STRAND 3:

NDM DAILY DEMAND ANALYSIS

1 Section Information

1.1 Terms and Abbreviations Used in this Section

In each section any regularly used phrases or abbreviations are set out here as defined terms to provide clarity and avoid repetition in the main body of the document.

Defined Terms

NDMs

- **Small NDM**: < 2196 MWh pa
- **Large NDM**: > 2196 MWh pa

For the purpose of this analysis and the results presented:

- **Sample AQ** – is derived from the sample and is not the core system AQ

Seasons are defined as:

- **Winter** – October to March
- **Summer** – April to September

Abbreviations

- ALP – Annual Load Profile
- CWV – Composite Weather Variable
- DAF – Daily Adjustment Factor
- DESC – Demand Estimation Sub Committee
- EUC – End User Category (see table below)
- NDM – Non-Daily Metered
- WAR – Winter to Annual Ratio
- WCF – Weather Correction Factor

EUC Bands and Attributes (for the purpose of this analysis)

EUC Band	AQ Range (MWh)	Customer Type	Attribute
1	up to 73.2	Domestic Non-Prepayment	01BND
		Industrial & Commercial Non-Prepayment	01BNI
		Domestic Prepayment	01BPD
2	73.2 to 293	Domestic Non-Prepayment	02BND
		Industrial & Commercial Non-Prepayment	02BNI
3	293 to 732	All	03B
4	732 to 2,196	All	04B
5	2,196 to 5,860	All	05B
6	5,860 to 14,650	All	06B
7	14,650 to 29,300	All	07B
8	29,300 to 58,600	All	08B

Note: The Following EUCs (not included in the table) are not analysed due to lack of sample data: 01BPI, 02BPI, 02BPD and WAR Bands.

1.2 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 analysis strands are as follows:

- Strand 1 – Weather Analysis
- Strand 2 – Unidentified Gas Analysis
- Strand 3 – NDM Daily Demand Analysis

This document covers 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 2022/23.

The purpose of this review is to monitor the accuracy of the forecasting and identify areas where there are either concerns or the possibility of improvements.

2. Executive Summary

Overall the results are good and an improvement on the results of the previous Gas Year. We are still seeing the effect of energy conservation due to high energy prices, however there is little impact of in-year behavioural changes.

A deep dive review into 01BNI is suggested, similar to that carried out into 01BND as part of the ad hoc workplan in 2022/23. This is because, despite the improvement this year, the results continue to be poor relative to some of the other EUCs with extensive sample coverage.

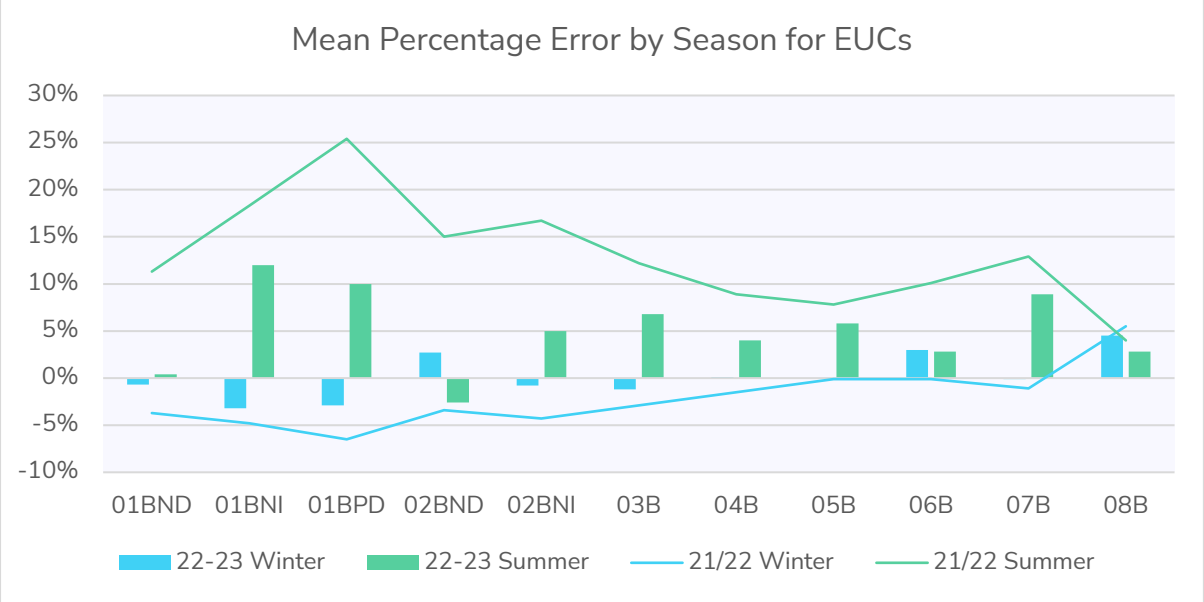
The table below shows the Mean Percentage Error (MPE) and Mean Absolute Percentage Error (MAPE) results for Gas Years 2021/22 and 2022/23, with improvements highlighted green.

	Gas Year MPE		Gas Year MAPE	
	2021/22	2022/23	2021/22	2022/23
01BND	-0.5%	-0.4%	10.9%	8.0%
01BNI	0.3%	0.2%	20.1%	15.2%
01BPD	0.5%	0.2%	21.9%	11.0%
02BND	1.4%	1.1%	23.1%	11.7%
02BNI	1.3%	0.9%	15.8%	8.4%
03B	1.4%	1.1%	12.5%	8.6%
04B	1.6%	1.3%	9.8%	7.2%
05B	2.6%	2.0%	8.5%	8.6%
06B	3.8%	2.9%	11.3%	9.9%
07B	4.7%	3.7%	18.8%	17.5%
08B	4.8%	3.7%	17.0%	20.1%

MPE gives a good indication of the scale and direction of the overall modelling error bias (negative result means an under allocation and positive result means an over allocation), however daily positive and negative errors will offset each other. As MAPE uses the absolute error values, the lower the MAPE the closer the prediction was to the actual value.

The chart below (Figure 2.1) shows the seasonal MPE (Mean Percentage Error) for Gas Year 22/23 and Gas Year 21/22 by End User Category.

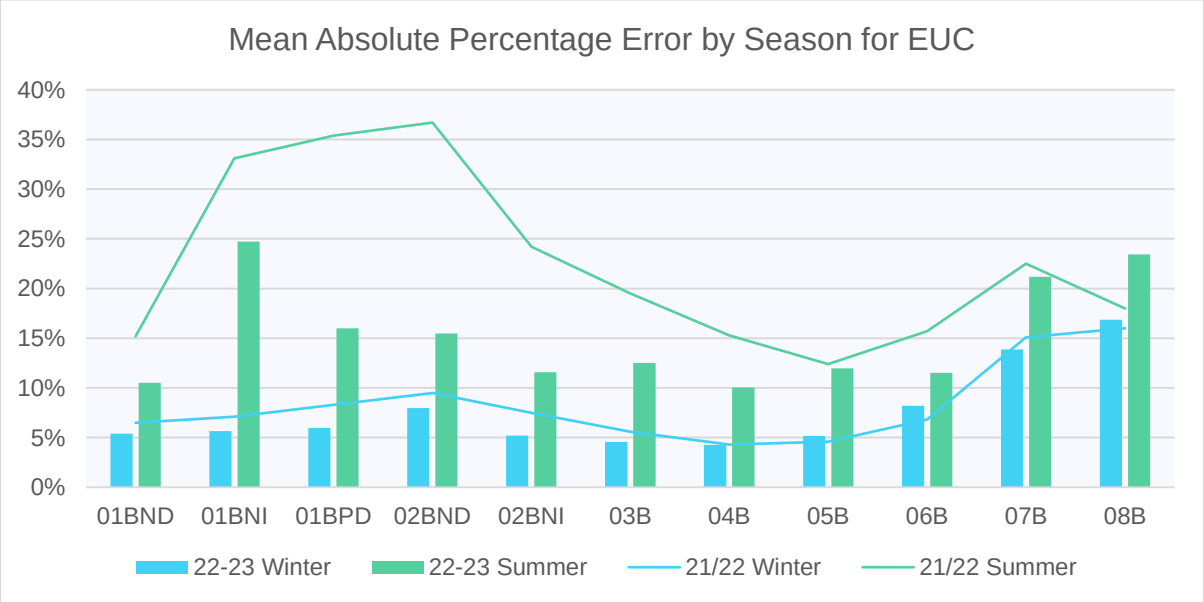
Figure 2.1 Mean Percentage Error (MPE) by Season for EUCs



Apart from 06B **Winter**, the NDM Algorithm for all seasons and full years have performed better in 2022/23 compared to 2021/22. **Summer** values are largely positive, whilst **Winter** is more mixed.

The chart below shows the seasonal MAPE (Mean Absolute Percentage Error) for Gas Year 22/23 and Gas Year 21/22 by End User Category.

Figure 2.2 Mean Absolute Percentage Error (MAPE) by Season for EUCs



For all **Small NDM** EUCs (Band 4 and below) all MAPEs are improved on the previous Gas Year. This is likely to be a result of the increased cost of living having an impact across the whole year instead of mid-year as in 2021/22.

The table below shows the MPE for the latest Gas Year broken down by each EUC/LDZ combination where sample data was sufficient for LDZ level analysis.

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
01BND	-0.6	-0.9	-0.4	-0.6	-0.7	-0.6	-0.5	-0.4	-0.1	-0.3	-0.2	-0.4	0.0	-0.4
01BNI	0.3	-0.2	0.1	-0.2	0.1	0.2	0.2	0.4	0.5	0.6	0.2	0.2	0.4	0.2
01BPD	0.2	0.2	0.2	0.0	-0.1	0.2	0.1	0.5	0.1	0.0	0.2	0.2	0.1	0.2
02BND														1.1
02BNI	0.4	0.9	0.7	0.8	0.8	1.1	0.6	1.4	0.8	1.1	0.9	1.4	0.9	0.9
03B	0.8	1.6	0.9	1.0	1.2	1.3	0.9	1.6	0.9	1.0	1.1	1.7	1.3	1.1
04B	0.8	1.5	1.2	1.4	1.6	1.4	1.1	1.8	1.3	1.1	1.3	1.7	1.5	1.3
05B	1.9	2.4	1.7	2.1	2.3	2.0	1.6	2.6	1.7	1.5	1.8	2.6	2.1	2.0
06B														2.9
07B														3.7
08B														3.7

Most LDZs show a similar result to the overall MPEs for the EUC. Where no breakdown is shown the sample count is insufficient for LDZ level analysis.

The table below shows the MAPEs for each EUC/LDZ combination, where sample data was sufficient for LDZ level analysis.

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Overall
01BND	8.3	8.1	8.4	9.2	8.3	9.9	10.7	8.5	6.6	6.0	6.7	6.4	7.4	8.0
01BNI	15.5	15.3	23.1	12.2	14.7	11.8	11.9	25.9	12.9	12.6	8.6	8.9	17.9	15.2
01BPD	8.4	10.5	10.1	9.4	10.1	8.5	13.1	10.2	11.0	9.7	9.7	16.0	10.3	11.0
02BND														11.7
02BNI	8.7	8.1	12.7	6.6	5.9	6.8	9.6	15.4	8.6	7.8	6.5	8.0	6.0	8.4
03B	6.6	6.9	9.2	10.5	10.0	7.8	8.2	18.3	7.0	6.6	6.9	7.3	13.5	8.6
04B	6.7	5.6	8.0	6.4	10.7	7.6	10.0	6.6	8.8	5.1	6.8	6.1	8.8	7.2
05B	8.2	8.7	7.6	11.2	8.1	8.1	17.1	14.3	7.8	6.1	7.2	10.0	9.1	8.6
06B														9.9
07B														17.5
08B														20.1

Generally, the individual LDZs show a similar MAPE to that of the EUC overall, however, Wales South (WS) has a quite significant MAPE for '01BNI' which is thought to be due to the large number of schools and other government buildings remaining in the sample (see Analysis Introduction section below for more information). Where no breakdown is shown the sample count is insufficient.

3. Strand 3 Analysis Introduction

The performance of the algorithms has been evaluated on three bases this year:

1. **Model** – allocated using 2022/23 ALPs, DAFs, WCFs and NDM sample derived AQs
2. **Retro** – allocated using 2023/24 ALPs, DAFs (adjusted to apply to pattern of days/holidays in 2022/23), WCFs and NDM sample derived AQs
3. **Fallback** – allocated using the 2021/22 ALPs, DAFs (adjusted to apply to pattern of days/holidays in 2022/23, using the old Holiday Codes), WCFs and NDM sample derived AQs

The majority of the analysis presented is on the 'Model' base, that is, on the algorithms that applied to the Gas Year being analysed (i.e. 2022/23). Analysis is on the Model basis unless specified.

The 'Retro' analysis is based on the algorithms derived for the current Gas Year (i.e. 2023/24) but retro fitted with appropriate adjustment for the pattern of days of the week and holidays for Gas Year 2022/23. This analysis is helpful in assessing the performance of the most current algorithms had they applied to the Gas Year being analysed. Retro analysis is available in part 4.4 Retro Analysis.

The 'Fallback' analysis is based on the algorithms derived for Gas Year 2021/22 but with appropriate adjustment for the pattern of days of the week and holiday dates for Gas Year 2022/23. This analysis has been included to allow a comparison of the new holiday codes, introduced by DESC to the Modelling Approach in 2022, to the old holiday codes and is available in part 4.5 Holiday Code Changes.

The AQs used in the NDM daily demand analysis are based on the consumption data of the sample itself rather than system AQs; this removes any bias which might be introduced because of erroneous AQs or AQs that are not reflective of the current seasonal normal demand levels.

Mean Percentage Error (MPE) and Mean Absolute Percentage Error (MAPE) are a measure of prediction accuracy of a forecasting method. MPE gives a good indication of the scale and direction (under or over forecast) of the modelling error bias, however daily positive and negative errors can offset each other. As MAPE uses absolute values, the lower the MAPE the closer the prediction was to the actual value.

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 2022/23 was available from three sources, namely 'Network managed', 'Third Party provided' (which has been provided

by eligible Shippers as per UNC Section H 1.6.10 obligations) and 'Class 3 Read' data. Only supply meter points that are NDM and have passed data validation can be used.

Population and Sample counts are shown at the start of each section. Analysis has been performed on consumption band EUCs only for Bands 3 to 8, as the number of validated supply meter points available are not sufficient to perform analysis on WAR (Winter Annual Ratio) band EUCs. Bands 1 and 2 have been analysed for the heavily populated EUCs (01BND, 01BNI, 01BPD, 02BND and 02BNI) where sufficient validated supply meter points are available.

Once again, a large number of schools were present in the sample data, particularly for LDZ WS. Whilst we have removed the majority, some remain as there would be some schools in a representative sample. Removing the schools still left WS:01BNI with poor results and on further investigation we noticed a large number of the sample meters having zero or very little consumption over summer months. These were identified as government sites, such as libraries, and have been removed from the analysis.

In interpreting this analysis, it is worth considering:

1. The weather conditions that prevailed during Gas Year 2022/23 (please refer to Strand 1 - Weather Analysis).
2. The limitations in using the **Sample AQ**, and the low meter count in some EUC/LDZ combinations.
3. That this analysis is based on validated NDM sample data which is not necessarily representative of the whole population.

