Demand Estimation Sub Committee

2.0 Gas Demand EUC Modelling Results (2 of 3) Results – Small NDM

24 May 2023

Contents

2.0 Gas Demand EUC Modelling Results

BACKGROUND: SMALL NDM

Total NDM Population Counts: AQ and Supply Point

Small NDM is the main component of the overall NDM:

- Band 1 (0-73.2 MWh pa) constitutes nearly 3/4 of overall NDM (on an AQ basis)
- Bands 1 to 2 (0-293 MWh pa) constitutes nearly 4/5 of overall NDM
- Bands 1 to 4 (0-2196 MWh pa) constitutes nearly 9/10 of overall NDM

Large NDM is very much a minority component of overall NDM

EUC Bands: Range	**% of Total NDM**	
	Total AQ	**Total SP Count**
Band 1: 0 to 73.2 MWh pa	71.06%	98.99%
Bands 1 to 2: 0 to 293 MWh pa	77.41%	99.74%
Bands 1 to 4: 0 to 2,196 MWh pa	87.06%	99.97%
Bands 5 to 9: >2,196 MWh pa	12.94%	0.03%

Proposed EUC Bands / Consumption Ranges

- End User Category (EUC) definitions are not prescribed in Uniform Network Code and are the responsibility of DESC to review and confirm. This year's Modelling Approach document did not propose any changes to the EUC definitions for Gas Year 2023/24
- Below represents EUC Bands and AQ Range along with latest view of Population supply point counts

Band / Range	Description	Meter Point Count*
Band 1 0 to 73.2 MWh p.a.	PPM Domestic	1,708,984
	Non-PPM Domestic	22,556,941
	PPM I&C	3,344
	Non-PPM I&C	521,832
Band 2 73.2 to 293 MWh p.a.	PPM Domestic	1,553
	Non-PPM Domestic	48,129
	PPM I&C	56
	Non-PPM I&C	139,213
Band 3 293 to 732 MWh p.a.	All NDM Supply Points	41,598
Band 4 732 to 2,196 MWh p.a.	All NDM Supply Points	17,025

*Meter Point Count as at April 2023

Small NDM: Agreed Modelling Runs

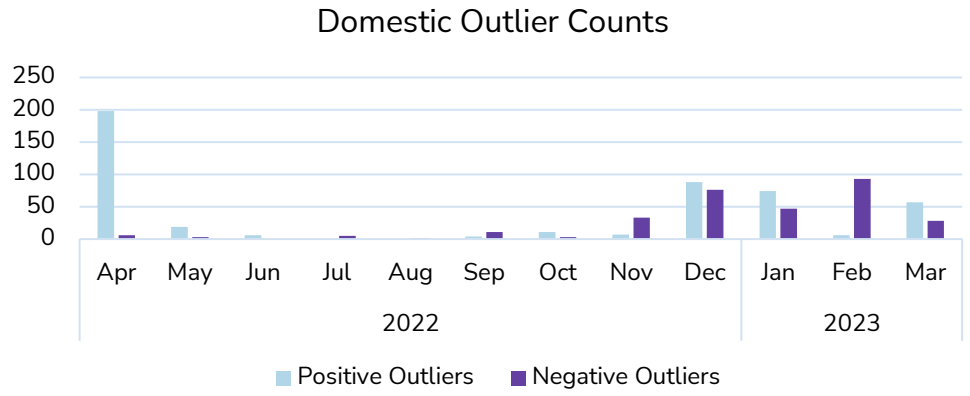
Band / Range	Description	EUC	Option 1	Option 2
Band 1 0 to 73.2 MWh p.a.	PPM Domestic	01BPD	Individual LDZ analysis	N/A
	Non-PPM Domestic	01BND	Individual LDZ analysis	N/A
	PPM I&C	01BPI	No Model Available (Lack of Data)	N/A
	Non-PPM I&C	01BNI	Individual LDZ analysis	N/A
Band 2 73.2 to 293 MWh p.a.	PPM Domestic	02BPD	No Model Available (Lack of Data)	N/A
	Non-PPM Domestic	02BND	Individual LDZ analysis except NO combined with SC, WN with NW and SW with WS	2 LDZ Group (North / South Split)
	PPM I&C	02BPI	No Model Available (Lack of Data)	N/A
	Non-PPM I&C	02BNI	Individual LDZ analysis	N/A
Band 3 293 to 732 MWh p.a.	Non-PPM I&C	03B	Individual LDZ analysis	N/A
Band 4 732 to 2,196 MWh p.a.	Non-PPM I&C	04B	Individual LDZ analysis	N/A

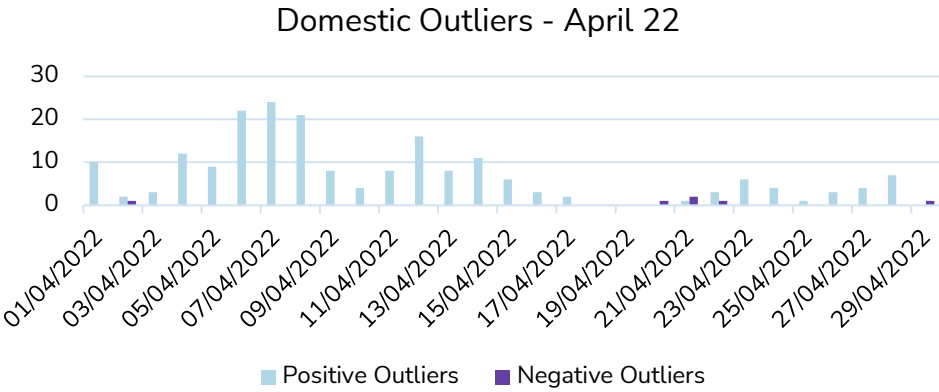
2.0 Gas Demand EUC Modelling Results

RESULTS: SMALL NDM DOMESTIC EUCS

Results: Small NDM Domestic Outliers

- The chart on the right shows the frequency of outliers by month
  - Negative outliers are where consumption was much lower than the model predicted
  - Positive outliers are where consumption was much higher than the model predicted
- In all LDZs we have seen an increase in positive outliers at the beginning of the Analysis Period – the second chart shows the frequency of outliers by day for April
  - This is likely due to a fall in consumption over the Analysis Period (as a result of changes to customer behaviour related to the increased price of gas) and warmer than normal weather
- Due to ongoing high gas prices, the recommendation is to leave all outliers in the data





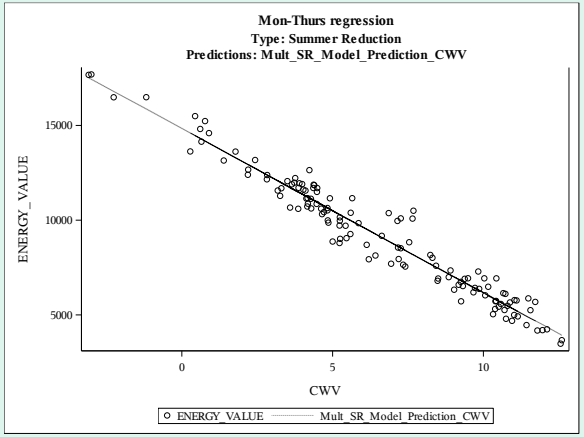
Results – Small NDM: 01BPD Summary

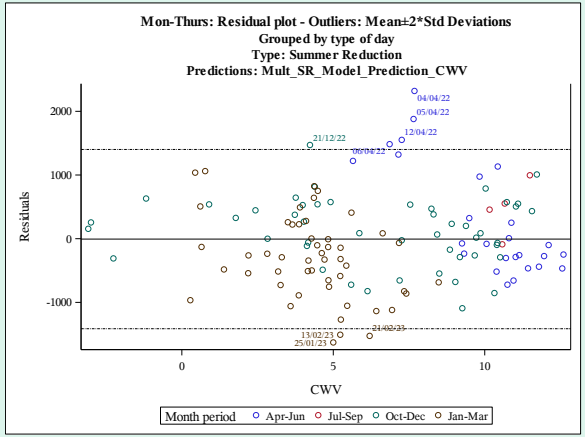
- Previous 2 years used in average are 2021/22 and MOD451AV 2012/13
- R^2 values are similar to the previous 2 years average with no significant changes
- Sample Sizes were well above the minimum for all areas and close to the target of 385 for some
- ILF values have reduced for most LDZs indicating consumers are exhibiting more weather sensitivity

	R^2		Sample Size	ILF	
LDZ	Avg. prev 2 years	2022/23	2022/23	Avg. prev 2 years	2022/23
SC	98.2%	↘ **97.2%**	**256**	37.4	↓ **37.1**
NO	98.1%	↗ **98.5%**	**383**	38.0	↓ **36.1**
NW	97.4%	↗ **98.3%**	**384**	35.3	↓ **34.2**
NE	97.8%	↗ **98.3%**	**384**	35.9	↓ **34.4**
EM	98.8%	↘ **98.7%**	**306**	33.9	↓ **31.9**
WM	98.5%	↘ **98.4%**	**359**	33.5	↓ **32.8**
WN	96.8%	↗ **98.0%**	**224**	35.4	↓ **33.4**
WS	98.0%	↗ **98.3%**	**248**	33.8	↓ **32.4**
EA	98.4%	↗ **98.7%**	**222**	33.4	↓ **31.1**
NT	99.0%	↘ **99.0%**	**202**	34.4	↓ **31.8**
SE	98.8%	↘ **98.6%**	**268**	32.6	↑ **33.3**
SO	98.4%	↗ **98.7%**	**244**	30.3	↓ **27.8**
SW	98.1%	↗ **98.8%**	**383**	30.6	↓ **29.1**

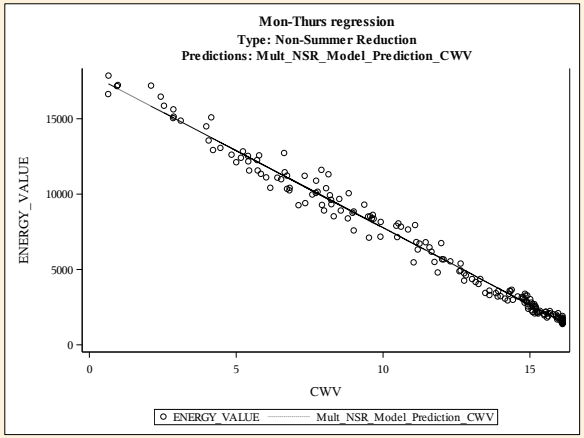
Results – Small NDM: 01BPD Summary

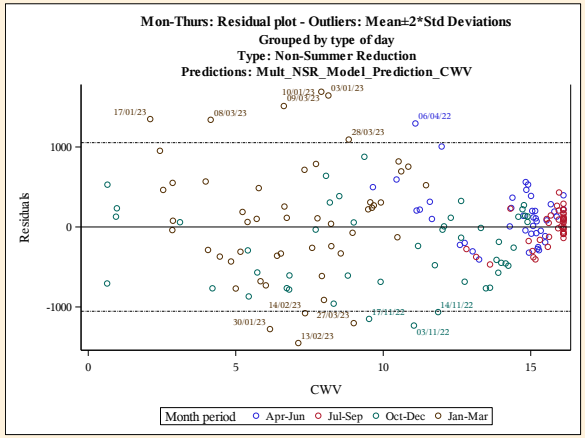
01BPD Scenario with **highest** ILF
Model: Summer Reduction
EUC: 01BPD
LDZ: SC
Demand: SC
R^2: 97.2%
ILF: 37.1
Sample Points: 256



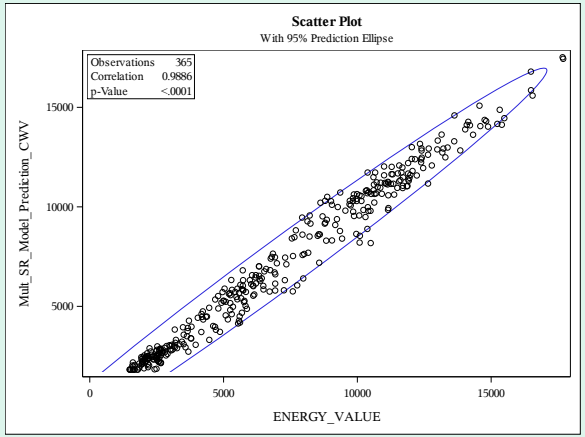


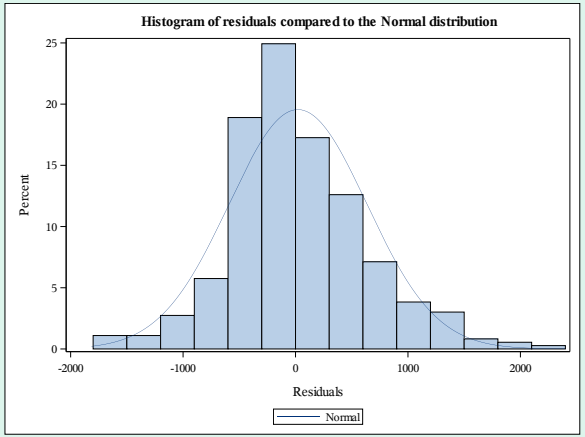
01BPD Scenario with **lowest** ILF
Model: No Summer Reduction
EUC: 01BPD
LDZ: SO
Demand: SO
R^2: 98.7%
ILF: 27.8
Sample Points: 244

