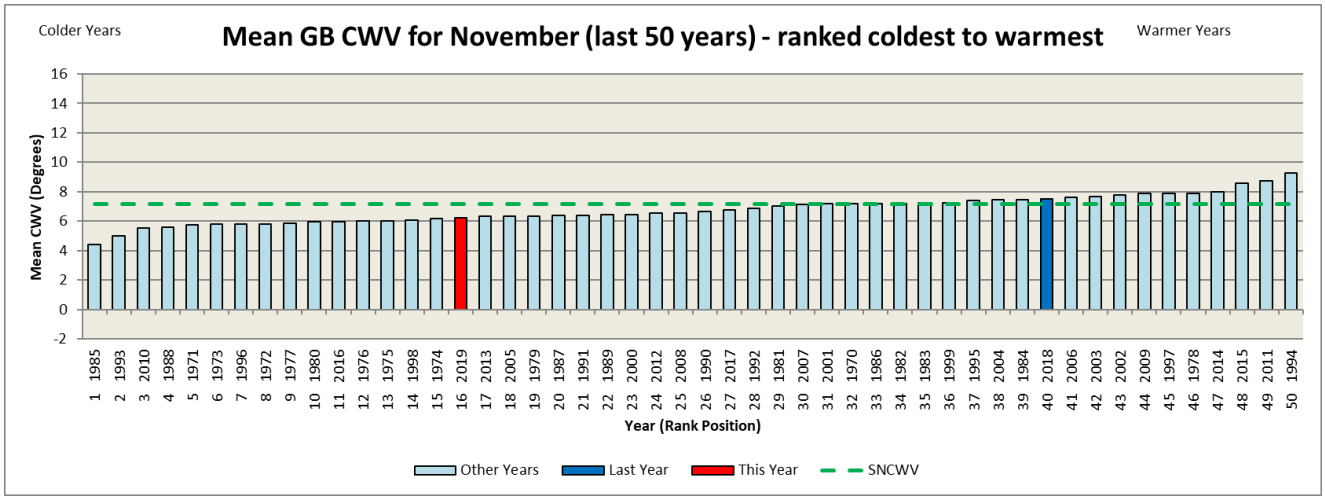



**Figure S12.1.3 – 50 Year GB CWV Ranking - December**

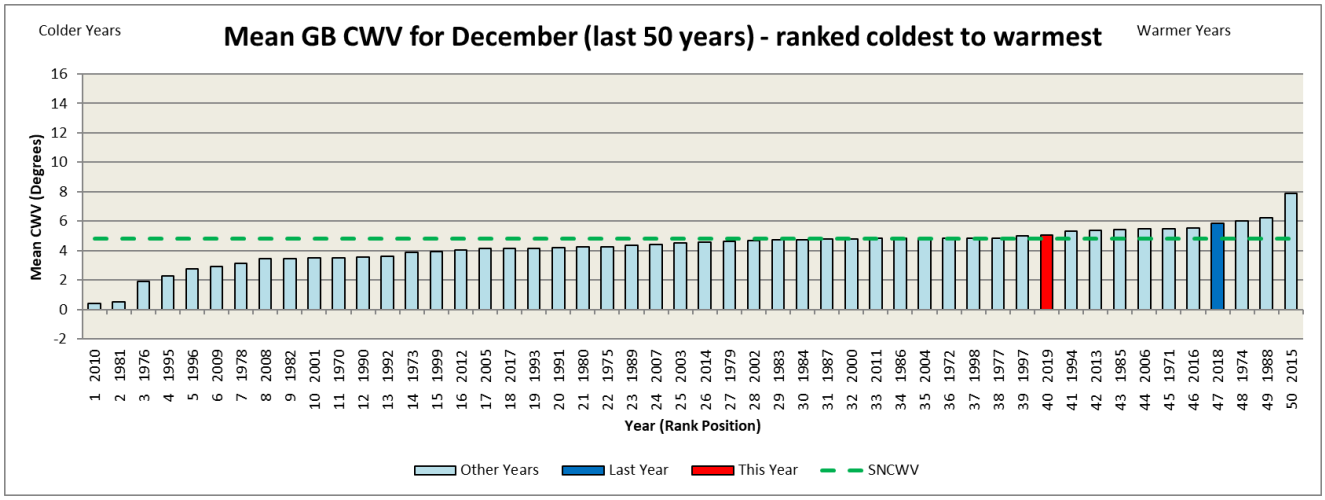


**Figure S12.1.4 – 50 Year GB CWV Ranking - January**

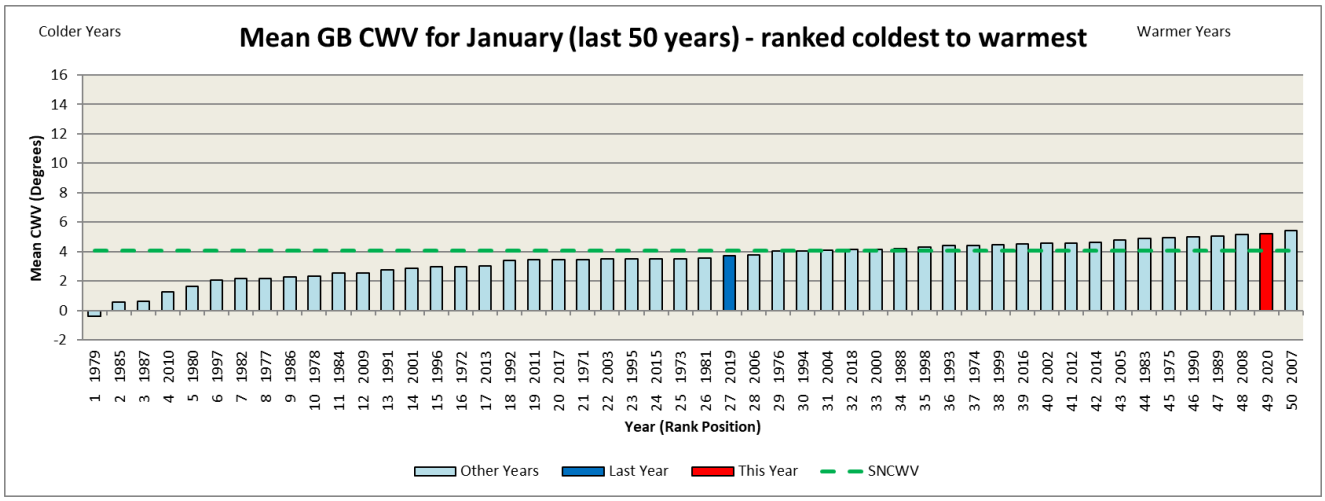



**Figure S12.1.5 – 50 Year GB CWV Ranking – February**

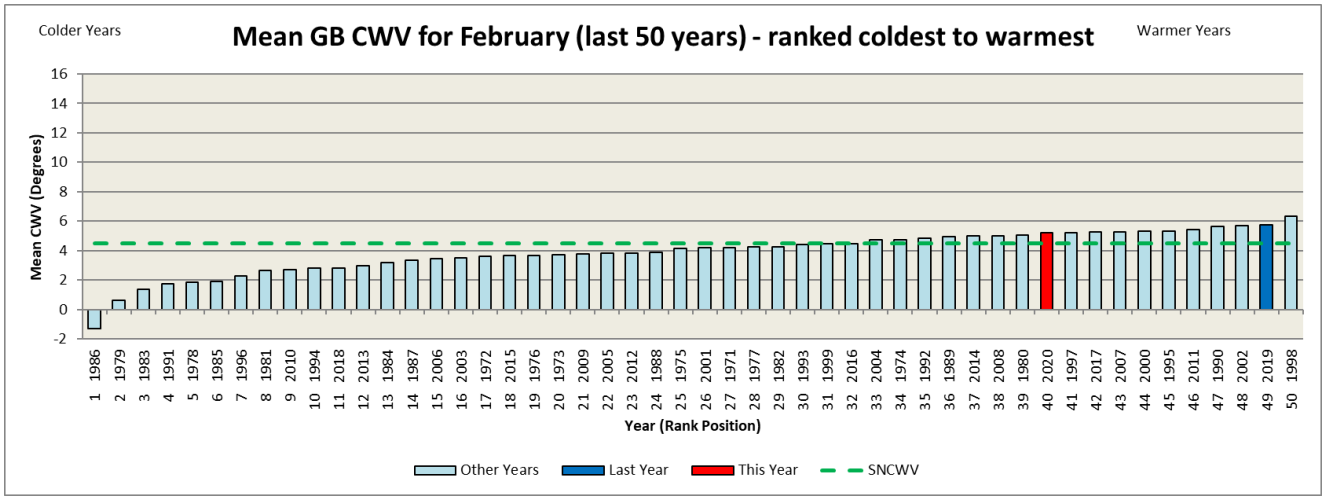



**Figure S12.1.6 – 50 Year GB CWV Ranking - March**

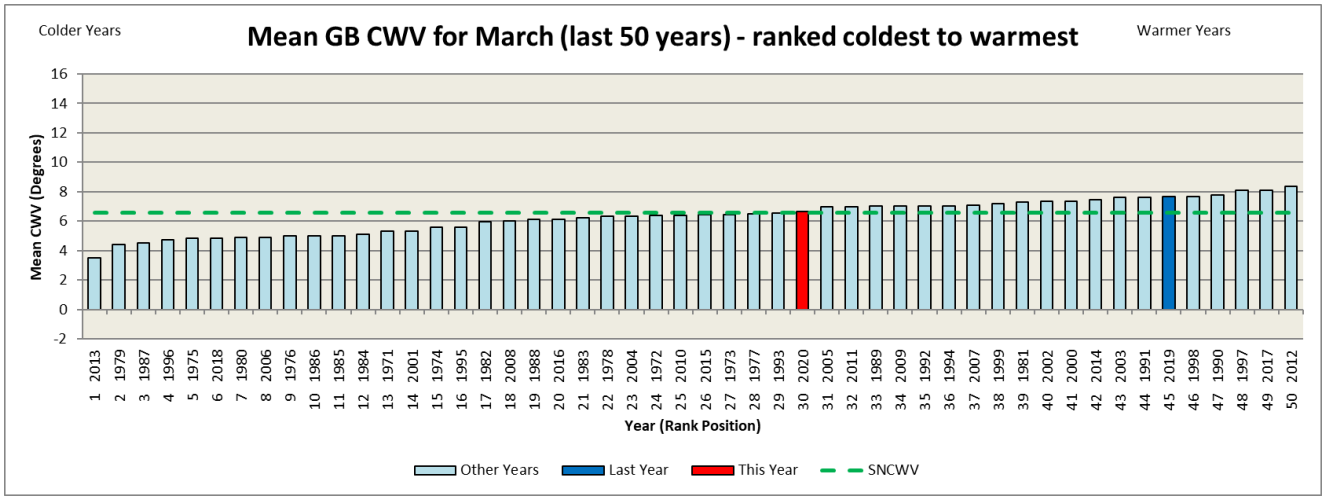


**Figure S12.1.7 – 50 Year GB CWV Ranking - April**

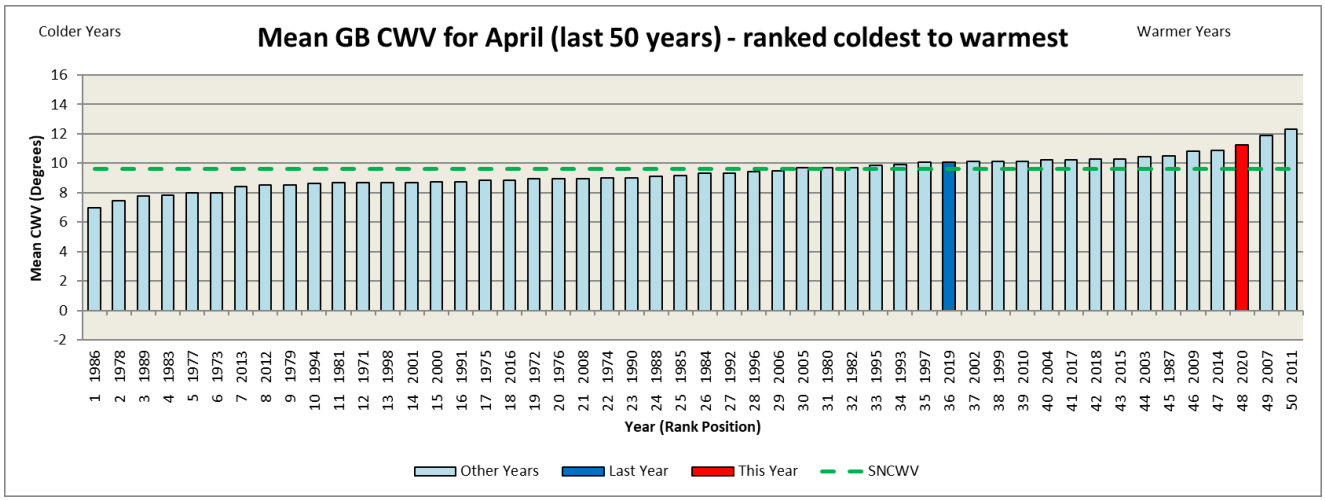



**Figure S12.1.8 – 50 Year GB CWV Ranking - May**

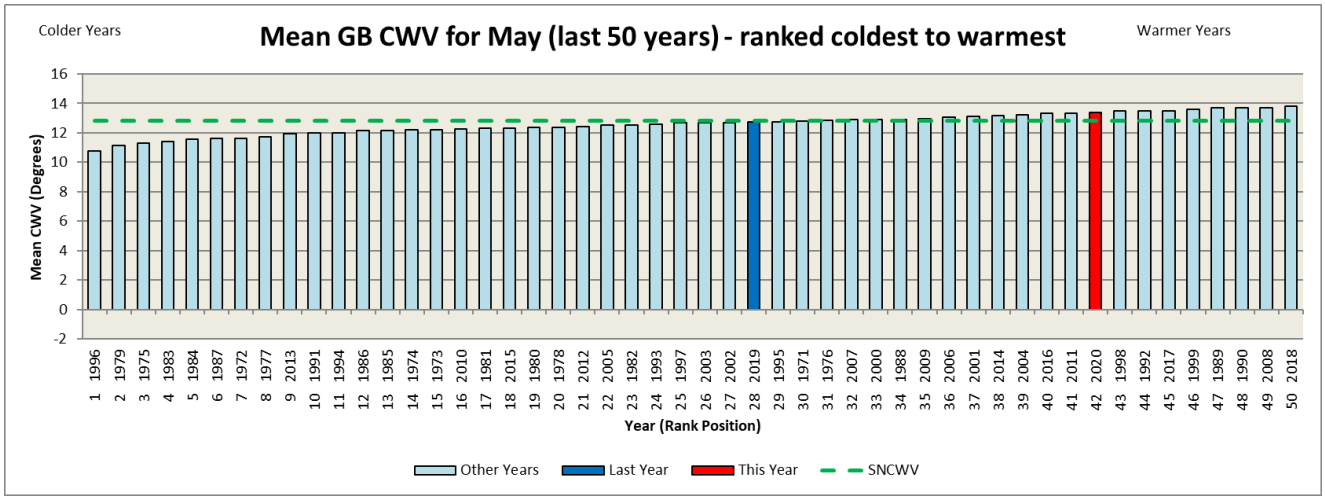



**Figure S12.1.9 – 50 Year GB CWV Ranking - June**

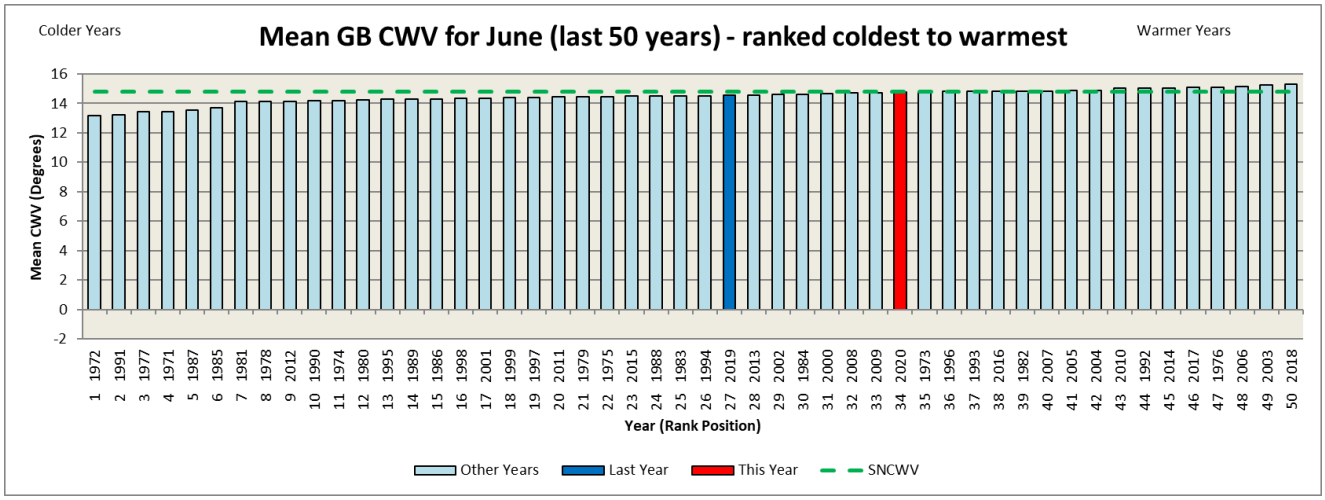


**Figure S12.1.10 – 50 Year GB CWV Ranking - July**

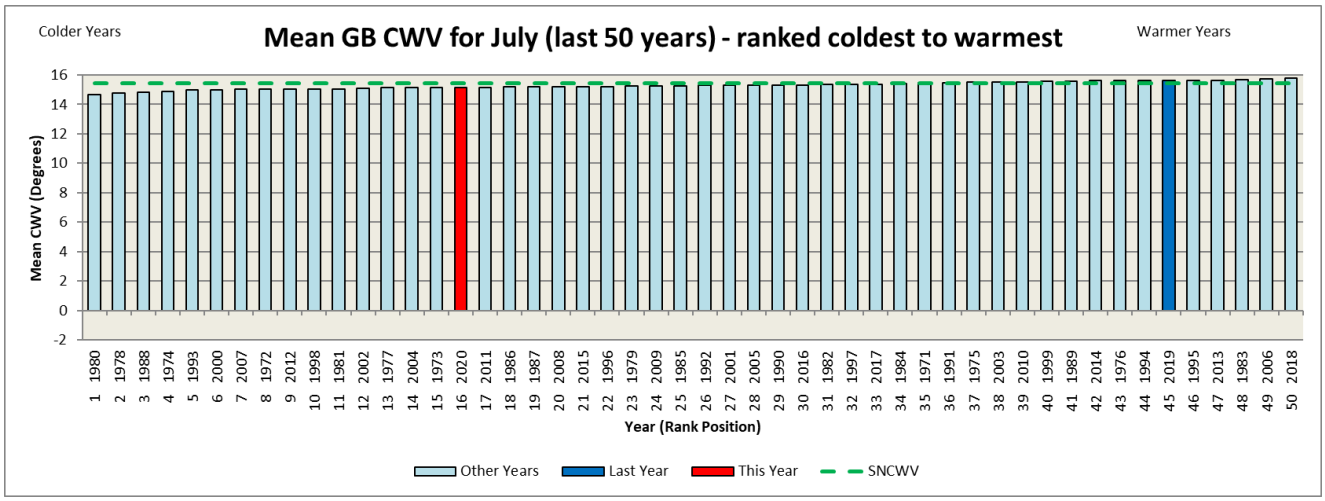



**Figure S12.1.11 – 50 Year GB CWV Ranking - August**

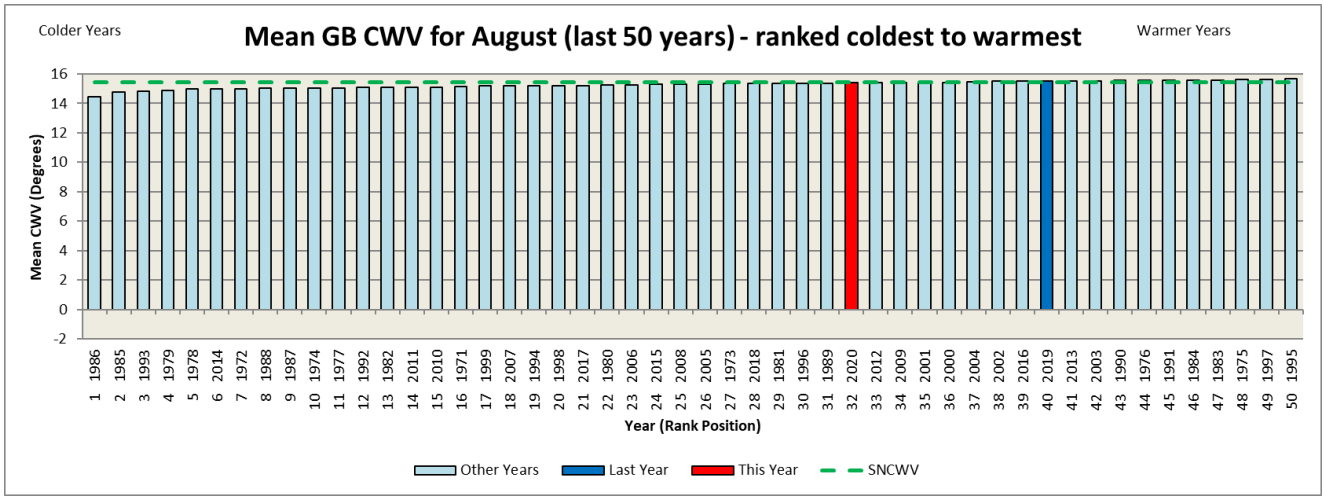



**Figure S12.1.12 – 50 Year GB CWV Ranking - September**

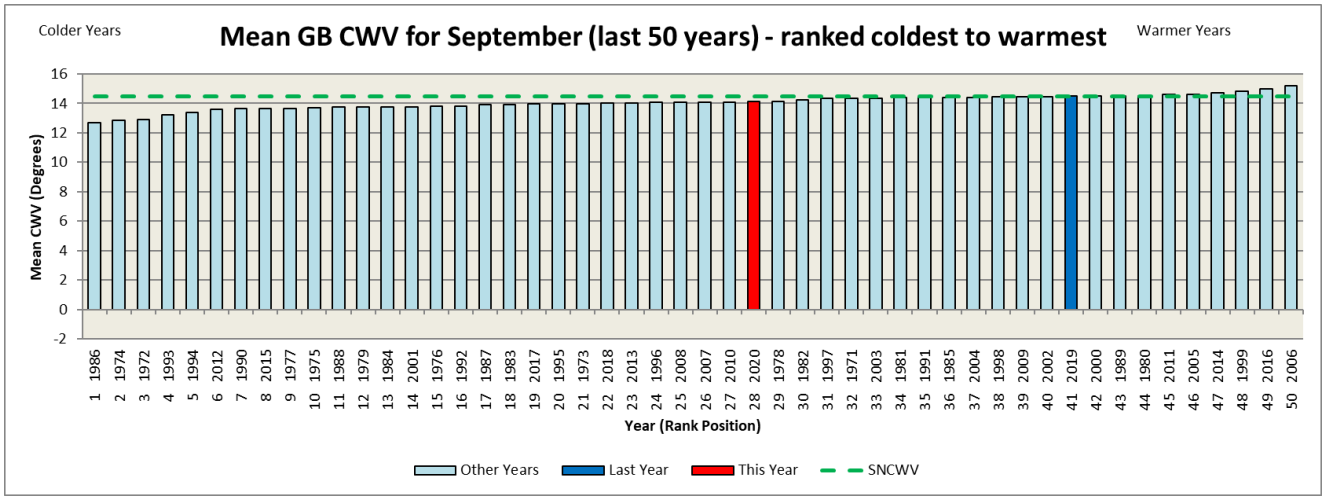


**Figure S12.1.13 – Daily Comparisons of CWV vs SNCWV (GB) – Gas Year 2019/20**

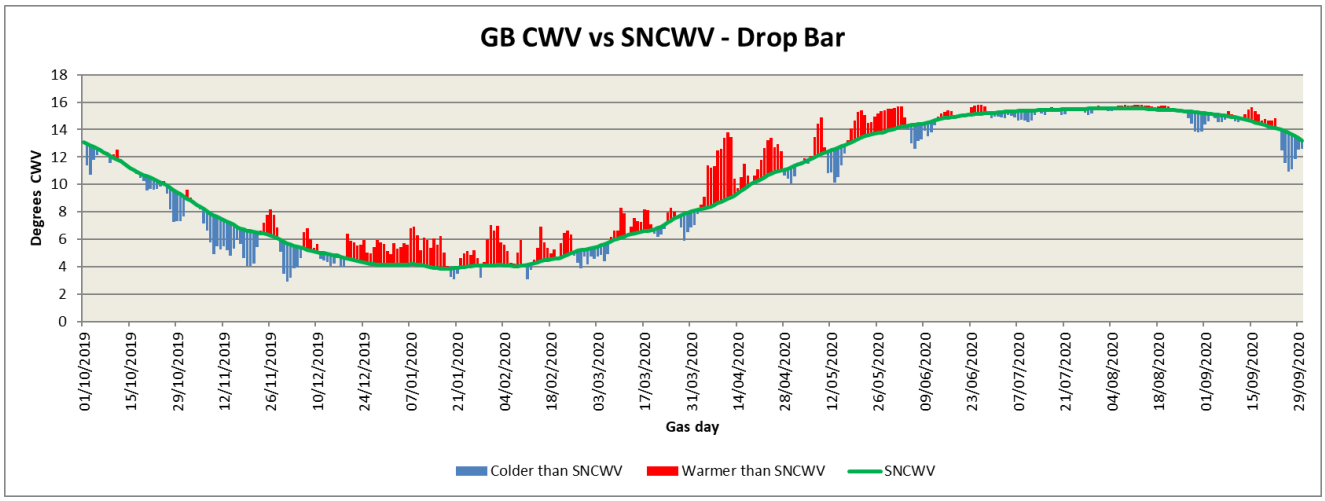



**Figure S12.1.14 – Daily Comparisons of CWV vs SNCWV (LDZ SC) - Full Year**

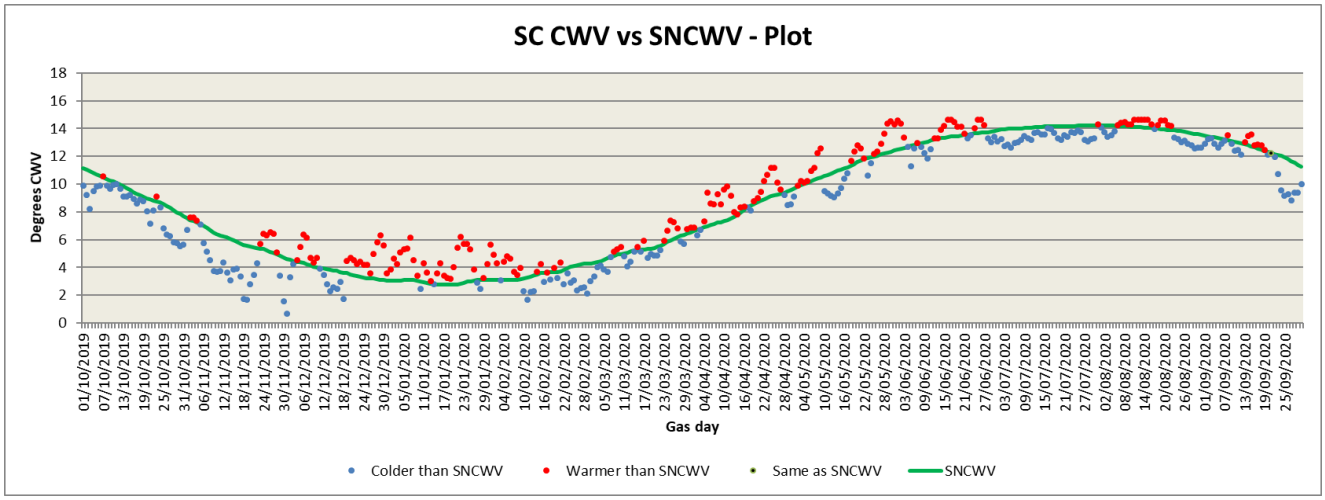