4. Assessment

4.1 Domestic EUC Models

This section outlines the results for the domestic EUCs; Band 1 credit meters '01BND' and prepayment meters '01BPD' are at LDZ level and Band 2 credit meters '02BND' are at overall EUC level. No analysis was possible for 02BPD due to lack of sample data.

The table below shows the class 3 and 4 supply point population of the domestic EUCs in units of thousands – e.g. SC for 01BND has a population of 1,908,000 supply meter points (as at October 2023).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
01BND	1908	1167	2602	1353	2347	1985	244	810	1939	2113	2451	1745	1582
01BPD	228.0	139.8	307.3	129.7	194.3	189.5	26.4	91.8	134.5	228.7	222.3	91.8	103.0
02BND	3.4	1.7	4.5	2.7	3.9	3.4	0.3	0.9	3.5	7.6	7.1	2.8	2.2

The table below is a continuation of the table above, with actual values (not in thousands).

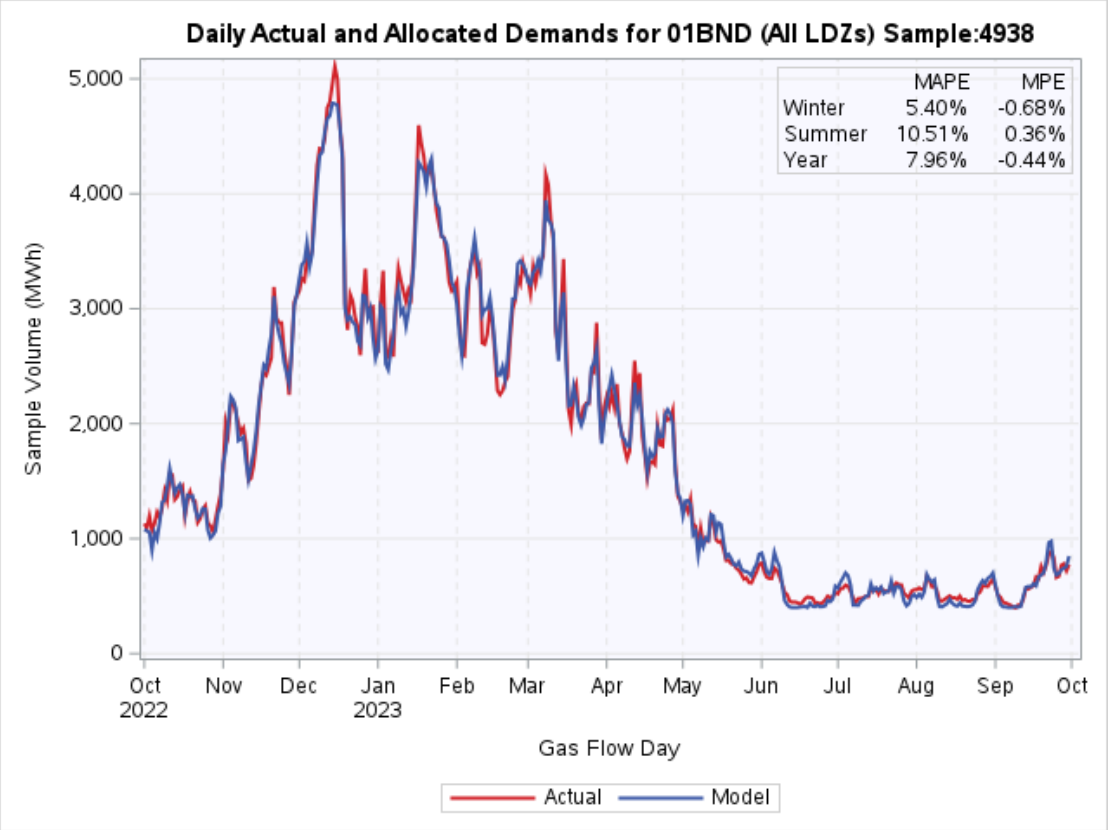
EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
02BPD	143	102	233	130	145	157	8	65	122	215	161	66	61

Band 1 Domestic Credit Meters - 01BND

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 4,938 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
01BND	375	386	381	357	395	394	301	345	397	418	403	392	394	4,938

Figure 4.1.1 Daily Actual and Allocated demands - 01BND



The model shows a good correlation to the actual demand except for some under-allocation on the days with the highest demand as a result of unusually cold weather.

Modelling Error by Season - 01BND

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 01BND.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	-1.8	-1.0	-2.2	-2.1	-1.1	0.7	-2.4	0.6	-0.9	-0.1	0.4	-0.8	1.0
Summer	3.3	-0.4	5.9	4.5	0.7	-4.9	6.3	-3.9	2.4	-1.0	-2.3	1.0	-3.3
Full Year	-0.6	-0.9	-0.4	-0.6	-0.7	-0.6	-0.5	-0.4	-0.1	-0.3	-0.2	-0.4	0.0

This table confirms there were no clear seasonal trends for all areas.

Modelling Error by Month - 01BND

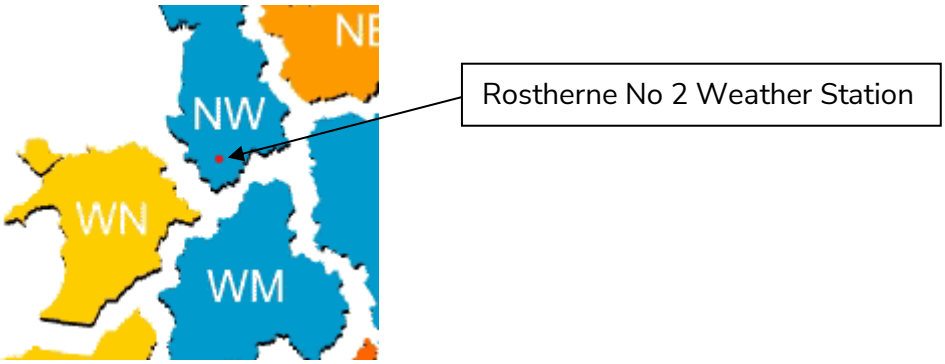
The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 01BND.

Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	-0.6	-3.1	-2.0	-3.7	0.2	-1.7	1.2	-5.3	4.2	-2.8	-8.5	-4.8	-3.9
November	-2.3	1.3	-0.5	-3.0	0.3	0.2	-1.6	-1.0	2.1	-1.1	-0.5	3.4	1.5
December	-4.6	-0.5	-3.2	-4.8	-2.7	-0.2	-4.2	2.2	-3.0	-0.5	1.9	-2.6	-0.3
January	-3.0	-3.5	-3.2	-3.7	-3.6	0.8	-3.9	0.0	-3.3	-0.8	1.8	-2.9	1.9
February	0.6	1.5	0.1	3.6	2.9	5.2	0.4	6.2	2.4	4.1	3.0	3.3	5.6
March	0.8	-1.7	-3.3	-0.3	-1.5	-1.0	-3.0	-2.0	-2.4	-0.9	-1.0	-1.5	-1.0
April	1.7	-5.1	2.0	1.6	0.5	0.1	5.4	-0.8	3.2	1.6	2.0	0.7	-2.9
May	-0.1	1.9	15.4	10.4	1.0	-2.0	23.3	4.5	9.3	4.3	-8.4	-0.6	4.4
June	2.3	8.9	10.6	14.7	3.1	-10.7	2.2	-7.0	-4.0	-7.6	-8.3	-3.6	-8.4
July	16.6	4.9	10.4	-0.4	0.2	-11.5	5.0	-8.8	-3.9	-7.6	-3.6	4.8	-1.9
August	3.2	-1.6	2.4	-2.9	-2.9	-14.4	-2.1	-11.7	-1.2	-4.4	1.7	3.1	-10.9
September	3.4	-0.4	1.1	7.5	2.3	-6.0	-0.6	-10.9	4.4	-1.5	-1.5	3.9	-5.3
Full Year	-0.6	-0.9	-0.4	-0.6	-0.7	-0.6	-0.5	-0.4	-0.1	-0.3	-0.2	-0.4	0.0

Again, there are no clear trends for all areas with only February showing a consistent directional result across all areas (the magnitude is still very different for all LDZs).

WN has a particularly large variance in May, and this is also apparent in some of the other EUCs (01BPD and 05B in particular). Whilst the weather was warm, WN was no warmer than the rest of the UK, however WN uses the NW weather and therefore could have experienced different weather conditions than used in the WCF. This will be investigated further as part of the Seasonal Normal review in 2024, which includes an optimisation of the CWV formula definition.

The map below shows the approximate location of the weather station used for WN and NW for information.



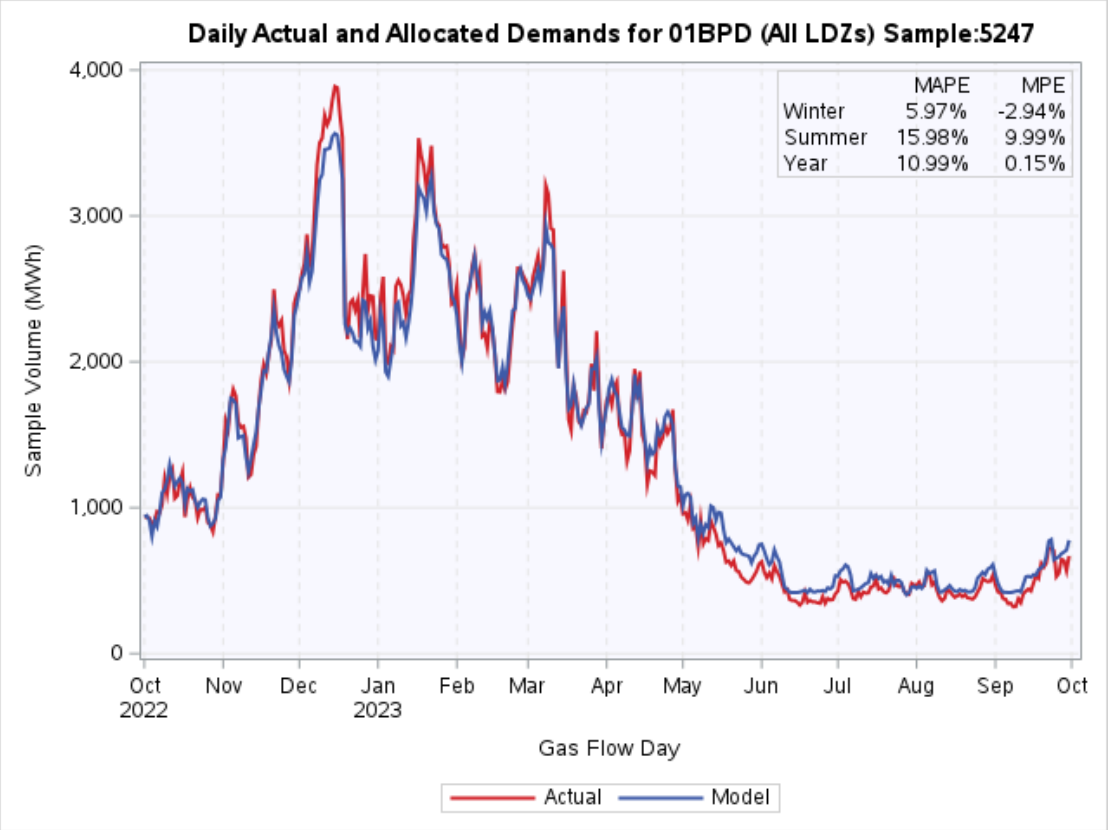
A few areas show an under allocation over the **Summer**, in particular WM. This will also be included in the Seasonal Normal review.

Band 1 Domestic Pre-Payment Meters - 01BPD

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 5,247 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
01BPD	229	365	819	379	353	421	254	257	425	300	227	817	401	5,247

Figure 4.1.2 Daily Actual and Allocated Demands – 01BPD



Over the **Winter** some under-allocation is apparent on the days with the highest demand, whilst **Summer** actual demand was lower than forecast.

Modelling Error by Season - 01BPD

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 01BPD.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	-1.6	-2.9	-3.0	-2.5	-3.0	-2.0	-4.3	-0.6	-3.3	-3.3	-2.6	-4.2	-2.6
Summer	5.4	9.6	10.5	7.9	9.7	7.1	15.0	3.8	10.7	10.0	8.5	15.0	9.1
Full Year	0.2	0.2	0.2	0.0	-0.1	0.2	0.1	0.5	0.1	0.0	0.2	0.2	0.1

This table confirms the seasonal trends of under-allocation in the **Winter** and over-allocation in the **Summer** was apparent for all areas. This suggests the profile is too flat and could be a result of the current model being influenced by the MOD451AV data

(2012/13) which was particularly 'flat' (i.e. less weather sensitive). From 2024/25 the modelling will no longer use this 2012/13 data as there will be 3 Analysis Years of Class 3 and/or Third Party provided data available.

Modelling Error by Month - 01BPD

The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 01BPD.

Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	-2.8	-0.9	-2.3	-6.3	1.9	1.4	0.0	0.9	2.1	6.5	-0.4	12.3	6.8
November	-2.8	-3.6	-3.8	-5.9	-3.7	-3.7	-7.1	-0.8	-3.6	-3.1	-1.6	2.9	-1.0
December	-3.8	-4.7	-6.4	-6.3	-7.3	-5.7	-8.0	-3.0	-6.6	-6.9	-4.0	-7.9	-6.2
January	-1.9	-5.2	-3.9	-2.6	-4.3	-2.7	-5.1	-2.0	-5.3	-6.0	-3.7	-8.5	-3.3
February	-0.3	0.0	1.5	3.9	1.6	3.5	1.4	5.5	2.5	0.3	0.1	-2.7	0.9
March	2.0	-0.7	-0.8	2.0	-1.3	-1.5	-3.2	-2.3	-3.9	-3.3	-3.7	-6.1	-4.8
April	6.5	5.7	7.9	6.4	2.9	3.4	12.9	1.6	3.4	2.3	-1.2	-0.7	-0.4
May	0.2	18.7	25.9	17.8	16.4	14.0	38.9	23.0	8.4	13.6	4.3	18.6	20.0
June	10.0	21.5	17.5	14.3	20.4	14.7	20.8	16.6	11.8	13.7	17.9	29.3	14.8
July	8.1	9.9	3.6	0.5	11.8	2.9	3.4	-6.5	16.8	12.8	14.7	29.5	13.8
August	6.0	2.4	2.5	2.3	8.1	2.9	4.4	-8.9	22.1	13.3	20.1	24.8	7.9
September	5.0	4.1	5.4	4.0	11.8	9.4	6.3	-2.1	22.5	18.9	21.9	28.8	16.5
Full Year	0.2	0.2	0.2	0.0	-0.1	0.2	0.1	0.5	0.1	0.0	0.2	0.2	0.1