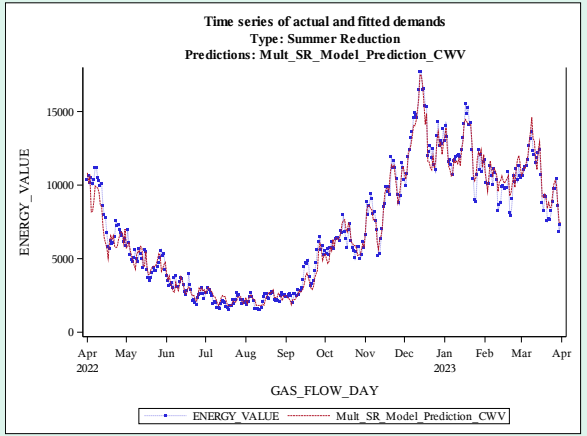


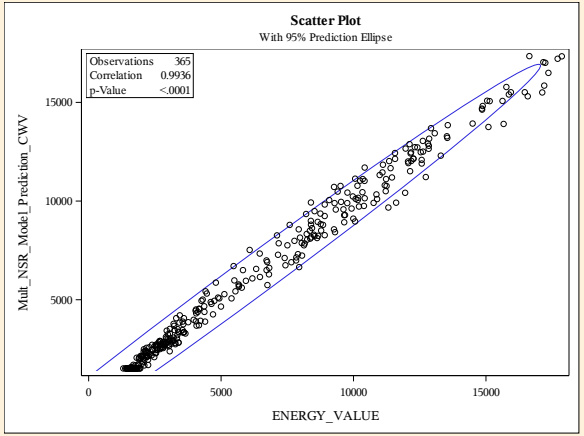


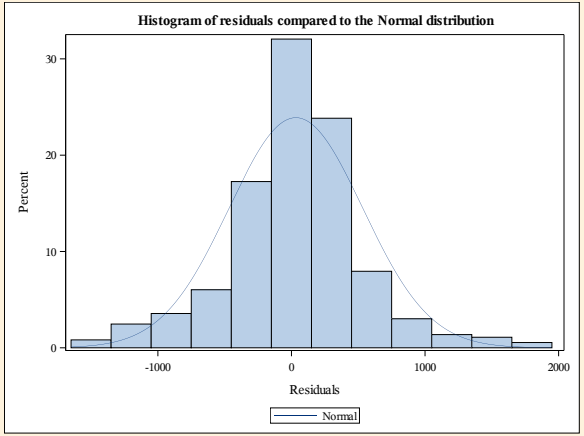
Results – Small NDM: 01BPD Summary

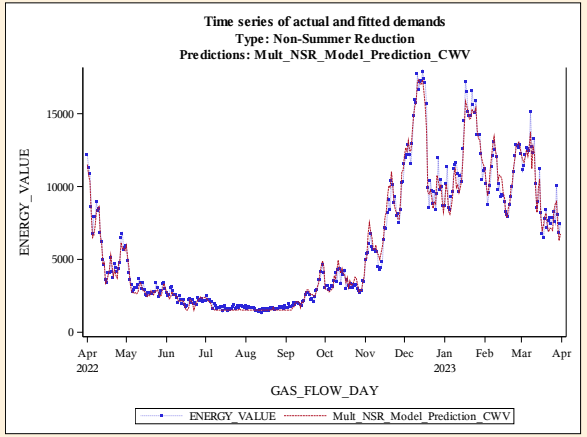












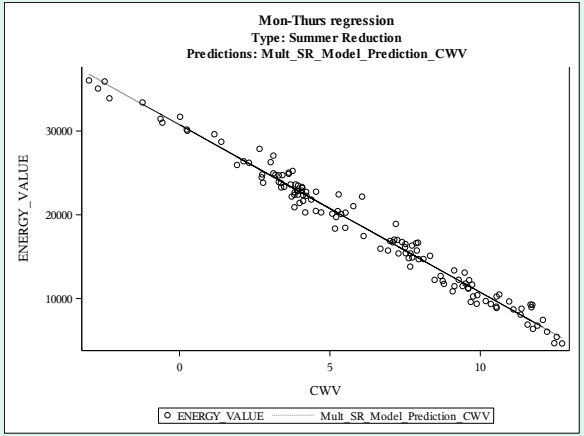
Results – Small NDM: 01BND Summary

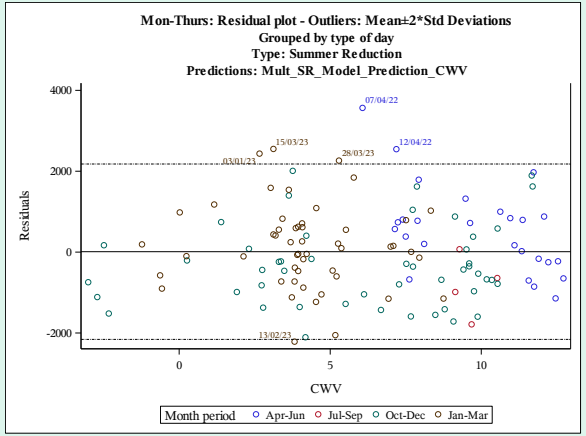
- Previous 2 years used in average are 2020/21 and 2021/22
- R^2 values are very similar to the previous 2 years average with no significant changes
- Sample Sizes were well above the minimum for all areas and meets the target of 385 for 3 of them
- ILF values have reduced for all LDZs indicating consumers are exhibiting more weather sensitivity

	R^2			Sample Size		ILF		
LDZ	Avg. prev 2 years		2022/23		2022/23	Avg. prev 2 years		2022/23
SC	98.6%	↘	98.3%	🟢	379	35.4	↓	33.9
NO	98.2%	↗	98.9%	🟢	356	35.9	↓	35.3
NW	98.0%	↗	98.9%	🟢	374	32.4	↓	31.0
NE	97.9%	↗	98.5%	🟢	364	34.1	↓	31.7
EM	98.6%	↗	98.9%	🟢	376	32.2	↓	30.6
WM	98.7%	↘	98.4%	🟢	385	30.8	↓	29.3
WN	97.3%	↗	98.6%	🟢	255	32.2	↓	31.3
WS	97.9%	↗	98.4%	🟢	279	31.6	↓	30.6
EA	98.3%	↗	98.7%	🟢	385	32.3	↓	31.1
NT	98.8%	↘	98.7%	🟢	285	32.3	↓	31.8
SE	98.6%	↗	98.9%	🟢	370	30.6	↓	30.5
SO	98.3%	↗	98.7%	🟢	385	29.0	↓	27.7
SW	98.0%	↗	98.8%	🟢	348	30.4	↓	29.0

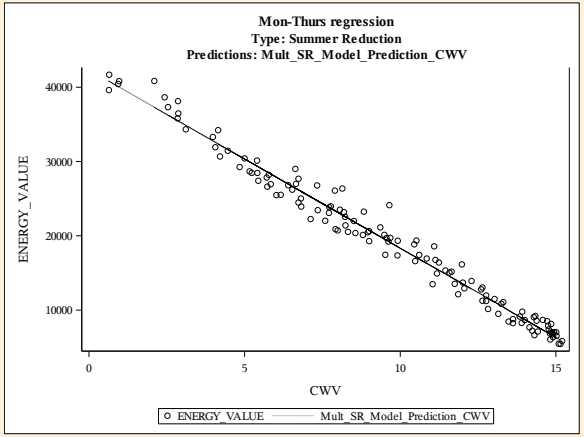
Results – Small NDM: 01BND Summary

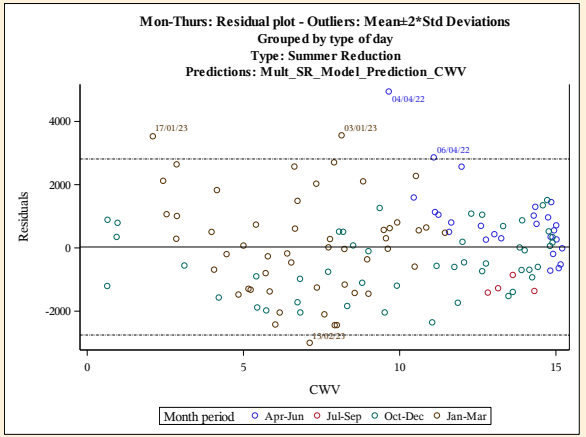
01BND Scenario with **highest** ILF
Model: Summer Reduction
EUC: 01BND
LDZ: NO
Demand: NO
R^2: 98.9%
ILF: 35.3
Sample Points: 356



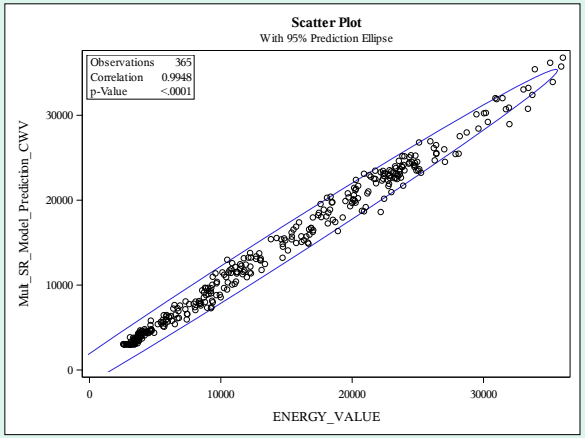


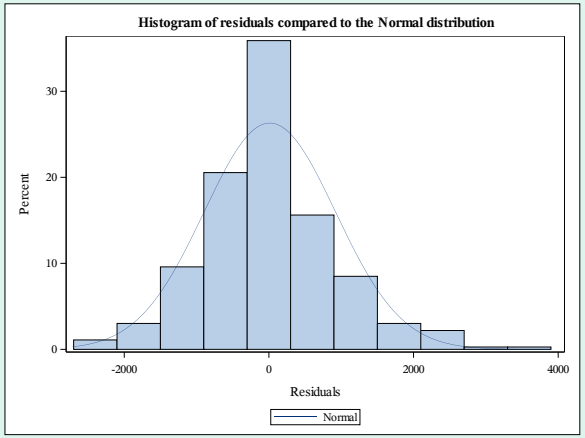
01BND Scenario with **lowest** ILF
Model: Summer Reduction
EUC: 01BND
LDZ: SO
Demand: SO
R^2: 98.7%
ILF: 27.7
Sample Points: 385

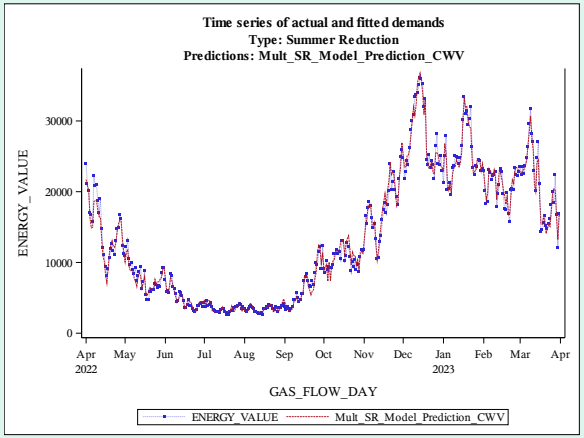


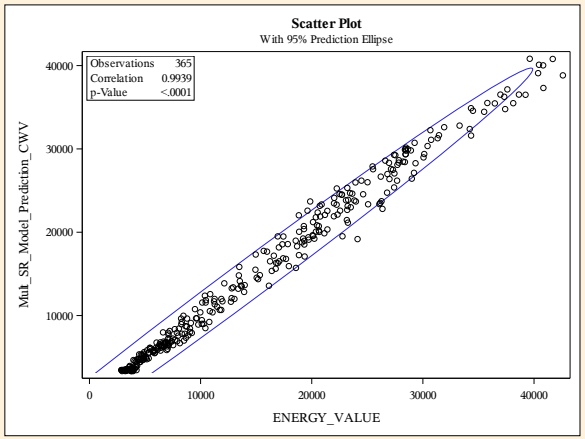


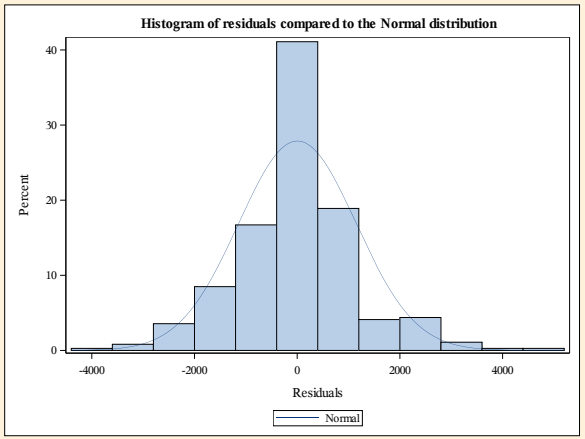
Results – Small NDM: 01BND Summary

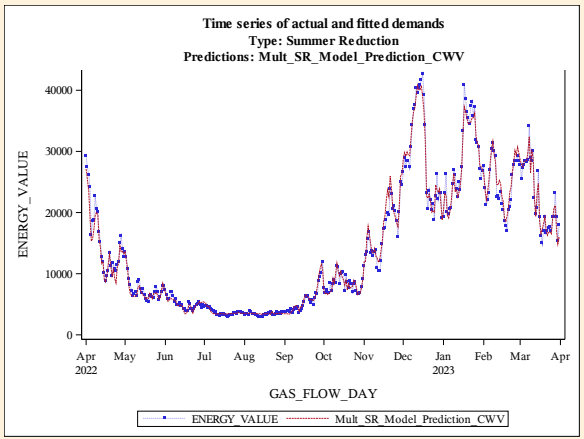












Results – Small NDM: 02BND Summary

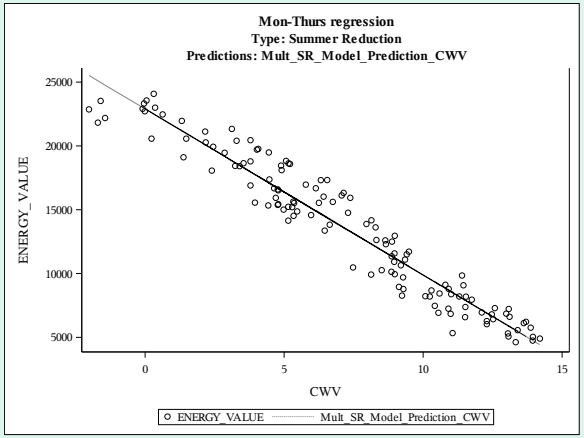
- Previous 2 years used in average are 2019/20 and 2021/22
- Two options were suggested at the April DESC
  - Option 1 – Individual LDZ analysis except NO/SC, WN/NW and SW/WS
  - Option 2 – North/South split
- A third option was also run to try to reduce the aggregation in option 2
  - Option 3 – As option 1 with additional aggregation of EA/NT, NW/NO, SW/WS/SO, EM/WM
- R^2 values
  - Option 1 values are similar to previous years with the exception of WM
  - Option 2 values are also similar with slight improvements for all areas
  - Option 3 improved values for 6 LDZs compared with Option 1
- Sample Sizes were below the minimum for 4 areas
- ILF values
  - have significantly reduced for all Northern LDZs indicating consumers are exhibiting more weather sensitivity
  - Southern LDZs are closer to previous values