**Figure S12.1.15 – Daily Comparisons of CWV vs SNCWV (LDZ NO) - Full Year**

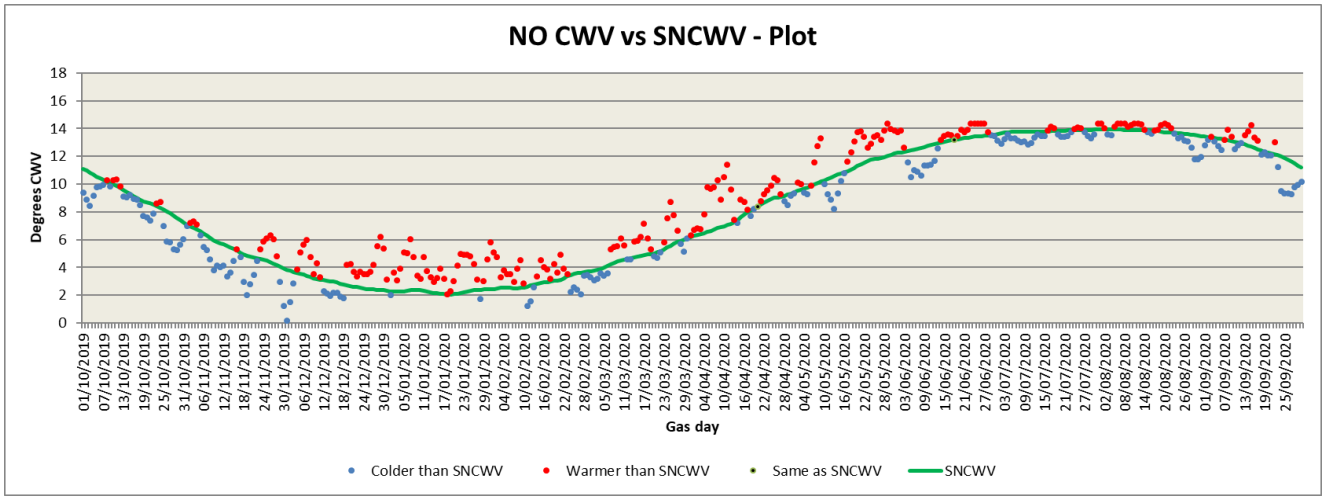


**Figure S12.1.16 – Daily Comparisons of CWV vs SNCWV (LDZs NW and WN) - Full Year**

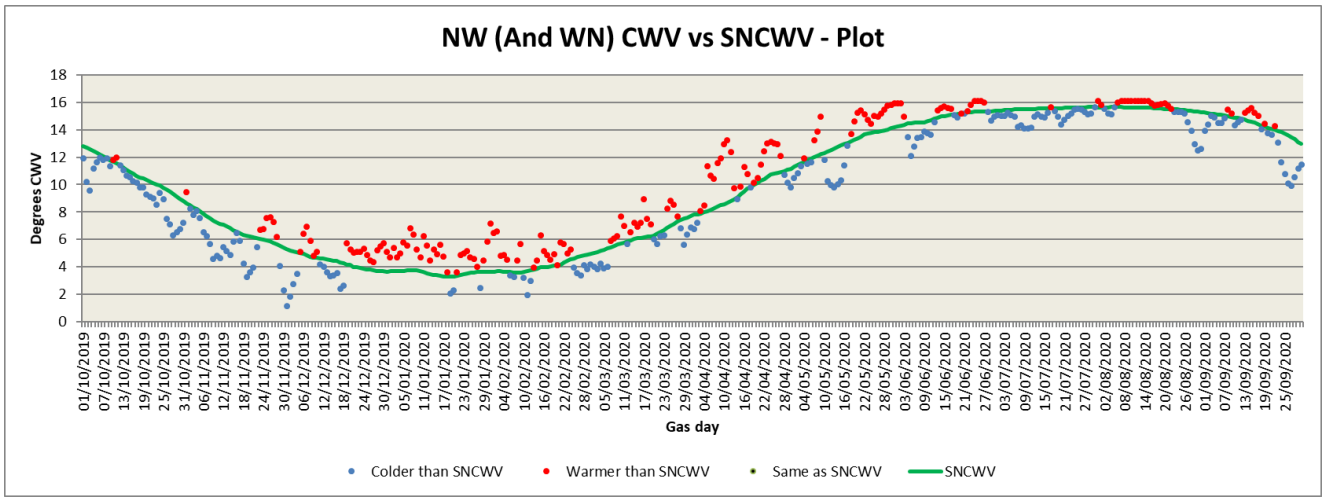



**Figure S12.1.17 – Daily Comparisons of CWV vs SNCWV (LDZ NE) - Full Year**

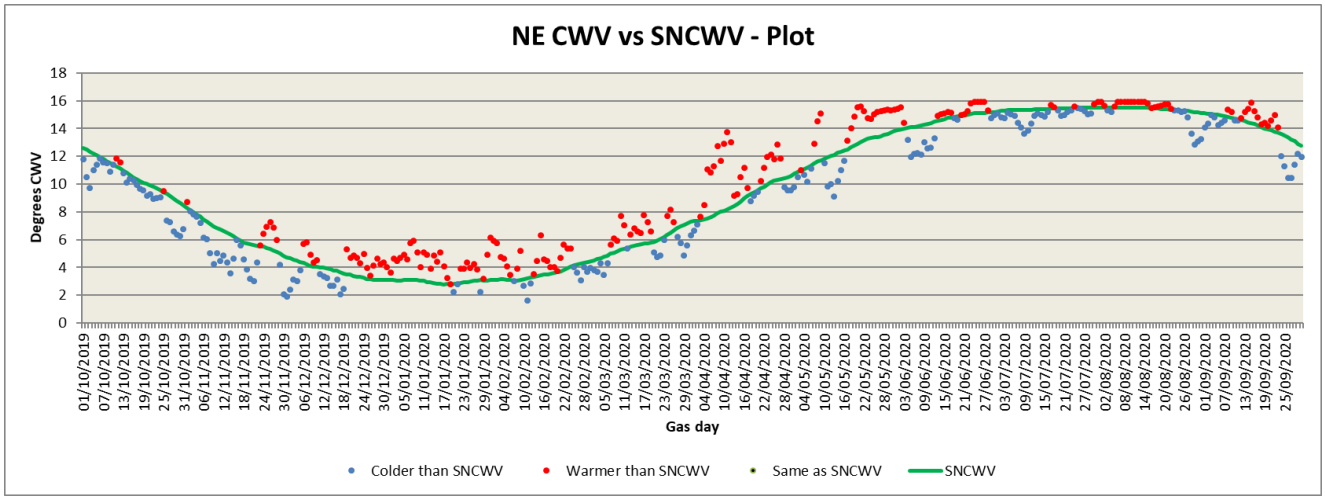



**Figure S12.1.18 – Daily Comparisons of CWV vs SNCWV (LDZ EM) - Full Year**

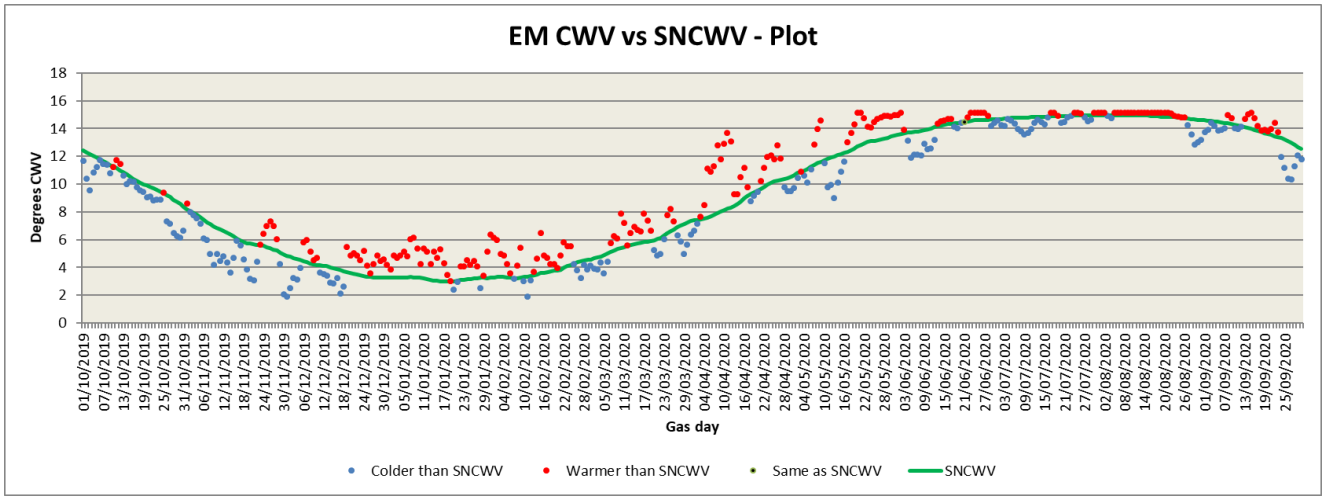


**Figure S12.1.19 – Daily Comparisons of CWV vs SNCWV (LDZ WM) - Full Year**

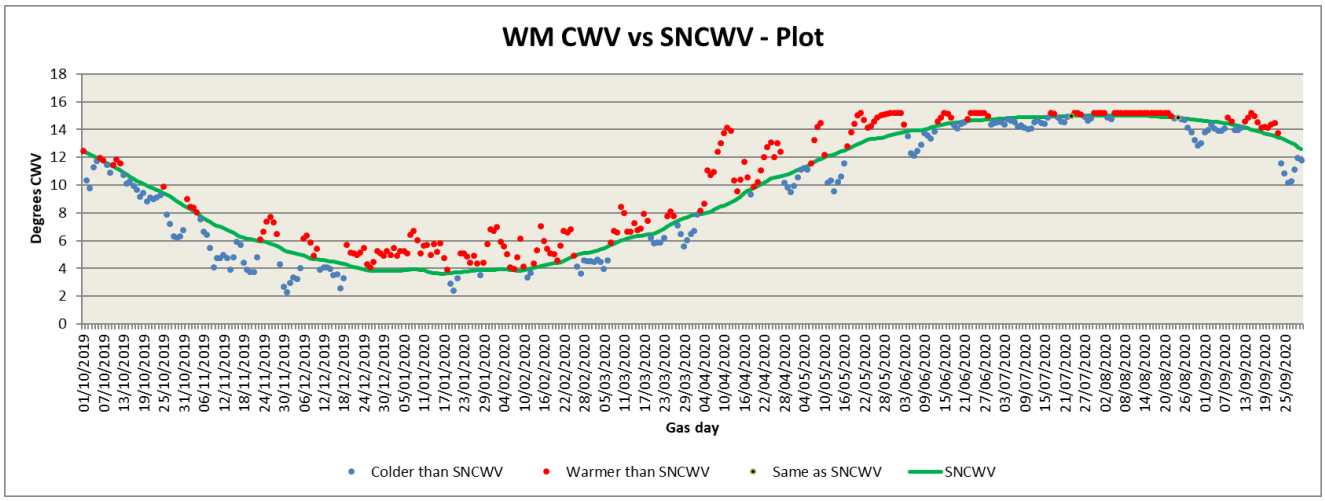



**Figure S12.1.20 – Daily Comparisons of CWV vs SNCWV (LDZ WS) - Full Year**

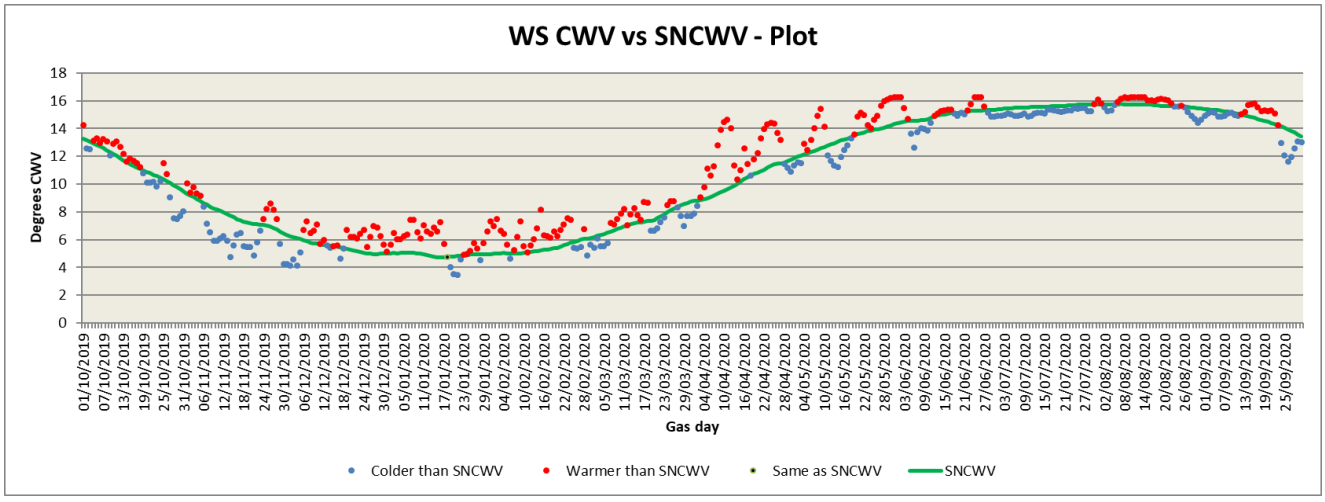



**Figure S12.1.21 – Daily Comparisons of CWV vs SNCWV (LDZ EA) - Full Year**

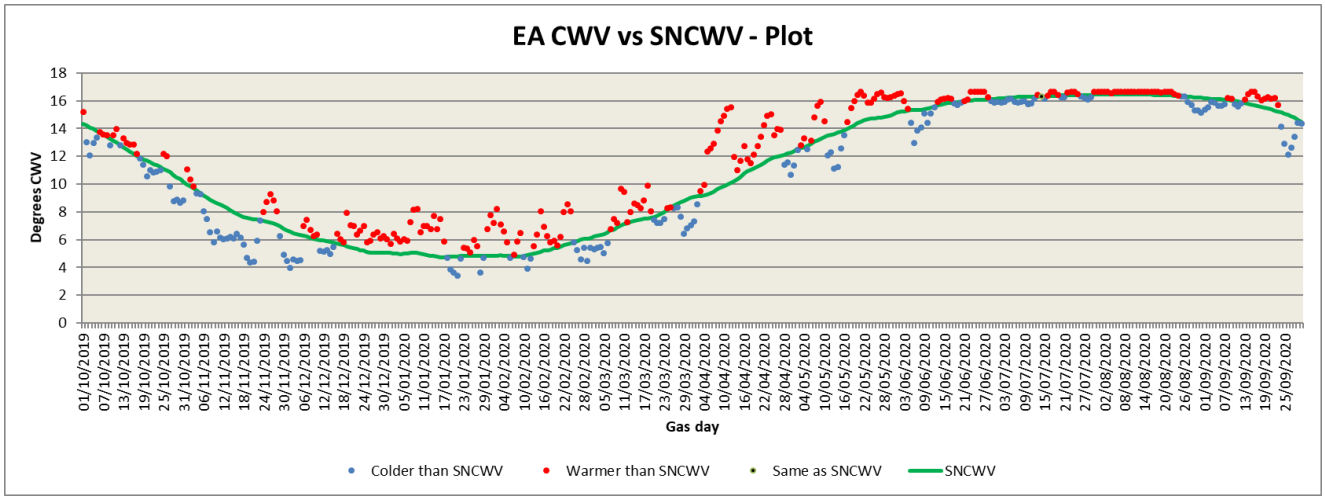


**Figure S12.1.22 – Daily Comparisons of CWV vs SNCWV (LDZ NT) - Full Year**

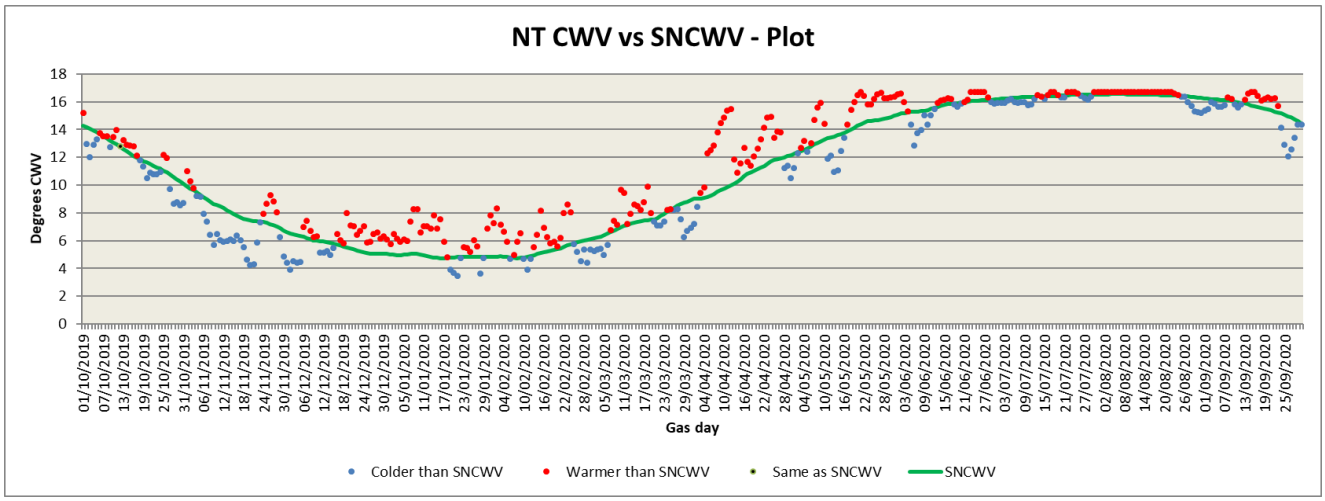



**Figure S12.1.23 – Daily Comparisons of CWV vs SNCWV (LDZ SE) - Full Year**

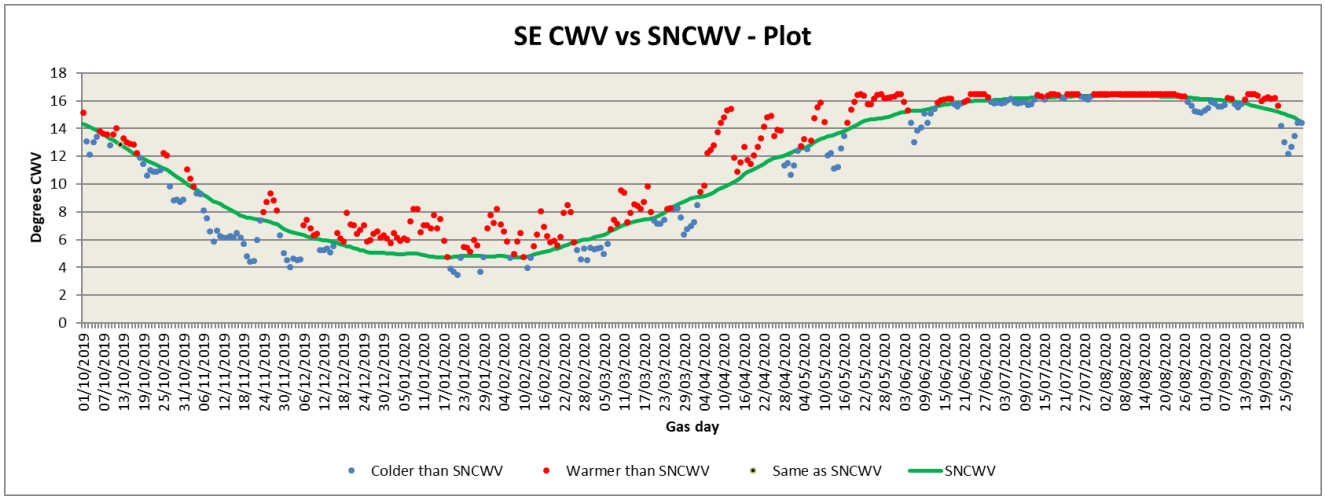



**Figure S12.1.24 – Daily Comparisons of CWV vs SNCWV (LDZ SO) - Full Year**

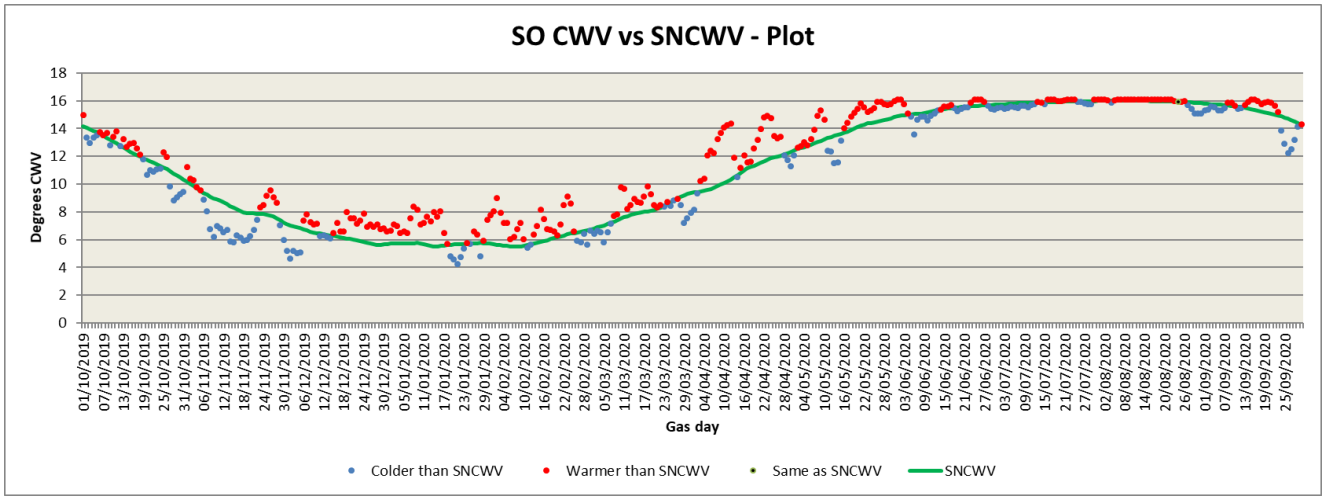


**Figure S12.1.25 – Daily Comparisons of CWV vs SNCWV (LDZ SW) - Full Year**

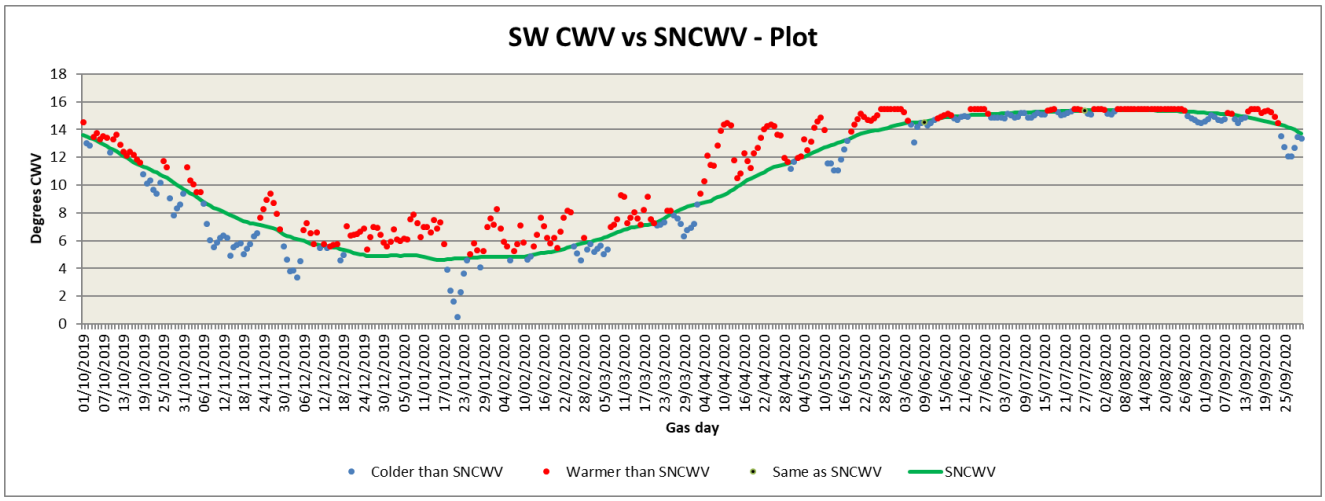