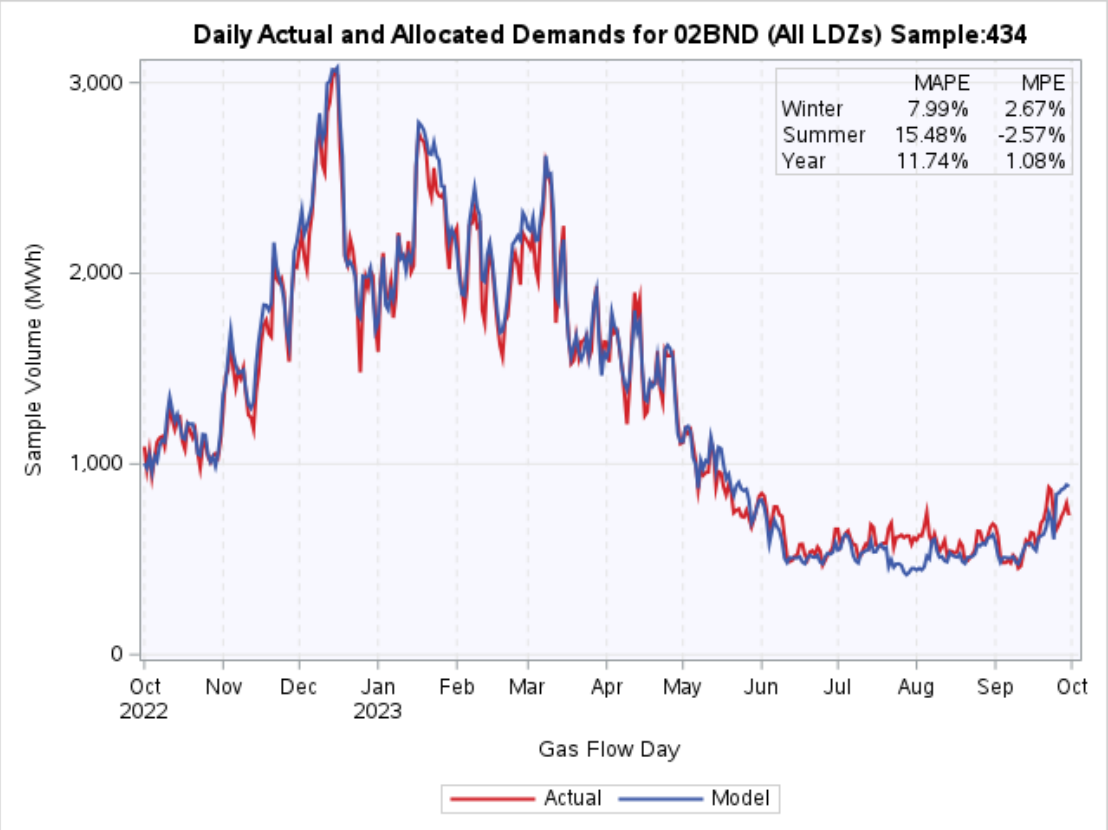
There is over-allocation from early **Summer** onwards for most areas, as consumers continued to reduce their energy use due to the ongoing cost of living crisis.

Please see the 01BND section for more information on the high WN variance for May.

Band 2 Domestic Credit Meters - 02BND

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 434 sample supply points representing this EUC across all LDZs (no breakdown due to small sample count).

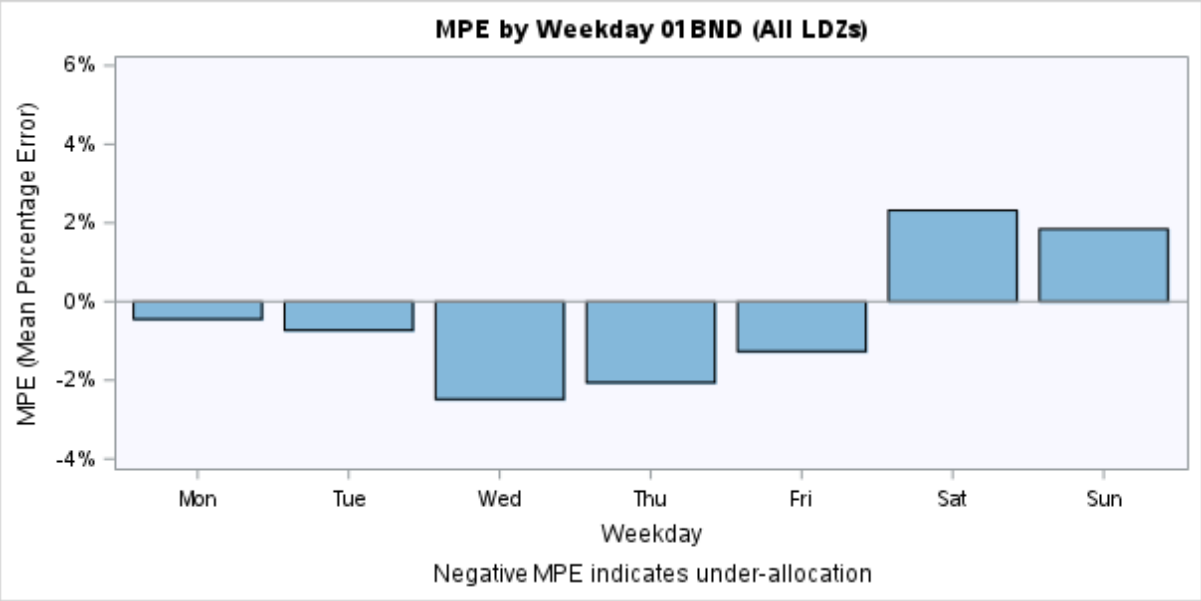
Figure 4.1.3 Daily Actual and Allocated Demands – 02BND



Over the **Winter** there is some over-allocation on the days with the lowest demand. **Summer** is fairly good, except for the Summer Holiday period in late July when there was no reduction in actual consumption.

Domestic Modelling Error by Day of Week (all Domestic EUCs)

Figure 4.1.4 MPE by Weekday – 01BND



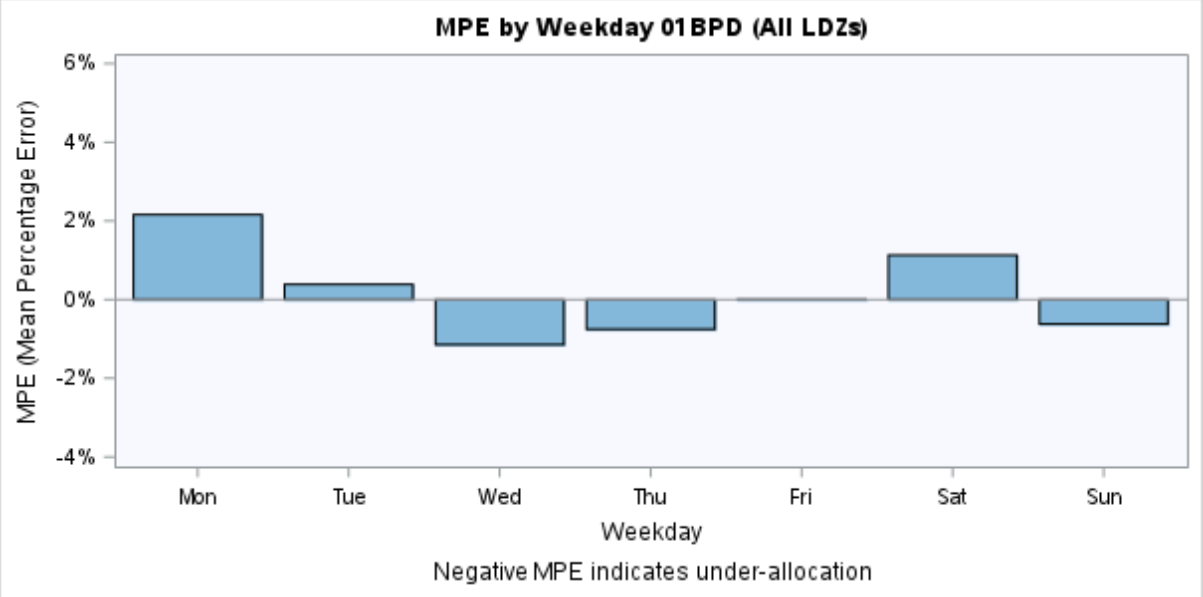
There is an under-allocation for Monday to Friday and an over-allocation for Saturday and Sunday. Last year showed a more significant under allocation for Mondays, however this is not the case in these figures suggesting it may not be an ongoing trend.

The table below shows the same data broken down by LDZ.

Weekday	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Mon	-1.7	-1.9	-1.5	0.1	-2.4	-2.5	-2.6	3.0	-0.2	0.7	0.8	2.2	-0.1
Tue	-0.8	-2.1	-1.2	1.3	-0.4	-1.1	-2.2	-0.1	-1.3	-0.4	-0.2	-0.8	-0.6
Wed	-1.4	-2.6	-2.1	-0.9	-4.0	-4.1	-3.4	-3.4	-2.5	-1.5	-0.7	-3.3	-3.2
Thu	-1.3	-1.9	-1.7	-1.2	-2.9	-3.4	-2.5	-1.8	-2.6	-1.6	-0.2	-2.6	-3.5
Fri	-0.4	-1.2	-0.6	-3.5	-1.4	-3.6	-1.7	-1.7	0.4	-0.7	-1.2	-0.7	-0.4
Sat	0.8	2.5	4.0	-0.2	3.4	6.6	5.6	1.7	2.6	-0.1	0.4	1.5	4.2
Sun	0.7	1.4	1.0	0.6	3.4	5.1	3.8	-0.4	3.6	1.3	-0.5	1.2	4.0

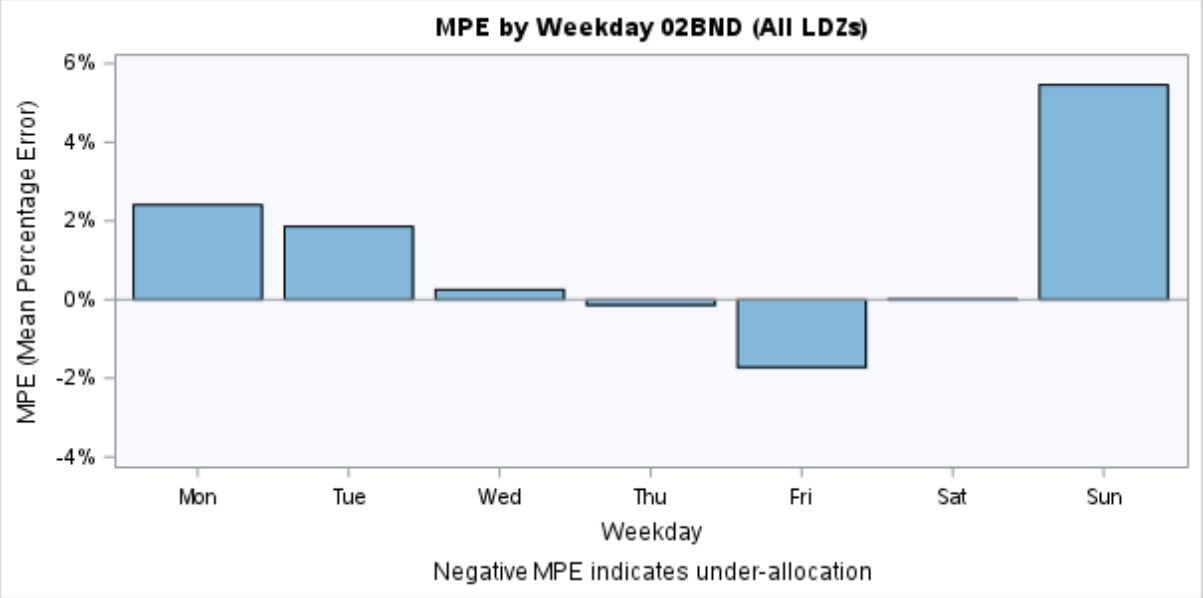
The results are fairly consistent across all the LDZs, with weekdays under-forecast, and weekends over-forecast. This will be picked up in the Day of Week Review as part of the ad hoc workplan for 2023/24.

Figure 4.1.5 MPE by Weekday – **01BPD**



Results indicate an over-forecast on Mondays (c2%) with mixed smaller variances for the other weekdays.

Figure 4.1.6 MPE by Weekday – 02BND

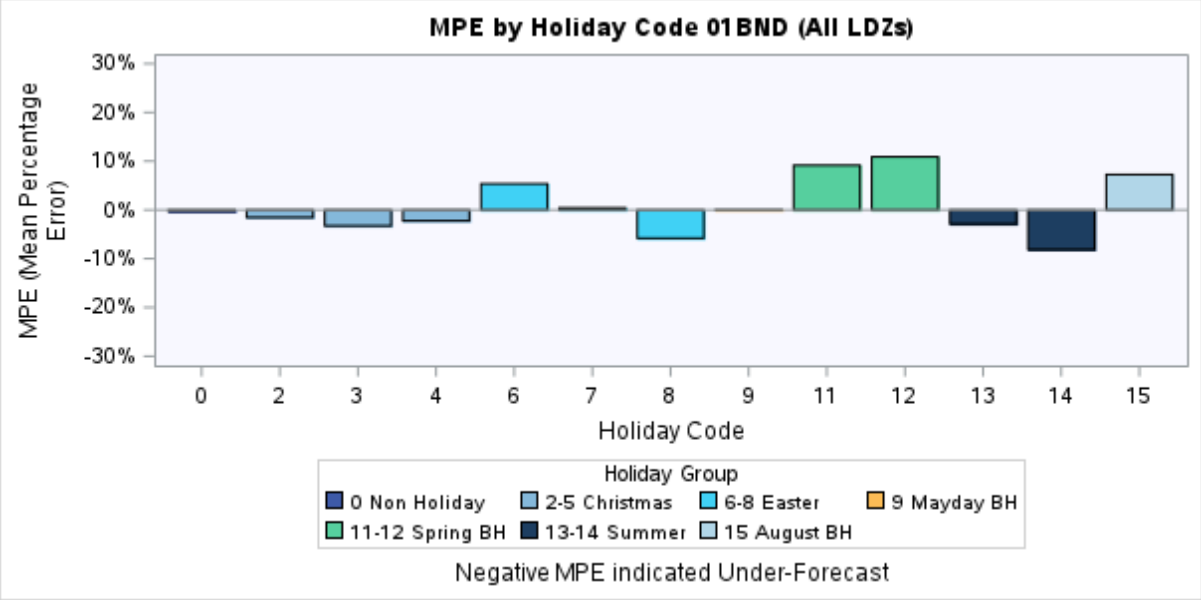


Shows a fairly significant over-forecast for Sundays and smaller mixed results for the other days of the week. This could be due to because the Market Sector Codes are incorrect and some sites are actually I&C.