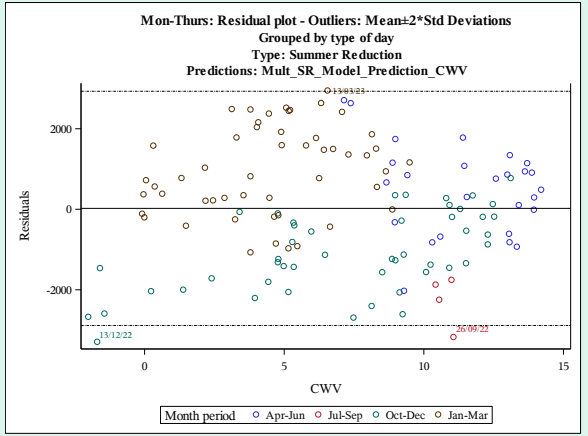
Results – Small NDM: 02BND Summary

LDZ	R^2						Sample Size						ILF					
	Avg. prev 2 years	2022/23					2022/23						Avg. prev 2 years	2022/23				
		Option 1		Option 2		Option 3	Option 1		Option 2		Option 3			Option 1		Option 2		Option 3
SC	94.8%	↗	95.3%	↗	96.3%	↗	97.0%	🔴	27	🟢	184	🟢	49	39.5	↓	37.8	↓	33.7	↓	36.2
NO	96.0%	↘	95.8%	↗	96.3%	↘	95.8%	🟢	49	🟢	184	🟢	49	40.9	↓	38.6	↓	36.1	↓	38.6
NW	96.1%	↘	95.9%	↗	96.3%	↗	96.6%	🟢	32	🟢	184	🟢	54	38.6	↓	33.8	↓	33.6	↓	34.0
NE	96.1%	↗	96.8%	↗	97.0%	↗	96.8%	🔴	28	🟢	184	🔴	28	39.9	↓	33.5	↓	34.4	↓	33.5
EM	95.7%	↗	96.1%	↗	96.5%	↘	94.9%	🟢	32	🟢	184	🟢	60	39.6	↓	30.8	↓	34.3	↓	31.2
WM	95.4%	↓	91.8%	↗	95.5%	↘	94.2%	🔴	28	🟢	184	🟢	60	38.3	↓	31.1	↓	33.9	↓	30.7
WN	95.6%	↗	96.4%	↗	96.5%	↗	96.4%	🟢	47	🟢	184	🟢	47	39.3	↓	36.2	↓	34.2	↓	36.2
WS	95.4%	↗	96.6%	↗	97.0%	↗	97.3%	🟢	37	🟢	175	🟢	64	37.3	↑	44.5	↔	37.3	↑	39.7
EA	96.8%	↘	96.5%	↗	97.8%	↗	97.8%	🟢	31	🟢	175	🟢	72	37.4	↓	31.6	↑	37.5	↓	35.8
NT	97.1%	↗	97.2%	↗	97.9%	↗	97.2%	🟢	41	🟢	175	🟢	41	37.2	↑	39.6	↑	37.5	↑	39.6
SE	96.7%	↘	96.0%	↗	97.7%	↘	96.0%	🟢	39	🟢	175	🟢	39	36.5	↓	36.4	↑	37.0	↓	36.4
SO	95.3%	↘	95.0%	↗	96.5%	↘	95.0%	🔴	27	🟢	175	🔴	27	35.0	↓	33.5	↑	35.9	↓	33.5
SW	94.5%	↗	95.9%	↗	96.9%	↗	96.8%	🟢	37	🟢	175	🟢	64	36.6	↑	44.2	↑	36.6	↑	39.3

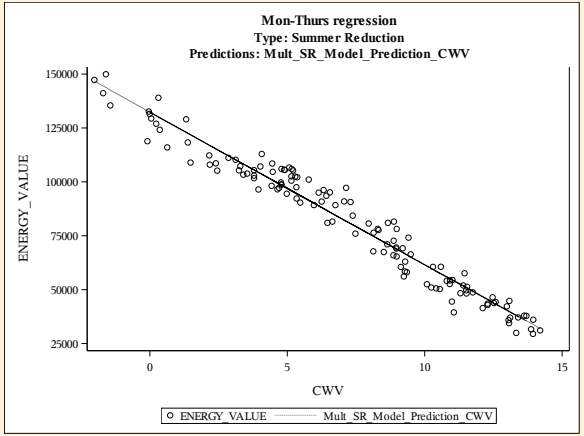
Results – Small NDM: 02BND Summary

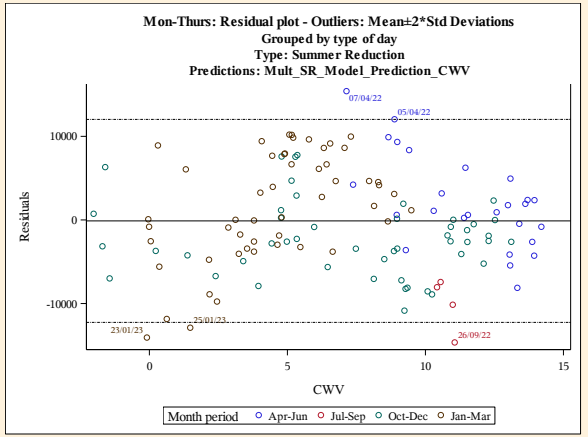
02BND Option 1 **lowest** R^2
Model: Summer Reduction
EUC: 02BND
LDZ: WM
Demand: WM
R^2: 91.8%
ILF: 31.1
Sample Points: 28



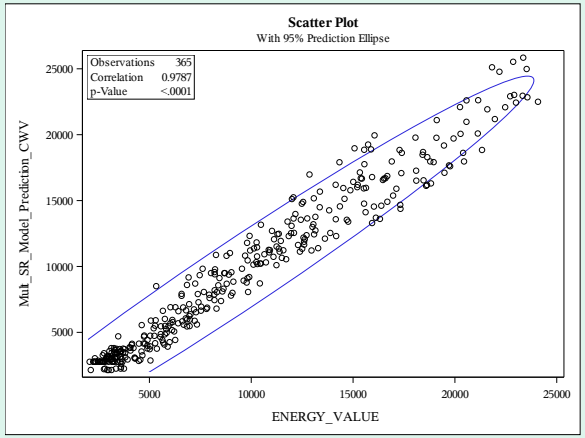


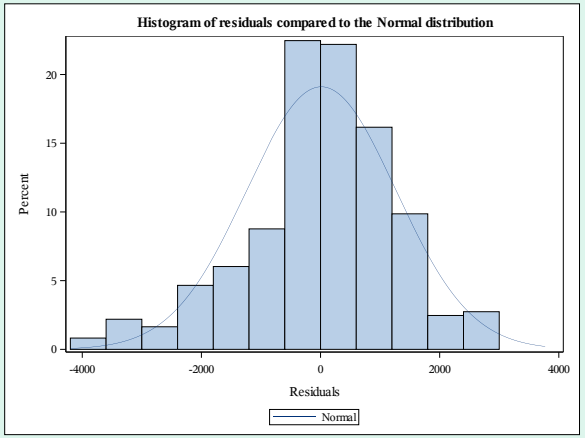
02BND Option 2 WM
Model: Summer Reduction
EUC: 02BND
LDZ: WM
Demand: Northern 7 LDZs
R^2: 95.5%
ILF: 33.9
Sample Points: 184

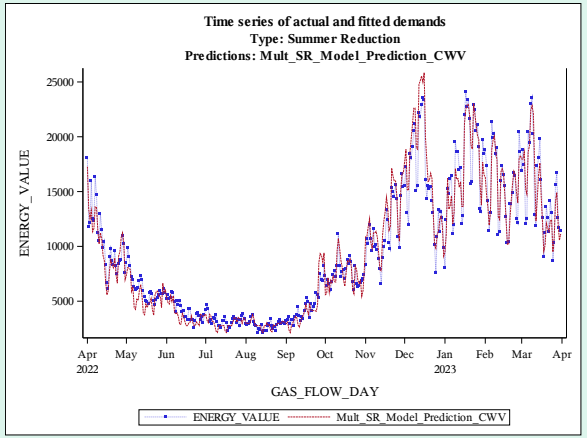


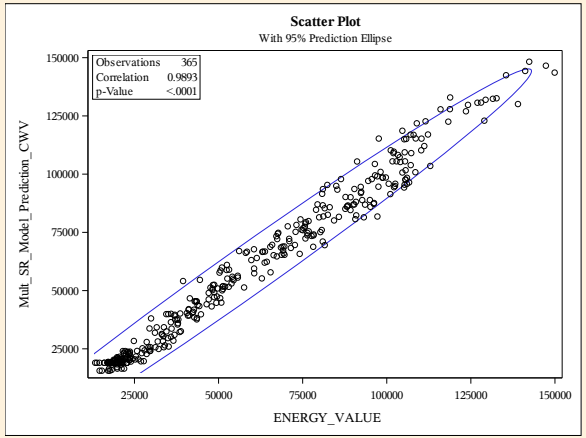


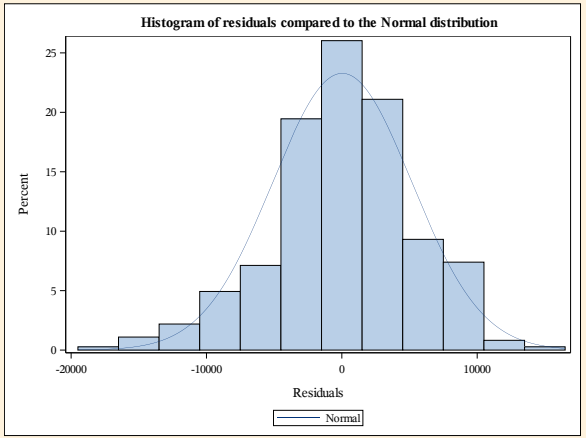
Results – Small NDM: 02BND Summary

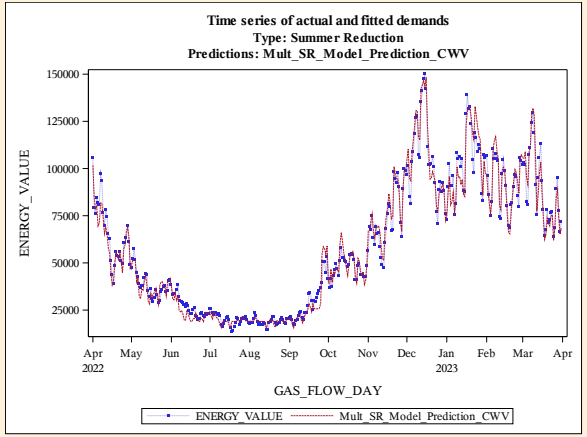






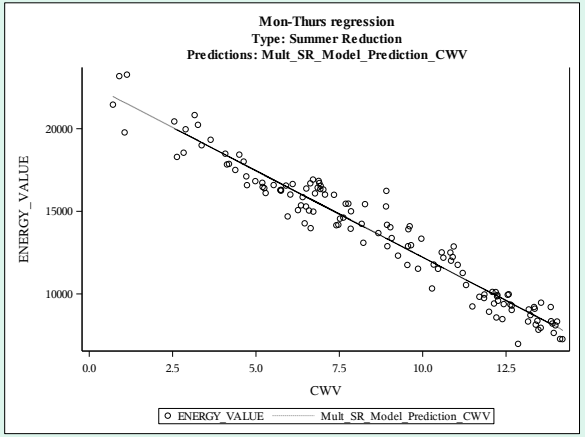


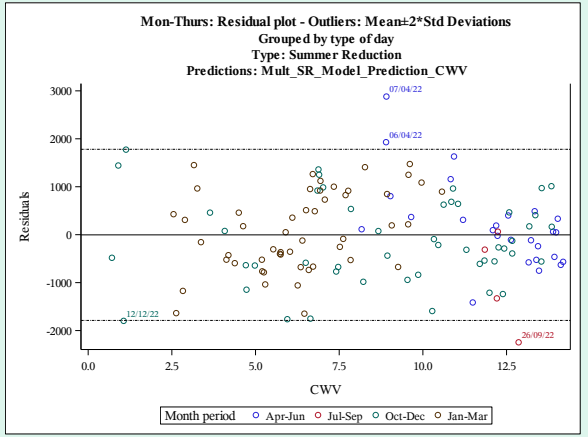




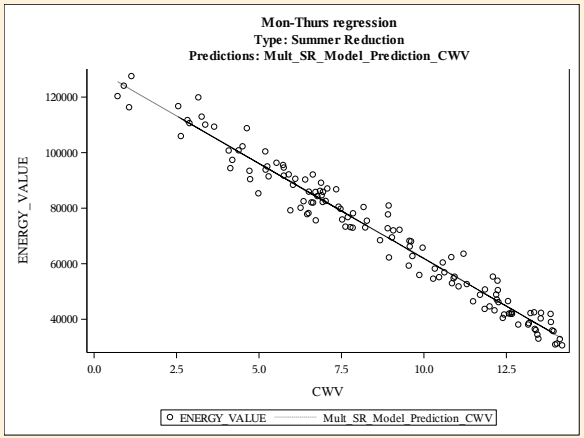
Results – Small NDM: 02BND Summary

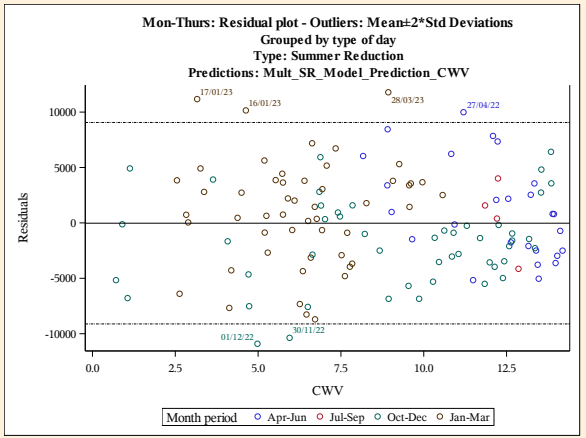
02BND Option 1 **Highest** ILF
Model: Summer Reduction
EUC: 02BND
LDZ: WS
Demand: WS
R^2: 96.6%
ILF: 44.5
Sample Points: 37



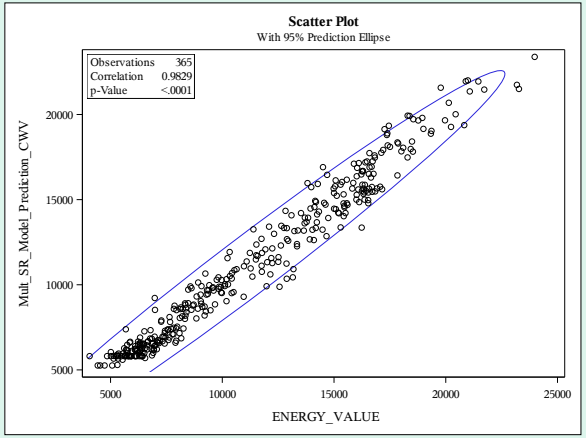


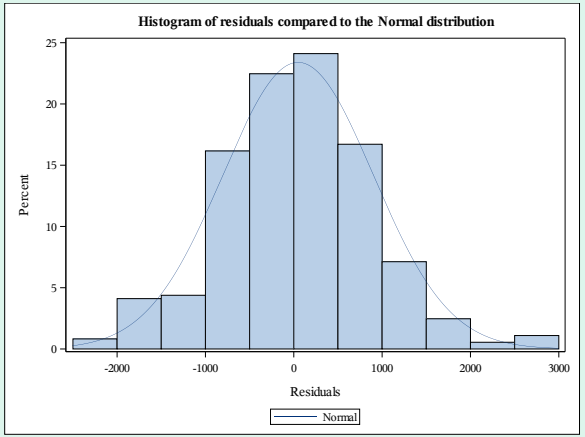
02BND Option 2 WS
Model: Summer Reduction
EUC: 02BND
LDZ: WS
Demand: Southern 7 LDZs
R^2: 97.0%
ILF: 37.3
Sample Points: 175