**Figure S12.1.26 – WCF vs Confidence Intervals (LDZ SC) - Full Year**

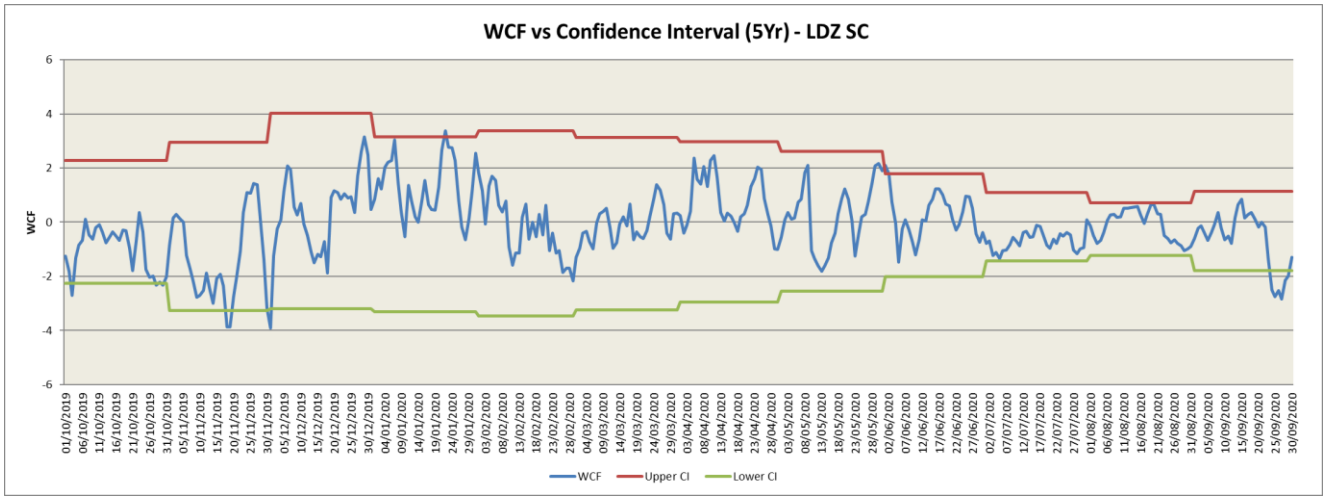



**Figure S12.1.27 – WCF vs Confidence Intervals (LDZ NO) - Full Year**

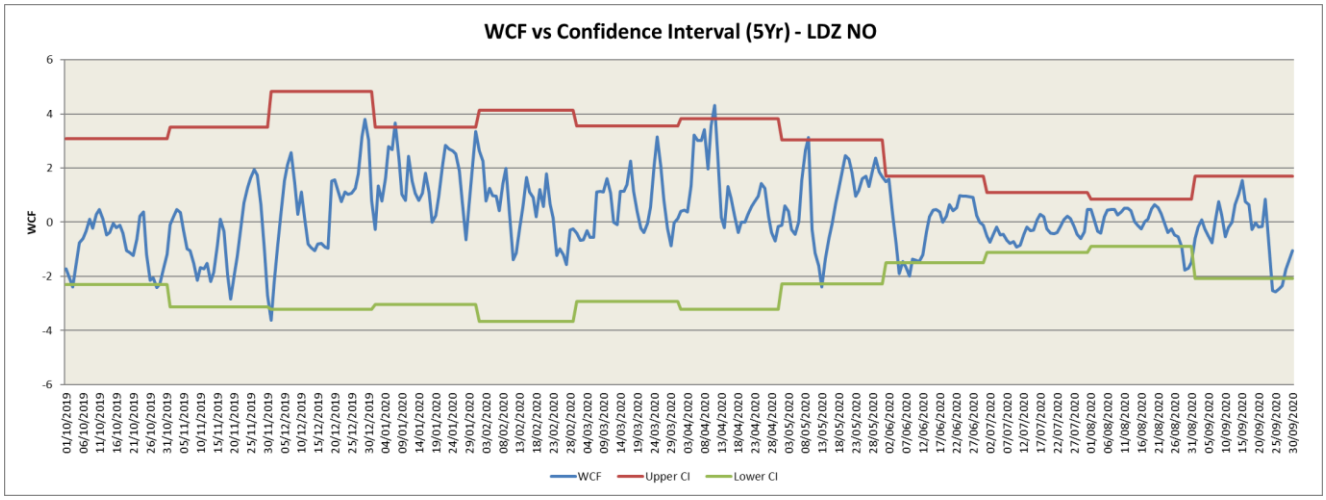


**Figure S12.1.28 – WCF vs Confidence Intervals (LDZs NW and WN) - Full Year**

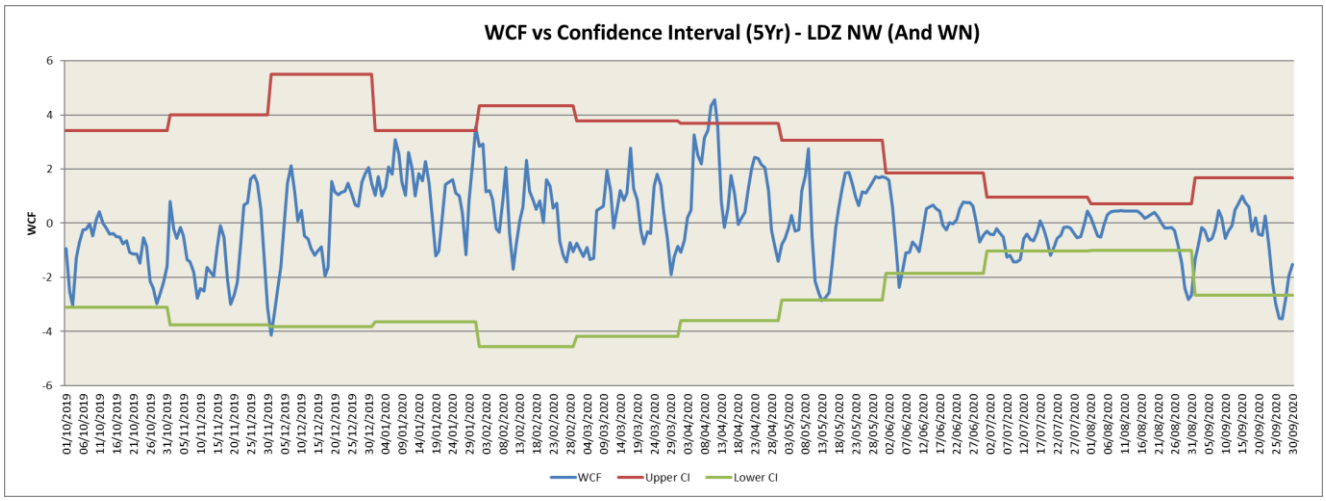



**Figure S12.1.29 – WCF vs Confidence Intervals (LDZ NE) - Full Year**

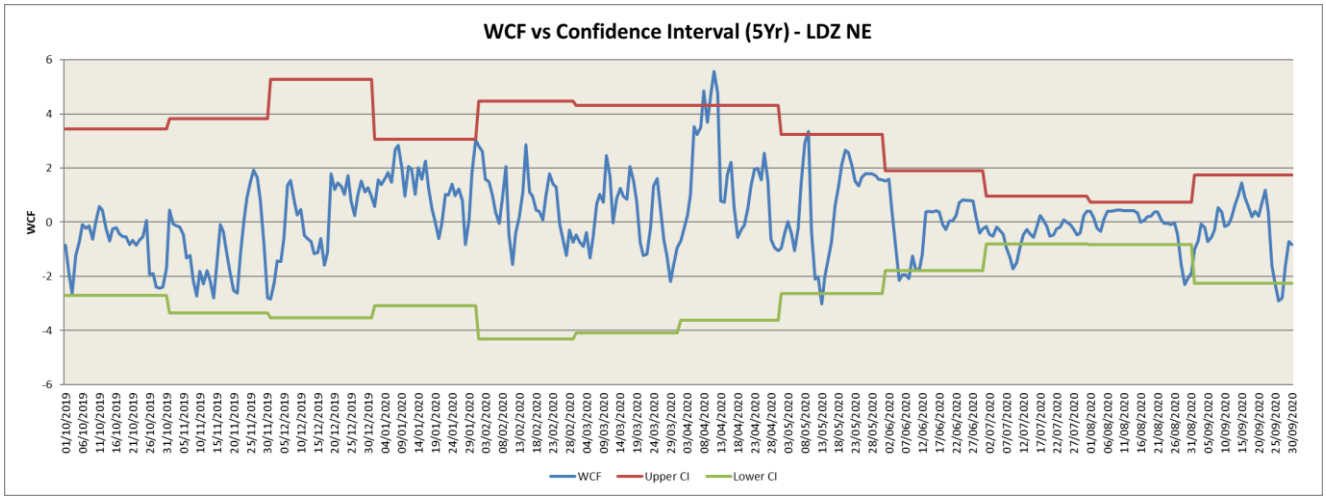



**Figure S12.1.30 – WCF vs Confidence Intervals (LDZ EM) - Full Year**

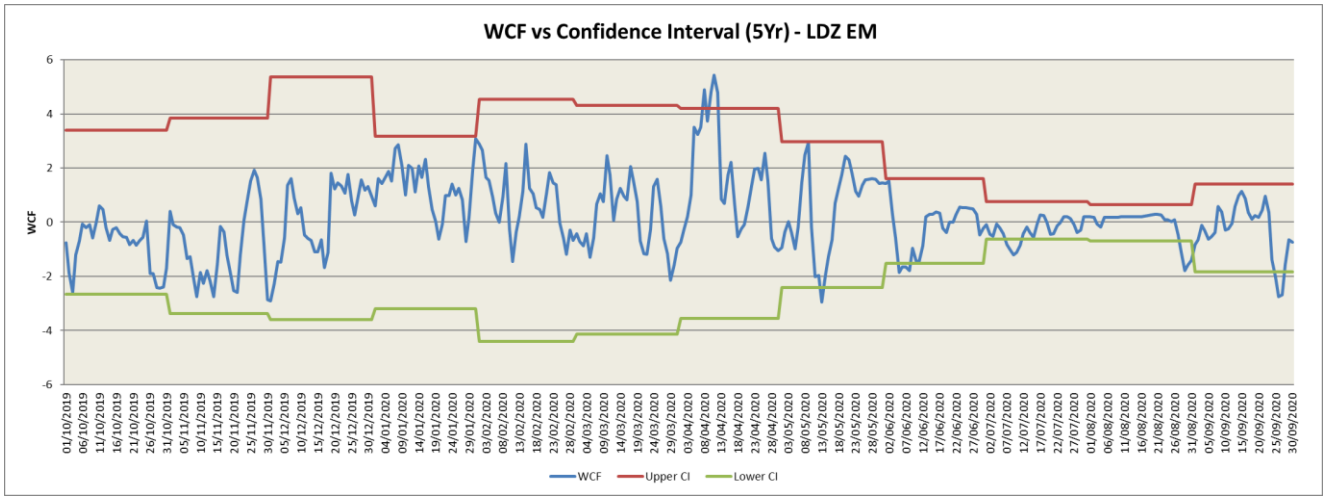


**Figure S12.1.31 – WCF vs Confidence Intervals (LDZ WM) - Full Year**

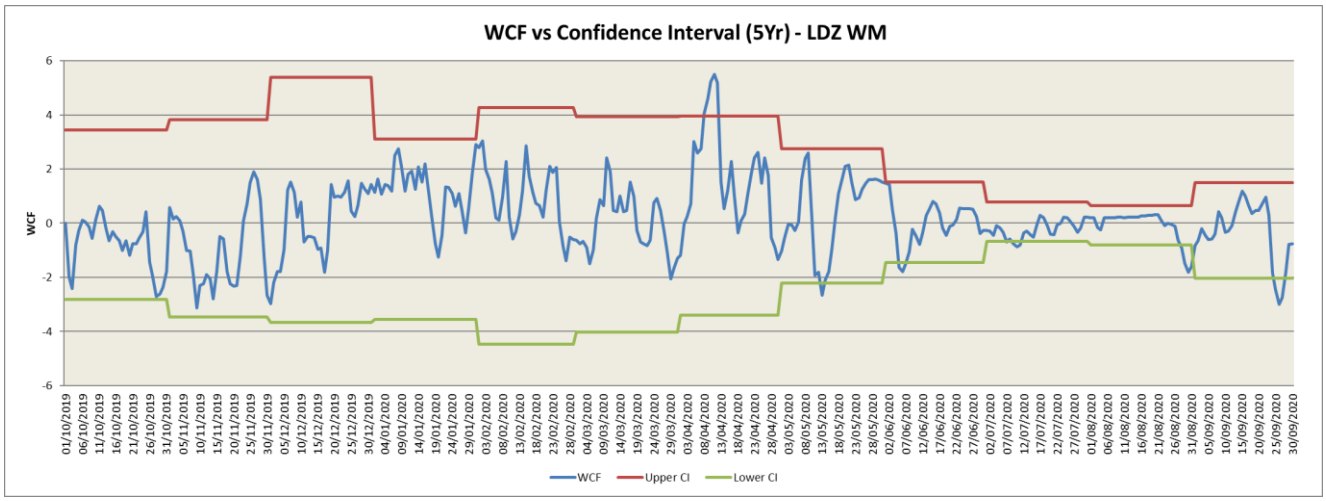



**Figure S12.1.32 – WCF vs Confidence Intervals (LDZ WS) - Full Year**

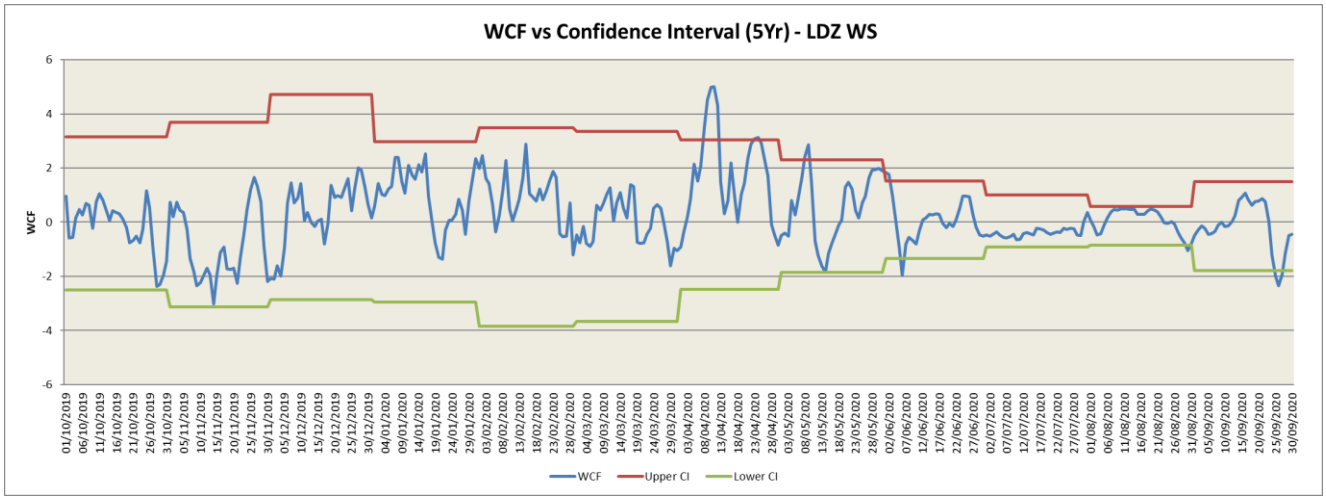



**Figure S12.1.33 – WCF vs Confidence Intervals (LDZ EA) - Full Year**

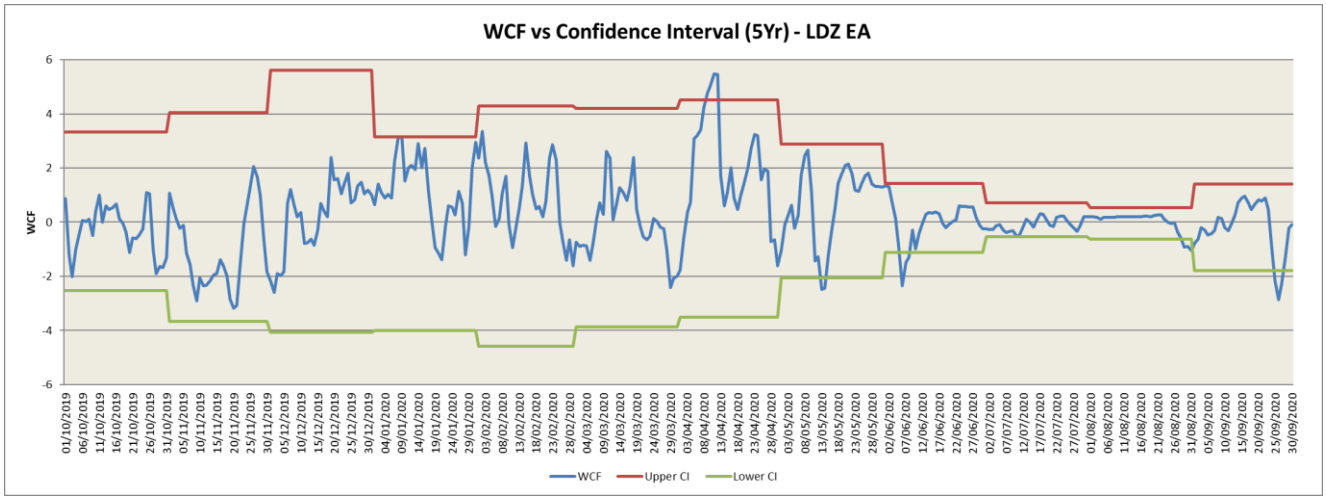


**Figure S12.1.34 – WCF vs Confidence Intervals (LDZ NT) - Full Year**

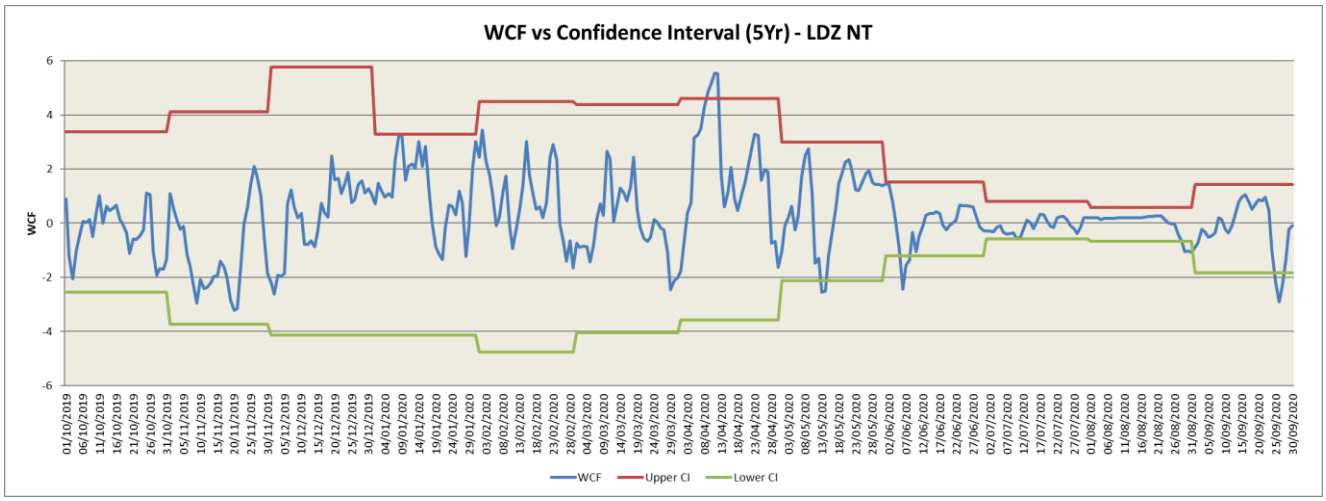



**Figure S12.1.35 – WCF vs Confidence Intervals (LDZ SE) - Full Year**

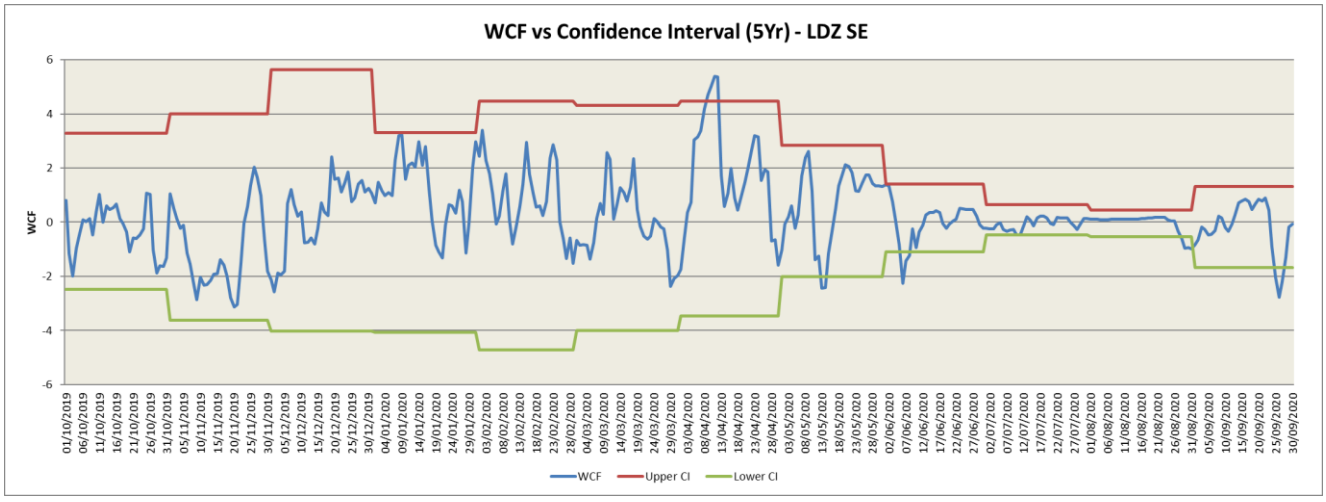
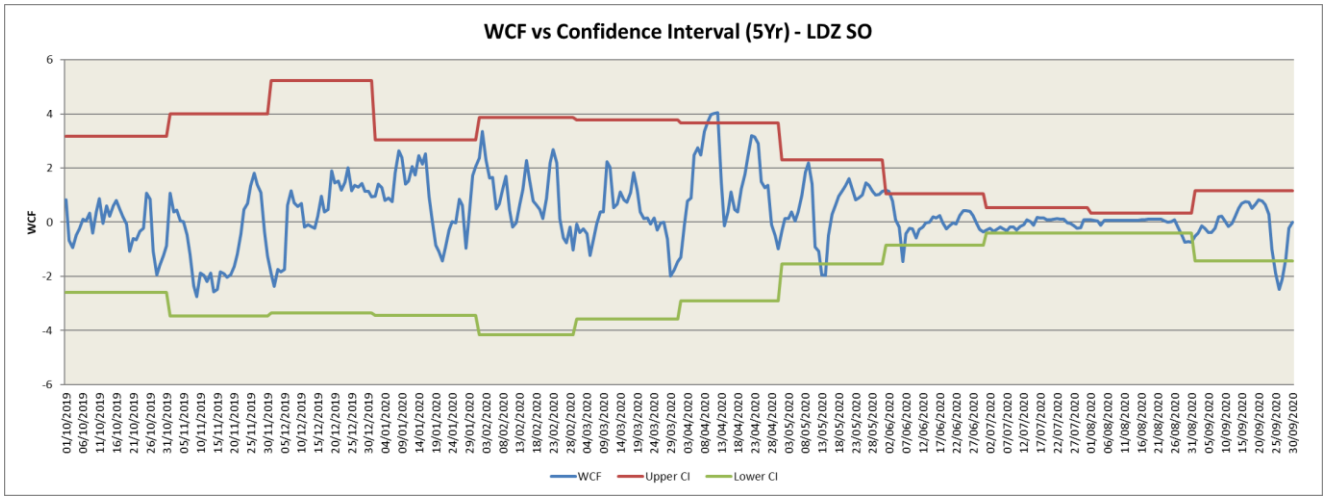
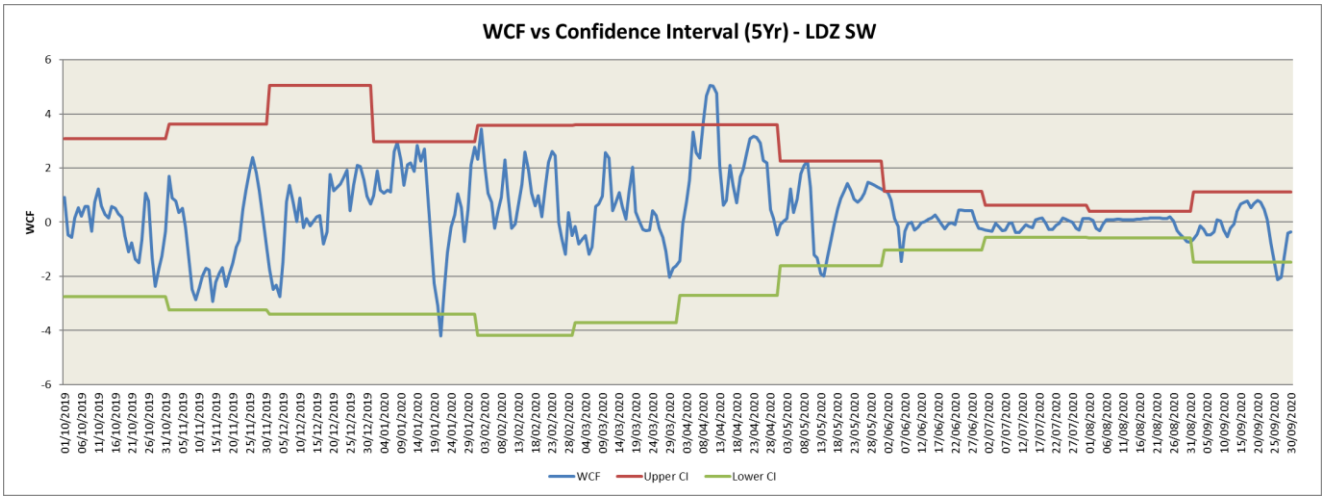