Modelling Error by Holiday Code - Domestic EUCs

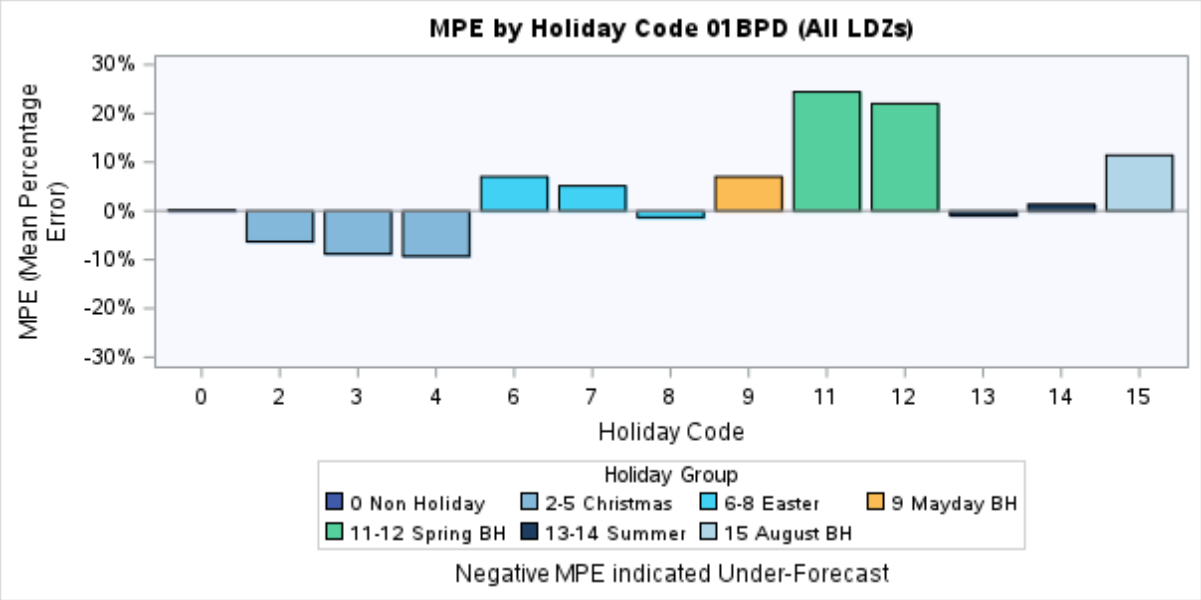
This section reviews the new holiday codes introduced for the 2022/23 Gas Year. For a review of the impact of the changes to the codes, see section 4.5 Holiday Code Changes.

Figure 4.1.7 MPE by Holiday Code – 01BND



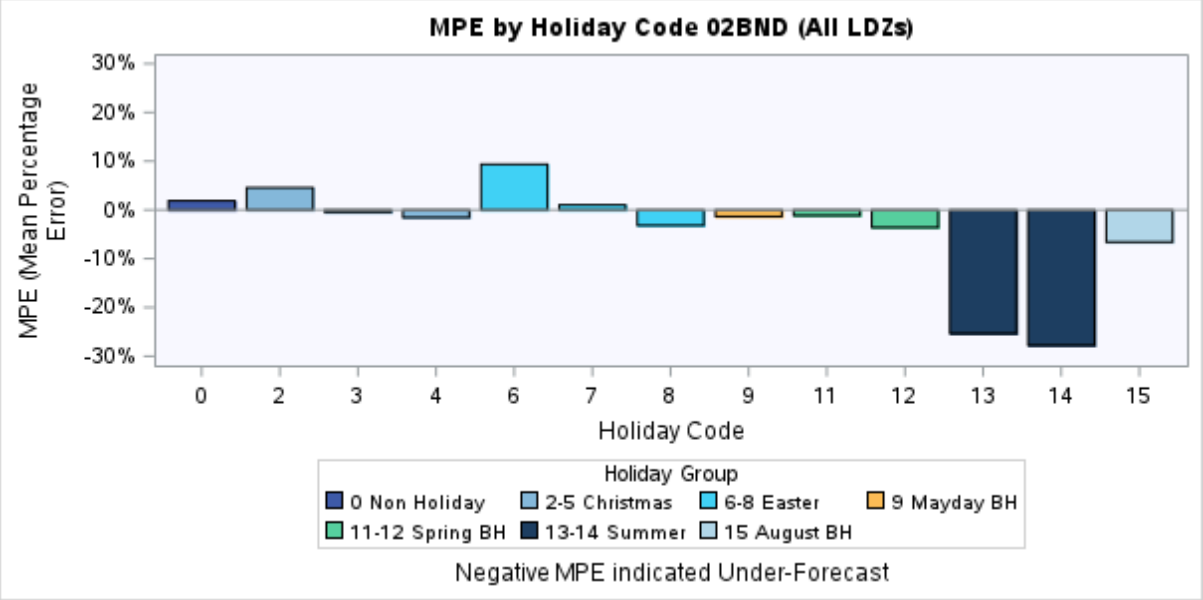
The results across the year are quite mixed and with the spring bank holiday showing the largest overallocation and summer the largest under allocation.

Figure 4.1.8 MPE by Holiday Code – 01BPD



01BPD results are similar to 01BND, but with larger variances for the Spring Bank Holiday.

Figure 4.1.9 MPE by Holiday Code – 02BND



02BND has fairly small variances, with similar values to 01BND for Codes 2-9. The under-allocation for summer however, is more significant than 01BND and may be an indication of incorrectly flagged I&C meters.

4.2 Small NDM Industrial and Commercial EUC Models

This section outlines the results for the **Small** Industrial and Commercial EUCs; Band 1 and 2 credit meters '01BNI' and '02BNI', Band 3 and 4 Bucket Bands '03B'and '04B' are at LDZ level.

The table below shows the population for each **Small** I&C EUC in thousands except where indicated. No analysis was possible for the Band 1 and 2 pre-payment meters due to lack of sample data.

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
01BNI	40.8	26.9	65.2	37.3	53.5	45.5	7.3	20.8	41.3	61.2	56.9	40.4	39.8
02BNI	11.7	7.1	16.0	8.8	13.4	12.4	1.6	4.4	11.0	16.6	14.6	11.2	9.4
03B	4.2	2.2	4.6	2.3	3.7	3.7	0.4	1.2	3.2	5.6	4.1	3.1	2.5
04B	1.8	0.8	1.7	1.0	1.5	1.5	0.2	0.5	1.3	2.6	1.6	1.3	0.9

The table below is a continuation of the table above, with actual values (not in thousands).

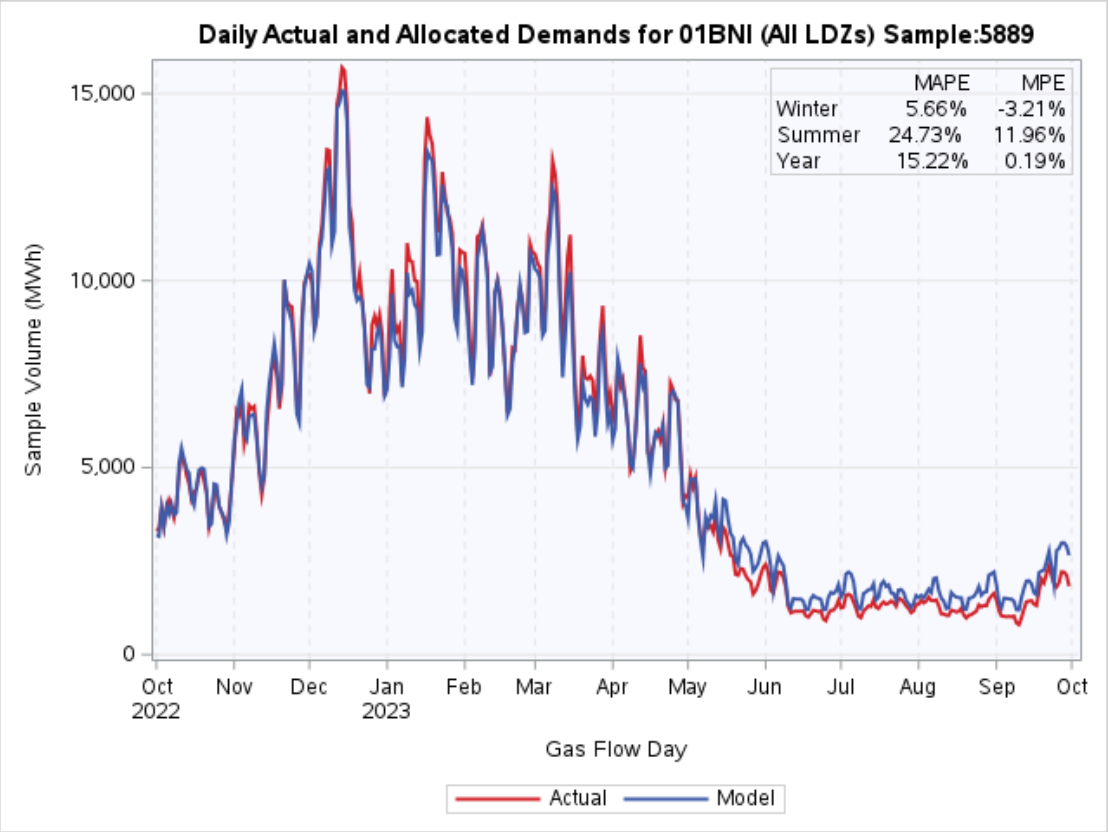
EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
01BPI	175	138	492	214	307	294	49	171	213	619	514	129	203
02BPI	4	4	6	1	4	5	0	1	5	11	5	5	2

Band 1 I&C Credit Meters - 01BNI

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 5,889 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
01BNI	595	515	742	524	504	427	56	373	443	402	499	374	435	5,889

Figure 4.2.1 Daily Actual and Allocated Demands – 01BNI



Over the **Winter** some under-allocation is apparent on the days with relatively high demand, most of which correspond with particularly cold periods in December, January and March.

There is overallocation from May onwards as businesses continued to reduce their consumption because of high energy costs. This was seen to some degree across all LDZs but was particularly prevalent in NW and WS. The over-allocation was exacerbated by the warm weather over the **Summer**, for example during June and September.

Modelling Error by Season – 01BNI

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 01BNI.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	-3.6	-3.0	-5.6	-3.0	-3.1	-2.1	-1.7	-5.0	-2.1	-3.3	-1.4	-1.1	-2.7
Summer	12.5	9.3	22.0	9.5	12.3	8.3	6.3	20.6	8.7	11.8	5.6	5.2	11.7
Full Year	0.3	-0.2	0.1	-0.2	0.1	0.2	0.2	0.4	0.5	0.6	0.2	0.2	0.4

This table confirms the seasonal trends of under-allocation in the **Winter** and over-allocation in the **Summer** were apparent for all areas to varying degrees.

Modelling Error by Month - 01BNI

The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 01BNI.

Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	0.0	-0.5	-0.8	-3.5	-1.8	3.8	-4.8	0.3	-0.5	8.0	-3.8	-4.3	12.7
November	0.8	1.1	-2.5	-0.4	-0.5	1.2	-3.5	-0.8	-0.8	0.4	-0.6	3.8	2.6
December	-3.2	-2.2	-5.6	-3.5	-3.3	-1.5	-2.0	-4.6	-3.3	-3.6	1.1	1.7	-4.2
January	-5.8	-5.8	-7.0	-4.8	-5.9	-4.6	-2.0	-6.7	-4.2	-5.6	-1.2	-3.4	-4.4
February	-5.4	-2.0	-5.2	-1.3	-1.2	-2.5	2.9	-3.3	1.1	-3.5	-0.7	0.5	-2.2
March	-5.3	-6.2	-9.0	-3.5	-4.3	-4.6	-2.1	-10.3	-2.8	-7.9	-4.7	-5.6	-8.8
April	-1.3	-7.6	-1.6	0.1	0.3	-0.8	1.8	-6.3	2.7	-2.9	-1.2	-1.1	-9.1
May	4.5	13.3	27.2	8.3	14.2	12.1	9.1	23.6	3.7	13.9	1.1	7.6	24.9
June	31.8	32.9	57.5	20.6	13.6	18.3	-8.0	55.9	3.9	14.8	8.1	2.4	28.0
July	34.6	33.7	46.5	17.1	24.5	15.5	3.6	54.3	8.4	16.2	11.5	9.3	27.9
August	34.9	23.5	45.8	18.2	29.5	13.2	14.9	59.1	21.8	30.7	16.9	12.7	31.6
September	22.4	17.5	42.5	25.8	36.9	20.4	31.7	49.5	39.5	35.2	26.2	21.3	42.0
Full Year	0.3	-0.2	0.1	-0.2	0.1	0.2	0.2	0.4	0.5	0.6	0.2	0.2	0.4

There is over-allocation from late spring onwards for all areas, rising through the **Summer** as consumers reduce their energy use due to rising energy prices and high temperatures.

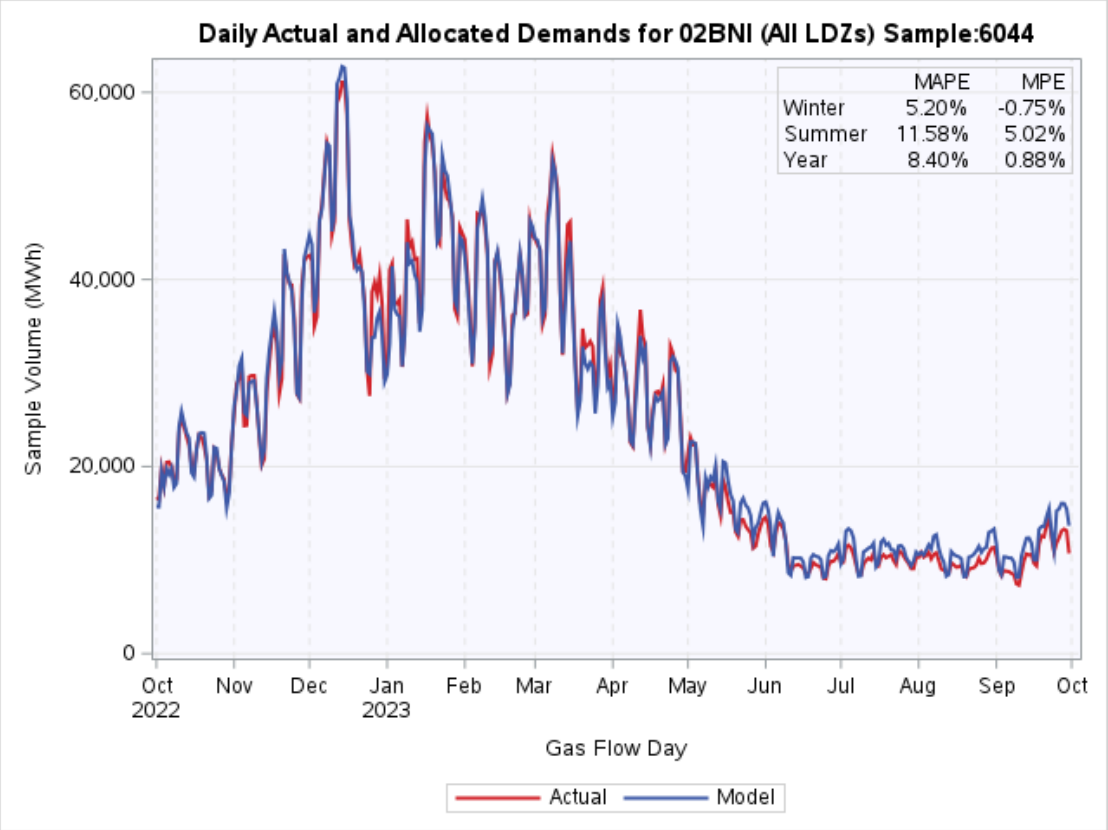
There are significant spikes in MPE for WS and, to a lesser degree NW, in July and August. Investigation into WS in particular, showed a number of government buildings (such as libraries) where consumption dropped to zero over the summer months.

Band 2 I&C Credit Meters - 02BNI

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 6,044 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
02BNI	729	379	790	434	576	557	44	249	351	528	440	536	431	6,044

Figure 4.2.2 Daily Actual and Allocated Demands – 02BNI



Most of the year shows a good correlation between the model and actual demands, there are a few days in **Winter** with under-allocation and over the **Summer** over allocation is seen, similar to 01BNI.