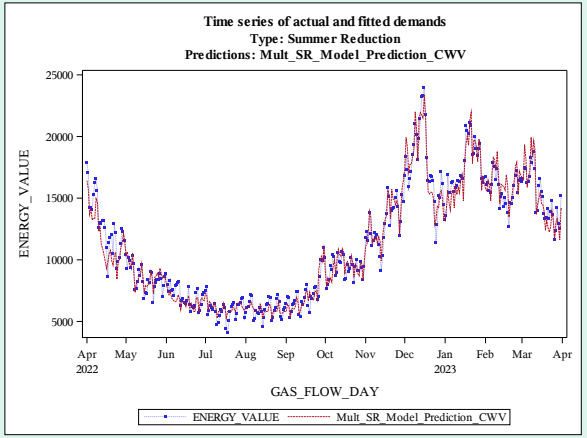


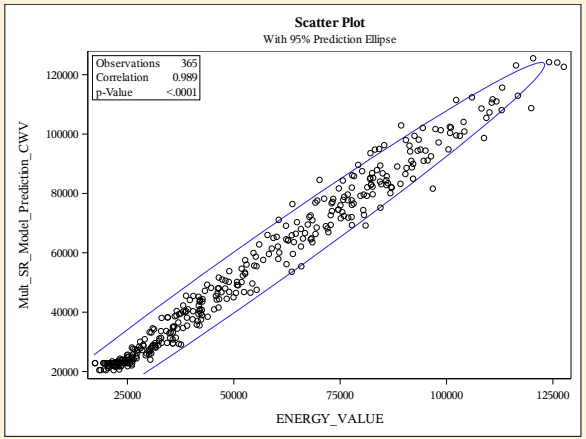


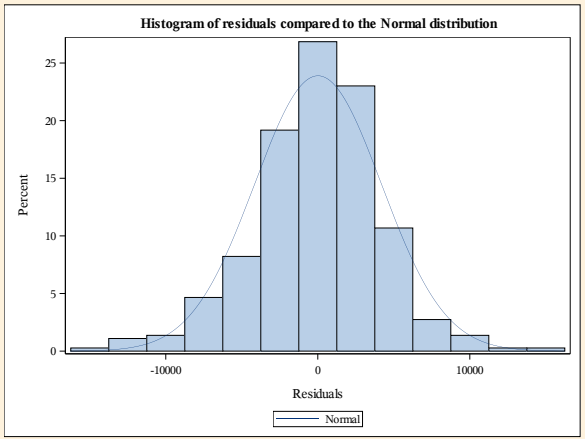
Results – Small NDM: 02BND Summary

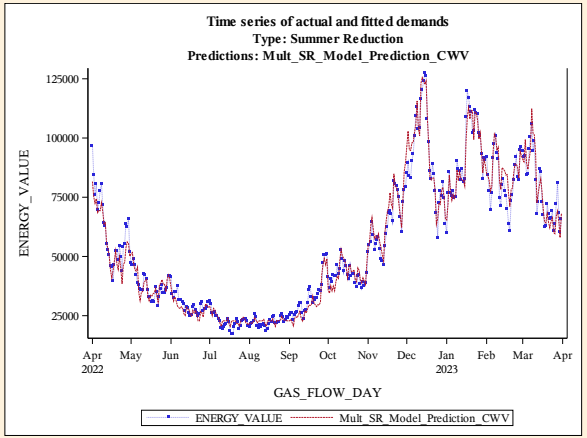












Recommendations

Option 1 – Individual LDZ analysis except NO/SC, WN/NW and SW/WS

- ➕ Lowest aggregation
- ➖ Poor results for WM
- ➖ Large changes for some ILFs

Option 2 – North / South Split

- ➕ Improved R^2 for all LDZs
- ➖ Significant aggregation
- ➖ Large movement in Northern ILFs

Option 3 – As option 1 with additional aggregation of EA/NT, NW/NO, SW/WS/SO, EM/WM

- ➕ Compromise aggregation
- ➕ R^2 better or close to previous values
- ➕ Fewest significant ILF changes
- ➖ Some R^2 deterioration

Recommendation

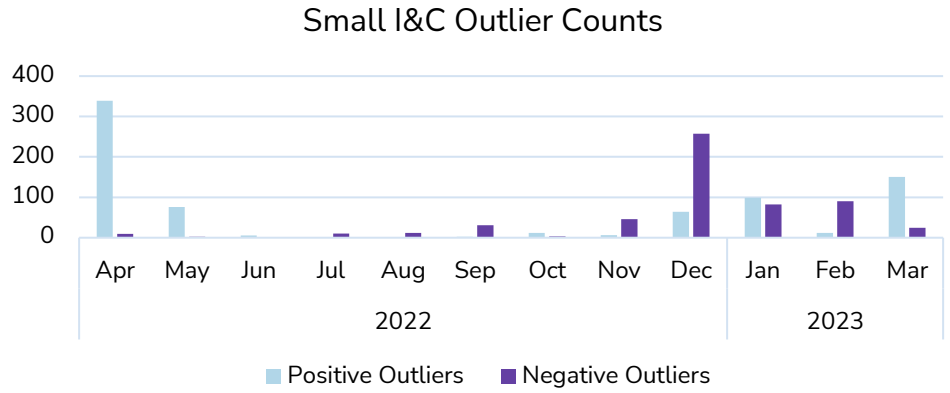
Option 3 for all LDZs except EM, where Option 1 produced better results and less aggregation

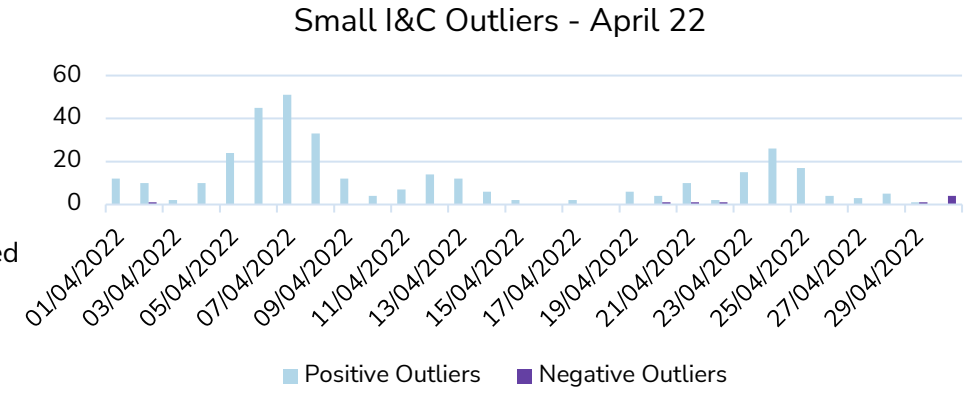
2.0 Gas Demand EUC Modelling Results

RESULTS: SMALL NDM I&C EUCS

Results: Small NDM I&C Outliers

- The chart on the right shows the frequency of outliers by month
  - Negative outliers are where consumption was much lower than the model predicted
  - Positive outliers are where consumption was much higher than the model predicted
- In all LDZs we have seen an increase in positive outliers at the beginning of the Analysis Period – the second chart shows the frequency of outliers by day for April
  - This is likely due to a fall in consumption over the Analysis Period (as a result of changes to customer behaviour related to the increased price of gas) and warmer than normal weather
- There is a large number of significantly negative outliers for the 19th September when the was an additional late notice Bank Holiday for the Queen's funeral
  - This impacted all I&C EUC models and has been removed from the analysis
- Due to ongoing high gas prices, the recommendation is to leave all other outliers in the data





Results: Small NDM I&C – Schools

- When the Algorithm Performance was carried out in Winter 22/23 the large number of schools in the sample for Wales South and North West were found to be skewing the results

- The results for Wales South 01BNI, 02BNI and 03B results were investigated as they were not as expected, and again a large number of schools were found in the sample for Wales South and North West

- 259 schools were removed from the sample for WS
  - 66 from 01BNI out of a total sample of 378 – replaced with 88 alternative sites to maintain the sample size
  - 135 from 02BNI out of a total sample of 354 – replaced with 153 alternative sites
    - We are aware this has taken the sample count over the target, however, due to time constraints the extra meters were left in
  - 58 from 03B out of a total sample of 219 – it was not possible to replace these due to the limited sample
  - As we have removed some sample meters from 03, we have also changed the WAR boundaries for 03W01-04 in order to maintain the 20:30:30:20 ratio

- 88 schools were removed from the sample for NW
  - These were all removed from 02BNI and replaced with alternative sites to maintain the sample size

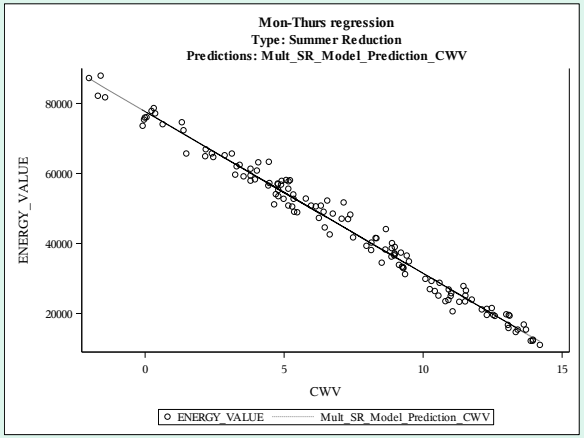
Results – Small NDM: 01BNI Summary

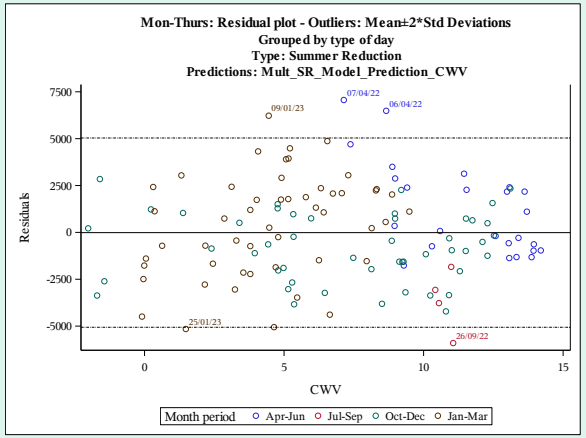
- Previous 2 years used in average are 2019/20 and 2021/22
- R^2 values are very similar to the previous 2 years average with no significant changes
- Sample Sizes were above the minimum for all areas and close to the target of 385 for most LDZs with the exception of WN
- ILF values have reduced for most LDZs indicating consumers are exhibiting more weather sensitivity
- Models are good and no alternatives were required

	R^2			Sample Size		ILF		
LDZ	Avg. prev 2 years		2022/23		2022/23	Avg. prev 2 years		2022/23
SC	96.9%	↗	**97.2%**	●	**381**	33.6	↓	**32.0**
NO	97.2%	↗	**97.7%**	●	**379**	32.7	↓	**32.1**
NW	97.5%	↘	**96.7%**	●	**383**	31.0	↓	**28.2**
NE	96.8%	↗	**97.5%**	●	**381**	31.5	↓	**30.5**
EM	96.6%	↗	**97.5%**	●	**382**	30.2	↓	**29.0**
WM	97.1%	↗	**97.8%**	●	**382**	29.0	↓	**28.9**
WN	94.3%	↗	**95.5%**	●	**60**	31.3	↑	**34.3**
WS	97.3%	↘	**94.9%**	●	**378**	30.8	↓	**26.5**
EA	97.4%	↗	**97.7%**	●	**381**	31.7	↓	**30.9**
NT	97.6%	↘	**97.5%**	●	**383**	32.9	↓	**30.9**
SE	98.0%	↘	**97.4%**	●	**382**	28.4	↓	**27.6**
SO	97.2%	↘	**96.7%**	●	**381**	26.2	↓	**24.8**
SW	97.1%	↗	**97.7%**	●	**381**	28.9	↓	**27.3**

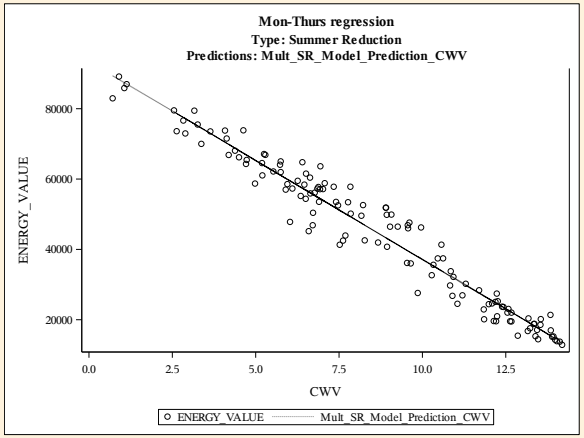
Results – Small NDM: 01BNI Summary

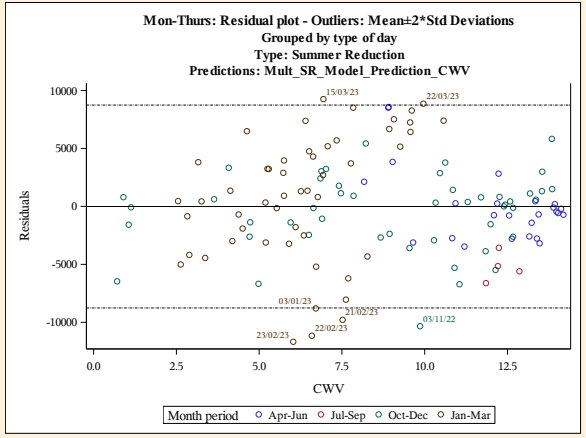
01BNI Scenario with **highest** R^2
Model: Summer Reduction
EUC: 01BNI
LDZ: WM
Demand: WM
R^2: 97.8%
ILF: 28.9
Sample Points: 382



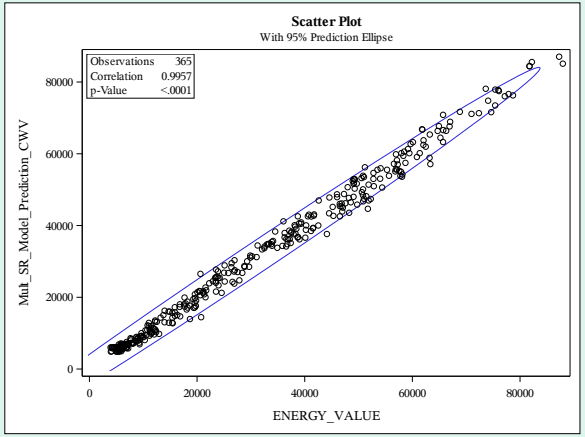


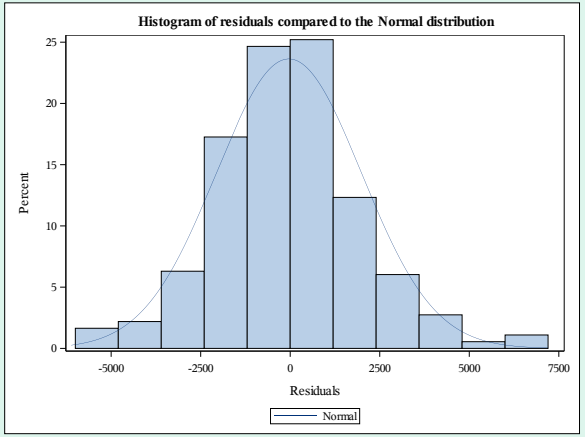
01BNI Scenario with **lowest** R^2
Model: Summer Reduction
EUC: 01BNI
LDZ: WS
Demand: WS
R^2: 94.9%
ILF: 26.5
Sample Points: 378