**Figure S12.1.36 – WCF vs Confidence Intervals (LDZ SO) - Full Year**



## Figure S12.1.37 – WCF vs Confidence Intervals (LDZ SW) - Full Year




## Figure S12.1.38 – Percentage of WCF Values within Confidence Intervals for each LDZ/Month

| Month | SC | NO | NW / WN | NE | EM | WM | WS | EA | NT | SE | SO | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct'19 | 90% | 94% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Nov'19 | 93% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Dec'19 | 97% | 97% | 97% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Jan'20 | 97% | 97% | 97% | 100% | 100% | 100% | 100% | 97% | 100% | 100% | 100% | 97% |
| Feb'20 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Mar'20 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Apr'20 | 100% | 97% | 93% | 87% | 87% | 83% | 77% | 87% | 87% | 87% | 87% | 83% |
| May'20 | 100% | 94% | 97% | 94% | 97% | 97% | 90% | 94% | 94% | 94% | 94% | 94% |
| Jun'20 | 97% | 90% | 97% | 87% | 87% | 90% | 90% | 90% | 90% | 90% | 90% | 93% |
| Jul'20 | 100% | 100% | 81% | 84% | 84% | 87% | 100% | 100% | 100% | 97% | 100% | 100% |
| Aug'20 | 100% | 87% | 87% | 87% | 87% | 87% | 97% | 90% | 90% | 87% | 87% | 90% |
| Sep'20 | 80% | 87% | 87% | 93% | 90% | 90% | 90% | 90% | 90% | 90% | 90% | 90% |

Key: < 95%

## 4. STRAND 2: UNIDENTIFIED GAS ANALYSIS

The concept of Unidentified Gas (UIG) was introduced on 1st June 2017 under Project Nexus, which introduced a revised NDM allocation formula bought about by UNC Modification 0432. Unidentified Gas forms part of daily gas allocation and is calculated as the balancing figure to ensure that within in each LDZ, total input matches total output. UIG is derived as follows:

Total LDZ Energy – (Shrinkage + DM Energy + Total LDZ NDM Energy) = UIG

It is worth noting that UIG can be a positive or negative value. UIG volatility may occur for a variety of reasons including imperfections in the NDM Algorithms themselves, but also errors in aggregate NDM AQs and in measured LDZ and DM consumption. If these factors are not material, a positive UIG value could indicate a tendency for the NDM algorithms to under allocate, whereas a negative UIG value could indicate the algorithm over allocates.

It is important to note that in the summer of 2018, in order to directly impact the overall levels and volatility of Unidentified Gas (UIG), DESC approved the application of 'Uplift' factors to the Annual Load Profiles (ALPs) and Daily Adjustment Factors (DAFs) for Gas Year 2018/19. Following analysis on the effects of the uplift factors to resultant UIG levels, DESC made the decision to discontinue the use of the Annual Load Profile (ALP) 'Uplift' Factors during Gas Year 2019/20, opting only to apply 'Uplift' Factors to the Daily Adjustment Factors (DAF).

The analysis in this document reflects the actual observed values of UIG which has been influenced by Daily Adjustment Factor (DAF) 'Uplift' factors. Simulation analysis of alternative UIG values in the event that the uplift factors had not been applied was presented at DESC on 7th December 2020.

The following analysis is based on Gas Year 2019/20. The data was analysed by seasons which are defined as:

- Autumn: October 2019 to December 2019
- Winter: January 2020 to March 2020
- Spring: April 2020 to June 2020
- Summer: July 2020 to September 2020

A selection of bar charts and distribution graphs are presented below:

Figures S12.2.1 to S12.2.4 show the monthly average percentage (displayed by season) of Unidentified Gas for each LDZ observed during Gas Year 2019/20. Figure S12.2.5 is a line graph showing the national daily UIG % values (at D+5) from 1st October 2019 to 30th September 2020. Figures S12.2.6 to S12.2.9 show the national distribution of UIG % values by seasons.

During the analysis period of 1st October 2019 to 30th September 2020, the average UIG percentage levels by month and LDZ have shown a bias towards positive values and have ranged from -34.65% (in SW LDZ during May'20) to +22.33% (in EA LDZ during September'20). When considering the percentage UIG ranges for the seasons, Autumn (Oct '19 to Dec '19) ranged from -11.38% to +20.74%, with 95% of UIG values between -4% and +12%. Winter (Jan '20 to Mar '20) ranged from -17.48% to +18.66%, with 95% of values between -5% and +13%. Spring (Apr '20 to Jun '20) ranged from -34.65% to +21.10%, with 95% of values between -21% and +15%. Summer (Jul '20 to Sep '20) ranged from -23.03% to +22.33%, with 95% of values between -10% and +16%.

Unidentified Gas levels during Gas Year 2019/20 have been heavily perturbed by the influence of the COVID-19 related National Lockdowns, especially during both the Spring and Summer months. National lockdown days referred to throughout the following charts relate to the days in which the nation was under its 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.

Performance analysis of the NDM supply meter point demand formula is specifically assessed under Strand 3 'NDM Daily Demand Analysis'.