Modelling Error by Season - 02BNI

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 02BNI.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	-2.0	-1.0	-3.8	-0.8	1.0	0.7	-2.1	-2.3	1.5	-1.7	2.2	-0.8	0.4
Summer	6.7	5.9	13.3	4.8	0.3	1.9	7.5	11.4	-0.9	7.3	-2.2	7.1	2.3
Full Year	0.4	0.9	0.7	0.8	0.8	1.1	0.6	1.4	0.8	1.1	0.9	1.4	0.9

Unlike 01BNI, the **Winter / Summer** split is less clear by LDZ, and the overall results are skewed by NW and WS.

Modelling Error by Month - 02BNI

The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 02BNI.

Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	-5.2	-2.7	-2.0	-1.9	0.1	4.8	1.0	4.8	3.6	1.9	-3.6	-0.9	-1.4
November	-0.5	1.7	-2.4	0.3	4.2	3.5	0.6	-0.6	7.3	0.9	3.5	2.4	1.5
December	-1.5	2.2	-2.0	-1.3	0.2	-0.3	-3.2	-2.1	1.1	-2.3	5.0	1.0	1.0
January	-2.8	-2.2	-5.7	-1.6	-0.4	-0.8	-3.5	-3.9	0.2	-2.1	2.6	-2.3	2.1
February	-1.7	-1.3	-3.4	0.9	2.5	1.4	0.7	0.0	3.0	-1.3	3.1	-0.3	1.0
March	-1.3	-4.3	-6.1	-1.2	0.1	-1.4	-5.3	-7.7	-3.2	-4.8	-0.6	-4.2	-3.0
April	0.3	-5.5	0.5	0.3	-0.7	-3.2	-0.3	-1.0	-2.6	-3.4	-1.9	-2.5	-6.3
May	-3.9	8.1	17.4	7.3	2.9	4.6	16.4	13.3	-1.2	6.7	-2.0	7.1	5.1
June	9.9	15.5	20.5	5.6	-3.1	2.4	12.8	16.6	-6.4	9.9	-6.8	9.4	3.0
July	20.7	13.6	19.7	2.5	-1.1	1.3	12.0	17.5	-2.7	11.7	-6.4	10.0	7.0
August	17.7	10.2	23.9	6.9	-0.3	2.8	4.9	21.5	3.2	14.4	-1.7	16.9	6.6
September	14.4	12.8	18.7	12.7	4.3	11.2	8.7	21.4	8.9	21.3	5.9	19.6	11.6
Full Year	0.4	0.9	0.7	0.8	0.8	1.1	0.6	1.4	0.8	1.1	0.9	1.4	0.9

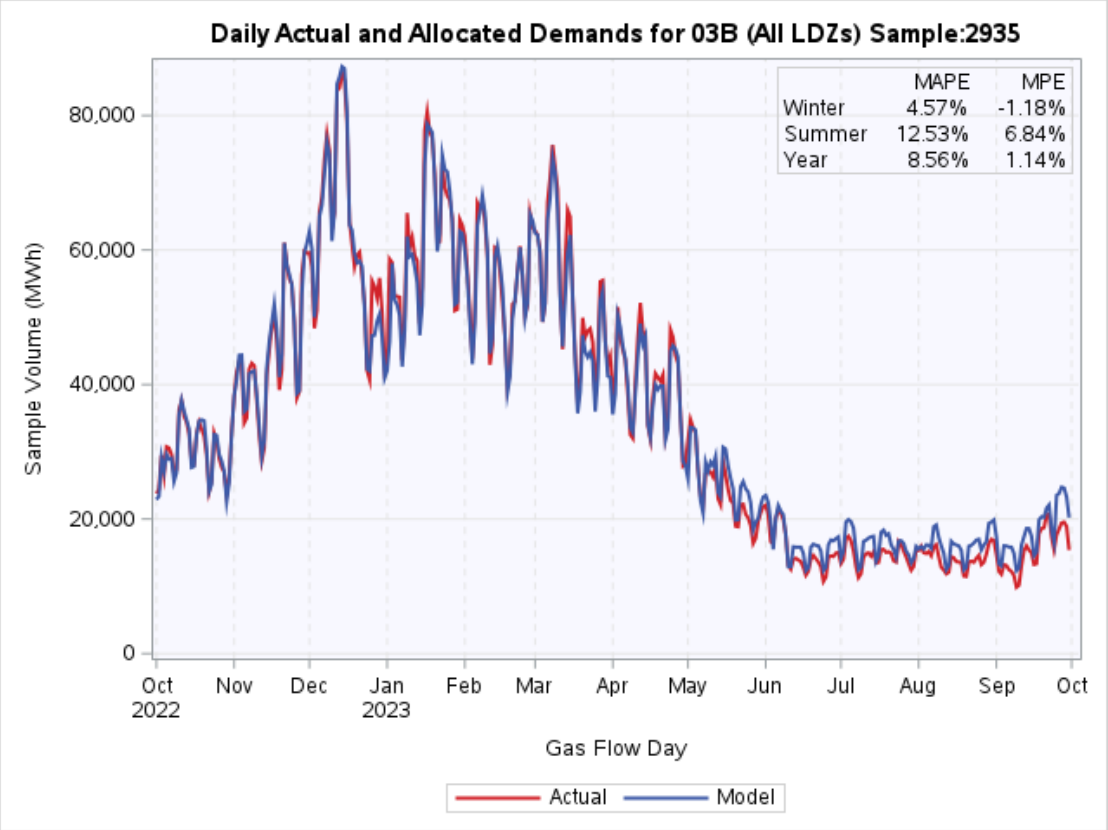
A mixed picture of under and over-allocations with only September showing a consistent view across all areas.

Band 3 I&C Meters - 03B

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 2,935 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
03B	459	151	326	188	236	207	31	122	219	291	280	239	186	2,935

Figure 4.2.3 Daily Actual and Allocated Demands – 03B



Over the **Winter** some under-allocation is apparent on a few days around the Christmas/New Year holiday period. **Summer** shows an over-allocation, similar to other EUCs.

Modelling Error by Season - 03B

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 03B.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	-0.5	0.6	-2.3	-2.7	-2.4	-0.8	-1.1	-4.5	-0.2	-0.4	-0.2	0.0	-2.7
Summer	4.2	3.9	8.8	10.7	10.9	6.3	5.4	18.4	3.9	4.2	4.0	5.7	11.8
Full Year	0.8	1.6	0.9	1.0	1.2	1.3	0.9	1.6	0.9	1.0	1.1	1.7	1.3

This table confirms the seasonal trends of slight under-allocation in the **Winter** for most LDZs and over-allocation in the **Summer** for all areas.

Modelling Error by Month - 03B

The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 03B.

Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	-1.6	1.8	-2.5	-7.3	4.4	6.0	-1.2	-3.0	-2.5	2.8	-1.8	-1.9	5.4
November	1.2	6.5	-0.8	-1.2	1.2	0.7	-1.6	-1.5	0.7	2.9	0.6	2.4	2.1
December	-2.3	4.5	-0.9	-3.1	-2.7	-0.8	-0.9	-6.3	1.9	-0.1	1.8	1.3	-4.2
January	-1.6	-2.9	-2.5	-5.7	-4.2	-2.4	-0.1	-5.2	-0.4	-0.7	0.8	0.3	-3.5
February	0.9	-2.4	-2.5	-0.8	-2.9	-0.6	-1.5	-1.7	2.7	1.3	0.4	1.2	-3.6
March	0.8	-2.6	-4.4	1.0	-6.1	-4.0	-1.4	-7.4	-4.5	-6.1	-3.8	-3.8	-7.1
April	1.8	-3.2	-1.2	0.3	0.1	-1.8	0.8	-2.6	0.4	-3.5	-3.8	-3.6	-8.1
May	-0.2	3.5	8.1	11.8	11.6	2.2	10.4	17.7	1.5	2.5	3.6	6.3	14.1
June	4.9	7.5	16.6	17.3	12.4	6.8	2.3	34.1	-2.0	4.4	4.4	9.0	20.1
July	10.9	8.2	12.4	12.8	14.3	10.7	6.6	31.8	5.5	6.9	4.9	10.5	25.7
August	7.8	7.4	14.0	17.4	20.3	14.0	4.2	38.0	11.9	11.3	11.1	12.1	26.2
September	6.5	10.2	18.9	22.4	26.7	21.6	12.6	35.0	16.4	17.9	19.2	16.5	32.0
Full Year	0.8	1.6	0.9	1.0	1.2	1.3	0.9	1.6	0.9	1.0	1.1	1.7	1.3

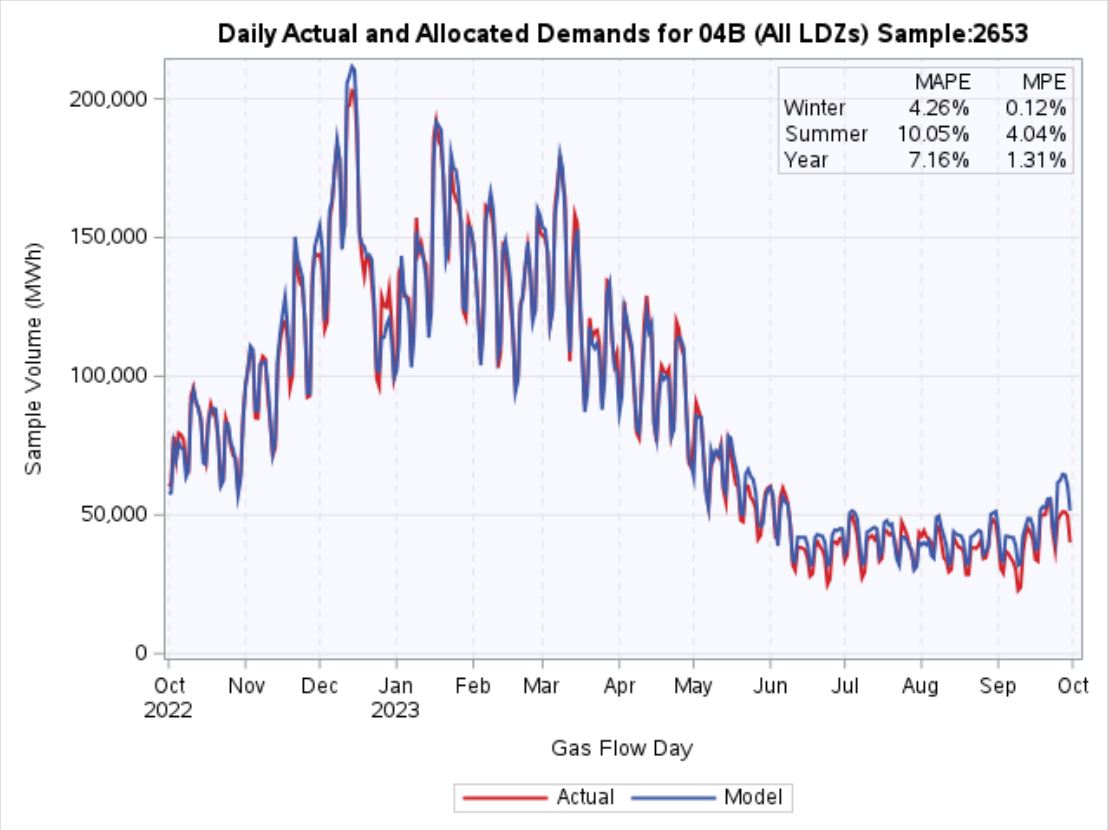
There is some over-allocation over the summer for all areas, likely to be a result of energy saving as a result of continued high prices. Modelling Error is generally worse over the Summer period due to much lower demands.

Band 4 I&C Meters - 04B

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 2,653 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
04B	393	175	214	214	201	192	31	107	176	240	306	253	151	2,653

Figure 4.2.4 Daily Actual and Allocated Demands – 04B



There is little variance between Actual and Allocated demand for **Winter**, except for a couple of days over the Christmas/New Year period. There is some over-allocation from May onwards, a trend that is seen across all I&C EUCs.

Modelling Error by Season - 04B

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 04B.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	0.9	0.8	-1.4	0.1	-2.0	-0.1	-2.3	2.1	-0.6	0.9	0.2	1.3	-0.7
Summer	0.5	3.0	7.1	4.1	10.4	4.9	8.9	1.1	5.8	1.8	3.9	2.5	6.3
Full Year	0.8	1.5	1.2	1.4	1.6	1.4	1.1	1.8	1.3	1.1	1.3	1.7	1.5

This table confirms the over-allocation in the summer was apparent for all areas to varying degrees.

Modelling Error by Month - 04B

The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 04B.

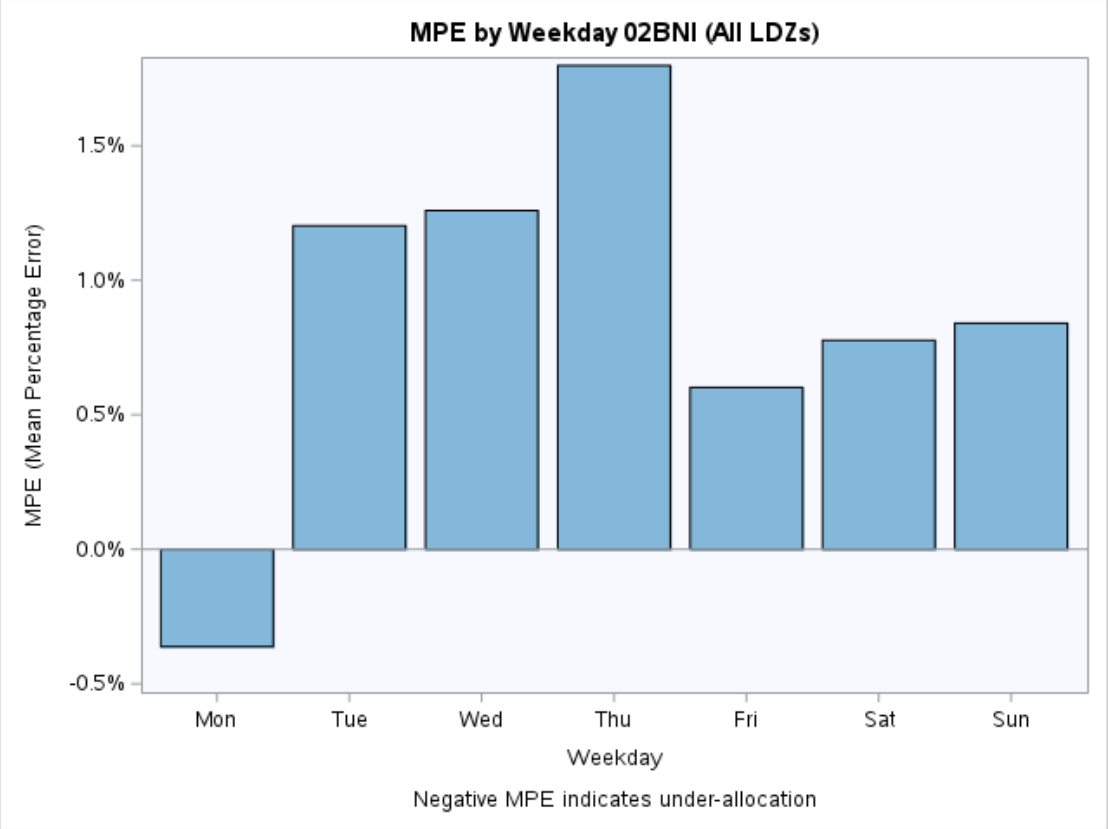
Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	-8.7	-0.7	-0.2	1.3	2.4	-5.3	1.3	-0.6	0.6	1.0	1.9	-0.7	-5.6
November	0.3	3.9	-0.1	4.5	2.3	-1.5	-7.6	4.9	1.3	2.8	3.9	5.8	0.7
December	3.2	4.1	-1.6	-0.8	-2.9	3.2	-0.7	3.3	-0.7	0.6	2.3	2.4	1.2
January	2.0	-0.1	-3.3	-2.6	-5.1	-0.1	-1.8	2.6	-1.0	0.4	-1.0	1.2	0.7
February	2.2	-1.3	0.0	1.8	-2.1	-0.6	-2.1	2.6	1.1	3.0	-1.1	1.6	0.4
March	2.7	-1.4	-2.2	-1.5	-3.5	1.0	-2.1	-1.3	-3.7	-2.0	-3.4	-2.4	-3.5
April	-1.2	-2.7	-0.3	-0.5	-0.5	0.1	1.0	-2.7	0.7	-0.7	-2.4	-0.6	-4.5
May	-7.9	2.7	6.6	5.9	6.9	3.1	9.4	6.3	2.1	1.2	5.1	4.0	4.8
June	3.4	6.2	14.3	6.3	16.2	8.6	3.2	1.2	6.6	-0.4	4.3	2.8	10.4
July	5.6	6.5	6.9	0.0	13.1	3.4	2.4	-6.1	4.8	-1.4	1.5	0.0	9.3
August	3.7	5.2	8.5	6.1	18.9	5.5	17.5	-0.3	10.3	2.1	5.5	0.7	13.2
September	6.5	8.0	17.2	12.7	27.8	17.3	34.5	12.6	22.6	14.3	19.6	12.4	22.0
Full Year	0.8	1.5	1.2	1.4	1.6	1.4	1.1	1.8	1.3	1.1	1.3	1.7	1.5

The seasonal over-allocation in summer is more pronounced for some areas, particularly EM and WN. Only September shows a consistent over-allocation across all LDZs.