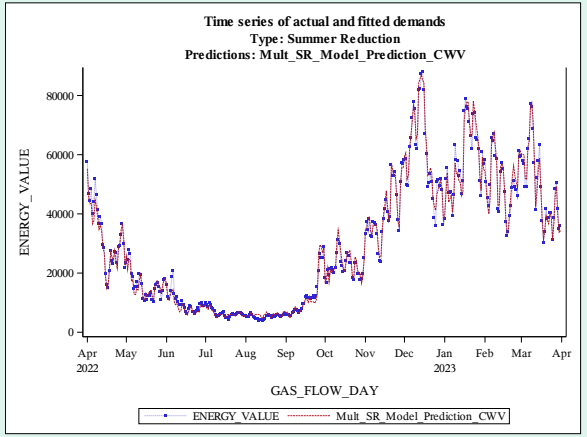


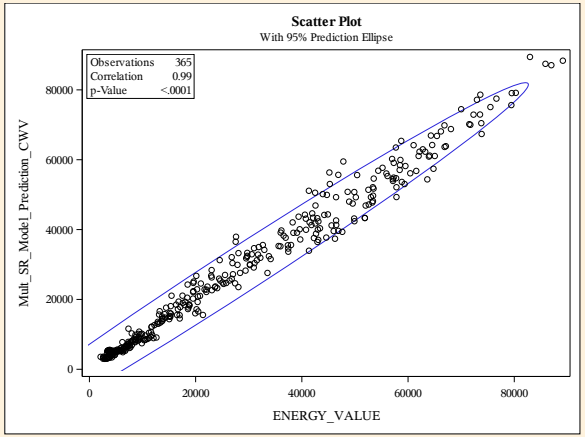


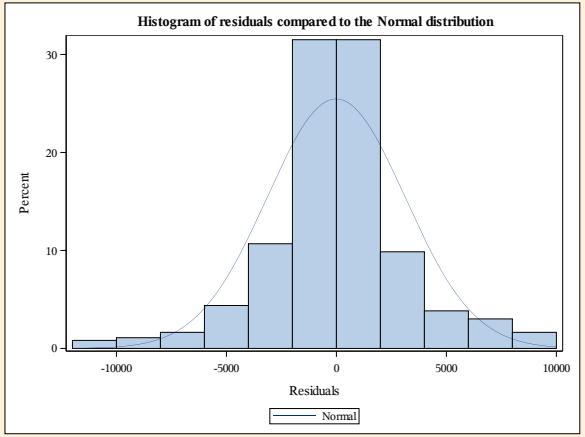
Results – Small NDM: 01BNI Summary

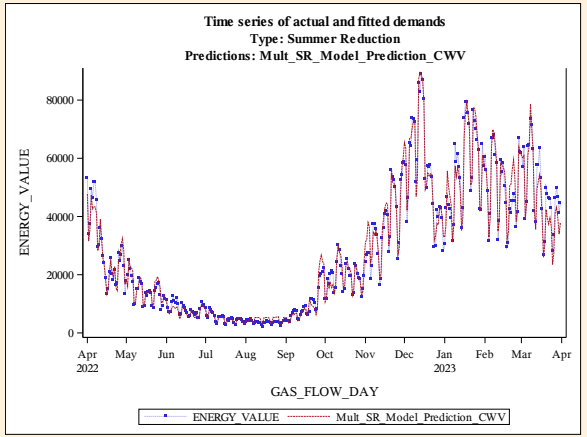












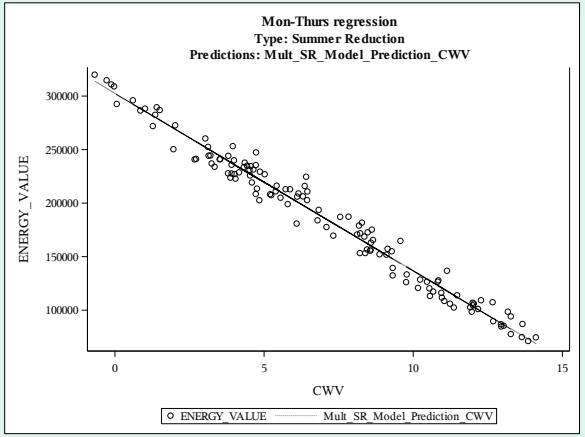
Results – Small NDM: 02BNI Summary

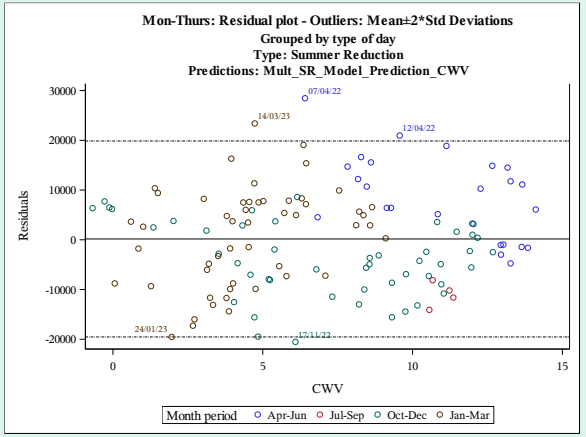
- Previous 2 years used in average are 2019/20 and 2021/22
- R^2 values are very similar to the previous 2 years average with no significant changes except WS which has deteriorated by 3.3%
- Sample Sizes were above the minimum for all areas and close to the target of 385 for most LDZs with the exception of WN
- ILF values have reduced for most LDZs indicating consumers are exhibiting more weather sensitivity
  - The exception is NE where the ILF is 0.4 higher than previously
- Models are good and no alternatives were required

	R^2			Sample Size		ILF		
LDZ	Avg. prev 2 years	2022/23		2022/23		Avg. prev 2 years	2022/23	
SC	96.8%	↘	96.4%	🟢	373	35.4	↓	34.9
NO	97.8%	↘	97.5%	🟢	365	37.4	↓	37.3
NW	96.7%	↘	96.0%	🟢	376	34.1	↓	33.2
NE	96.6%	↗	97.7%	🟢	369	35.6	↑	36.0
EM	96.7%	↗	97.2%	🟢	374	33.3	↓	32.1
WM	95.6%	↗	95.9%	🟢	373	33.4	↓	32.2
WN	95.5%	↗	95.8%	🟢	66	35.6	↓	32.7
WS	96.5%	↓	93.2%	🟢	372	35.2	↓	30.0
EA	95.8%	↗	95.8%	🟢	372	32.8	↓	32.0
NT	96.7%	↘	96.2%	🟢	376	37.6	↓	33.6
SE	96.3%	↘	94.5%	🟢	375	31.4	↓	30.1
SO	97.2%	↘	96.5%	🟢	372	31.1	↓	29.4
SW	96.7%	↘	96.7%	🟢	370	32.8	↓	31.4

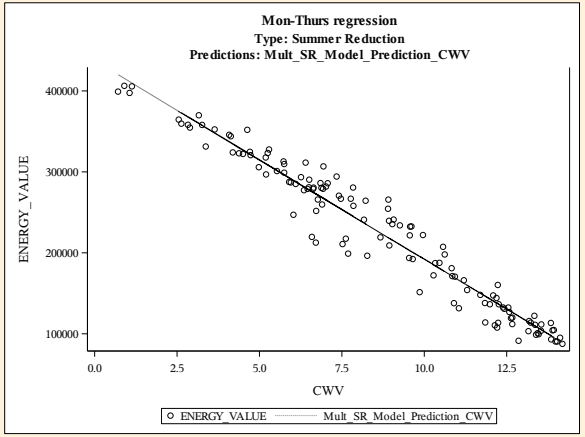
Results – Small NDM: 02BNI Summary

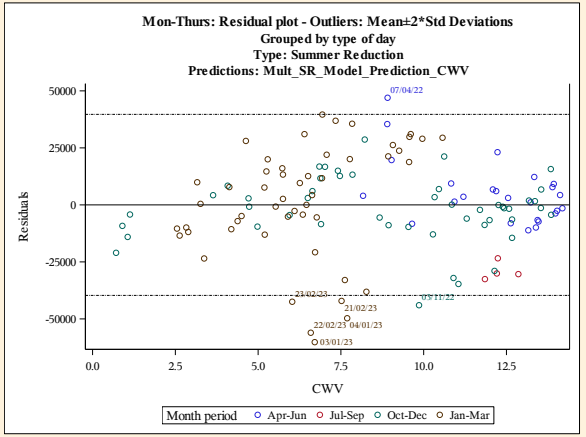
02BNI Scenario with **highest** R^2
Model: Summer Reduction
EUC: 02BNI
LDZ: NE
Demand: NE
R^2: 97.7%
ILF: 36.0
Sample Points: 369



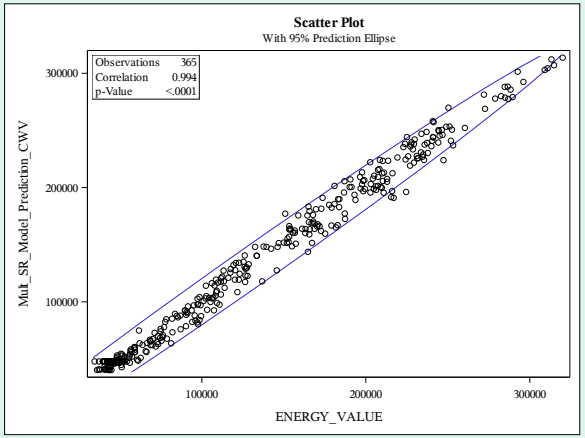


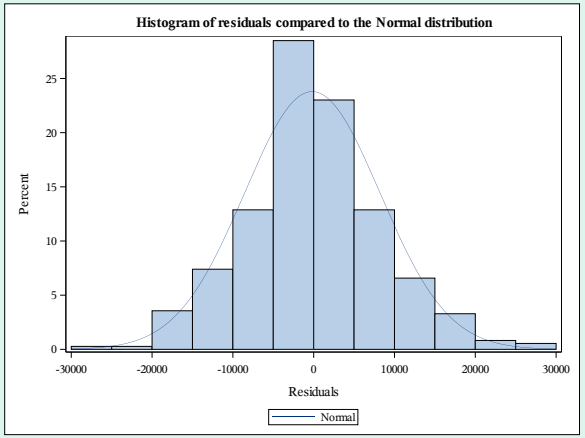
02BNI Scenario with **lowest** R^2
Model: Summer Reduction
EUC: 02BNI
LDZ: WS
Demand: WS
R^2: 93.2%
ILF: 30.0
Sample Points: 372

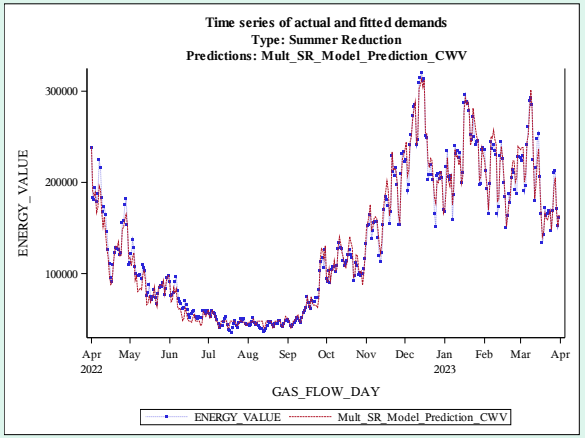


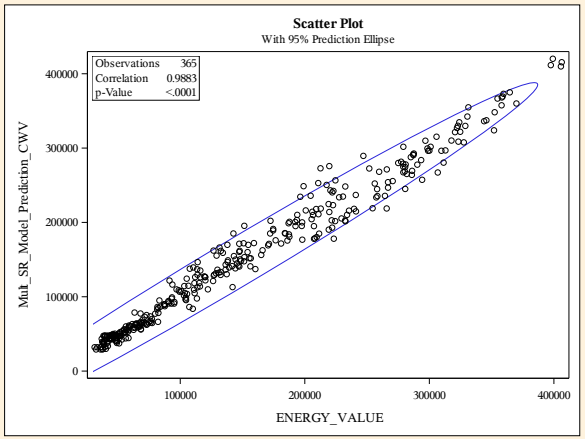


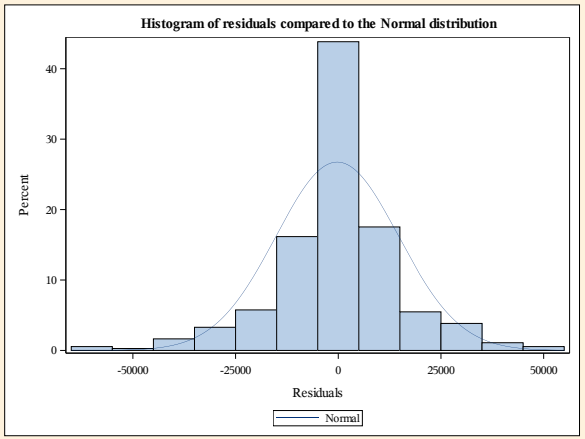
Results – Small NDM: 02BNI Summary

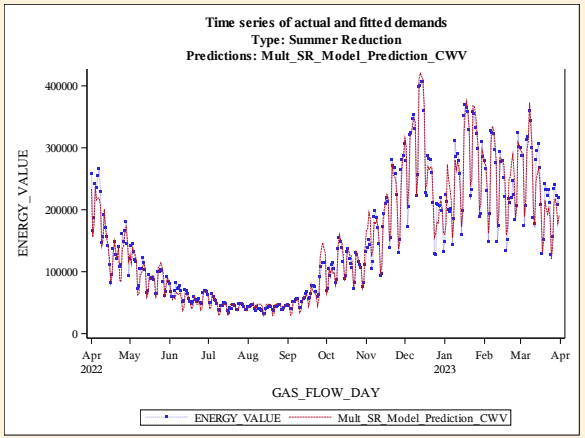












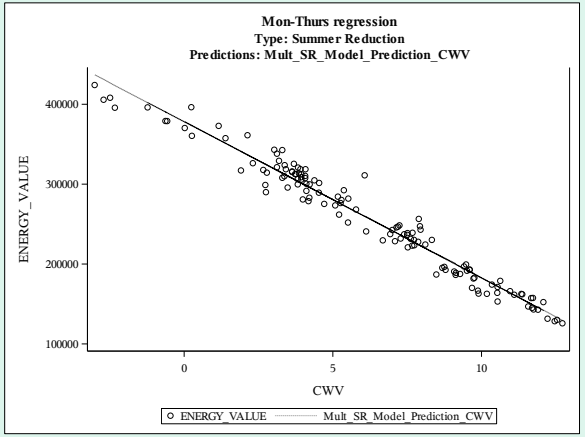
Results – Small NDM: 03B Summary

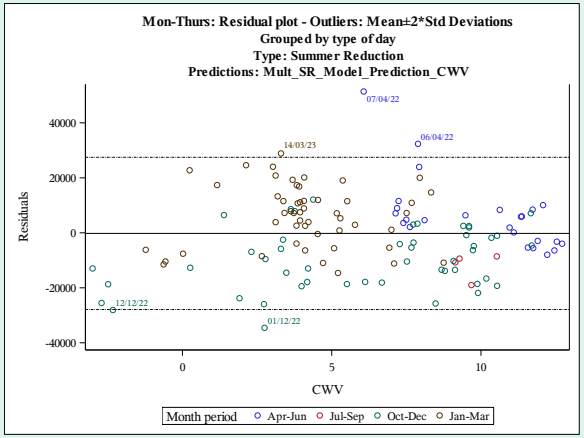
- Previous 2 years used in average are 2019/20 and 2021/22
- R^2 values are very similar to the previous 2 years average with no significant changes
- Sample Sizes were above the minimum for all areas and close to the target for most LDZs with the exception of WN
- ILF values have slightly increased for most LDZs indicating consumers are exhibiting less weather sensitivity
  - NO has seen a bigger increase, however we have investigated and it appears to be a result of consumer behaviour changes and not an issue with the sample or model
  - This increase will be lessened by model smoothing
- Models are good and no alternatives were required