**Figure S12.2.1 – Monthly average UIG% (at D+5) Autumn**

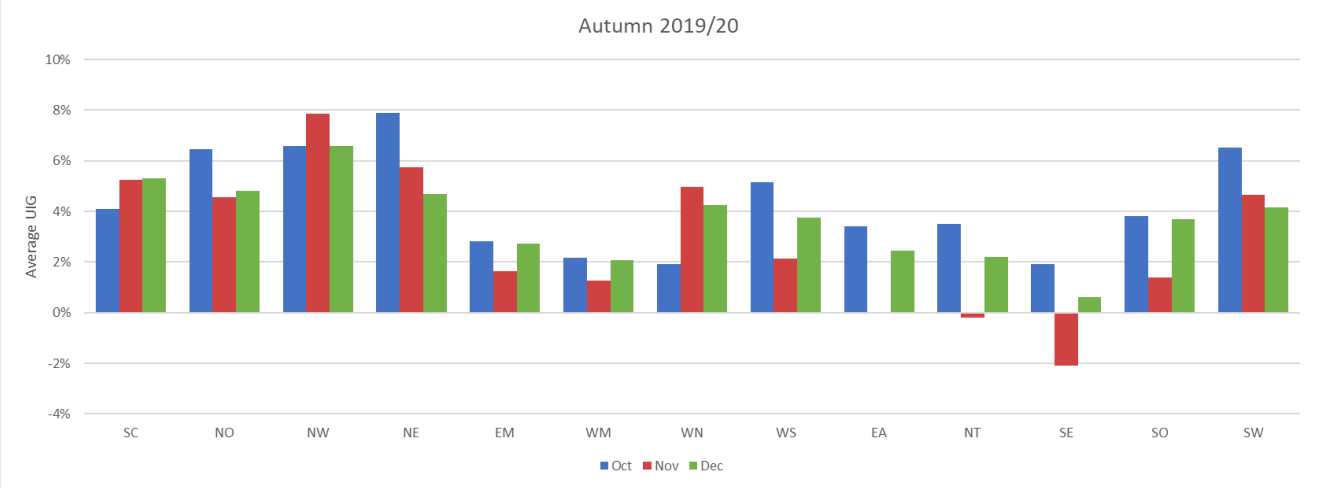



**Figure S12.2.2 – Monthly average UIG% (at D+5) Winter**

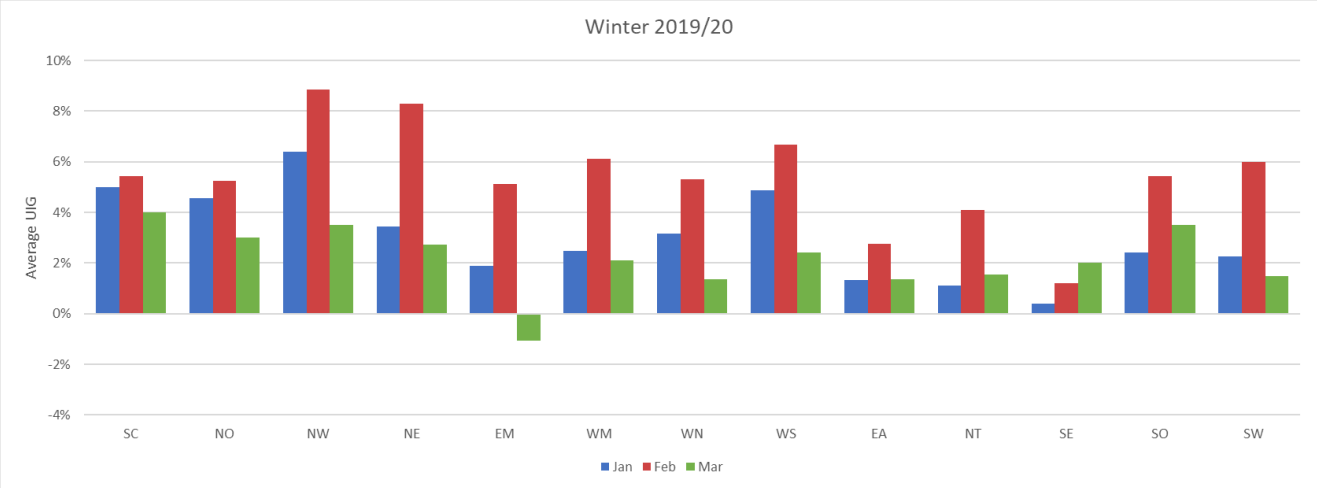



**Figure S12.2.3 – Monthly average UIG% (at D+5) Spring**

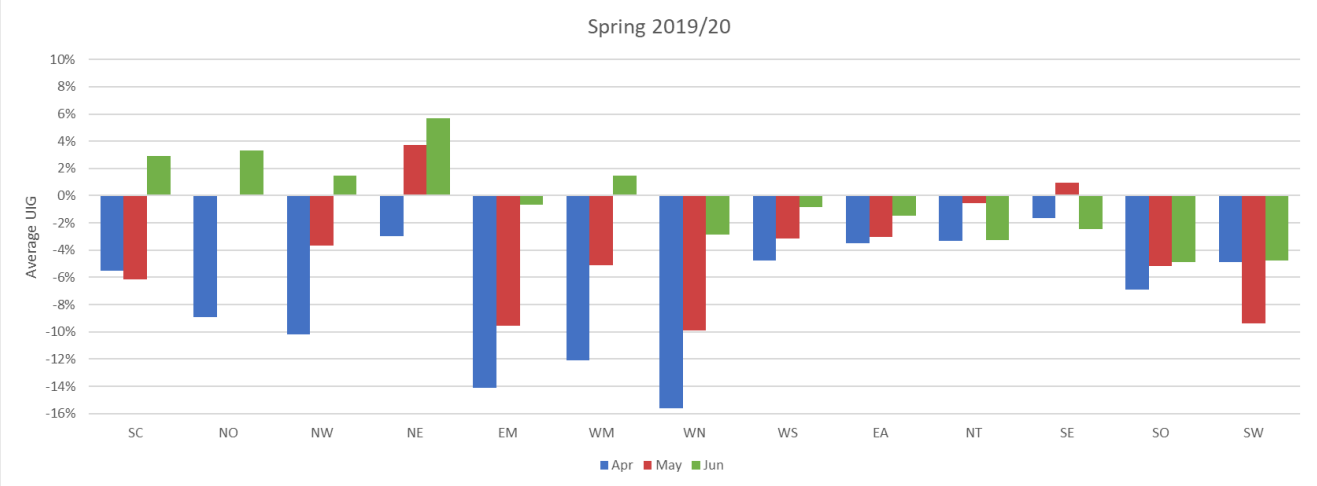


**Figure S12.2.4 – Monthly average UIG (at D+5) Summer**

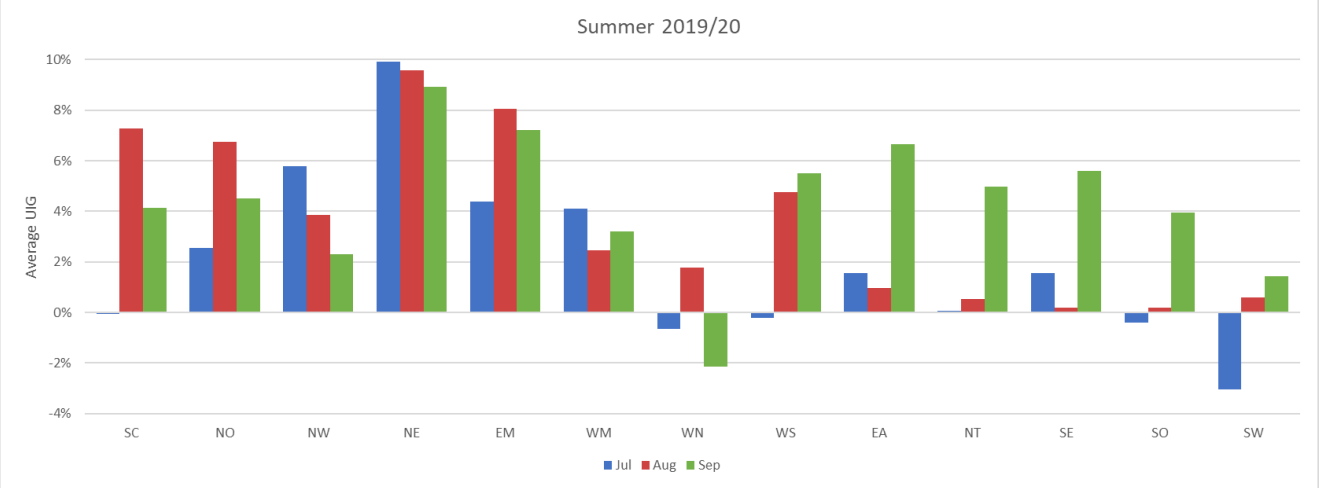



**Figure S12.2.5 – National Daily UIG% values (D+5)**

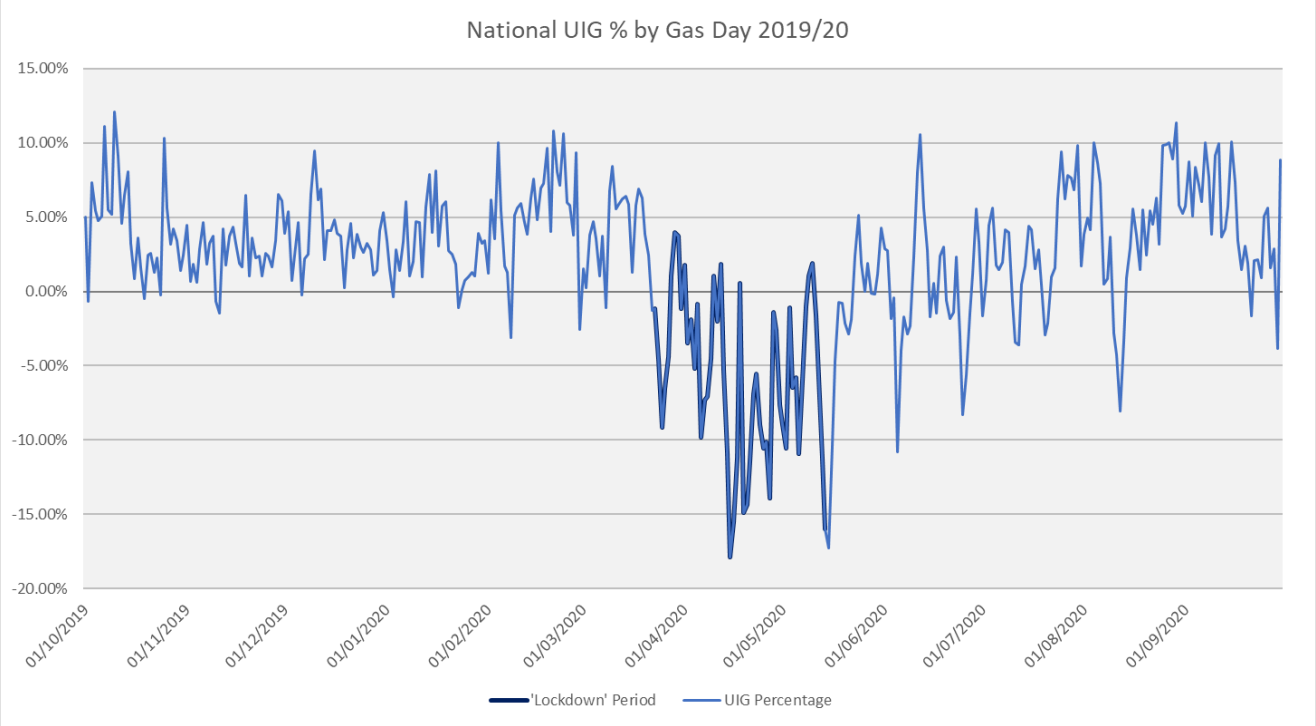


**Figure S12.2.6 – Distribution of UIG % values by Season – Autumn**

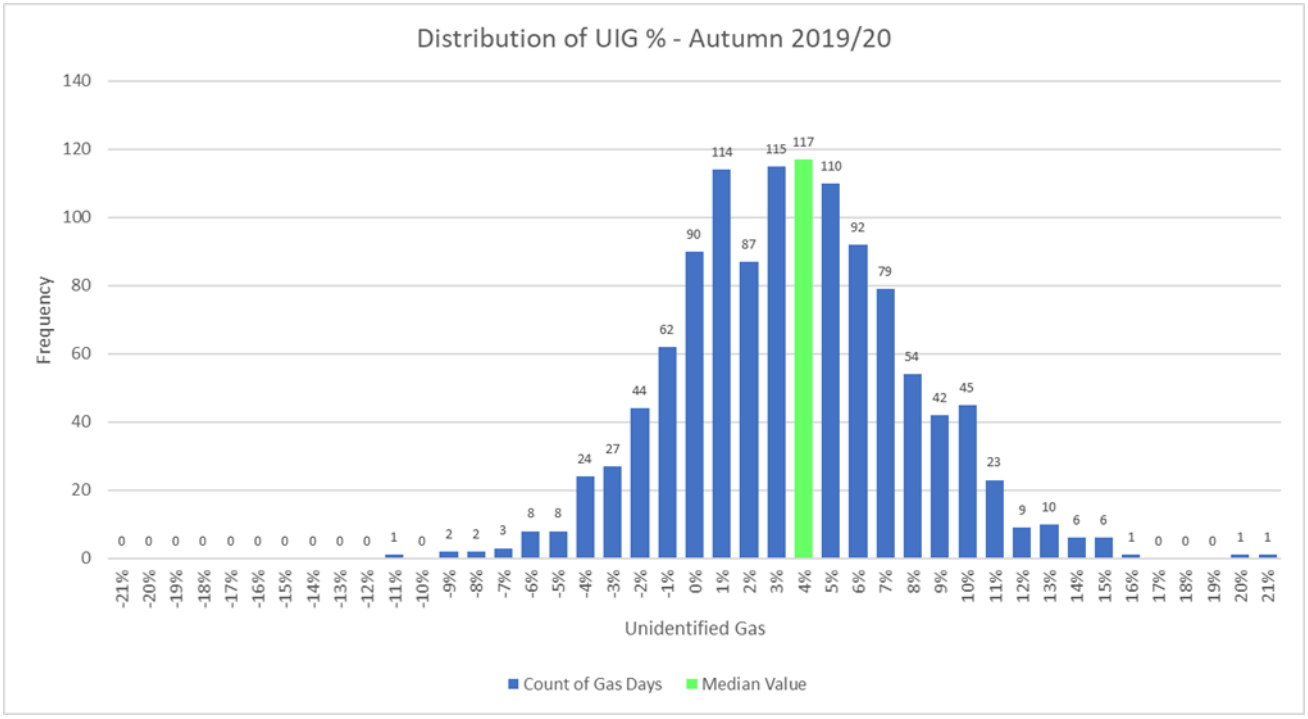



**Figure S12.2.7 – Distribution of UIG % values by Season – Winter**

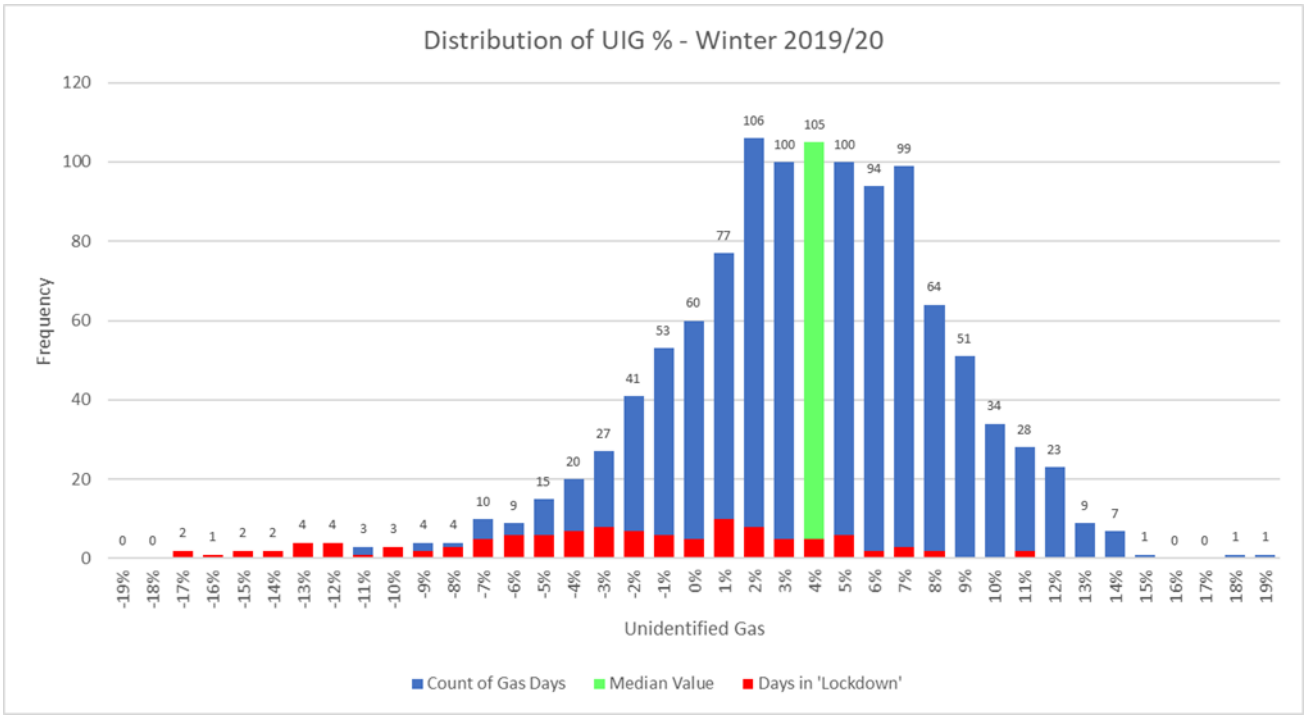


**Figure S12.2.8 – Distribution of UIG % values by Season - Spring**

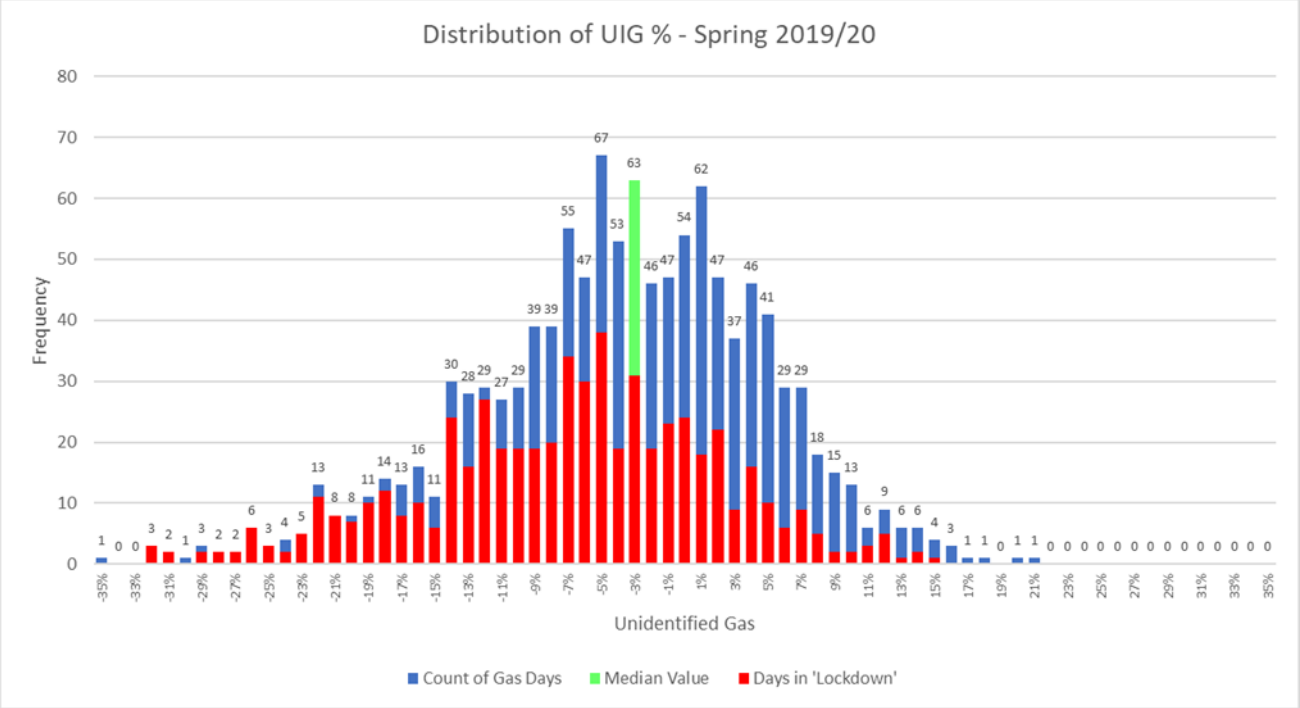
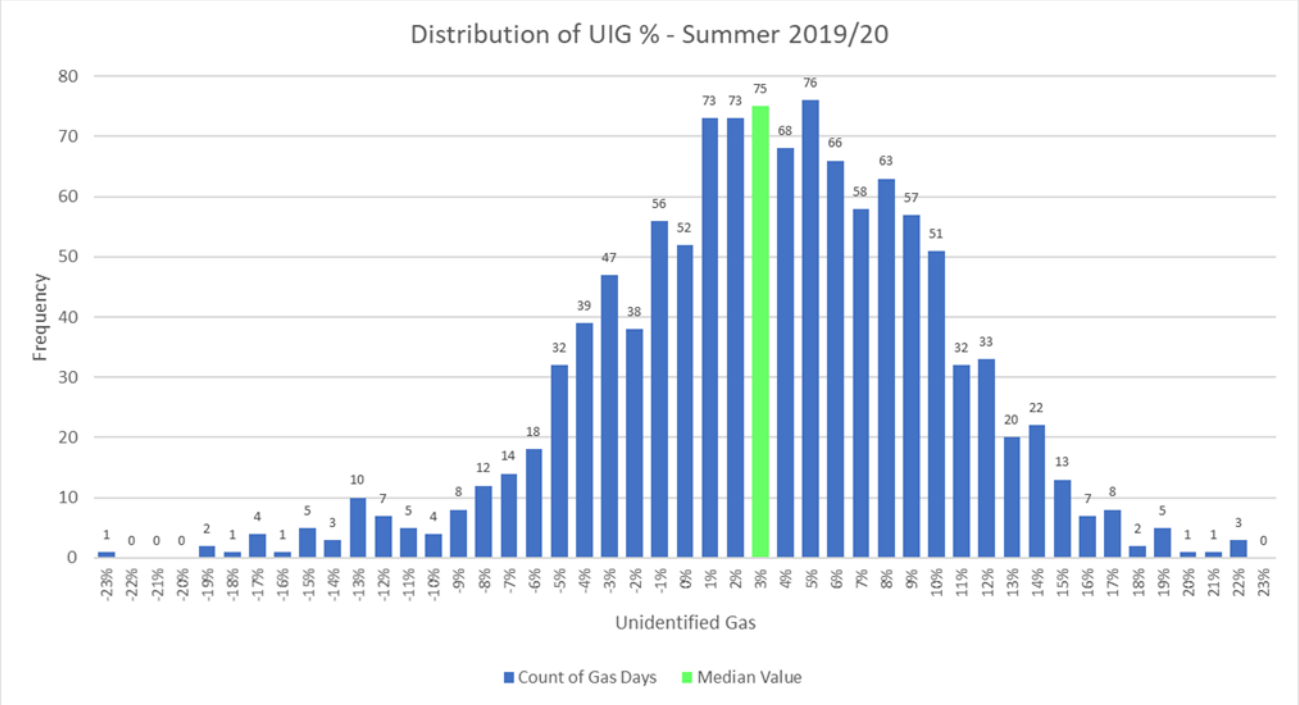



**Figure S12.2.9 – Distribution of UIG % values by Season – Summer**



## 5. STRAND 3: NDM DAILY DEMAND ANALYSIS

The performance of the NDM Supply Meter Point Demand Formula has been evaluated by comparing actual daily demands for supply points in the NDM sample with estimates of their daily demands (as per the NDM demand formula) across the range of EUCs (consumption bands only). This evaluation covers the period of the gas year 2019/20.

It is important to note that in the summer of 2019, in order to directly impact the overall levels and volatility of Unidentified Gas (UIG), DESC approved the application of 'Uplift' factors to the 'DAF' approved demand factors for Gas Year 2019/20.

The table below shows the relevant DAF uplift factors which applied to each LDZ for Gas Year 2019/20.

| LDZ | DAF Uplifts (applied to all EUC bands) |
|---|---|
| | Full gas year |
| EA | 1.04 |
| EM | 1.06 |
| NE | 1.09 |
| NO | 1.09 |
| NT | 1.04 |
| NW | 1.00 |
| SC | 1.09 |
| SE | 1.07 |
| SO | 1.07 |
| SW | 1.08 |
| WM | 1.02 |
| WN | 1.00 |
| WS | 1.05 |

The performance of the algorithms has been evaluated on two bases:

i) MODEL – allocated using 2019/20 ALPs, DAFs (including 'Uplift' factors), WCFs and NDM sample derived AQs

ii) RETRO – allocated using 2020/21 ALPs, DAFs (adjusted to apply to pattern of days/holidays in 2019/20), WCFs (using new CWV and SNCWVs) and NDM sample derived AQs

The 'Model' analysis is based on the algorithms that applied to the Gas Year being analysed (i.e. 2019/20) including the 'Uplift' factors.

The 'Retro' analysis is based on the algorithms derived for the current Gas Year (i.e. 2020/21) but retro fitted with appropriate adjustment for the pattern of days of the week and holidays for Gas Year 2019/20. This analysis is helpful in assessing the performance of the most current algorithms and new weather definitions had they applied to the Gas Year being analysed.

The AQs used in all the analysis bases are based on the consumption data of the sample itself rather than system AQs, which removes bias which might be introduced as a result of any erroneous AQs.

Analysis is performed on supply meter points which comprise the Demand Estimation Sample, where actual daily consumption values are known for days within the Gas Year being analysed. Daily NDM consumption data for Gas Year 2019/20 was available from three sources, namely 'Xoserve managed', 'Network managed' (both of which are long established datasets) and 'Third Party provided' which has been provided by shippers under the UNC obligations introduced as part of UNC Modification 0654S. Only supply meter points that are NDM and have passed data validation can be used. Figure S12.3.1 shows the number of validated supply meter points, by LDZ and EUC band, which have been used in this NDM Daily Demand Analysis.

It is worth noting at the outset that some EUC & LDZ combinations contain either no sample data and therefore no analysis is possible or very few validated sample points, which can skew the results significantly. The table shows a border around two EUC bands, 01BPD and 09B. Analysis highlighted a

day of the week discrepancy for the 01BPD datasets. Additionally, results for band 09 are unreliable and are disregarded in this assessment, as this band is represented by a very small number of supply meter points distributed in only some of the 13 LDZs. Analysis has been performed on consumption band EUCs only, as generally the number of validated supply meter points available are not sufficient to perform analysis on WAR (Winter Annual Ratio) band EUCs.

## STRAND 3: IMPACTS OF COVID-19 PANDEMIC

In performing this analysis, the impact of the ongoing COVID-19 pandemic has been observed in the results. The analysis shows the impacts started towards the end of March 2020 with the national and then localised lockdowns. For the purpose of this analysis, several key date ranges have been noted:

- 1st October 2019 – 22nd March 2020 – before National lockdown
- 23rd March 2020 – 14th May 2020 – noticeable change in demand levels during National Lockdown
- 15th May - 30th September 2020 – Impacted demand levels due to more localised restrictions

The level of the impact varies by EUC (and at a lower level by LDZ). Figures S12.3.2 to S12.3.5 have been prepared to show the trends for selected LDZs in the EUC bands 01BND, 01BNI, 03B and 05B. The demand has been grouped to distinguish the demand levels based on the key date ranges above. Figure S12.3.2 shows there is little visible impact when considering the domestic profile. Figures S12.3.3 to S12.3.5 show the impact on larger, industrial and / or commercial premises, which in all the examples show the impact, with a significant drop in demand in the 'during' and 'post' lockdown ranges.

This has made the interpretation of the results of this analysis more difficult as the materially different April to September demands have highlighted some limitations in the analysis. The calculation of Sample AQ from consumption minimises any errors from AQ. However, a consequence of the different demands has an impact on the sample AQ and its application when calculating the allocated demand.

Figure S12.3.6 shows the Sample AQ for 01BND vs UK Link AQ. The sample AQ is higher than the UK Link AQ for most of the analysis period. When calculating an allocation, this trend could lead to a higher resultant figure that when compared to actual demand inflates any positive daily differences.

Figure S12.3.7 shows the equivalent comparison for EUC 01BNI. The trend observed is that the UK Link AQs trace higher than the calculated Sample AQ. The impact of this trend could be that there is an inherent under allocation, particularly in the first half of the year, when compared to the actual energy, leading to higher negative daily differences.

## STRAND 3: ANALYSIS OF ACTUAL VS MODEL AND RETRO

Figures S12.3.8 to S12.3.17 are graphs showing actual demand and allocated demand on the 'Model' and 'Retro' bases for each consumption band across the whole year. In general, the allocated demand on the two bases tracked the actual demand for each consumption band on most days. For band 01, the most notable exceptions were periods of under allocation during December 2019 February with a period of over allocation in April 2020 which was the 3rd warmest April in the last 50 years.

Mean Absolute Percentage Error (MAPE) is a measure of prediction accuracy of a forecasting method. MAPE analysis has been performed for each EUC consumption band against the two bases for Winter, Summer and Full Year periods. The lower the MAPE value, the closer the prediction was to the actual value. For example, a MAPE of 3% means that, on average, the forecast is out by 3%.

Tables showing the MAPE for the full year and for winter and summer separately, by LDZ for each of the two bases, are attached as Figures S12.3.18 to S12.3.23.

Figures S12.3.24 and S12.3.25 are bar charts showing a simple summary of the overall picture given by these sets of tables, achieved using a weighted average MAPE across LDZs based on validated supply meter points. The overall MAPE has been summarised over the full year, winter and summer periods for EUCs in each consumption band.

Figures S12.3.26 to S12.3.35 are monthly bar charts comparing actual and allocated demands, across all LDZs for consumption bands 01 to 08 respectively.

This analysis includes for the first time the new EUCs introduced from October 2019. This extended the profiles in consumption bands 1 and 2 to better reflect sites with domestic, industrial and prepayment configurations. Figures S12.3.36 looks at the Industrial Sites in consumption band 1 and plots them against the domestic profile. The chart shows the poor performance, had the previous default profile been

applied. This can be contrasted with Figure S12.3.9 which shows the equivalent chart using the dedicated 01BNI profile.

Finally, Figure S12.3.37 is a table showing comparison of full year MAPE by EUC on the 'Retro' basis, against the equivalent analysis using sample data from the previous years' analysis.

## STRAND 3: ASSESSMENT

On the evidence of the bar chart in Figure S12.3.24, consumption band MAPE values on the 'Model' basis over the full year (gas year 2019/20) range from 7.61% to 22.83%. Overall, consumption band winter period errors range from 4.79% to 14.03% and overall consumption band summer period errors range from 10.44% to 31.62%. Actual summer demands are generally lower with the COVID-19 impacts hence percentage errors can be somewhat greater in the summer.

The bar chart in Figure S12.3.25 (Retro) shows that the algorithms derived for 2020/21 would (if applied to gas year 2019/20) have resulted in reduced allocation error in most consumption bands. MAPE values on the Retro basis over the full year range from 6.8% to 23.2%.

It must be borne in mind that these two analyses are based on validated NDM sample data which is not necessarily representative of the population as a whole. Furthermore, this sample dataset suffers from small numbers of contributing supply meter points at the higher consumption bands and results for bands 01 (01BND, 01BNI) and 02 (02BND and 02BNI) are susceptible to 'Market Sector Code' errors.

The selection of monthly charts in Figures S12.3.26 to S12.3.35 show for each month of Gas Year 2019/20, actual demand and allocated demand on the 'Model' and 'Retro' bases. In interpreting these monthly charts, it is relevant to recall the weather conditions that prevailed during Gas Year 2019/20 (please refer to section 3 of this document - Strand 1 Weather Analysis), the limitations with using the Sample AQ and the demand changes from the COVID-19 pandemic.

Please note that the following assessments considers the analysis from the 'Model' basis:

The monthly chart for band 01BND, in Figure S12.3.26, indicates under allocation in all winter months except January 2020. During the summer, over allocation was evident for April and May with the other months showing an under allocation.

The monthly chart for band 01BNI, in Figure S12.3.27, indicates an under allocation in all winter months except March 2020. April and May indicate a material over allocation with it diminishing through June 2020 and reversing to an under allocation for the remaining months.

The monthly chart for band 02BNI, in Figure S12.3.28, indicates winter under allocation from October 2019 to February 2020 with a significant over allocation from April 2020 to July 2020 with an under allocation returning in August and September 2020.

The monthly chart for band 02BND, in Figure S12.3.29, indicates a general winter under allocation except for October 2019. During the summer, April, May, July and August showed an over allocation with June and September tracking close to the actual.

Figure S12.3.30 is the monthly chart for band 03, which shows an under allocation during the winter months with an over allocation between April and August 2020 with September showing a marginal under allocation.

Figure S12.3.31 is the monthly chart for band 04, which shows an under allocation during the winter months with an over allocation between April and August 2020 with September showing a marginal under allocation.

The monthly chart for band 05, Figure S12.3.32 shows an under allocation in the winter. An over allocation was evident during all summer months.

Figure S12.3.33 is the monthly chart for band 06, which shows under allocation in the winter and an over allocation in all the summer months.

The monthly chart for band 07, Figure S12.3.34, shows an under allocation over the winter and an over allocation in the summer months.

Figure S12.3.35 is the monthly chart for band 08, which shows under allocation in all winter months and an over allocation in all the summer months.

Change proposal XRN4665 – "Creation of New End User Categories", introduced dedicated allocation profiles (effective from 1st October 2019) for Domestic, Industrial and Commercial and Pre-Payment

customers in bands 01 and 02. This analysis was the first opportunity to evaluate the performance of these new profiles.

The validated data has enabled analysis of the new profiles for 'I&C' consumers in band 01 and Domestic consumers in band 02 and these results are provided in Figure S12.3.9 and S12.3.11 respectively.

Figure S12.3.9 shows the daily actual and allocated demand for 3,215 available I&C sites in band 01 on the 'Model' basis (using the dedicated 01BNI profile applicable for gas year 2019/20). This profile shows it tracks the actual closely. As a comparison Figure S12.3.36 has been provided. This shows the actual and allocated demand if the dedicated profile had not been available. This profile does not provide a great fit for I&C customers, since it was modelled using data from Domestic consumers. The results in Figure S12.3.9 clearly supports the introduction of the new profiles.

A similar comparison has not been undertaken for the Domestic sites in band 02. This is due to the low number of sample points (121) and the variation in MAPE in Figures S12.3.18 to S12.3.20 which raises the possibility of incorrectly assigned market sector code.

The 'Retro' model gives an insight into the latest profiles (for 2020/21) adjusted for week and holidays for gas year 2019/20 and using the new weather definitions. The expectation is for the latest retro profiles to provide a better fit i.e. have a MAPE closer to zero.

As has been raised at stages in this analysis, the COVID-19 pandemic impact and limitations in the Sample AQ determination raises questions about the interpretation of the results. To try and look at the seasons Figure S12.3.37 has been included. This is a table of the MAPE difference between the Retro and the Model calculations but split into Winter, Full Year and Summer. The Winter MAPE shows an improvement in all EUCs apart from 07B. The Winter period had not been impacted by the pandemic and the improvements shown are encouraging.

## STRAND 3: CONCLUSIONS

In conclusion, the Strand 3 analysis this year has been inconclusive. The demand levels have been heavily influenced by the COVID-19 pandemic and subsequent national and local lockdowns making interpretations difficult. In addition, the calculation of sample AQ is potentially causing some of the under allocation we are seeing in the winter months prior to the lockdowns. However, the shape of the allocation to demands is reassuring albeit at a marginally different level.

The introduction of the 01BNI EUC has shown it fits the demand pattern better than the traditional 01BND profile. To fully utilise these new profiles and improve allocation, shippers must ensure the Market Sector Flag held on UK Link is relevant for their portfolios.

The Retro analysis has also generally shown an improvement in the accuracy of allocation for the majority of EUC bands in the period prior to the COVID-19 pandemic and for the whole year for band 01BND. This supports the changes made to the new weather definitions.

**Figure S12.3.1 – Validated Sample Site Breakdown**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | All LDZs | % Non-Third | % Third Party |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 392 | 349 | 390 | 376 | 395 | 403 | 204 | 328 | 370 | 351 | 360 | 416 | 428 | 4762 | 29% | 71% |
| 01BNI | 531 | 206 | 333 | 218 | 262 | 247 | 35 | 106 | 289 | 248 | 347 | 192 | 201 | 3215 | 5% | 95% |
| 01BPD | 25 | 25 | 64 | 26 | 52 | 39 | 7 | 14 | 19 | 26 | 4 | 19 | 11 | 331 | 0% | 100% |
| 02BND | 22 | 6 | 12 | 13 | 13 | 6 | 0 | 2 | 6 | 9 | 13 | 9 | 10 | 121 | 74% | 26% |
| 02BNI | 971 | 253 | 523 | 321 | 568 | 495 | 54 | 147 | 434 | 460 | 566 | 414 | 386 | 5592 | 19% | 81% |
| 03B | 781 | 166 | 227 | 191 | 226 | 186 | 29 | 65 | 203 | 247 | 324 | 234 | 194 | 3073 | 40% | 60% |
| 04B | 631 | 216 | 260 | 277 | 201 | 207 | 36 | 85 | 220 | 234 | 389 | 297 | 172 | 3225 | 67% | 33% |
| 05B | 223 | 104 | 106 | 132 | 84 | 115 | 18 | 33 | 78 | 140 | 139 | 107 | 59 | 1338 | 81% | 19% |
| 06B | 77 | 33 | 36 | 51 | 43 | 44 | 6 | 18 | 24 | 28 | 40 | 42 | 20 | 462 | 92% | 8% |
| 07B | 17 | 10 | 17 | 20 | 24 | 18 | 1 | 2 | 6 | 5 | 5 | 13 | 9 | 147 | 95% | 5% |
| 08B | 5 | 3 | 3 | 5 | 13 | 6 | 1 | 3 | 5 | 7 | 6 | 3 | 4 | 64 | 91% | 9% |
| 09B | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 10 | 80% | 20% |
| Totals | 3680 | 1373 | 1972 | 1630 | 1881 | 1766 | 391 | 803 | 1654 | 1755 | 2193 | 1748 | 1494 | 22340 | | |