Small I&C Modelling Error by Day of Week

The chart below shows the modelling error (MPE - Mean Percentage Error) by day of week across the whole year for 02BNI.

Figure 4.2.5 MPE by Weekday – 02BNI



The results for 03B and 04B show a very similar pattern to 02BNI, with under-forecasting on Mondays. 01BNI variances are also small, however, under-allocation is only seen on Sunday, with Monday like the other weekdays.

The table below shows the same results broken down by LDZ.

Weekday	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Mon	-3.5	-0.8	-4.2	1.4	1.8	1.9	-0.7	-6.9	4.4	1.6	1.5	0.3	0.0
Tue	0.7	0.2	-1.8	2.3	3.2	3.2	2.6	-4.9	5.1	1.6	3.0	0.0	1.2
Wed	1.3	0.0	-2.6	2.1	3.2	3.4	2.2	-4.1	5.4	1.7	3.6	0.1	1.1
Thu	1.8	2.9	-1.1	3.0	3.0	4.1	4.0	-5.0	5.4	1.7	3.8	0.3	1.1
Fri	-1.2	1.6	0.8	0.6	-0.4	0.8	-2.1	1.7	-0.3	1.2	1.4	1.2	2.1
Sat	1.8	0.3	12.3	-1.6	-5.1	-6.0	-0.6	31.5	-12.5	-0.7	-5.2	5.2	0.8
Sun	2.8	2.7	6.3	-3.4	-1.7	-1.9	-2.2	12.0	-5.3	0.0	-3.7	3.8	0.2

The MPEs are more varied when viewed at LDZ level, with the Monday under-allocation driven by only a few areas, and mixed results across the weekends.

Small I&C Modelling Error by Holiday Code

This section reviews the new holiday codes introduced for the 2022/23 Gas Year. For a review of the impact of the changes to the codes, see section 4.5 Holiday Code Changes.

The charts below show the modelling error (MPE - Mean Percentage Error) by holiday code.

Figure 4.2.6 MPE by Holiday Code – 01BNI

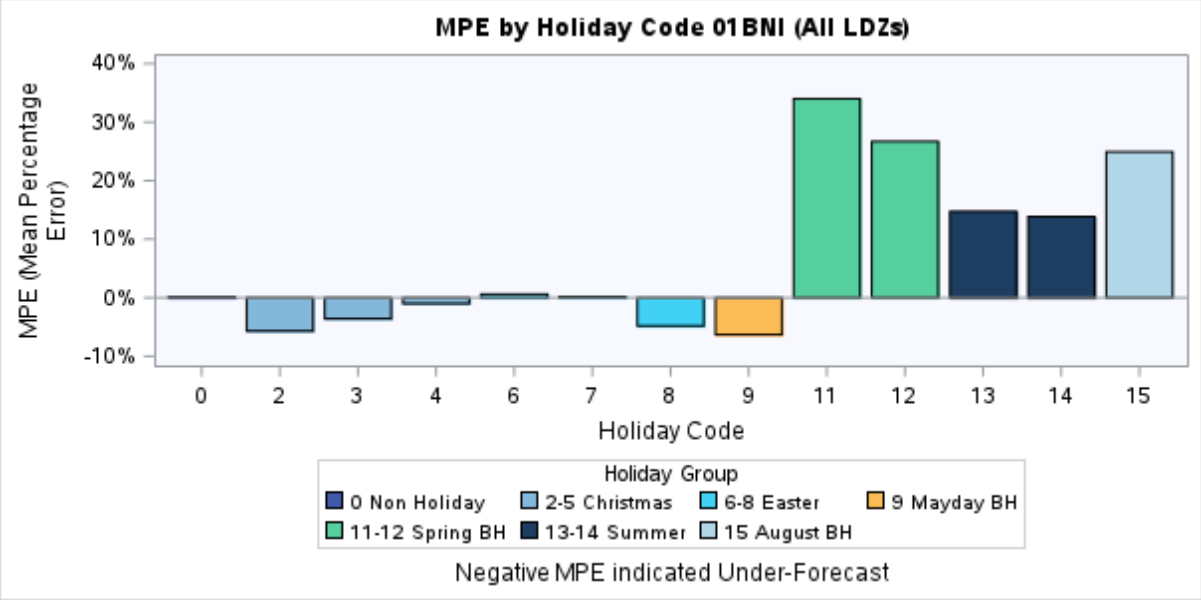
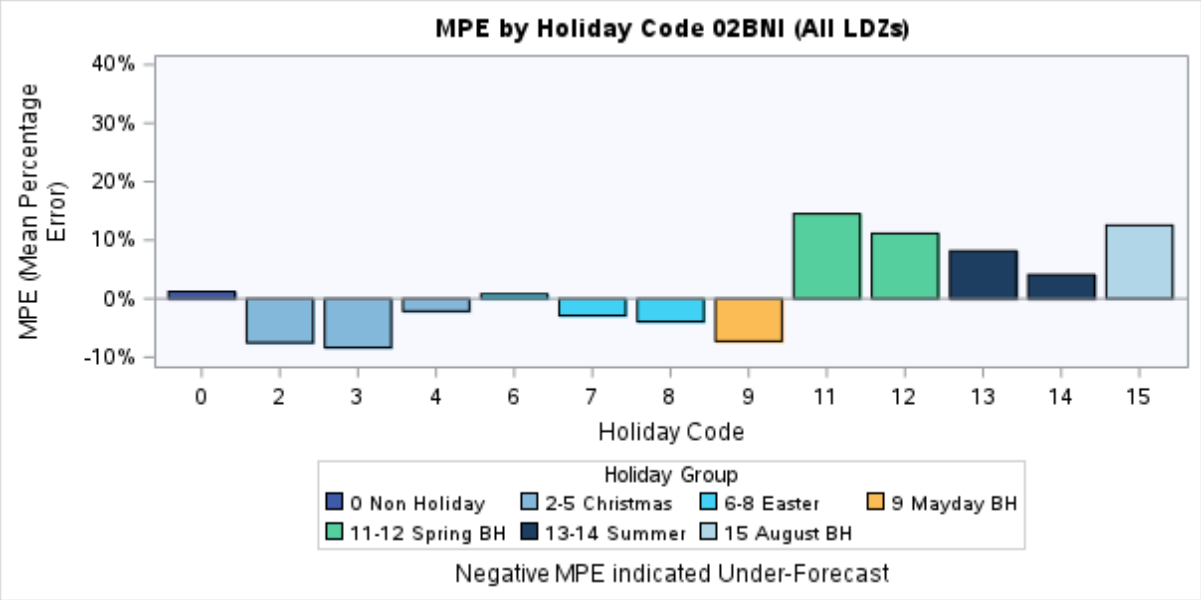


Figure 4.2.7 MPE by Holiday Code – 02BNI



All **small** I&C EUCs have a similar trend of under-allocation in the **Winter** and over-allocation in the **Summer**. This is more pronounced for 01BNI, whilst 03B and 04B results are very similar to 02BNI.

4.3 Large NDM Industrial and Commercial EUC Models

This section outlines the results for the **Large** Industrial and Commercial EUCs; Band 5 meters '05B' are at LDZ level, Bands 6, 7 and 8 ('06B', '07B' and '08B') are at EUC level due to lack of sample data.

The table below shows the total population size for each of the **Large** I&C EUCs.

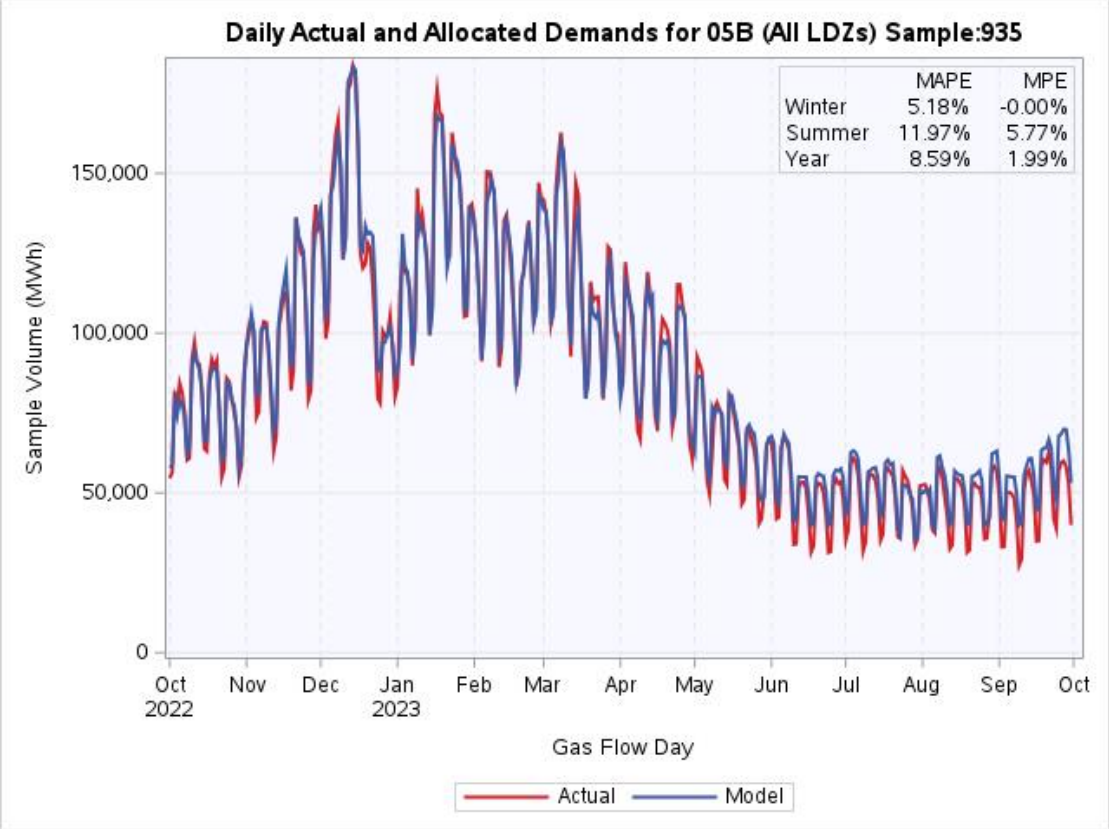
EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
05B	446	199	475	241	394	406	51	137	273	672	333	238	191
06B	123	75	180	94	174	122	24	50	112	186	94	91	92
07B	51	31	75	40	90	53	12	22	44	38	22	30	40
08B	18	14	44	16	49	31	6	14	28	21	20	16	20

Band 5 I&C Meters - 05B

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 935 sample supply points representing this EUC across all LDZs (breakdown in table below).

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
05B	132	75	85	79	75	88	12	36	60	91	103	62	37	935

Figure 4.3.1 Daily Actual and Allocated Demand 05B



There is little variance between Actual and Allocated demand for **Winter**, **Summer** shows some over-allocation, particularly for weekends.

Modelling Error by Season - 05B

The table below shows the seasonal modelling error (MPE - Mean Percentage Error) by LDZ for 05B.

Season	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
Winter	-0.9	0.4	-0.7	-1.7	1.4	0.8	-6.0	1.0	-0.7	0.9	1.3	-0.8	0.3
Summer	7.1	6.2	5.9	9.6	3.9	4.2	17.5	5.9	6.5	2.5	2.8	9.6	5.2
Full Year	1.9	2.4	1.7	2.1	2.3	2.0	1.6	2.6	1.7	1.5	1.8	2.6	2.1

Winter variances are very small, with the exception of WN, where a sample of only 12 meters means it is likely to be seasonally skewed due to the sample. **Summer** shows an over-allocation for all areas, similar to other I&C EUCs.

Modelling Error by Month - 05B

The table below shows the monthly modelling error (MPE - Mean Percentage Error) by LDZ for 05B.