	R^2			Sample Size		ILF		
LDZ	Avg. prev 2 years		2022/23		2022/23	Avg. prev 2 years		2022/23
SC	95.8%	↘	95.8%	●	353	35.3	↑	37.5
NO	96.9%	↗	97.0%	●	169	37.5	↑	41.9
NW	96.8%	↘	95.8%	●	356	35.6	↓	35.4
NE	96.9%	↘	96.3%	●	222	35.7	↑	36.2
EM	96.7%	↗	97.2%	●	309	34.7	↑	34.8
WM	97.1%	↘	96.5%	●	290	33.6	↑	34.1
WN	93.0%	↗	94.4%	●	32	34.6	↑	36.9
WS	96.5%	↘	95.3%	●	161	35.7	↓	34.2
EA	96.6%	↔	96.6%	●	251	32.8	↑	33.9
NT	97.2%	↘	96.6%	●	348	36.5	↑	36.8
SE	97.3%	↘	96.5%	●	353	33.3	↑	34.8
SO	96.6%	↘	96.5%	●	260	32.0	↑	33.1
SW	96.1%	↗	97.1%	●	227	35.3	↓	35.2

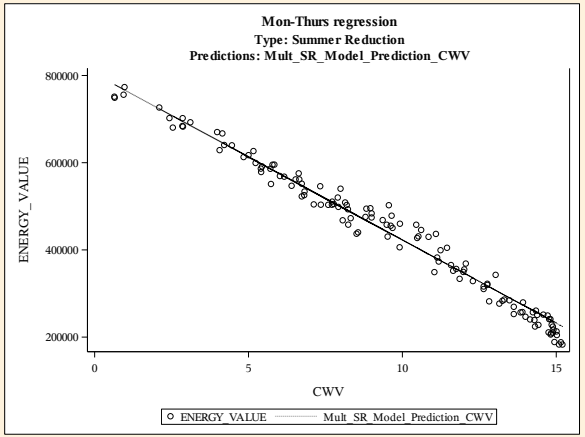
Results – Small NDM: 03B Summary

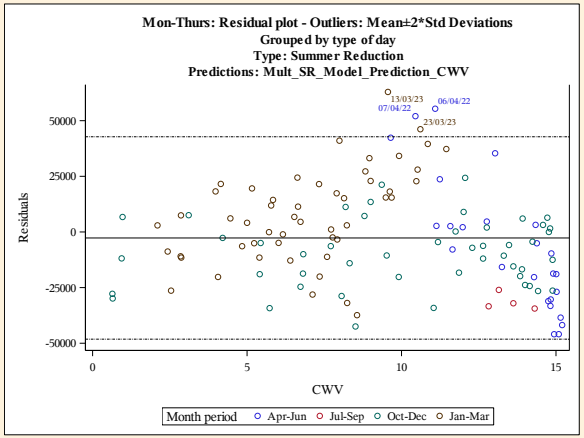
03B Scenario with **highest** ILF
Model: Summer Reduction
EUC: 03B
LDZ: NO
Demand: NO
R^2: 97.0%
ILF: 41.9
Sample Points: 169



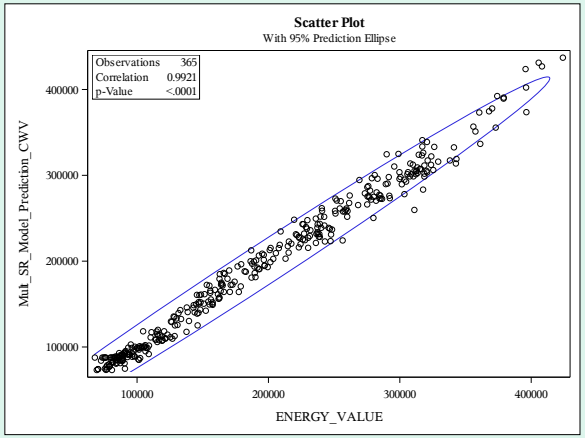


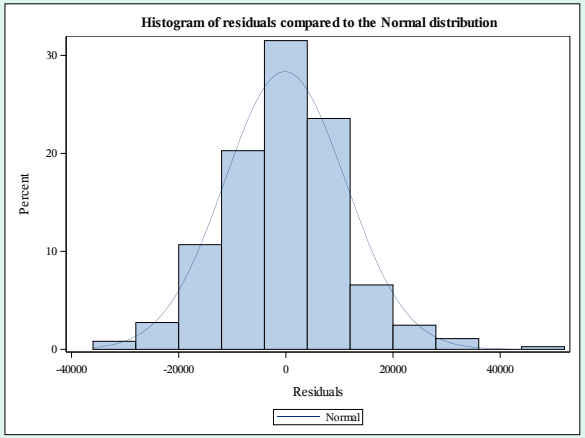
03B Scenario with **lowest** ILF
Model: Summer Reduction
EUC: 03B
LDZ: SO
Demand: SO
R^2: 96.5%
ILF: 33.1
Sample Points: 260

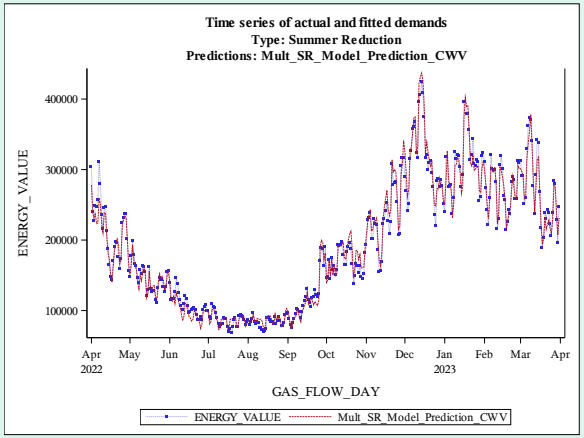


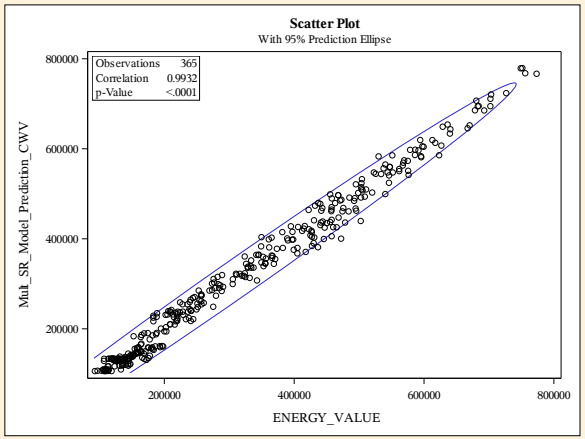


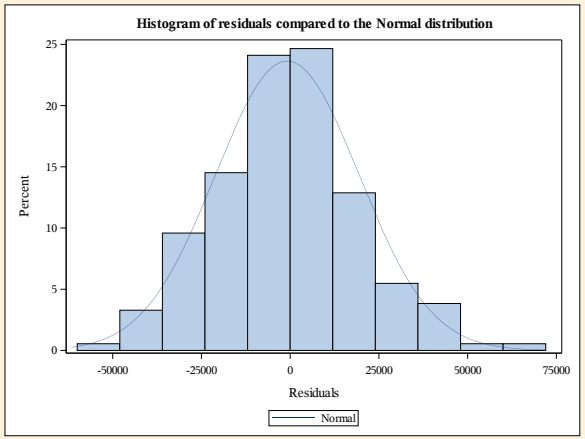
Results – Small NDM: 03B Summary

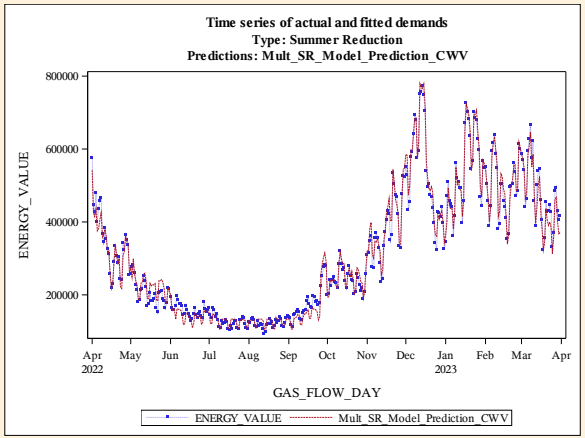












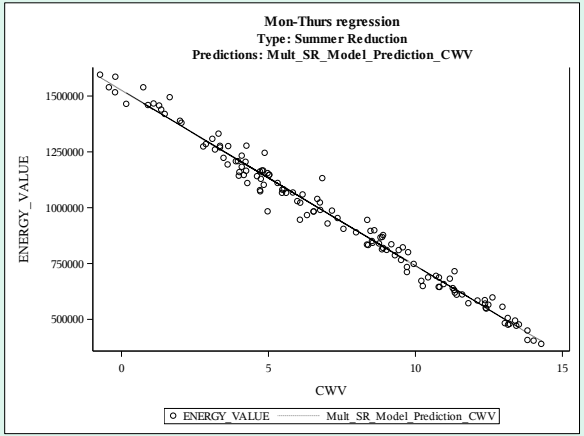
Results – Small NDM: 04B Summary

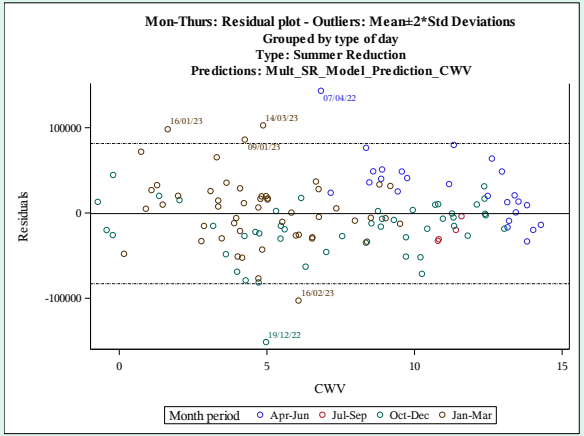
- Previous 2 years used in average are 2019/20 and 2021/22
- R^2 values are very similar to the previous 2 years average with just a slight deterioration in a few areas (within 2%)
- Sample Sizes were above the minimum for all areas and good for most LDZs with the exception of WN
- ILF values have changed very little for all LDZs with no changes greater than 3
- Model results are good with no alternatives required

	R^2			Sample Size		ILF		
LDZ	Avg. prev 2 years	2022/23		2022/23		Avg. prev 2 years	2022/23	
SC	97.1%	↘	**96.9%**	●	**318**	36.3	↑	**39.3**
NO	97.6%	↘	**96.9%**	●	**176**	38.0	↑	**39.6**
NW	97.2%	↘	**96.9%**	●	**252**	37.7	↓	**37.0**
NE	96.5%	↗	**96.9%**	●	**238**	35.7	↑	**36.8**
EM	97.6%	↗	**97.7%**	●	**207**	37.8	↓	**36.5**
WM	96.9%	↘	**96.4%**	●	**237**	34.1	↑	**36.6**
WN	94.8%	↘	**93.1%**	●	**35**	37.0	↓	**36.6**
WS	95.9%	↘	**95.4%**	●	**156**	35.3	↓	**35.2**
EA	96.9%	↘	**96.3%**	●	**205**	37.4	↑	**37.6**
NT	98.1%	↘	**96.6%**	●	**272**	38.6	↑	**39.2**
SE	98.0%	↘	**96.6%**	●	**310**	37.0	↓	**36.7**
SO	97.5%	↘	**96.6%**	●	**244**	31.8	↑	**33.0**
SW	96.0%	↘	**94.4%**	●	**162**	37.8	↑	**39.0**

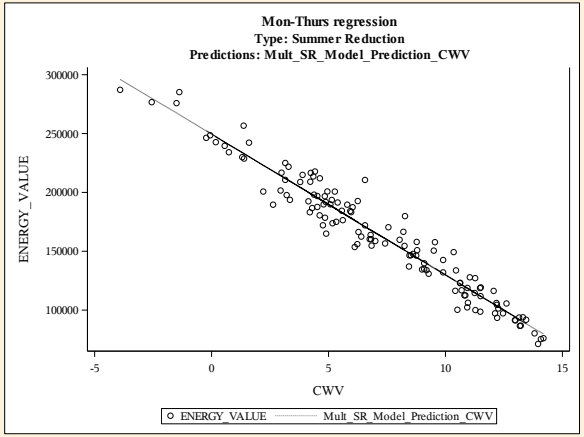
Results – Small NDM: 04B Summary

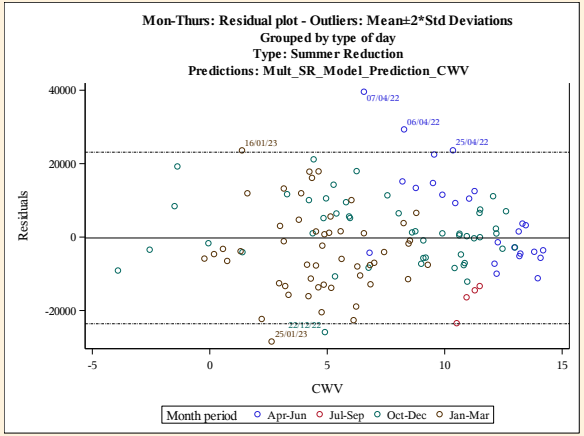
04B Scenario with **highest** R^2
Model: Summer Reduction
EUC: 04B
LDZ: EM
Demand: EM
R^2: 97.7%
ILF: 36.5
Sample Points: 207



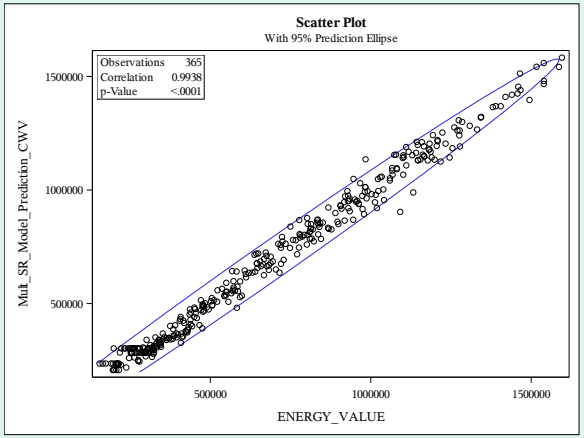


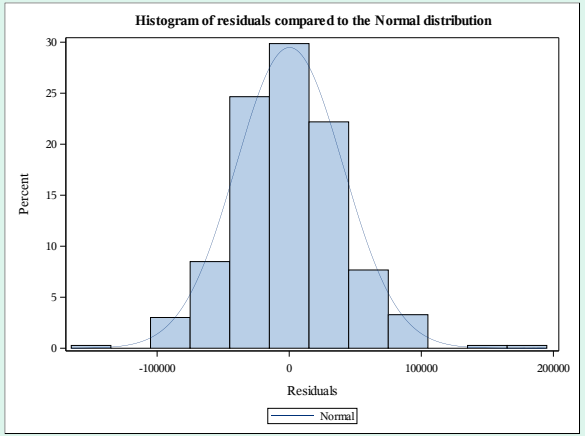
04B Scenario with **lowest** R^2
Model: Summer Reduction
EUC: 04B
LDZ: WN
Demand: WN
R^2: 93.1%
ILF: 36.6
Sample Points: 35