**Figure S12.3.2 – Scatter Plot Demand Vs CWV For EUC 01BND LDZ SC**

**Monday to Thursday Non-Holiday Data points**

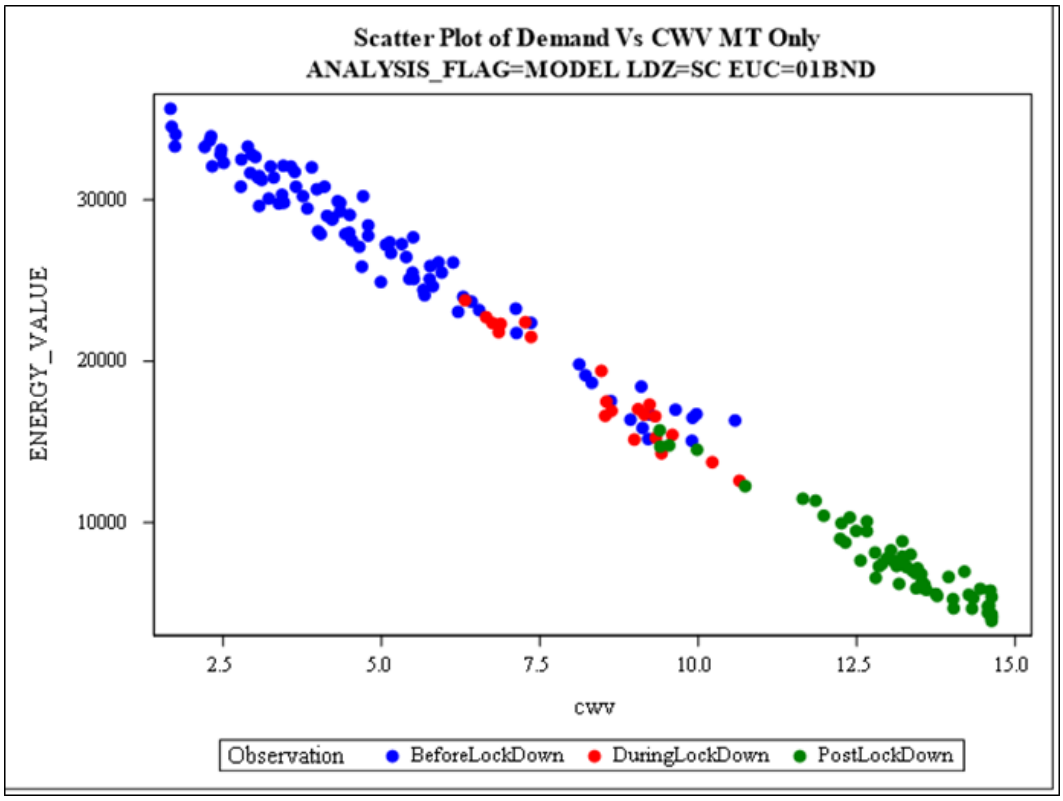



**Figure S12.3.3 – Scatter Plot Demand Vs CWV For EUC 01BNI LDZ SO**

**Monday to Thursday Non-Holiday Data points**

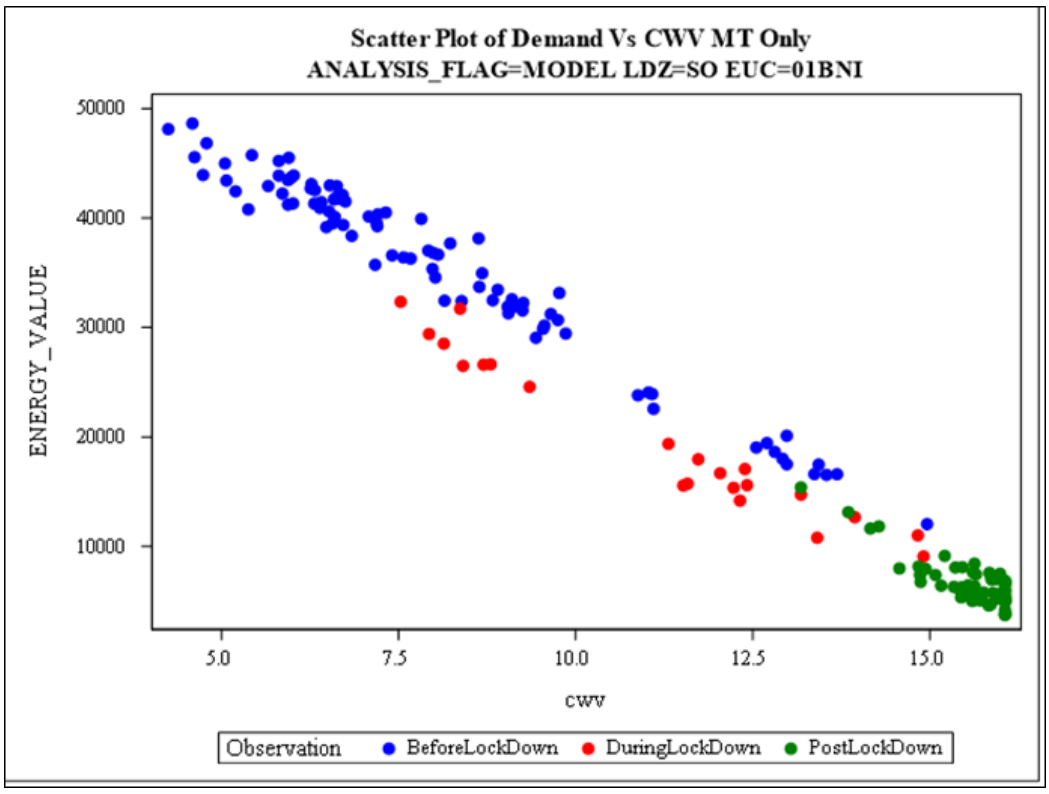


**Figure S12.3.4 – Scatter Plot Demand Vs CWV For EUC 03B LDZ WM**

**Monday to Thursday Non-Holiday Data points**

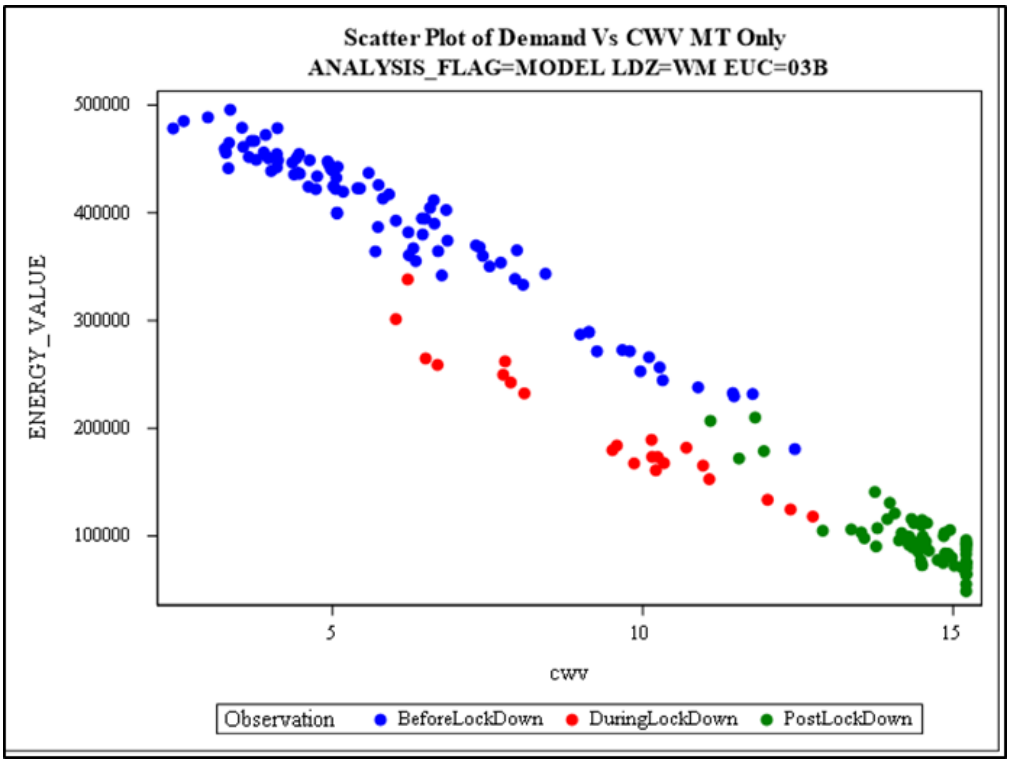



**Figure S12.3.5 – Scatter Plot Demand Vs CWV For EUC 05B LDZ NT**

**Monday to Thursday Non-Holiday Data points**

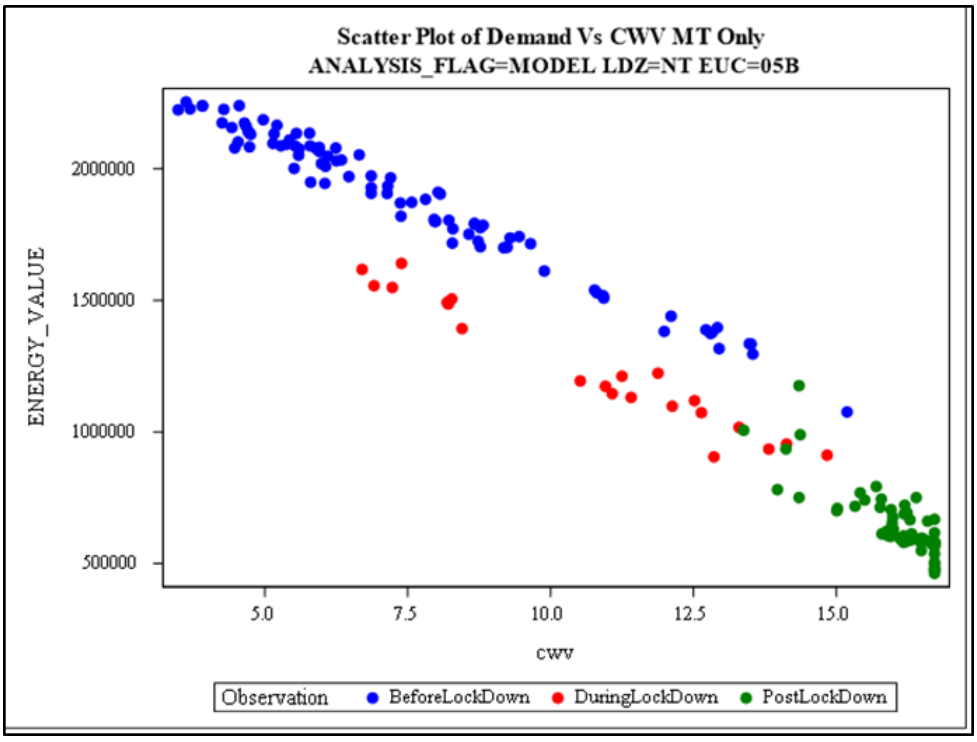


**Figure S12.3.6 – Chart of ratio of UK Link AQ vs calculated Sample AQ 01BND (across all LDZs)**

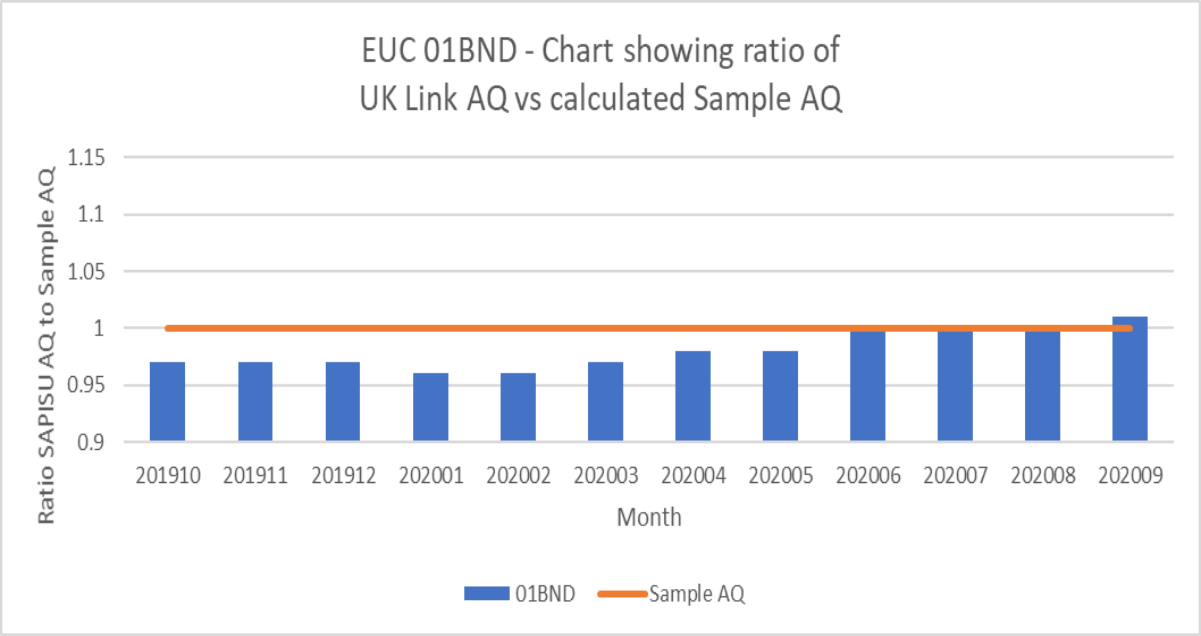



**Figure S12.3.7 – Chart of ratio of UK Link AQ vs calculated Sample AQ 01BND (across all LDZs)**

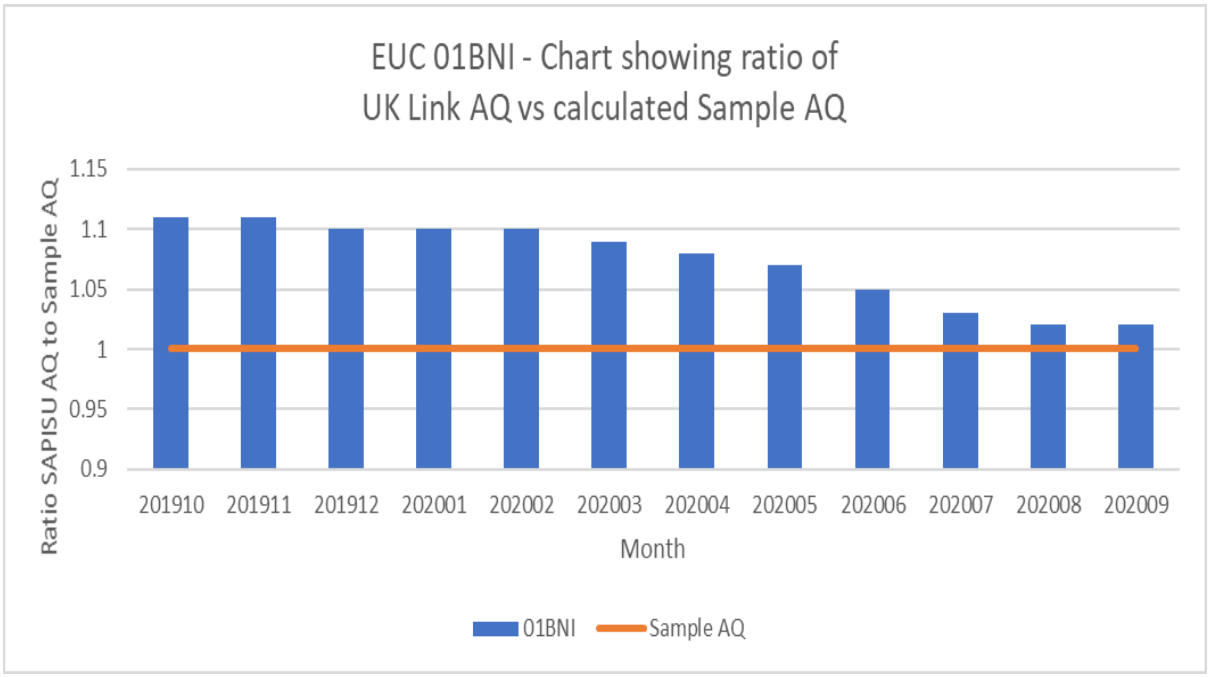


**Figure S12.3.8 – Daily Actual and Allocated Demands for 01BND (across all LDZs)**

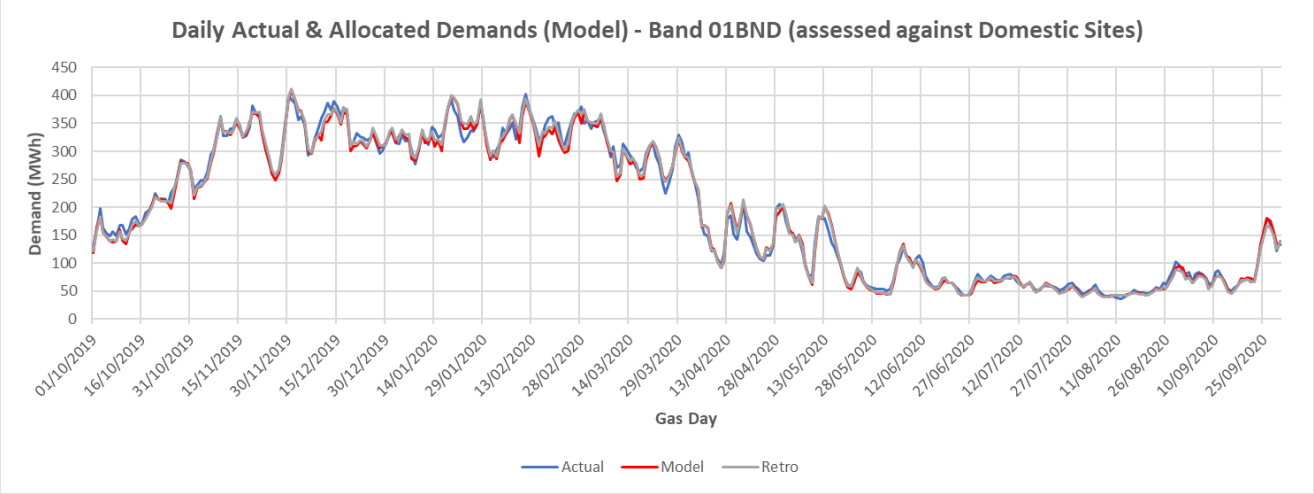



**Figure S12.3.9 – Daily Actual and Allocated Demands for 01BNI (across all LDZs)**

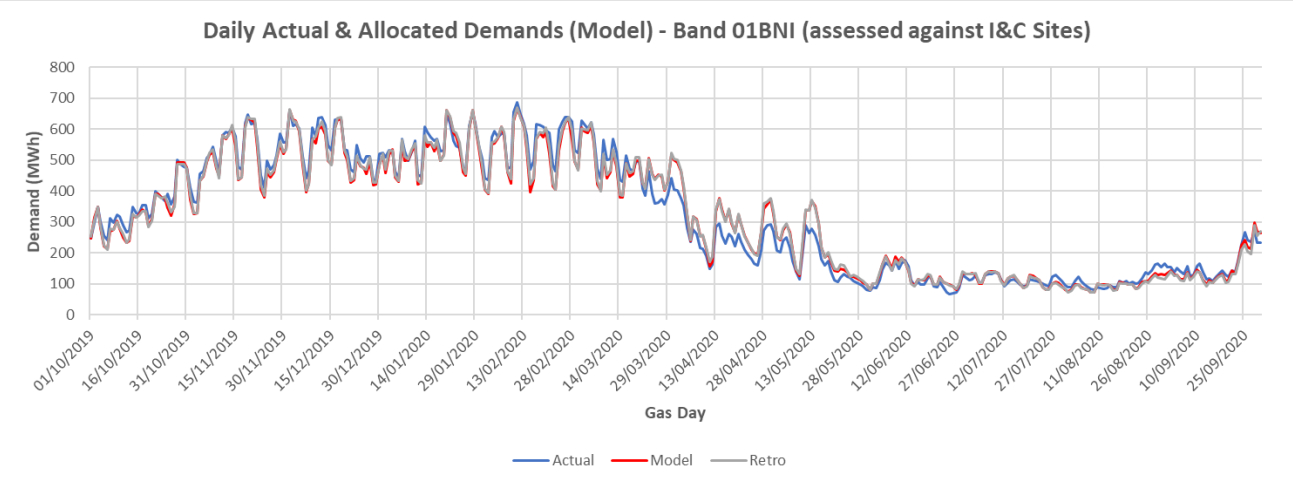



**Figure S12.3.10 – Daily Actual and Allocated Demands for 02BNI (across all LDZs)**

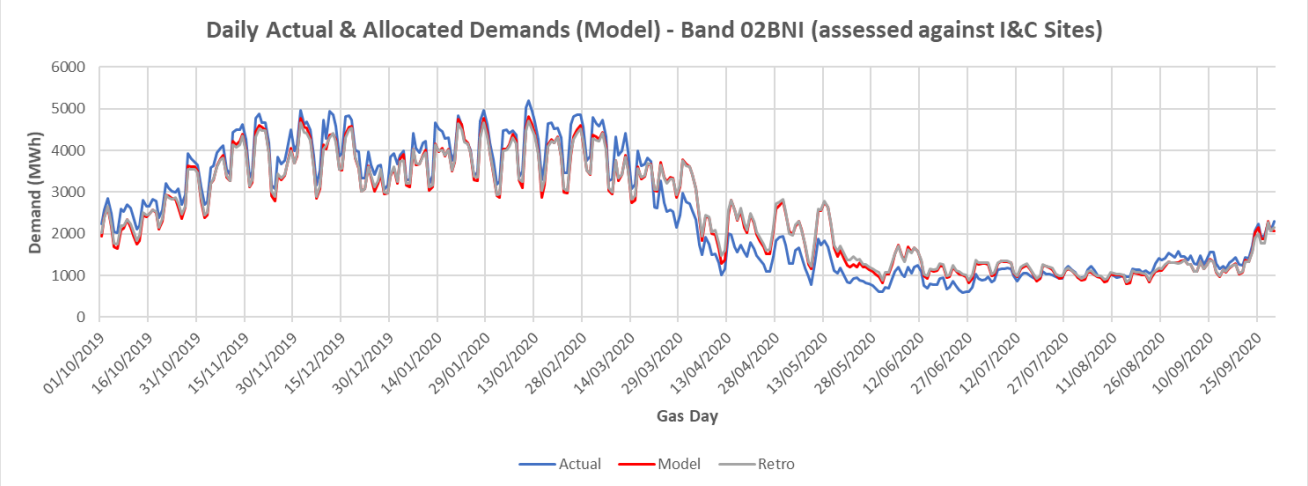


**Figure S12.3.11 – Daily Actual and Allocated Demands for 02BND (across all LDZs)**

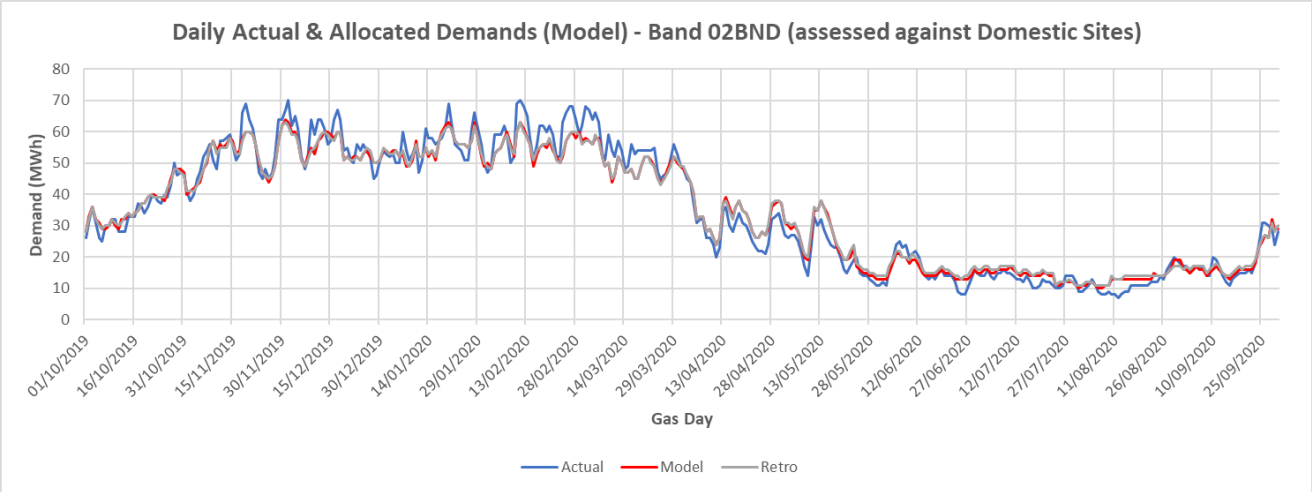



**Figure S12.3.12 – Daily Actual and Allocated Demands for 03B (across all LDZs)**

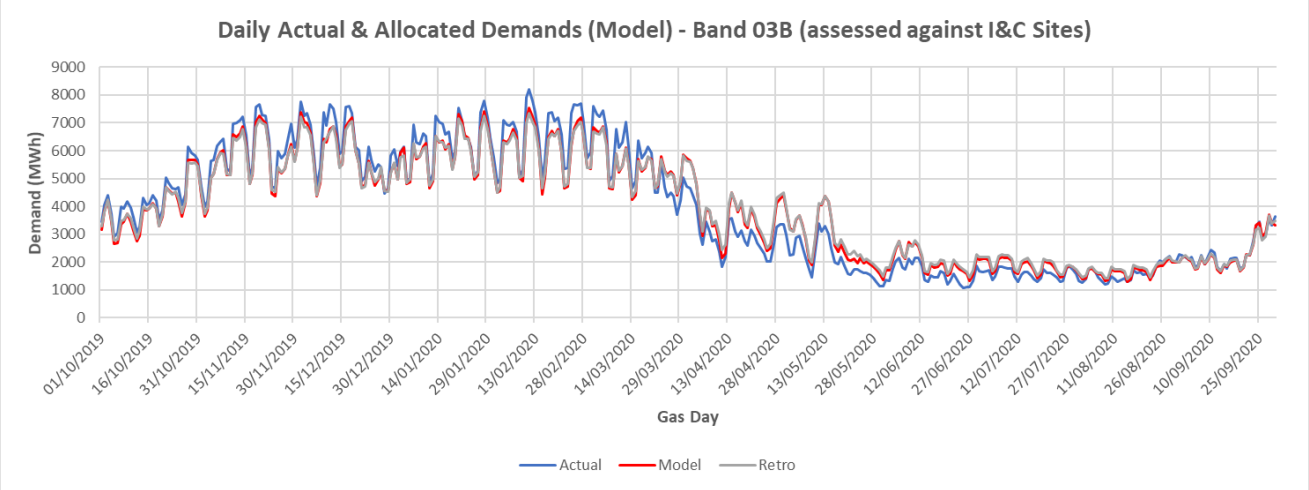



**Figure S12.3.13 – Daily Actual and Allocated Demands for 04B (across all LDZs)**

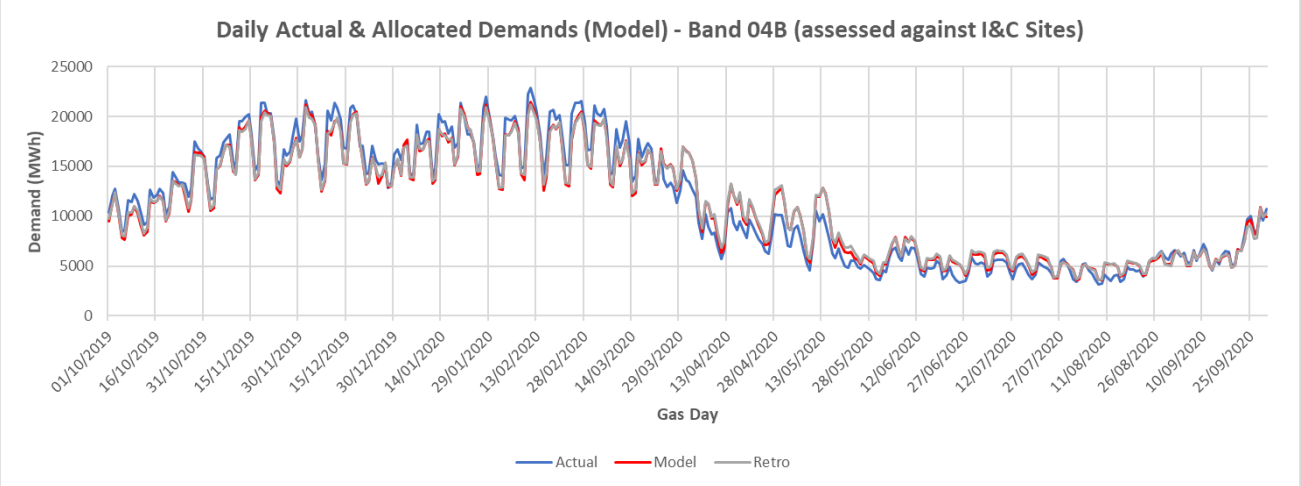


**Figure S12.3.14 – Daily Actual and Allocated Demands for 05B (across all LDZs)**

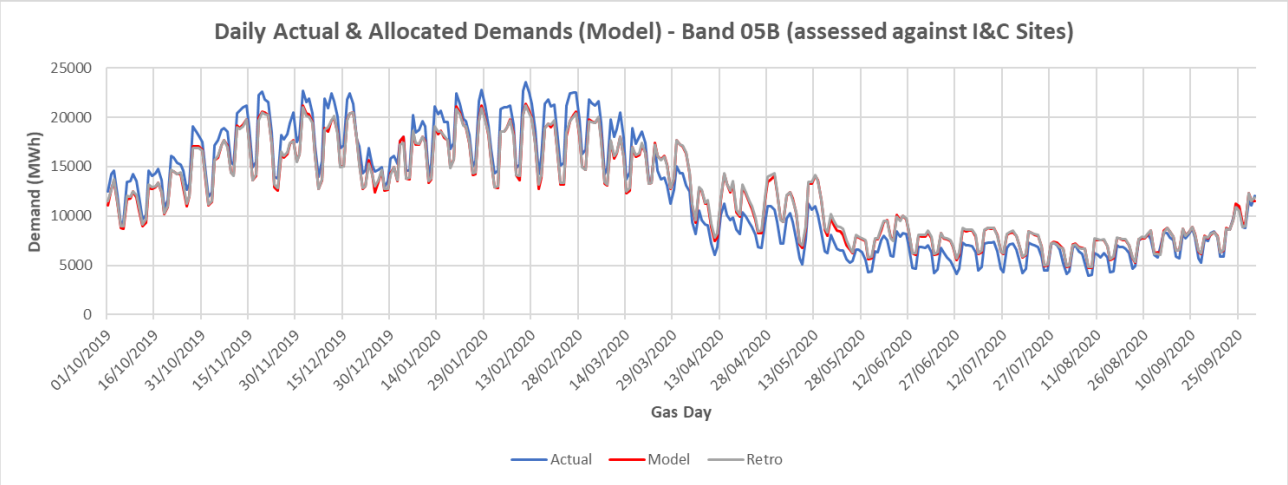



**Figure S12.3.15 – Daily Actual and Allocated Demands for 06B (across all LDZs)**

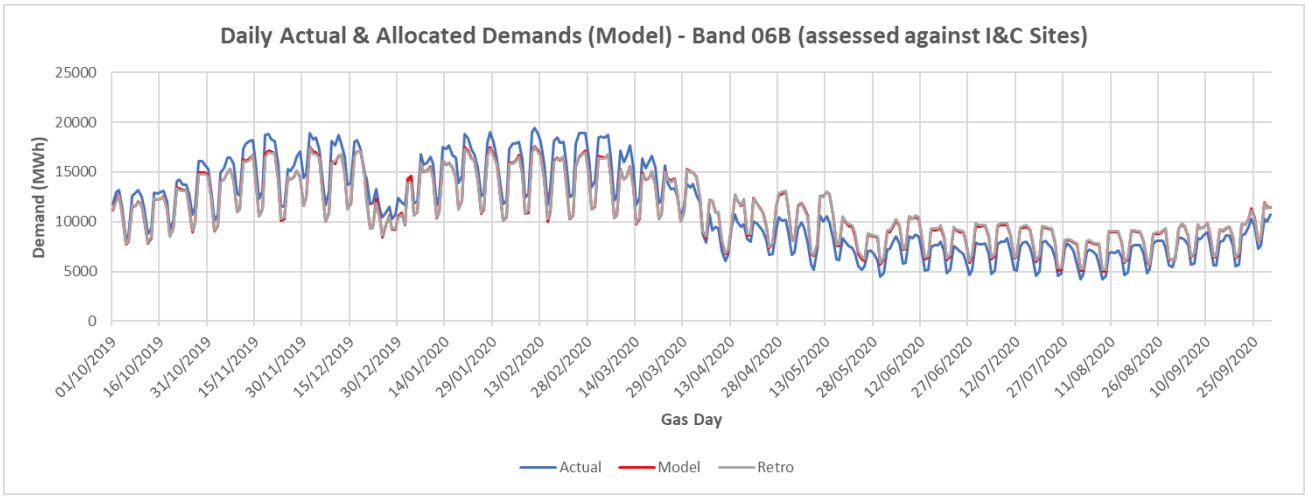



**Figure S12.3.16 – Daily Actual and Allocated Demands for 07B (across all LDZs)**

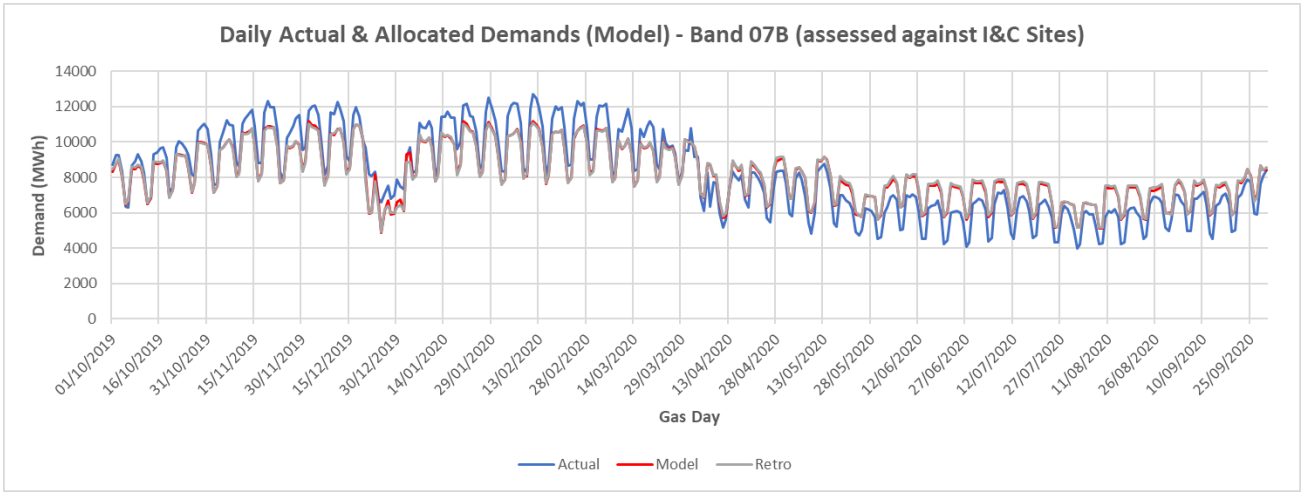


**Figure S12.3.17 – Daily Actual and Allocated Demands for 08B (across all LDZs)**

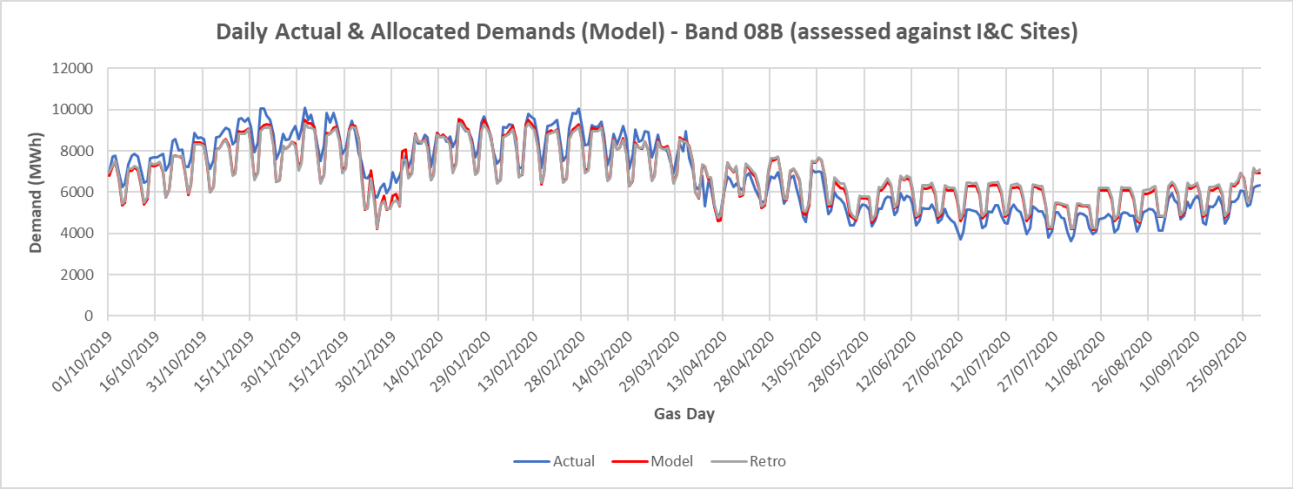



**Figure S12.3.18 – MAPE over Full Year (Oct'19 to Sep'20) on MODEL Basis**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | Total Weighted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 6.42% | 8.15% | 8.75% | 8.33% | 7.17% | 7.30% | 10.61% | 9.14% | 6.38% | 6.16% | 7.90% | 5.73% | 8.54% | 7.61% |
| 01BNI | 10.78% | 13.88% | 11.38% | 11.63% | 11.43% | 14.19% | 15.51% | 16.55% | 14.19% | 19.34% | 10.10% | 13.62% | 12.26% | 12.81% |
| 02BND | 10.89% | 22.54% | 10.49% | 9.67% | 48.53% | 65.33% | n/a | 26.82% | 11.36% | 12.50% | 14.85% | 17.20% | 16.58% | 19.81% |
| 02BNI | 14.31% | 17.49% | 21.32% | 14.52% | 18.35% | 18.58% | 28.18% | 25.10% | 18.90% | 29.07% | 16.97% | 21.67% | 20.97% | 19.17% |
| 03B | 9.68% | 14.25% | 14.71% | 14.38% | 11.12% | 18.78% | 19.79% | 14.81% | 11.57% | 23.24% | 15.82% | 14.12% | 13.47% | 13.89% |
| 04B | 8.49% | 12.32% | 10.42% | 13.89% | 9.62% | 11.83% | 13.86% | 14.30% | 10.48% | 8.76% | 11.45% | 15.11% | 11.98% | 11.17% |
| 05B | 11.46% | 17.57% | 15.48% | 17.22% | 16.51% | 19.80% | 15.43% | 14.55% | 14.81% | 10.68% | 11.77% | 17.40% | 12.96% | 14.67% |
| 06B | 10.39% | 20.20% | 10.48% | 14.36% | 18.84% | 19.00% | 14.51% | 16.49% | 19.95% | 20.15% | 10.67% | 15.33% | 27.90% | 15.75% |
| 07B | 11.99% | 16.29% | 14.50% | 15.07% | 10.65% | 23.25% | 95.96% | 96.36% | 16.56% | 21.16% | 29.52% | 5.77% | 16.96% | 16.72% |
| 08B | 13.00% | 28.68% | 11.65% | 13.28% | 16.71% | 78.81% | 12.24% | 62.19% | 14.41% | 10.55% | 12.07% | 19.97% | 10.35% | 22.83% |

**Figure S12.3.19 – MAPE over Winter (Oct'19 to Mar'20) on MODEL Basis**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | Total Weighted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 3.46% | 4.13% | 4.57% | 5.99% | 4.08% | 4.18% | 5.70% | 5.62% | 4.35% | 4.13% | 4.01% | 4.78% | 7.41% | 4.79% |
| 01BNI | 6.29% | 7.85% | 5.87% | 6.97% | 7.60% | 5.81% | 8.85% | 8.64% | 11.01% | 9.44% | 6.00% | 6.06% | 7.24% | 7.25% |
| 02BND | 6.20% | 13.73% | 7.59% | 4.86% | 21.39% | 15.25% | n/a | 15.27% | 10.16% | 5.93% | 10.33% | 9.38% | 12.18% | 10.15% |
| 02BNI | 8.68% | 9.36% | 11.40% | 8.10% | 9.40% | 8.74% | 13.17% | 10.97% | 9.51% | 14.41% | 9.05% | 10.99% | 11.00% | 10.02% |
| 03B | 6.05% | 8.65% | 9.09% | 9.46% | 7.55% | 9.43% | 8.87% | 9.04% | 6.91% | 10.53% | 8.66% | 8.40% | 9.13% | 8.10% |
| 04B | 6.07% | 7.05% | 7.07% | 9.04% | 6.67% | 6.96% | 9.28% | 8.42% | 5.29% | 4.86% | 6.40% | 7.66% | 8.00% | 6.81% |
| 05B | 8.39% | 9.86% | 10.25% | 10.35% | 9.60% | 10.94% | 10.97% | 9.12% | 8.65% | 6.65% | 6.82% | 8.83% | 8.65% | 8.91% |
| 06B | 8.88% | 12.26% | 6.88% | 11.26% | 12.21% | 12.16% | 14.10% | 11.40% | 10.02% | 11.30% | 6.52% | 8.63% | 15.21% | 10.27% |
| 07B | 8.74% | 11.17% | 10.09% | 11.10% | 7.60% | 13.81% | 135.50% | 24.37% | 9.81% | 14.33% | 12.57% | 5.13% | 11.11% | 11.08% |
| 08B | 11.57% | 19.37% | 9.52% | 11.70% | 13.98% | 23.35% | 12.99% | 36.28% | 8.93% | 6.38% | 12.60% | 14.65% | 10.58% | 14.03% |

**Figure S12.3.20 – MAPE over Summer (Apr'20 to Sep'20) on MODEL Basis**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | Total Weighted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 9.38% | 12.17% | 12.93% | 10.67% | 10.27% | 10.42% | 15.52% | 12.67% | 8.41% | 8.19% | 11.79% | 6.67% | 9.67% | 10.44% |
| 01BNI | 15.26% | 19.90% | 16.88% | 16.28% | 15.26% | 22.57% | 22.16% | 24.47% | 17.37% | 29.24% | 14.19% | 21.19% | 17.27% | 18.37% |