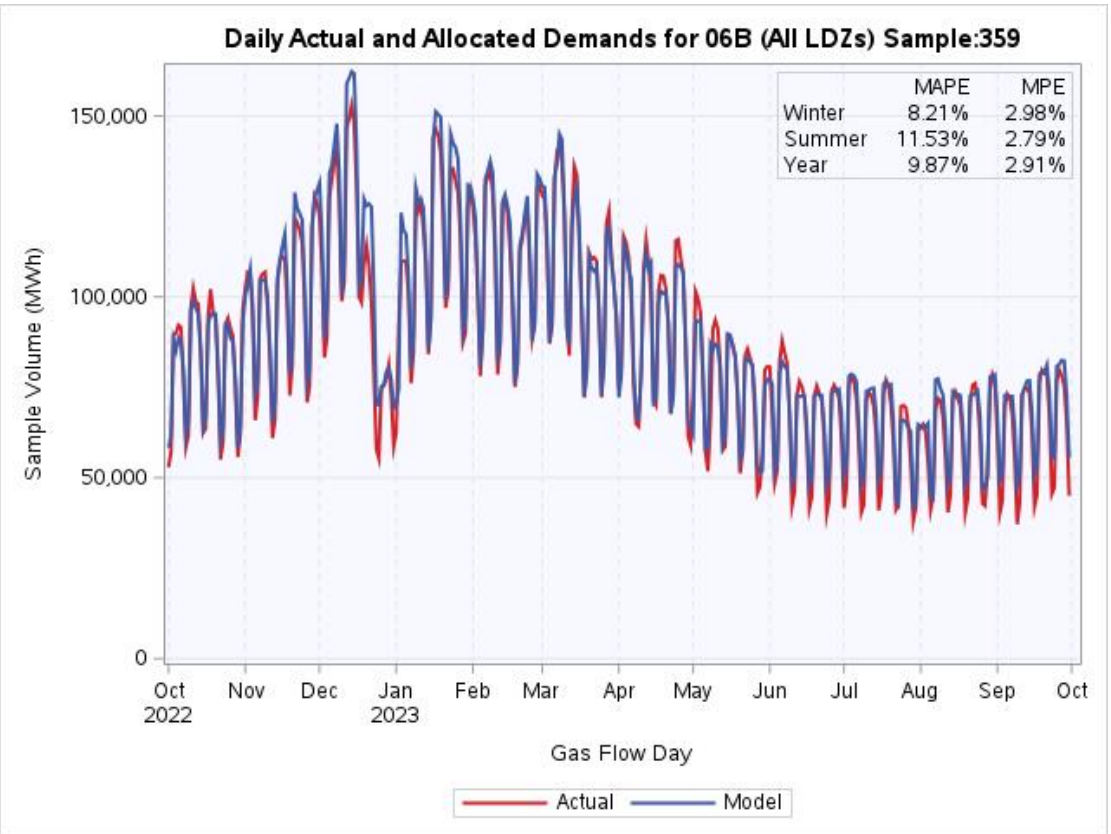
Month	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
October	-0.4	3.1	-0.5	-4.2	-6.5	-5.8	5.6	2.1	2.7	5.9	2.8	0.8	1.8
November	-0.7	4.3	1.4	3.6	-1.8	0.0	0.3	5.2	1.8	7.8	2.1	2.7	-0.7
December	-1.0	1.3	4.2	-1.1	6.7	7.5	-8.4	10.1	-0.7	1.5	2.9	1.6	3.0
January	-2.1	-2.9	-2.3	-3.0	1.7	0.0	-10.2	-4.6	-2.2	0.5	2.1	-3.1	-0.5
February	-0.3	-0.3	-1.1	-0.4	2.4	1.4	-9.1	-0.7	-1.9	-1.2	-0.1	-1.2	-0.6
March	-0.4	-1.1	-5.3	-4.7	3.6	-0.5	-7.7	-4.1	-1.9	-5.2	-1.7	-4.3	-0.6
April	-1.4	-0.3	-2.9	-0.5	4.0	1.6	-5.2	5.8	0.2	-3.2	0.2	-3.3	-1.8
May	-1.4	-1.6	1.7	4.3	-0.2	-0.9	23.9	10.2	4.0	8.4	5.0	8.8	-0.6
June	12.7	8.5	10.3	19.8	3.1	11.0	36.8	1.2	7.6	2.3	0.0	17.0	14.1
July	16.0	10.6	5.9	14.2	-0.1	3.8	27.5	-3.1	5.8	-3.0	0.1	11.4	5.7
August	14.1	10.4	10.7	8.8	7.8	4.7	18.3	4.0	10.9	-0.6	1.6	15.7	7.8
September	13.6	19.2	18.1	22.0	10.1	8.8	29.3	17.6	18.8	16.0	12.1	25.0	15.4
Full Year	1.9	2.4	1.7	2.1	2.3	2.0	1.6	2.6	1.7	1.5	1.8	2.6	2.1

Generally, the **Winter** is slightly under-allocated and the **Summer** over-allocated, but this isn't consistent across all LDZs. The sample for WN is too low to draw a conclusion from the figures.

Band 6 I&C Meters - 06B

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 359 sample supply points representing this EUC across all LDZs (no breakdown due to small sample count).

Figure 4.3.2 Daily Actual and Allocated Demand - 06B

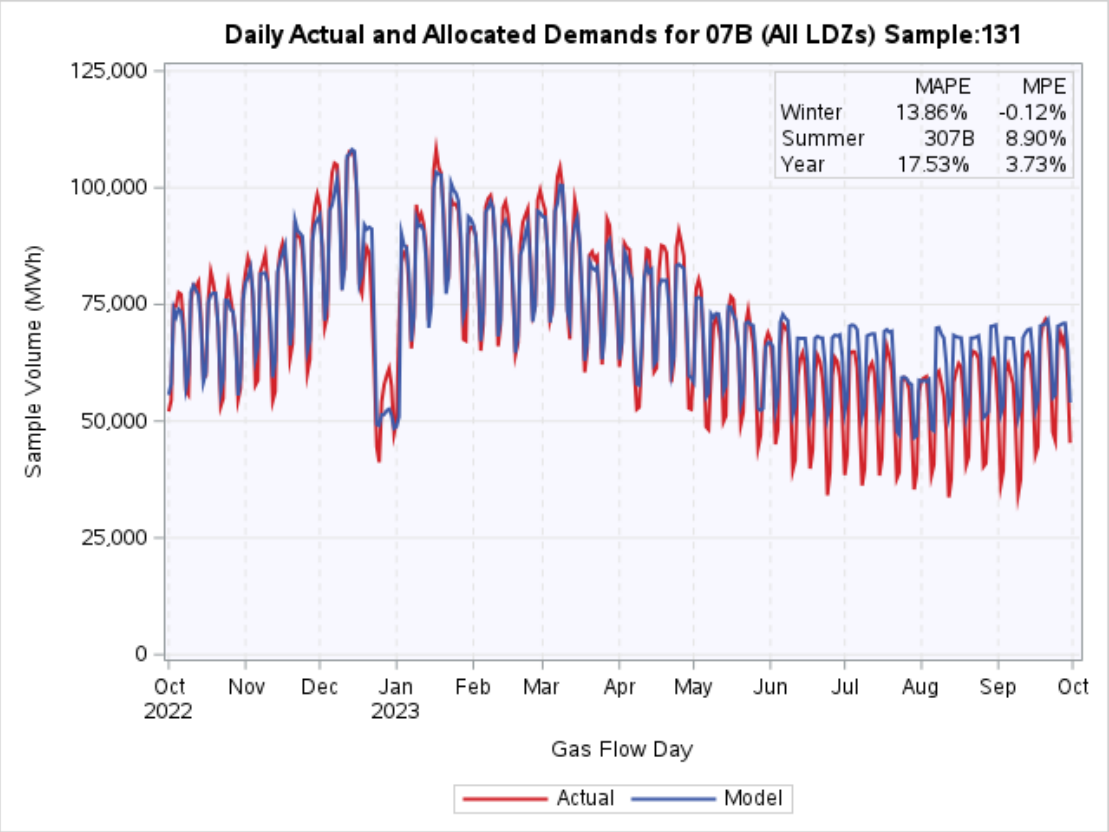


Winter daily actual and allocated demands were closely aligned, except for around the Christmas/ New Year Holiday period. Summer shows an over-forecast for most weekends from May onwards.

Band 7 I&C Meters - 07B

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 131 sample supply points representing this EUC across all LDZs (no breakdown due to small sample count).

4.3.3 Daily Actual and Allocated Demand - 07B

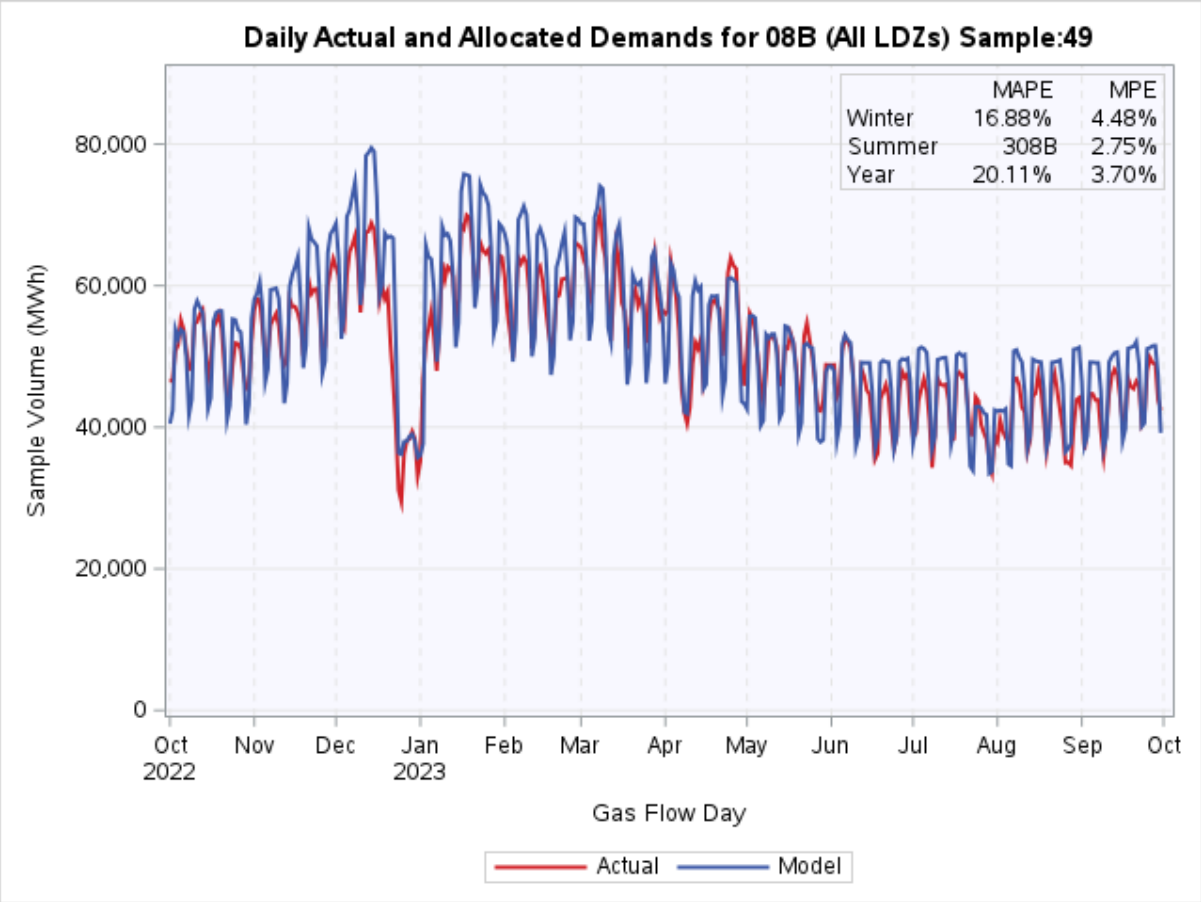


Winter daily actual and allocated demands were quite well aligned, except there was more demand on weekdays and less on weekends than forecast. Most days from early April are showing over-allocation.

Band 8 I&C Meters - 08B

The chart below compares the aggregated view of daily actual demands, with the allocated demands produced by the NDM Algorithm. This is for the 49 sample supply points representing this EUC across all LDZs (no breakdown due to small sample count).

Figure 4.3.4 Daily Actual and Allocated Demands - 08B



Almost all weekdays show a slight over-allocation, with weekends more mixed.

4.4 Retro Analysis

The 'Retro' analysis is based on the algorithms derived for the current Gas Year (i.e. 2023/24), but Retro fitted with appropriate adjustment for the pattern of days of the week and holidays for Gas Year 2022/23. This analysis is helpful in assessing the performance of the most current algorithms, had they applied to the Gas Year being analysed.

The only changes made to the Modelling Approach for 2023/24 were minor changes relating to the stratification of sample data, the groupings used for WAR Band Modelling and ceasing to Model Band 9. For this reason, the Retro analysis shows little difference in results to the Model analysis. The only driver for difference, is rolling on a year of sample data; see the table below for the analysis years and the weighting used in the models.

Analysis Year	2022/23 Model	2023/24 Retro	2022/23 Model	2023/24 Retro	2022/23 Model	2023/24 Retro
	01BND		01BPD		All Other EUCs	
2012/13			1/2	1/3		
2018/19					1/3	
2019/20	1/3				1/3	1/3
2020/21	1/3	1/3				
2021/22	1/3	1/3	1/2	1/3	1/3	1/3
2022/23		1/3		1/3		1/3

The following table shows the MAPE for the Retro analysis. Values highlighted green are better (i.e. lower) for the Retro analysis than the Model analysis. Values highlighted yellow are worse for the Retro analysis.

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Overall
01BND	8.1	8.0	8.1	9.0	8.0	8.2	10.6	7.5	5.9	5.8	6.0	6.3	7.3	7.5
01BNI	13.7	9.5	14.6	9.9	12.2	11.1	12.7	16.3	9.8	8.6	7.0	7.6	12.0	11.2
01BPD	7.5	9.0	9.1	8.5	7.6	7.3	11.1	9.2	8.1	6.9	9.0	11.0	7.9	8.8
02BND														10.6
02BNI	6.6	7.1	8.5	6.4	5.9	6.1	9.1	9.3	7.9	5.8	8.9	6.1	5.4	6.9
03B	6.9	6.1	6.6	8.5	7.4	6.1	8.3	13.5	6.3	5.4	5.9	6.5	11.0	7.1
04B	6.1	5.9	7.8	5.6	9.4	7.1	8.3	6.2	7.7	4.5	6.0	5.7	8.5	6.6
05B	8.2	8.6	7.5	11.9	8.3	8.0	16.6	13.0	8.7	6.0	7.7	10.5	9.2	8.7
06B														9.5
07B														17.8
08B														20.2

For most EUC LDZ combinations the MAPE values are quite similar or better than the Model analysis (allocated values).

The biggest areas of improvement are 01BNI where the improvements are significant (4% overall and over 5% in 4 LDZs) and 01BPD where results are around 2% better. The only deterioration to note is SE:02BNI which is 2.4% worse.

The following table shows the MPE for the Retro analysis. Again, values where the Retro analysis has produced a better result than the Model analysis are shown in green, and worse results are yellow.

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	Total
01BND	-0.6	-0.8	-0.4	-0.6	-0.7	-0.5	-0.5	-0.6	-0.2	-0.3	-0.1	-0.1	-0.3	-0.4
01BNI	0.2	-0.4	0.0	-0.1	0.1	0.1	0.2	0.4	0.5	0.4	0.2	0.0	0.2	0.1
01BPD	0.1	0.0	0.2	-0.1	-0.3	0.1	0.0	0.2	-0.1	-0.1	0.1	0.0	-0.2	0.0
02BND														1.0
02BNI	0.6	1.0	0.6	0.7	0.7	1.0	0.4	1.2	0.8	0.9	0.7	1.1	0.8	0.8
03B	1.0	1.6	0.9	0.9	1.0	1.1	0.8	1.4	0.9	0.9	1.0	1.7	1.2	1.1
04B	1.2	1.7	1.2	1.2	1.5	1.4	1.0	1.8	1.3	1.1	1.3	1.6	1.6	1.4
05B	1.9	2.4	1.7	2.3	2.4	2.1	1.6	3.0	1.5	1.5	1.9	2.7	2.0	2.0
06B														2.9
07B														3.7
08B														3.7

Most of the MPEs are improved and all Retro analysis values are within 0.4 of the Model analysis values. The biggest area for improvement is 01BPD as the profiles move away from using the 2012/13 MOD451AV data to the most recent year's Class 3 data.