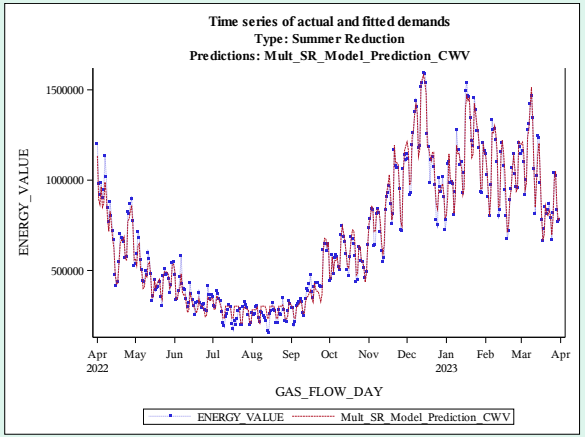


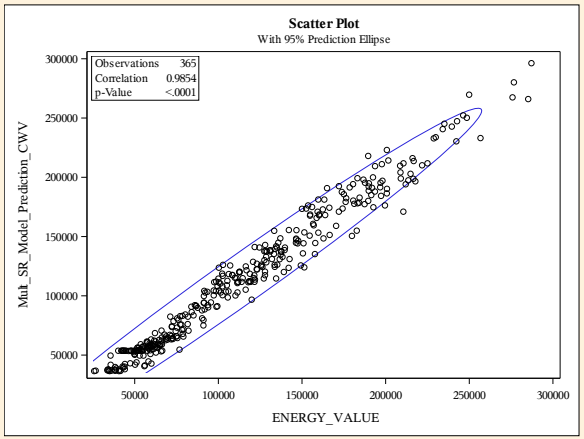


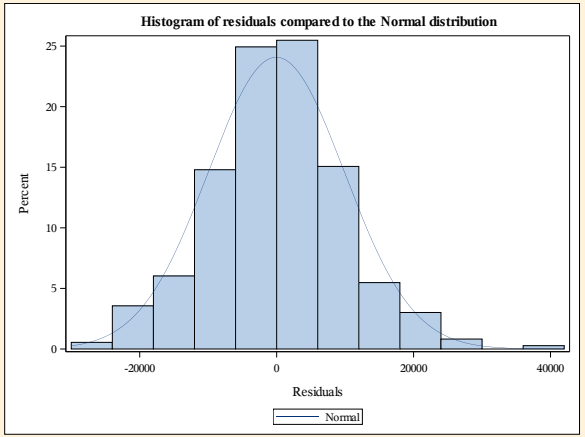
Results – Small NDM: 04B Summary

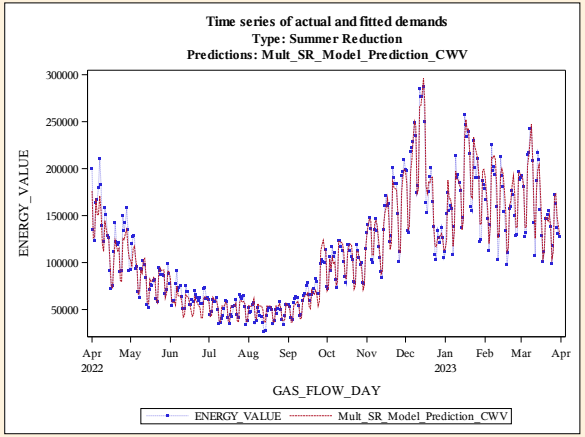












2.0 Gas Demand EUC Modelling Results

RESULTS: SMALL NDM I&C WAR BANDS

Small NDM: Agreed WAR Band Runs

Band / Range	Description	EUC	2022/23 Modelling Runs
Band 1 0 to 73.2 MWh p.a.	PPM Domestic	01BPD	Not generally Monthly read – no WAR Bands
	Non-PPM Domestic	01BND	
	PPM I&C	01BPI	
	Non-PPM I&C	01BNI	
Band 2 73.2 to 293 MWh p.a.	PPM Domestic	02BPD	Not generally Monthly read – no WAR Bands
	Non-PPM Domestic	02BND	
	PPM I&C	02BPI	
	Non-PPM I&C	02BNI	
Band 3 293 to 732 MWh p.a.	Non-PPM I&C	03B	Individual LDZs for most except NO (+NE), WN (+NW) and WS (+SW)
Band 4 732 to 2,196 MWh p.a.	Non-PPM I&C	04B	Individual LDZs for most except SC (+NO), and WN (+NW)

Results – Small NDM: 03W01-04 Summary

	03W01 (0 to 0.418)			03W02 (0.419 to 0.490)			03W03 (0.491 to 0.593)			03W04 (0.594 to 1)		
LDZ	R^2	Sample Size	ILF	R^2	Sample Size	ILF	R^2	Sample Size	ILF	R^2	Sample Size	ILF
SC	↓ 56.1%	59	↑ 70.4	↘ 95.3%	125	↓ 42.6	↘ 94.5%	135	↓ 31.4	↗ 95.4%	34	↑ 25.1
NO	↓ 82.3%	99	↑ 69.5	↘ 96.2%	131	↑ 47.7	↘ 95.2%	101	↑ 32.8	↗ 92.9%	60	↑ 24.2
NW	↓ 79.7%	76	↑ 66.4	↗ 95.7%	102	↑ 46.6	↓ 93.1%	106	↓ 30.5	↘ 93.8%	72	↓ 22.6
NE	↓ 81.1%	52	↑ 68.0	↘ 95.4%	63	↑ 46.5	↘ 94.2%	70	↓ 31.1	↘ 92.9%	37	↓ 22.7
EM	↓ 79.9%	66	↑ 65.8	↗ 95.5%	95	↓ 45.3	↘ 96.6%	71	↓ 32.6	↘ 94.4%	77	↓ 22.1
WM	↘ 87.4%	64	↑ 62.3	↘ 94.6%	76	↑ 45.8	↘ 95.7%	90	↑ 30.3	↘ 92.7%	60	↓ 21.1
WN	↓ 82.0%	87	↑ 67.3	↘ 95.0%	111	↑ 47.3	↓ 93.2%	112	↓ 31.3	↘ 94.3%	78	↓ 22.8
WS	↓ 78.3%	67	↑ 67.8	↗ 94.6%	120	↑ 44.9	↗ 95.9%	102	↑ 34.4	↗ 93.8%	99	↑ 22.7
EA	↓ 79.0%	52	↑ 63.3	↓ 90.5%	66	↓ 45.5	↘ 95.3%	64	↓ 32.5	↗ 95.2%	69	↑ 22.9
NT	↓ 76.8%	83	↑ 74.4	↓ 90.3%	87	↑ 47.6	↓ 94.6%	86	↓ 33.3	↗ 95.4%	92	↓ 23.4
SE	↓ 70.4%	61	↑ 69.4	↓ 93.0%	108	↑ 46.6	↘ 96.1%	89	↑ 33.3	↘ 93.2%	95	↓ 22.5
SO	↓ 77.3%	60	↑ 64.8	↘ 94.4%	72	↑ 43.0	↘ 95.9%	70	↑ 31.3	↘ 93.4%	58	↓ 19.9
SW	↓ 71.8%	48	↑ 68.9	↗ 94.0%	63	↓ 45.0	↘ 95.3%	58	↑ 34.9	↘ 93.8%	58	↑ 22.4

Results – Small NDM: 03W01-04 Summary

- WAR boundaries have changes since the April DESC as the removal of schools from WS required them to be recalculated. New values are displayed at the top of slide 39

- Previous 2 years used in average are 2019/20 and 2021/22
  - These values are not shown due to lack of space but drive the movement arrows

- Many R^2 values are similar to the previous 2 years average particularly for W02-04

- W01 has seen some fairly significant deterioration in R^2, however we expect WAR band 1 to have the least seasonality, and therefore lower R^2 values
- Charts for two LDZs in W01 are show on the following slides
  - WM:03W01 has the highest R^2 and a fairly good fit although some outliers are seen
  - SC:03W01 has the lowest R^2. Reduced consumption over the Analysis Period is clear from the charts

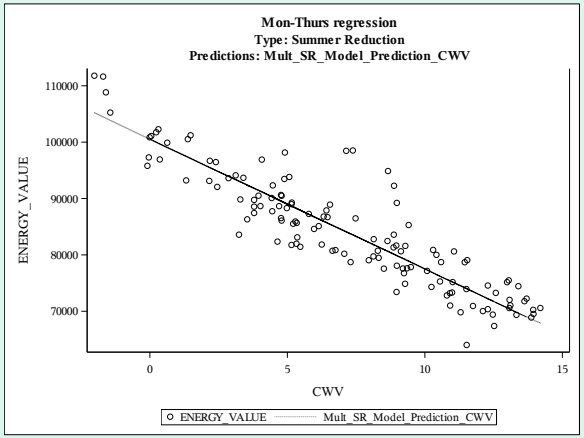
- Sample Sizes were above the minimum for all areas and good for most LDZs

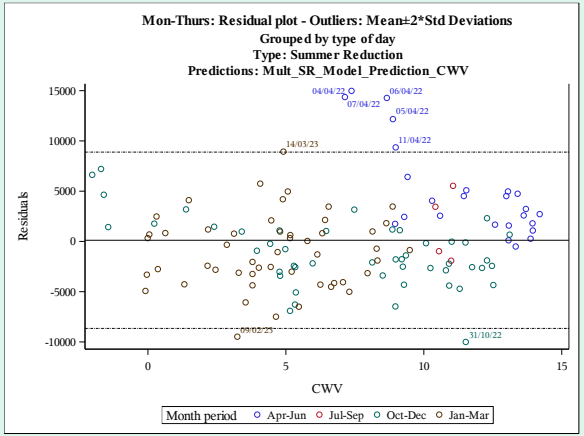
- ILF values have changed very little for W02-W04 however bigger changes have been seen for W01
  - Bigger changes are expected this year, as previously Band 03 was combined with Band 04 for WAR Band Modelling

- Model results are adequate with no alternatives required

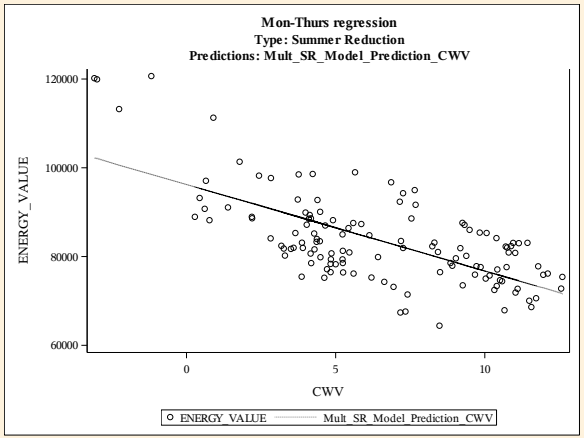
Results – Small NDM: 03W01-04 Summary

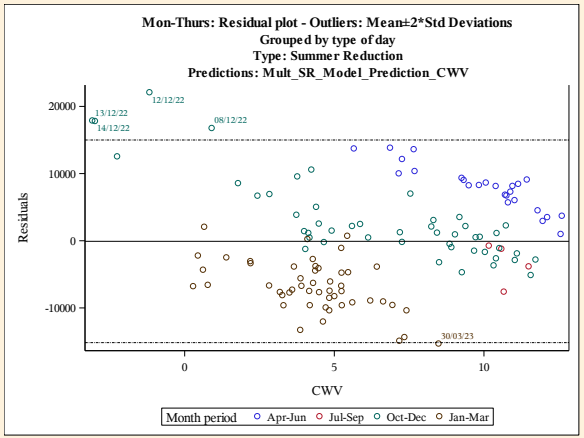
03W01 Scenario with **highest** R^2
Model: Summer Reduction
EUC: 03W01
LDZ: WM
Demand: WM
R^2: 87.4%
ILF: 62.3
Sample Points: 64



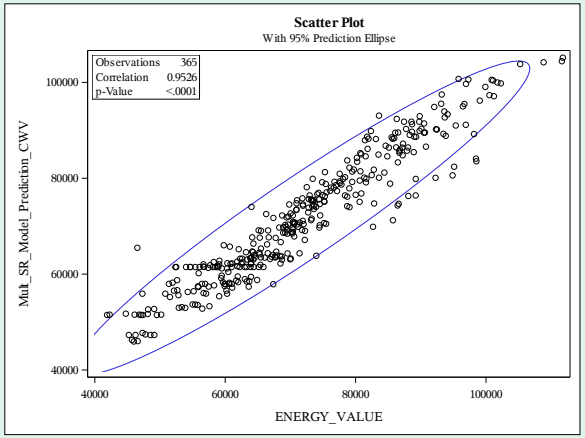


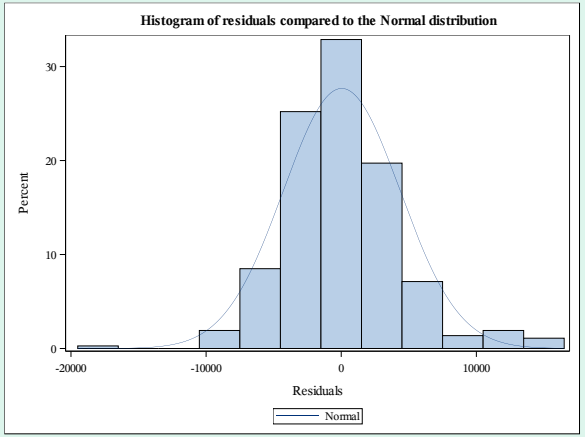
03W01 Scenario with **lowest** R^2
Model: Summer Reduction
EUC: 03W01
LDZ: SC
Demand: SC
R^2: 56.1%
ILF: 70.4
Sample Points: 59