| 02BND | 15.59% | 31.36% | 13.40% | 14.48% | 75.66% | 115.40% | n/a | 38.38% | 12.56% | 19.08% | 19.38% | 25.02% | 20.98% | 29.48% |
| 02BNI | 19.93% | 25.62% | 31.25% | 20.94% | 27.30% | 28.43% | 43.18% | 39.23% | 28.29% | 43.73% | 24.89% | 32.35% | 30.95% | 28.33% |
| 03B | 13.31% | 19.85% | 20.33% | 19.30% | 14.69% | 28.14% | 30.71% | 20.59% | 16.23% | 35.94% | 22.99% | 19.83% | 17.81% | 19.68% |
| 04B | 10.92% | 17.58% | 13.76% | 18.74% | 12.57% | 16.70% | 18.44% | 20.18% | 15.67% | 12.66% | 16.50% | 22.56% | 15.96% | 15.53% |
| 05B | 14.53% | 25.29% | 20.71% | 24.10% | 23.42% | 28.66% | 19.89% | 19.99% | 20.97% | 14.70% | 16.71% | 25.98% | 17.26% | 20.43% |
| 06B | 11.90% | 28.14% | 14.09% | 17.46% | 25.46% | 25.84% | 14.93% | 21.57% | 29.89% | 29.00% | 14.82% | 22.03% | 40.59% | 21.24% |
| 07B | 15.25% | 21.40% | 18.91% | 19.03% | 13.70% | 32.70% | 57.06% | 168.30% | 23.32% | 27.99% | 46.47% | 6.41% | 22.80% | 22.36% |
| 08B | 14.43% | 37.99% | 13.77% | 14.86% | 19.44% | 134.30% | 11.49% | 88.09% | 19.89% | 14.72% | 11.54% | 25.28% | 10.13% | 31.62% |

**Figure S12.3.21 – MAPE over Full Year (Oct'19 to Sep'20) on RETRO Basis**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | Total Weighted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 6.25% | 6.94% | 7.59% | 8.48% | 6.01% | 6.31% | 9.15% | 7.66% | 6.68% | 5.47% | 6.86% | 5.73% | 6.37% | 6.78% |
| 01BNI | 11.24% | 12.51% | 11.30% | 11.15% | 11.24% | 13.07% | 15.53% | 15.55% | 13.47% | 17.96% | 8.36% | 14.78% | 12.22% | 12.33% |
| 02BND | 11.75% | 24.48% | 9.66% | 10.21% | 51.81% | 68.75% | n/a | 28.06% | 11.25% | 13.07% | 15.17% | 18.70% | 18.53% | 20.93% |
| 02BNI | 14.06% | 18.77% | 21.89% | 14.91% | 19.04% | 20.11% | 29.43% | 27.13% | 19.86% | 29.43% | 17.30% | 24.13% | 22.90% | 19.99% |
| 03B | 9.78% | 16.94% | 18.28% | 16.32% | 13.25% | 24.07% | 22.93% | 18.53% | 12.80% | 24.36% | 16.42% | 17.09% | 16.13% | 15.66% |
| 04B | 10.01% | 13.47% | 10.88% | 13.38% | 10.65% | 14.48% | 13.79% | 14.72% | 10.92% | 9.76% | 12.06% | 14.98% | 12.14% | 11.96% |
| 05B | 12.19% | 17.02% | 15.18% | 17.02% | 16.66% | 19.57% | 15.51% | 15.31% | 15.75% | 11.80% | 12.99% | 19.69% | 13.30% | 15.22% |
| 06B | 11.09% | 20.88% | 10.69% | 15.00% | 19.24% | 19.11% | 14.45% | 13.29% | 19.59% | 20.41% | 12.30% | 19.26% | 27.25% | 16.39% |
| 07B | 12.61% | 16.18% | 14.65% | 14.50% | 12.26% | 19.97% | 93.61% | 99.69% | 18.06% | 23.65% | 36.72% | 8.17% | 18.19% | 17.29% |
| 08B | 13.52% | 28.23% | 12.28% | 13.44% | 17.57% | 73.04% | 11.61% | 62.34% | 14.52% | 13.21% | 13.94% | 24.29% | 10.37% | 23.20% |

**Figure S12.3.22 – MAPE over Winter (Oct'19 to Mar'20) on RETRO Basis**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | Total Weighted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 3.14% | 3.82% | 4.04% | 5.36% | 3.40% | 3.36% | 5.03% | 4.96% | 4.26% | 3.83% | 3.58% | 4.61% | 4.85% | 4.14% |
| 01BNI | 6.03% | 6.54% | 4.95% | 6.31% | 6.62% | 5.23% | 8.82% | 6.94% | 9.87% | 8.60% | 4.85% | 5.96% | 5.59% | 6.40% |
| 02BND | 5.81% | 13.78% | 6.95% | 4.95% | 21.29% | 15.46% | n/a | 15.34% | 10.08% | 6.15% | 10.23% | 9.13% | 12.08% | 10.00% |
| 02BNI | 7.77% | 9.12% | 11.13% | 6.98% | 8.76% | 8.99% | 13.34% | 10.50% | 9.45% | 13.75% | 8.01% | 10.73% | 10.19% | 9.47% |
| 03B | 5.39% | 9.36% | 10.10% | 8.88% | 6.97% | 10.64% | 10.12% | 9.00% | 6.52% | 10.30% | 7.98% | 8.67% | 8.14% | 7.89% |
| 04B | 6.22% | 7.07% | 6.64% | 7.84% | 5.60% | 7.10% | 8.71% | 7.47% | 4.81% | 4.92% | 5.90% | 6.84% | 6.45% | 6.37% |
| 05B | 8.40% | 9.38% | 9.79% | 9.46% | 8.67% | 10.75% | 10.94% | 8.79% | 8.27% | 6.60% | 6.75% | 9.21% | 7.30% | 8.60% |
| 06B | 8.91% | 12.43% | 6.87% | 11.27% | 11.89% | 11.69% | 13.92% | 9.04% | 9.74% | 11.24% | 6.77% | 10.22% | 13.93% | 10.21% |
| 07B | 8.92% | 10.84% | 9.99% | 10.57% | 8.69% | 12.23% | 130.90% | 25.15% | 10.64% | 16.02% | 15.06% | 5.26% | 11.68% | 11.18% |
| 08B | 11.71% | 18.67% | 9.96% | 12.05% | 14.08% | 21.69% | 12.14% | 35.53% | 8.73% | 7.54% | 12.13% | 15.93% | 10.73% | 14.01% |

**Figure S12.3.23 – MAPE over Summer (Apr'20 to Sep'20) on RETRO Basis**

| EUC | SC | NO | NW | NE | EM | WM | WN | WS | EA | NT | SE | SO | SW | Total Weighted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01BND | 9.36% | 10.05% | 11.15% | 11.60% | 8.63% | 9.26% | 13.28% | 10.35% | 9.09% | 7.10% | 10.15% | 6.85% | 7.89% | 9.42% |
| 01BNI | 16.46% | 18.49% | 17.64% | 16.00% | 15.86% | 20.90% | 22.24% | 24.17% | 17.08% | 27.32% | 11.88% | 23.59% | 18.85% | 18.26% |
| 02BND | 17.70% | 35.19% | 12.38% | 15.47% | 82.33% | 122.00% | . | 40.78% | 12.41% | 19.99% | 20.12% | 28.28% | 24.99% | 31.86% |
| 02BNI | 20.35% | 28.43% | 32.65% | 22.84% | 29.33% | 31.22% | 45.51% | 43.75% | 30.27% | 45.12% | 26.59% | 37.54% | 35.62% | 30.51% |
| 03B | 14.18% | 24.53% | 26.46% | 23.77% | 19.53% | 37.50% | 35.73% | 28.07% | 19.09% | 38.42% | 24.86% | 25.52% | 24.12% | 23.43% |
| 04B | 13.80% | 19.88% | 15.11% | 18.91% | 15.69% | 21.85% | 18.87% | 21.96% | 17.04% | 14.60% | 18.22% | 23.13% | 17.83% | 17.54% |
| 05B | 15.98% | 24.66% | 20.56% | 24.59% | 24.66% | 28.39% | 20.09% | 21.83% | 23.23% | 17.00% | 19.24% | 30.17% | 19.30% | 21.83% |
| 06B | 13.27% | 29.33% | 14.51% | 18.72% | 26.59% | 26.53% | 14.97% | 17.53% | 29.44% | 29.58% | 17.84% | 28.31% | 40.57% | 22.58% |
| 07B | 16.29% | 21.51% | 19.32% | 18.43% | 15.83% | 27.71% | 56.93% | 174.20% | 25.48% | 31.28% | 58.37% | 11.09% | 24.71% | 23.41% |
| 08B | 15.33% | 37.79% | 14.59% | 14.84% | 21.06% | 124.40% | 11.09% | 89.16% | 20.31% | 18.89% | 15.75% | 32.65% | 10.00% | 32.39% |