4.5 Holiday Code Changes

The holiday codes were reviewed as part of the Ad Hoc workplan in 2021/22 and this is the first year that has used the new Holiday Codes. Changes were made to Holiday Codes 1-5 (Christmas/New Year), 9 and 10 (May Day Bank Holiday Weekend), and 15 and 16 (August Bank Holiday Weekend). By comparing the Holiday Code results for the Fall Back ALP, produced in 2021 for Gas Year 22/23 to the live results we can see the impact of the changes.

01BND: All changed Holiday Codes have improved results, particularly Christmas/New Year and May Day.

Figure 4.5.1 MPE by Holiday Code – 01BND Fallback

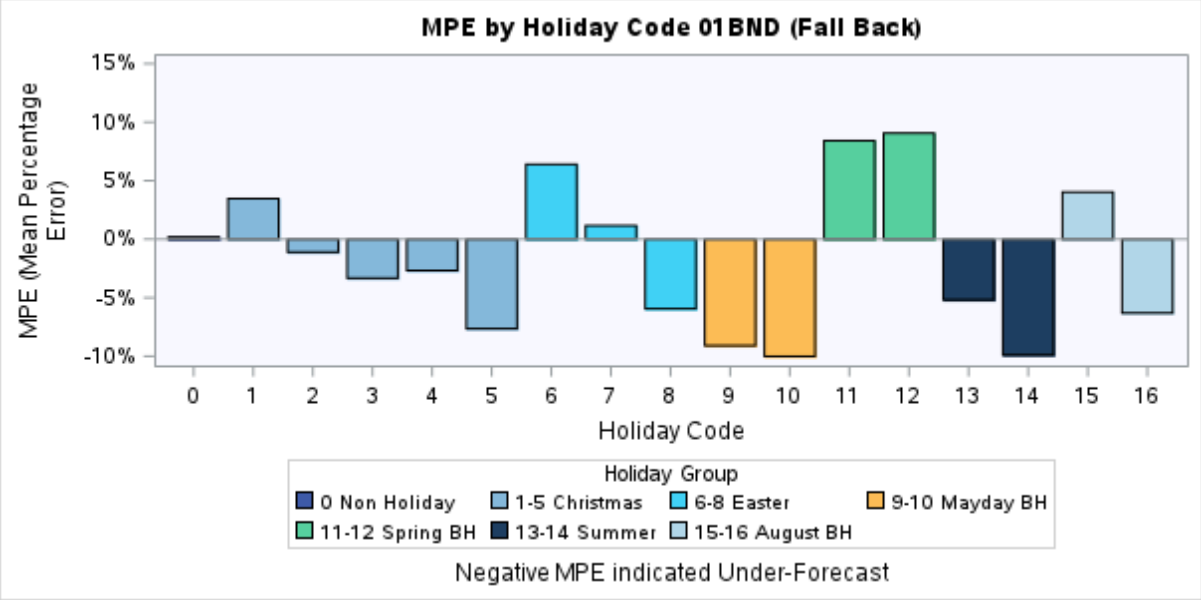
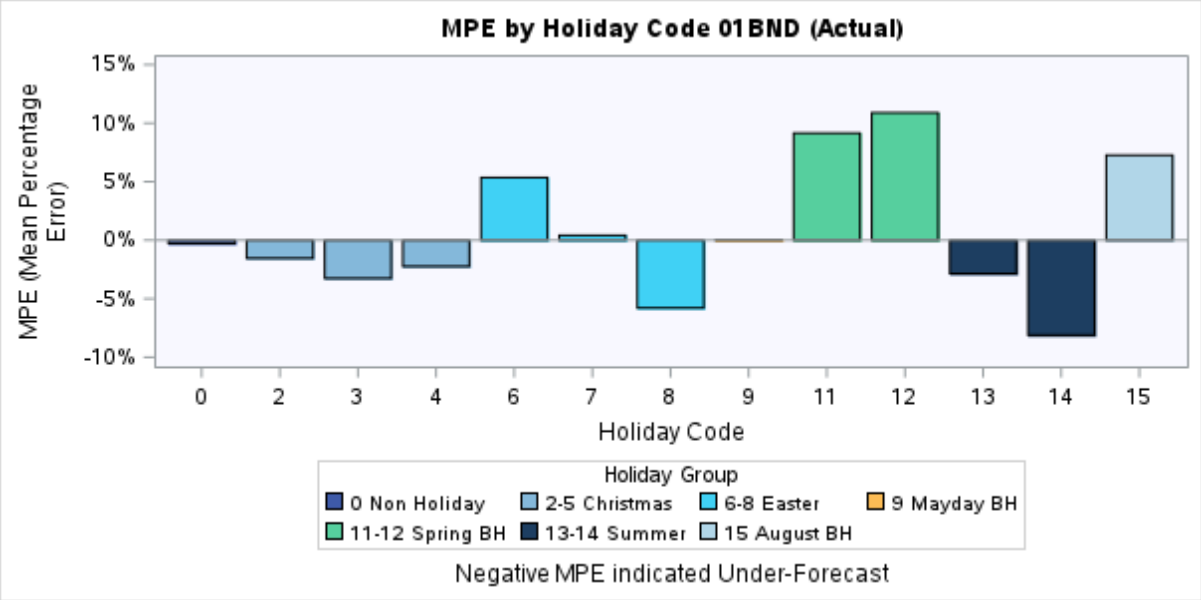


Figure 4.5.2 MPE by Holiday Code – 01BND Actual



02BNI: Christmas/New Year, and August holiday period are improved, there has been a slight deterioration in results for the May Day Bank Holiday. Changes to the results for the unchanged Holiday Codes are as a result of the updated model.

Figure 4.5.3 MPE by Holiday Code – 02BNI Fallback

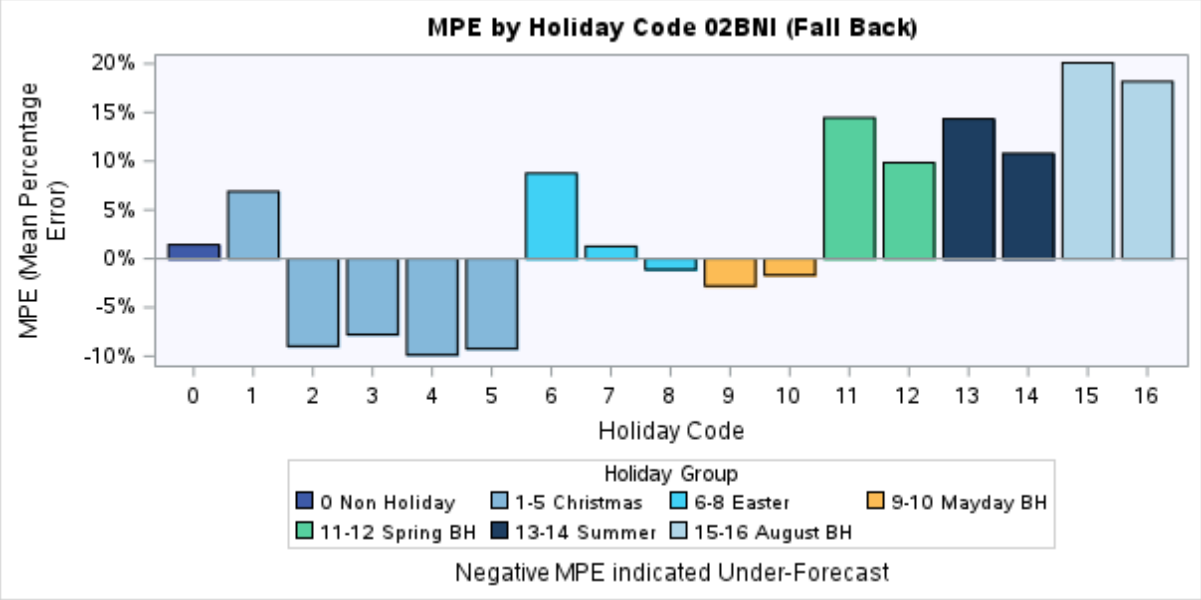
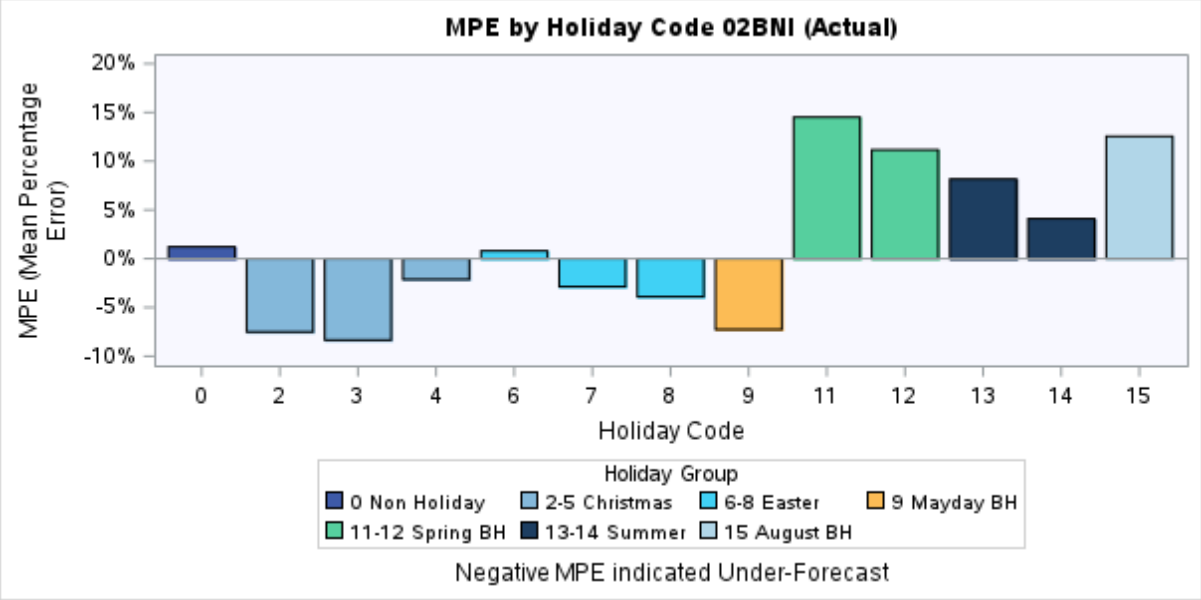


Figure 4.5.4 MPE by Holiday Code – 02BNI Actual



05B: Most of the Christmas New Year period is improved, although Holiday Code 4 has seen some deterioration. May Day Bank Holiday Weekend is improved, and August is similar although now only one code.

Figure 4.5.5 MPE by Holiday Code – 05B Fallback

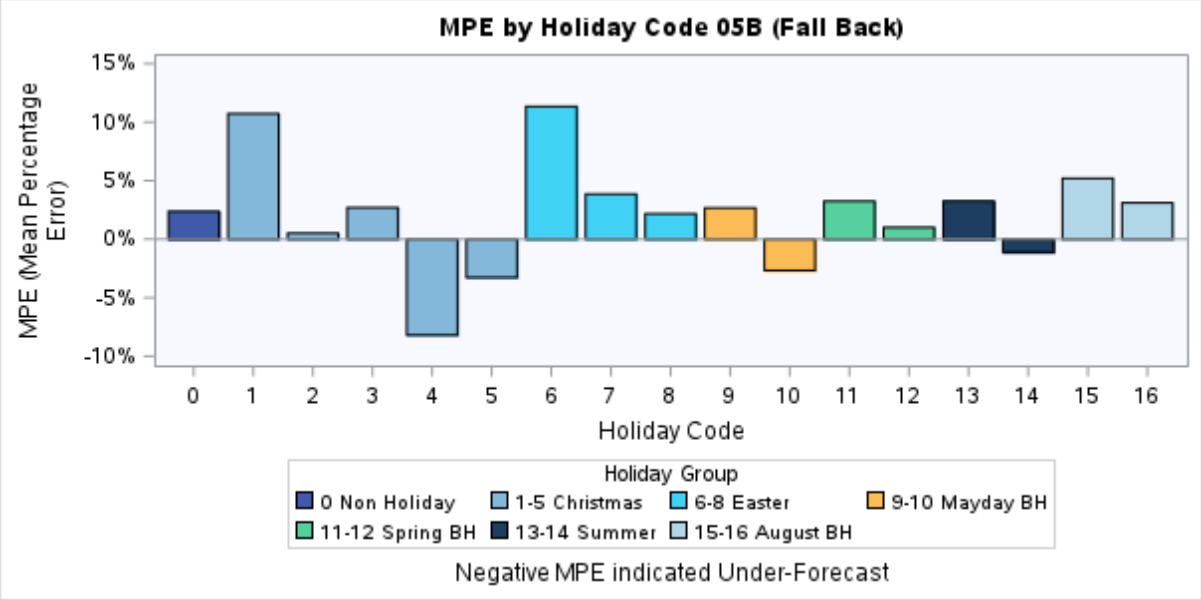
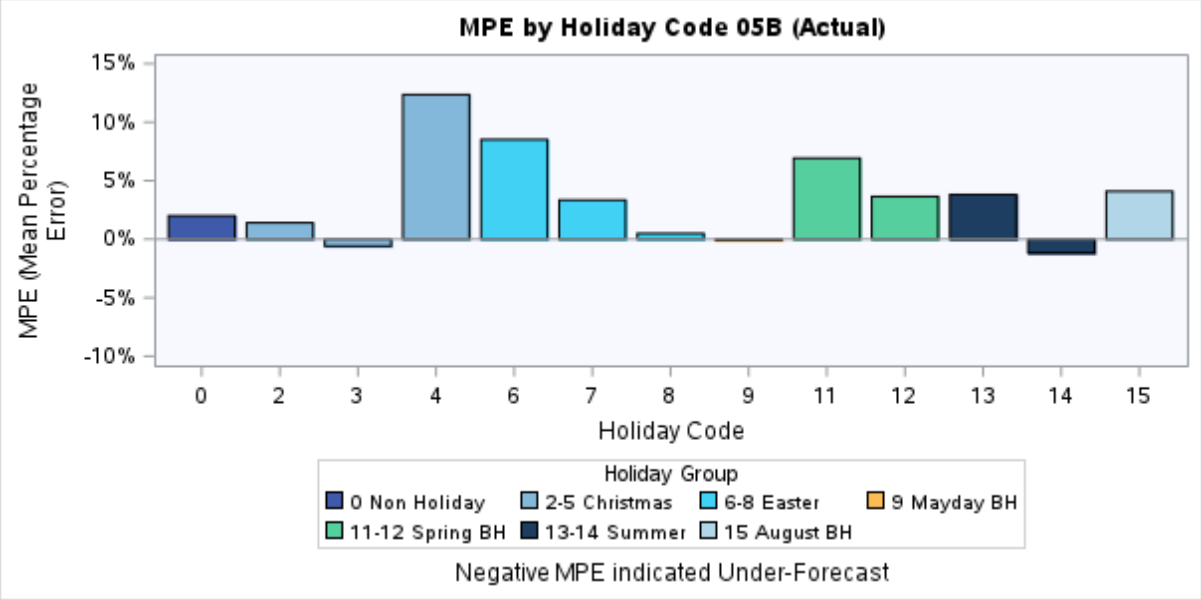


Figure 4.5.6 MPE by Holiday Code – 05B Actual



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