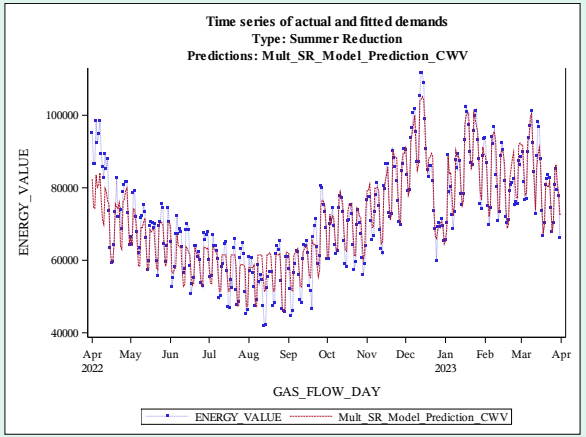


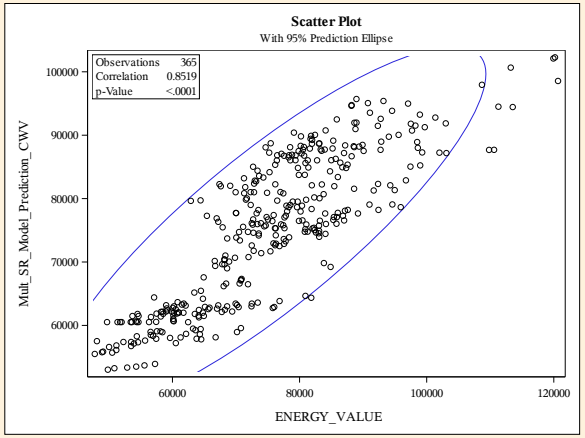


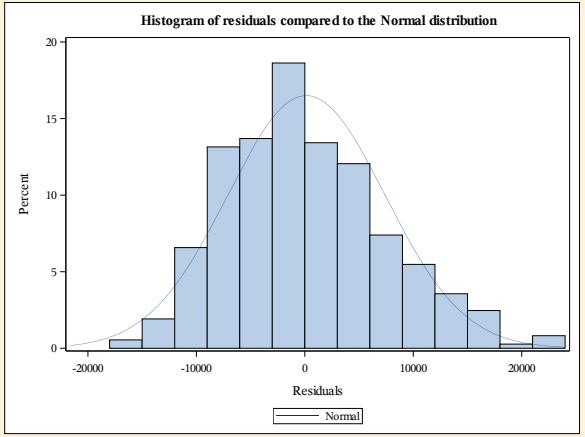
Results – Small NDM: 03W01-04 Summary

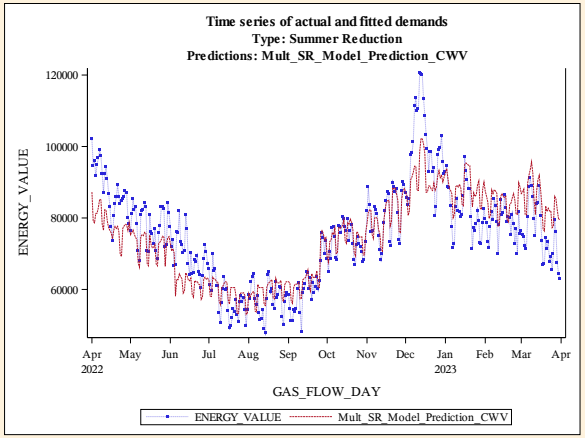












Results – Small NDM: 04W01-04 Summary

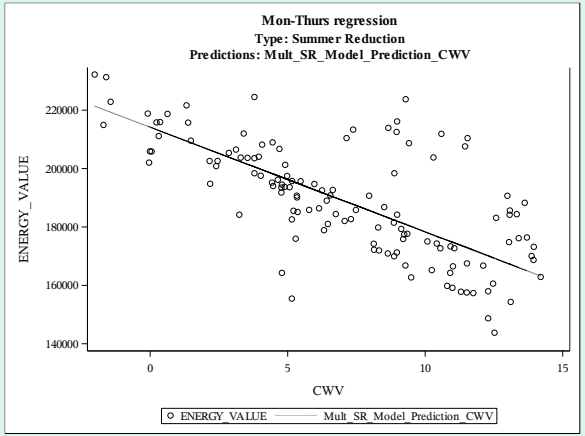
	04W01 (0 to 0.416)			04W02 (0.417 to 0.486)			04W03 (0.487 to 0.584)			04W04 (0.585 to 1)		
LDZ	R^2	Sample Size	ILF	R^2	Sample Size	ILF	R^2	Sample Size	ILF	R^2	Sample Size	ILF
SC	↗ 94.2%	115	↓ 60.5	↘ 96.4%	165	↑ 45.0	↗ 96.4%	170	↑ 31.8	↗ 94.8%	44	↓ 22.9
NO	↘ 91.1%	48	↑ 61.5	↓ 94.1%	50	↑ 46.5	↗ 96.8%	53	↑ 33.5	↘ 92.4%	25	↓ 23.6
NW	↗ 90.3%	51	↓ 61.2	↘ 93.3%	75	↑ 45.4	↘ 96.3%	67	↑ 33.9	↗ 94.8%	59	↑ 23.8
NE	↓ 89.7%	64	↓ 59.2	↗ 96.6%	56	↓ 44.5	↗ 96.2%	66	↑ 32.5	↗ 94.4%	52	↑ 23.7
EM	↓ 83.0%	43	↓ 59.6	↘ 93.9%	61	↓ 43.9	↗ 97.4%	63	↑ 33.5	↗ 95.4%	40	↓ 22.2
WM	↓ 74.7%	46	↑ 65.3	↓ 92.9%	71	↑ 42.6	↘ 95.3%	71	↑ 32.8	↗ 96.3%	49	↑ 24.5
WN	↗ 89.5%	57	↓ 63.0	↓ 92.5%	89	↑ 46.5	↘ 95.9%	76	↑ 33.9	↗ 94.9%	65	↑ 23.9
WS	↑ 89.5%	31	↑ 62.9	↘ 92.9%	46	↑ 46.0	↘ 93.5%	44	↑ 30.6	↗ 93.0%	35	↑ 21.1
EA	↓ 79.3%	29	↑ 65.3	↓ 88.4%	62	↑ 46.9	↘ 94.6%	70	↑ 36.3	↘ 94.0%	44	↑ 23.4
NT	↓ 72.0%	50	↑ 65.2	↓ 93.4%	89	↑ 46.8	↘ 96.4%	82	↑ 36.0	↗ 95.6%	51	↑ 25.2
SE	↗ 79.5%	52	↑ 65.1	↓ 93.5%	87	↑ 47.2	↘ 95.3%	90	↑ 34.9	↗ 96.3%	81	↑ 24.9
SO	↓ 76.5%	47	↓ 58.3	↓ 92.5%	53	↑ 41.6	↘ 95.8%	75	↑ 31.7	↗ 96.1%	69	↑ 22.6
SW	↓ 71.4%	30	↑ 66.8	↓ 87.4%	67	↑ 48.0	↘ 94.3%	35	↑ 35.0	↗ 94.4%	30	↑ 23.0

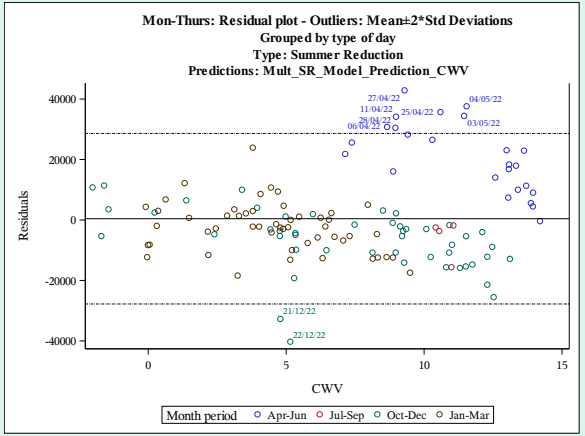
Results – Small NDM: 04W01-04 Summary

- Previous 2 years used in average are 2019/20 and 2021/22
  - These values are not shown due to lack of space but drive the movement arrows
- Many R^2 values are similar to the previous 2 years average particularly for W02-04
- Again W01 has seen some bigger movements in R^2, however we expect WAR band 1 to have the least seasonality, and therefore don't always produce strong R^2 values
- Charts for two LDZs in W01 are show on the following slides
  - WM:04W01 saw the biggest reductions in R^2
  - EA:04W01 saw the biggest change in ILF
- Sample Sizes were above the minimum for all areas except EA:W01 and NO:W04
- ILF values have changed very little for W02-W04 however bigger changes have been seen for W01
  - Bigger changes are expected this year, as previously Band 03 was combined with Band 04 for WAR Band Modelling
- Model results are adequate with no alternatives required

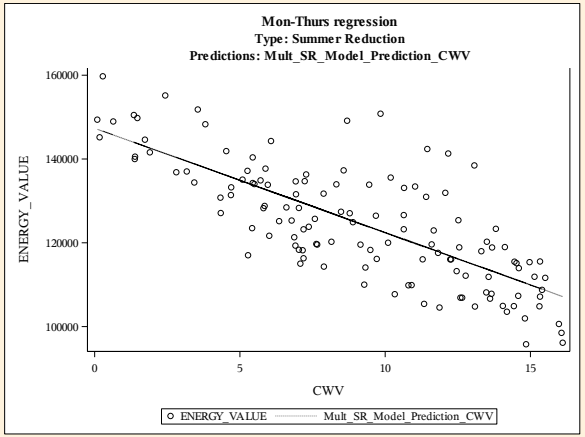
Results – Small NDM: 04W01-04 Summary

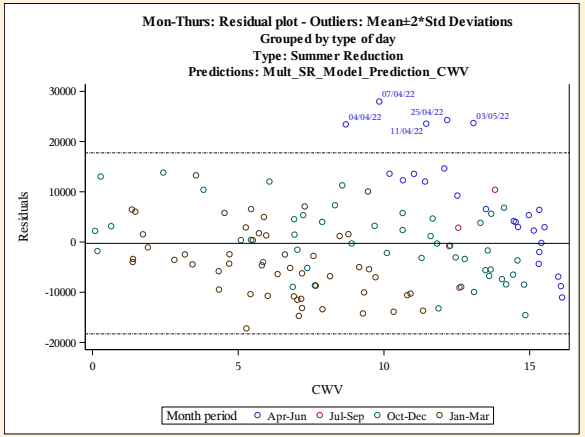
04W01 Scenario with **highest** reduction in **R^2**
Model: Summer Reduction
EUC: 04W01
LDZ: WM
Demand: WM
R^2: 74.7%
ILF: 65.3
Sample Points: 46



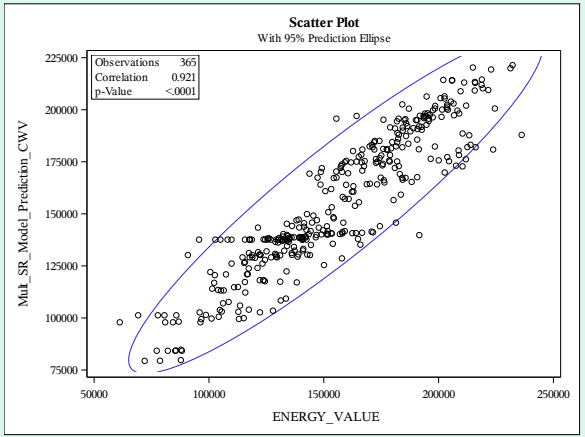


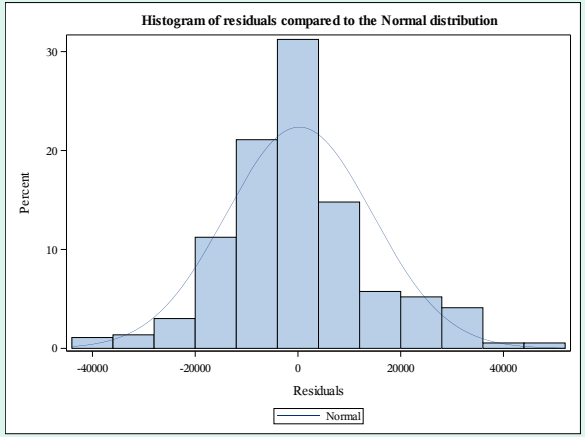
04W01 Scenario with **biggest** change in **ILF**
Model: Summer Reduction
EUC: 04W01
LDZ: EA
Demand: EA
R^2: 79.3%
ILF: 65.3
Sample Points: 29

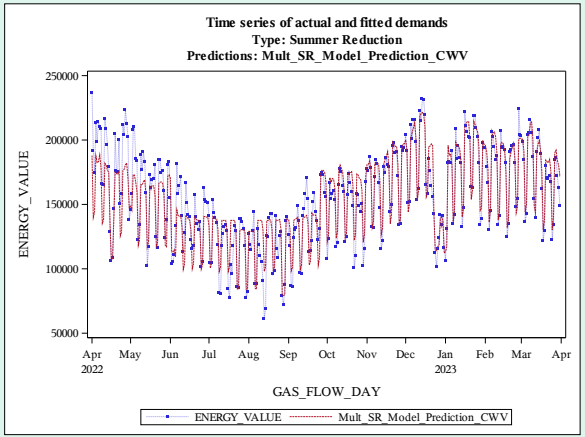


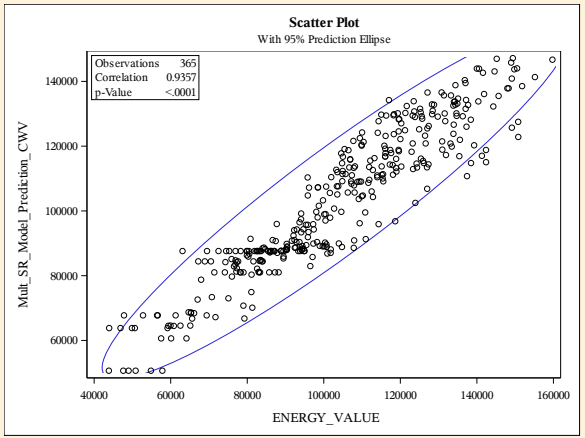


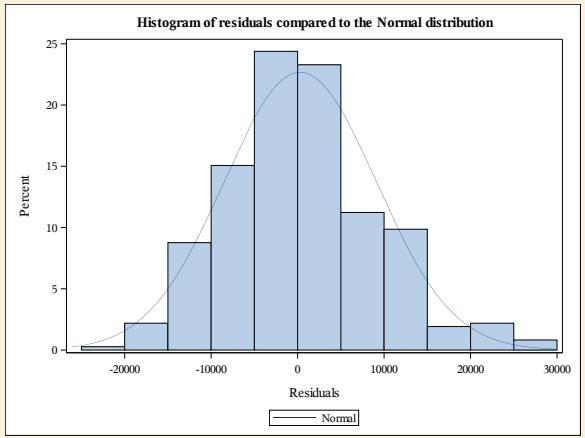
Results – Small NDM: 04W01-04 Summary

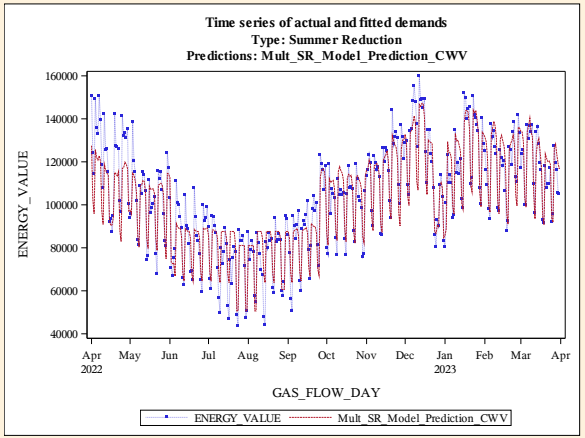












Conclusions

- All NDM models have seen changes to ILFs as a result of changes in consumer behaviour

- R^2 values are in line with previous years results for Consumption Band modelling

- R^2 for WAR Band models are more varied and changes to aggregations and consumer behaviour have impacted results

- All models have produced good or adequate results that can be carried forward into model smoothing