**Figure S12.3.24 – MAPE Summary (Weighted average across LDZs) on MODEL(inc) Basis**

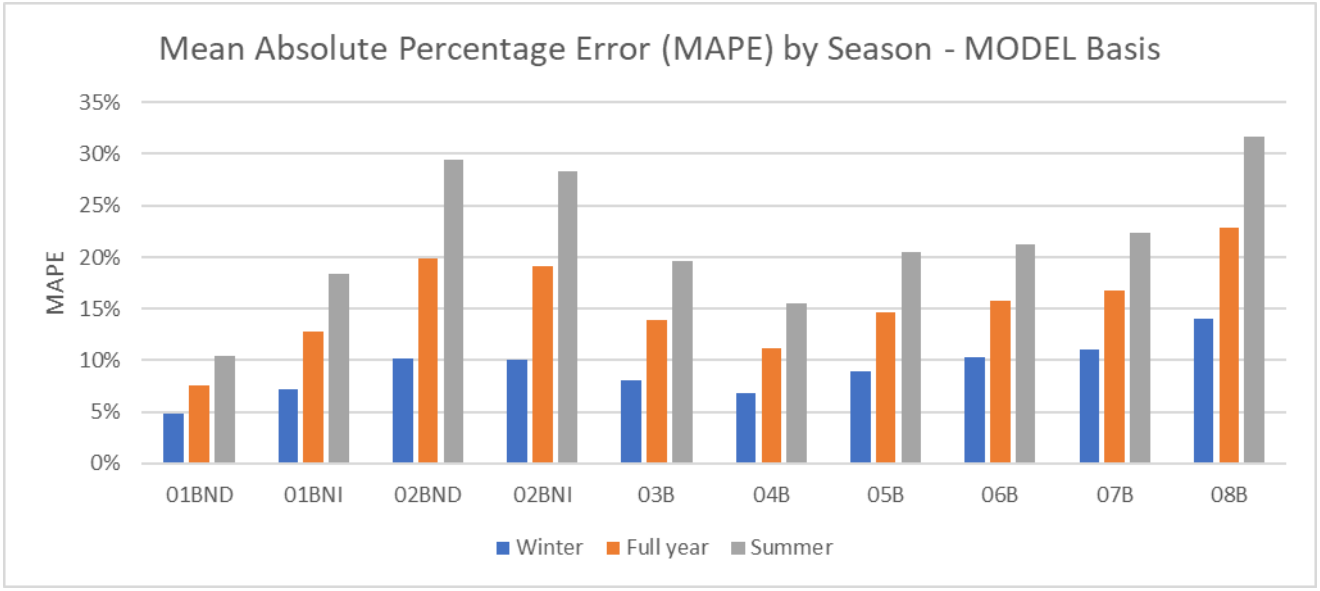



**Figure S12.3.25 – MAPE Summary (Weighted average across LDZs) on RETRO Basis**

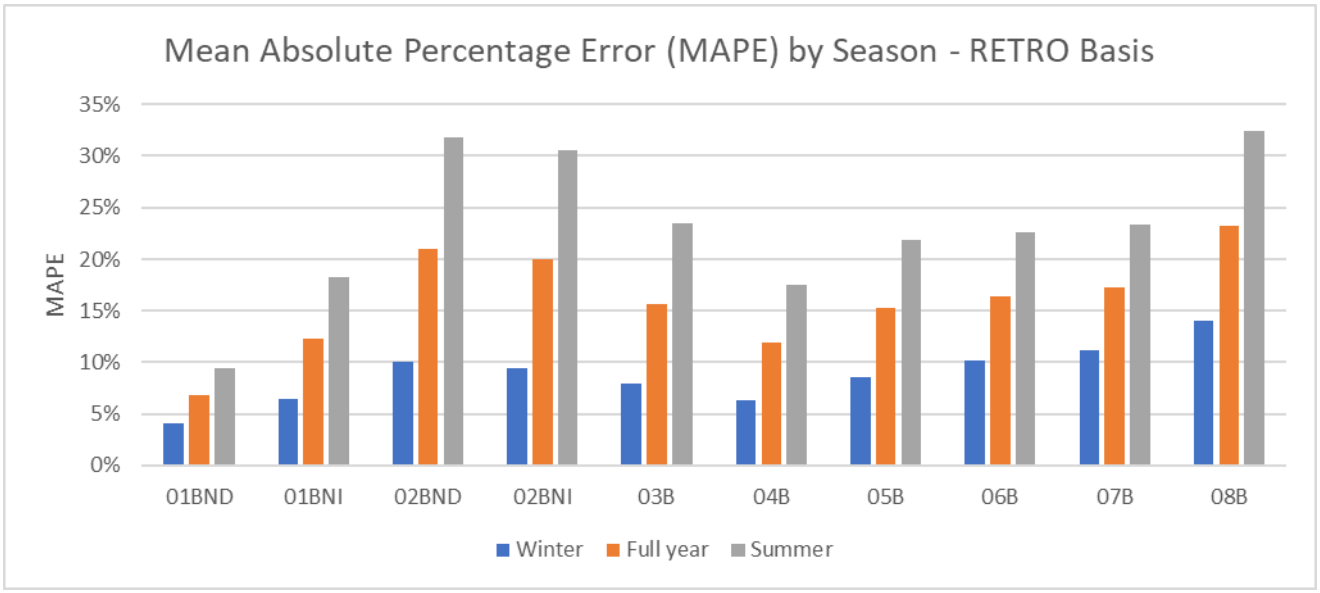


**Figure S12.3.26 – Monthly Actual and Allocated Demands for 01BND (across all LDZs)**

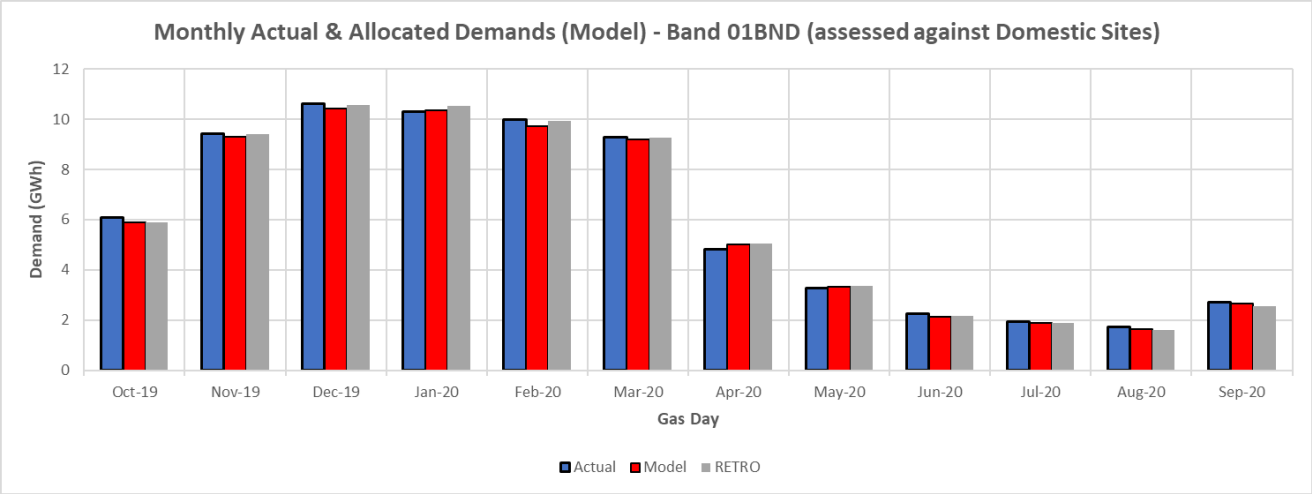



**Figure S12.3.27 – Monthly Actual and Allocated Demands for 01BNI (across all LDZs)**

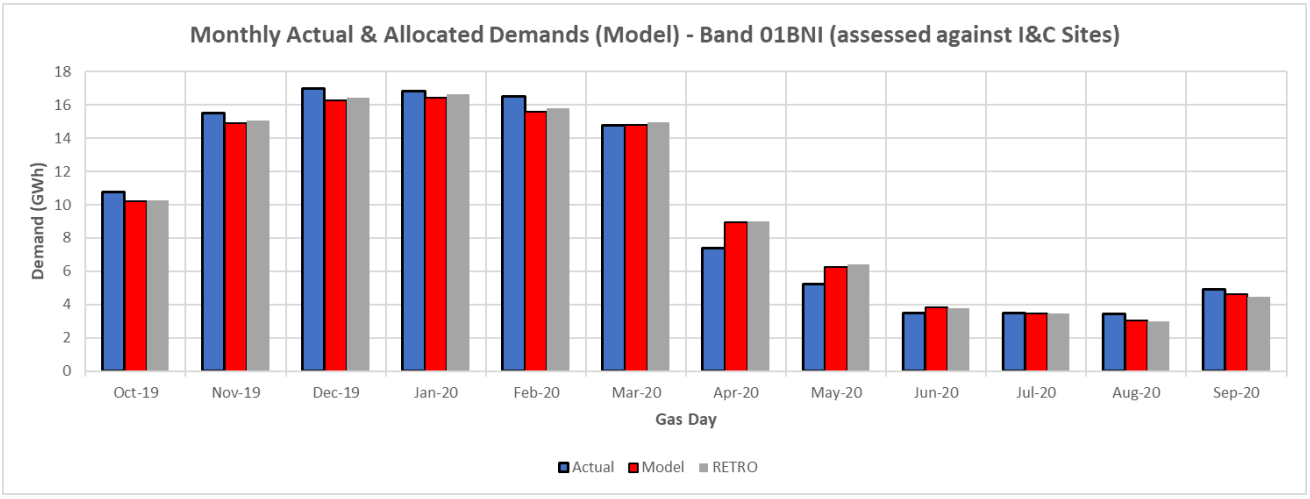



**Figure S12.3.28 – Monthly Actual and Allocated Demands for 02BNI (across all LDZs)**

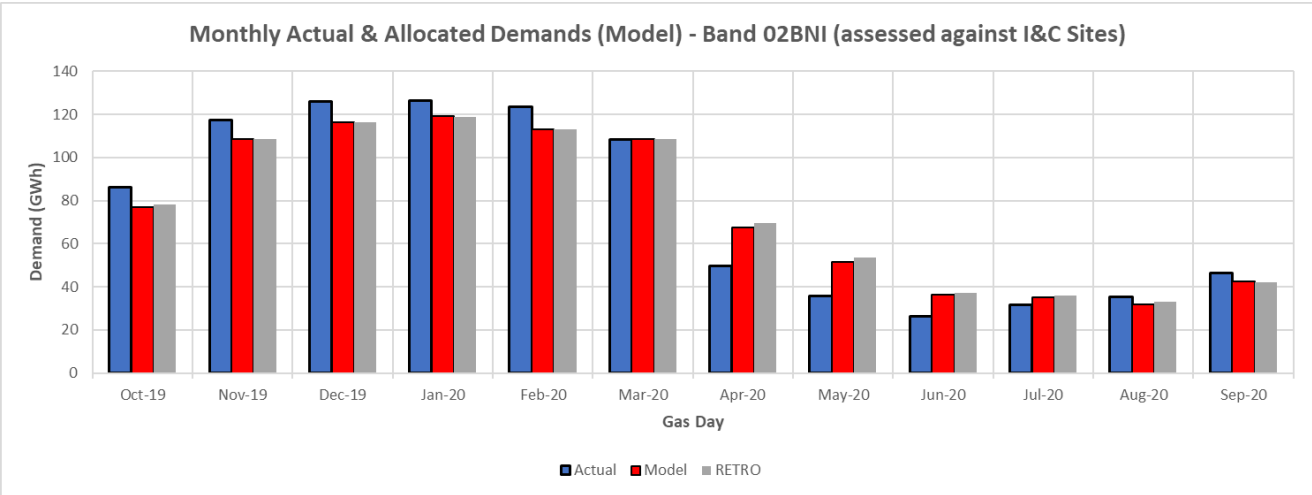


**Figure S12.3.29 – Monthly Actual and Allocated Demands for 02BND (across all LDZs)**

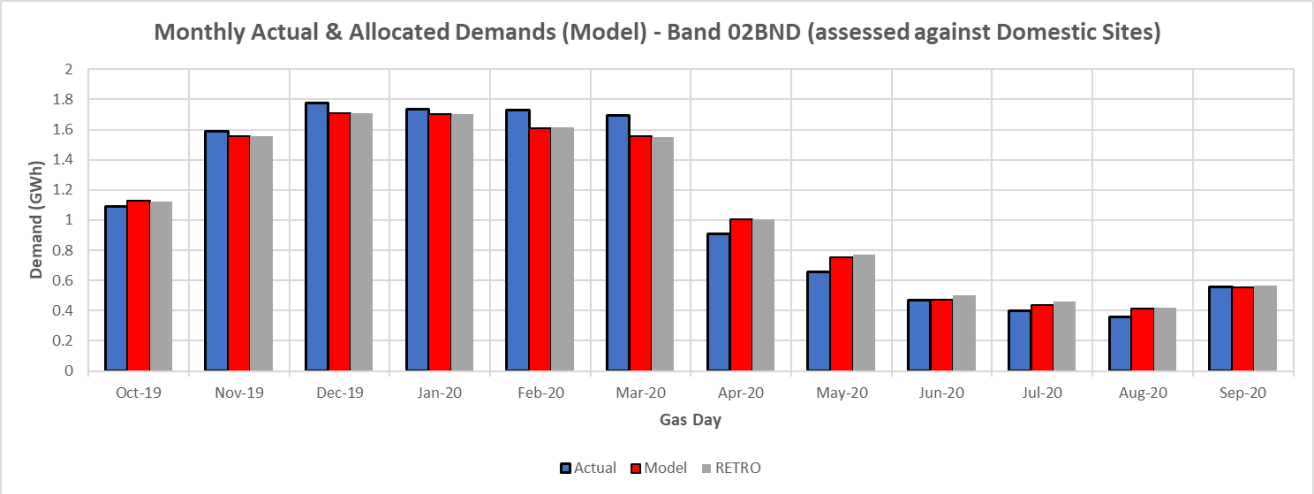



**Figure S12.3.30 – Monthly Actual and Allocated Demands for 03B (across all LDZs)**

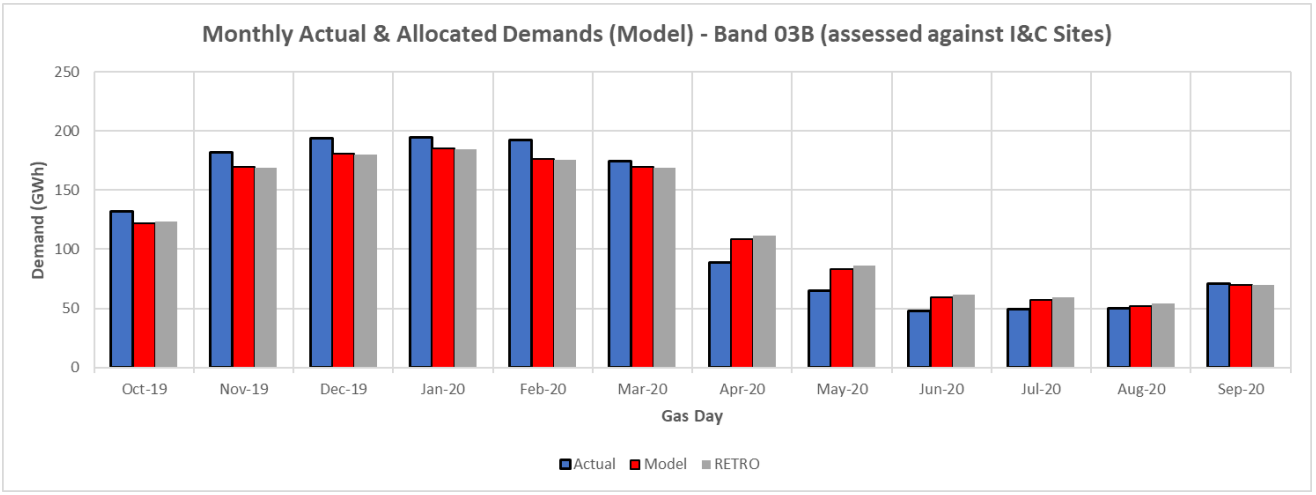



**Figure S12.3.31 – Monthly Actual and Allocated Demands for 04B (across all LDZs)**

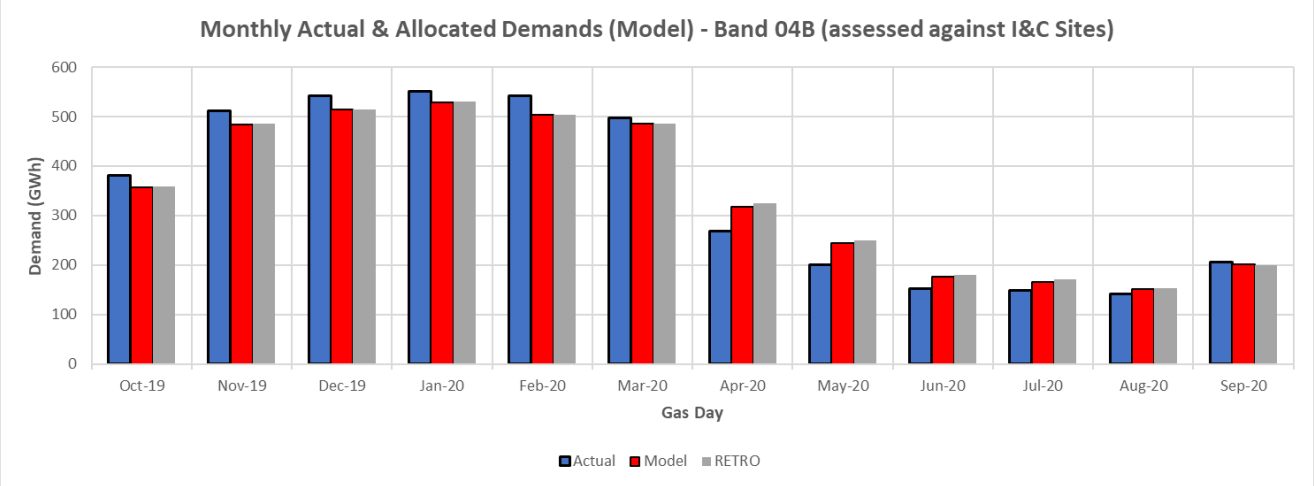


**Figure S12.3.32 – Monthly Actual and Allocated Demands for 05B (across all LDZs)**

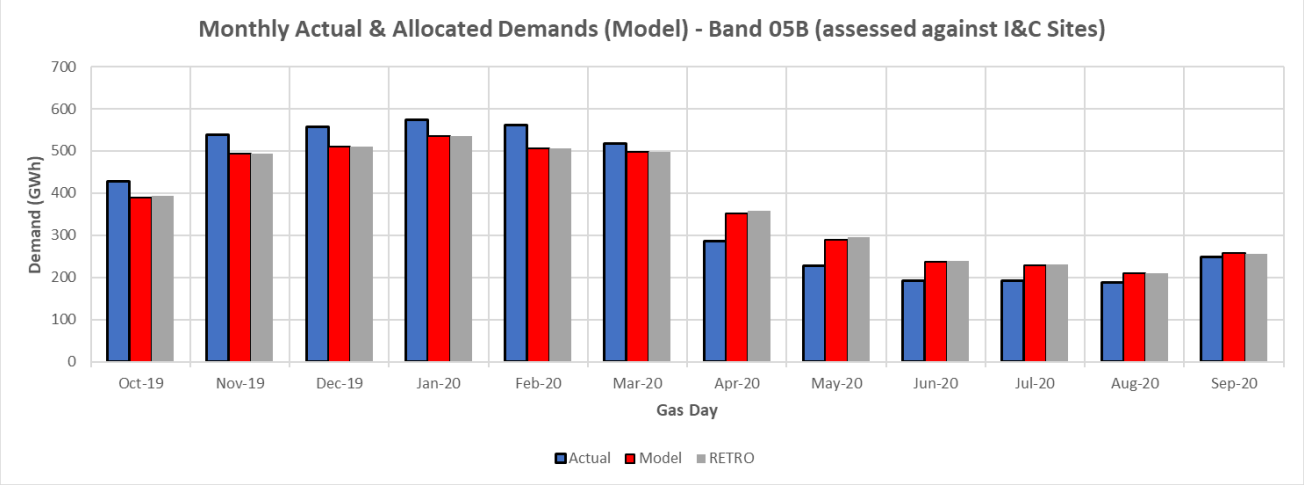



**Figure S12.3.33 – Monthly Actual and Allocated Demands for 06B (across all LDZs)**

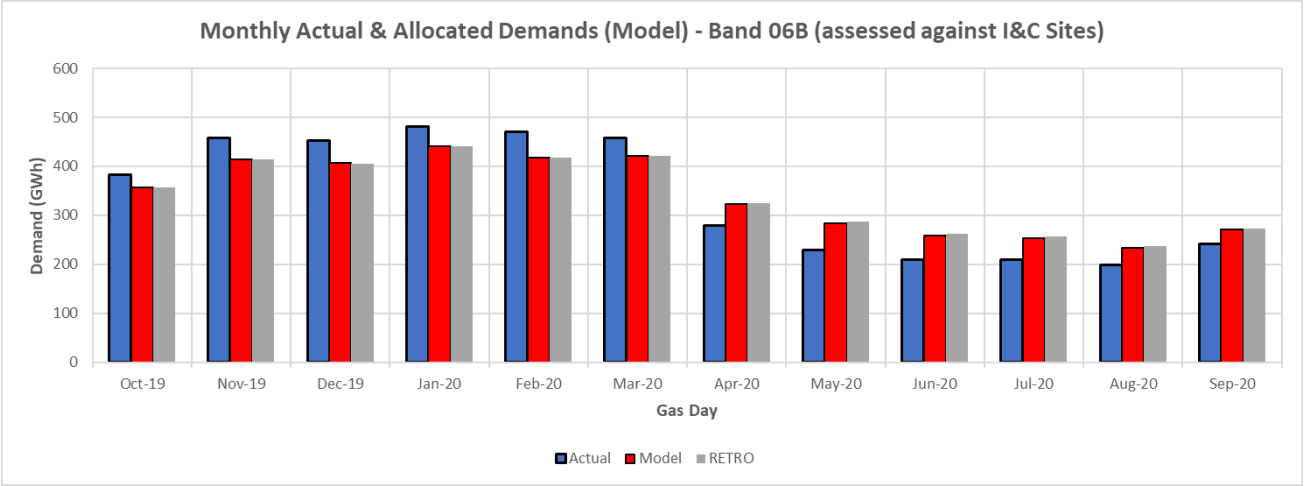



**Figure S12.3.34 – Monthly Actual and Allocated Demands for 07B (across all LDZs)**

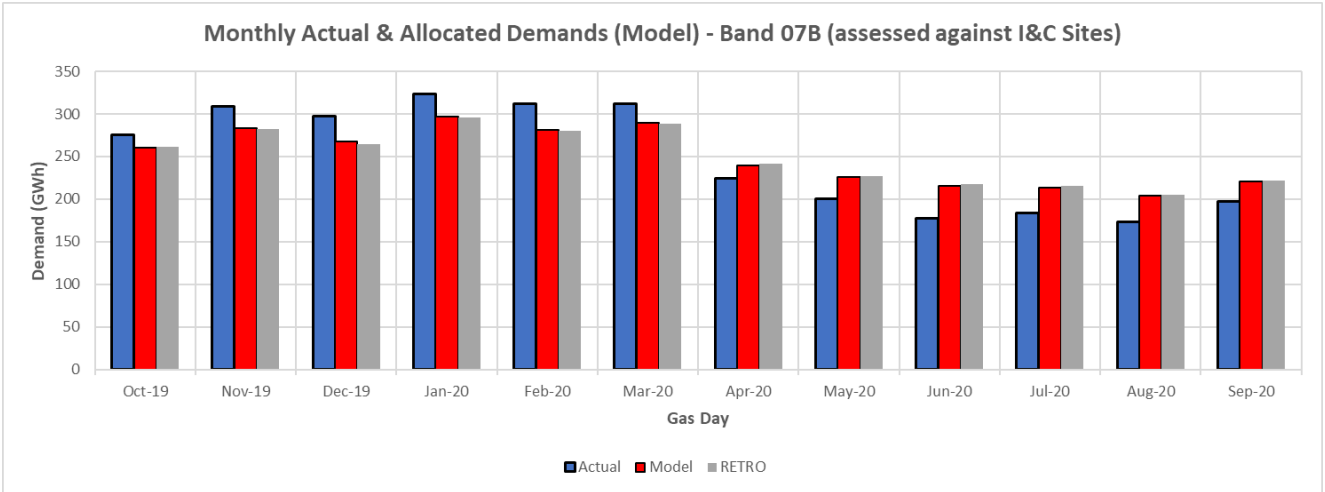


**Figure S12.3.35 – Monthly Actual and Allocated Demands for 08B (across all LDZs)**

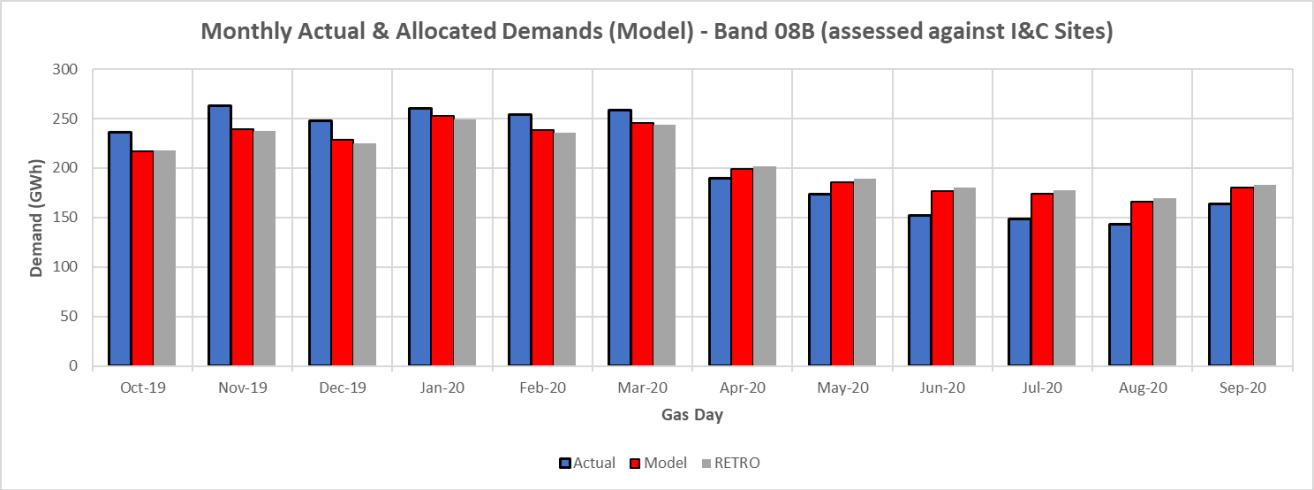



**Figure S12.3.36 – Daily Actual and Allocated Demands for 01BND (across all LDZs) for I&C Sites**

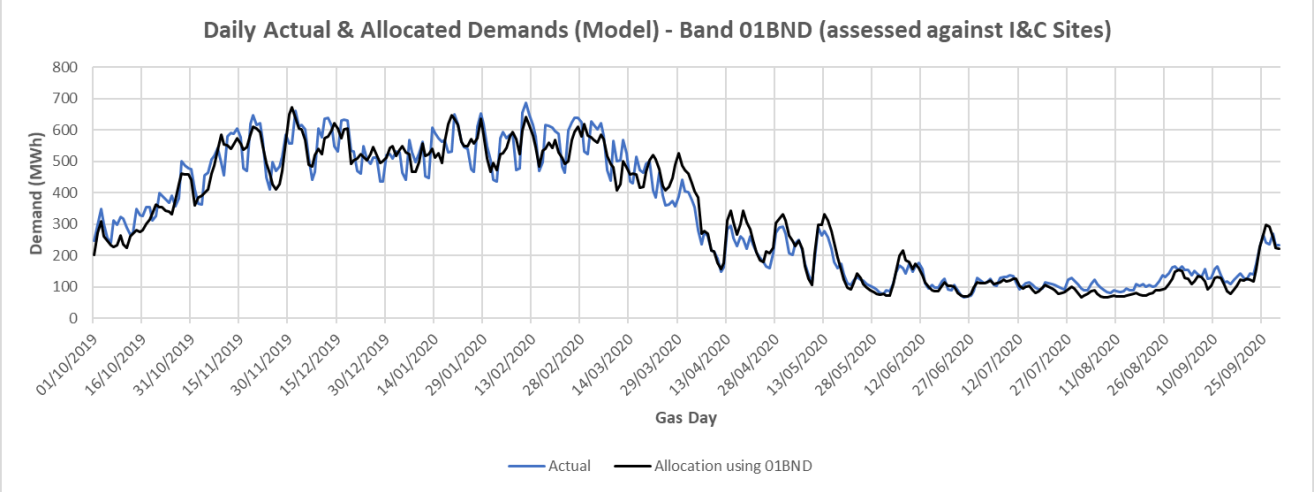



**Figure S12.3.37 – MAPE Summary by EUC (Current versus Previous Year) by Season**

| | MAPE Diff (Retro minus Model) | | |
|---|---|---|---|
| EUC | Winter | FullYear | Summer |
| 01BND | -0.7% | -0.8% | -1.0% |
| 01BNI | -0.8% | -0.5% | -0.1% |
| 02BND | -0.2% | 1.1% | 2.4% |
| 02BNI | -0.5% | 0.8% | 2.2% |
| 03B | -0.2% | 1.8% | 3.8% |
| 04B | -0.4% | 0.8% | 2.0% |
| 05B | -0.3% | 0.6% | 1.4% |
| 06B | -0.1% | 0.6% | 1.3% |
| 07B | 0.1% | 0.6% | 1.1% |
| 08B | 0.0% | 0.4% | 0.8% |