

Post-Nexus Demand Response to Changes in CWV (°C)

Background

A significant number of national NDM AQs are included in the “Bucket” or default EUC WAR bands within the EUC band categories 3 – 8. The weather sensitivity of Demand Estimation will be determined partly by the correct assignment of supply points into each EUC WAR bands. For example, the incorrect assignment of a highly weather sensitive supply points into the default EUC WAR band could result in a demand response that is too low. On the whole the default EUC WAR band is somewhere between the weather sensitivity of bands W02 and W03.

There have been observations that the Demand Estimation response to weather is too low, particularly during the shoulder months when actual demand moves greater than Demand Estimation, influencing the scale of UIG. It has been suggested that the use of default EUC WAR bands is contributing to this effect.

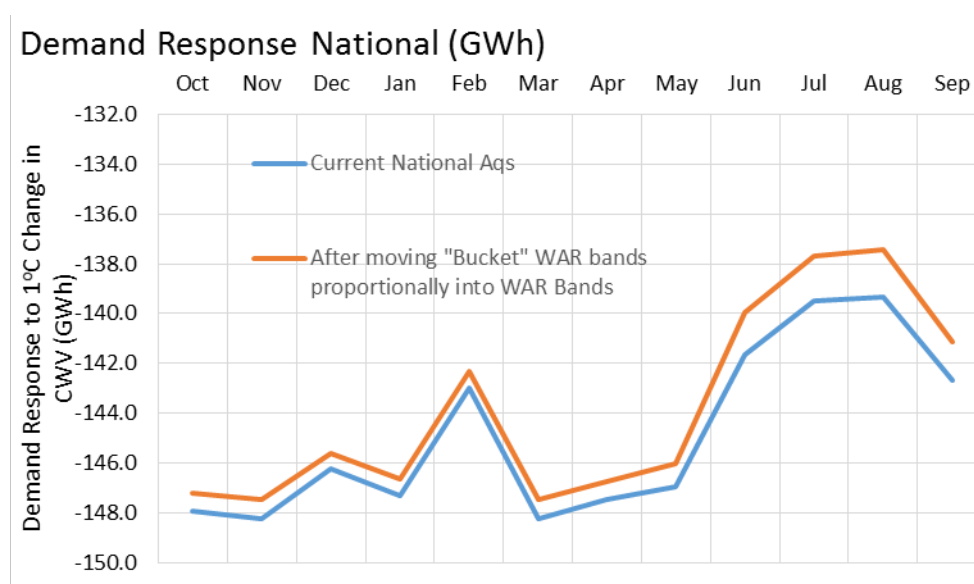
The document “Post Nexus Demand Response - Supporting Notes.pdf” describes a method for calculating the weather sensitivity of Demand Estimation. This document details the results of applying this method to understand if the use of default WAR bands is impacting the accuracy of demand response.

Results

The analysis presented in [Figure 1](#) illustrates the demand response of Demand Estimation given a 1 unit change in CWV firstly based on the current AQ population (which includes default EUC WAR bands) and after moving AQ from the default bands into a correct WAR band - based upon the proportion of the current WAR band population. See Table 4: WAR Band Percentages based on National AQs for a subset of data for LDZ EA.

Assumption 1 - based upon the proportion of the current WAR band population

Figure 1 National Demand Response – after the movement of default AQ into WAR bands 1,2,3,4 in proportional to the existing WAR band population.



On a daily basis each 1 unit change in CWV will produce a linear demand response according to the Table 1 (below) for total NDM demands. Demand response is fairly flat across the year, ranging between -139 to -148 GWh each day with a lower response in June, July, August and September due to lower ALPs and its multiplicative interaction with DAFs.

Looking at the results overall the use of default EUC WAR bands is not significantly impacting the demand response of Demand Estimation, both measures are within 1-2GWh. Assigning supply points from default WAR bands to their correct bands would slightly reduce demand response, although the effect is not significant.

The corrected demand response, being slightly less could contribute approx. -0.61 to -1.87 GWh of the daily variability in UIG.

Table 1: Daily Demand Response from Demand Estimation GWh

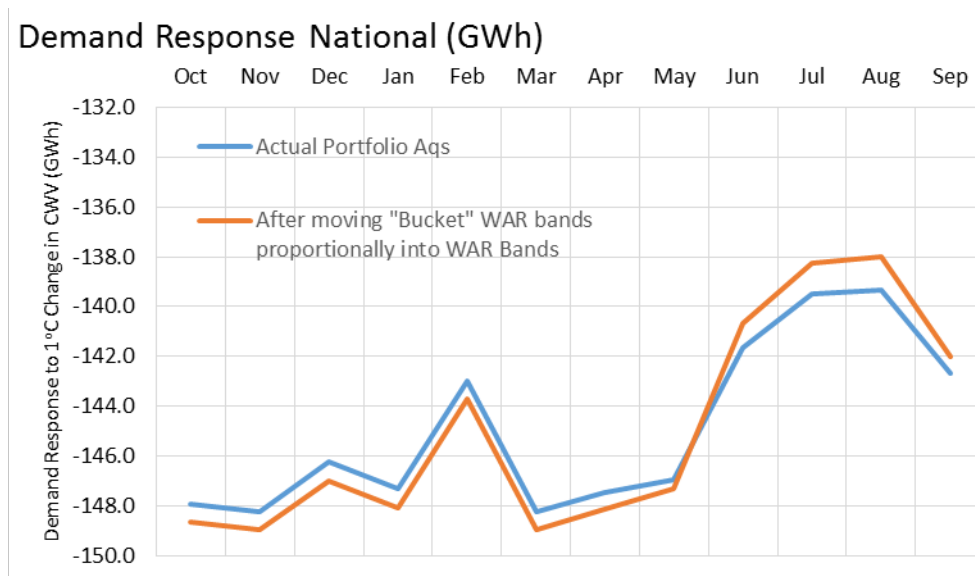
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Current National AQs	-148	-148	-146	-147	-143	-148	-147	-147	-142	-140	-139	-143
Corrected	-147	-147	-146	-147	-142	-147	-147	-146	-140	-138	-137	-141
Δ GWh	-0.74	-0.75	-0.61	-0.68	-0.71	-0.74	-0.73	-0.93	-1.66	-1.82	-1.87	-1.55

Assumption 2 – the default bands have been assigned to WAR bands based upon a 10%, 30%, 30%, 30% spilt

The assumption used so far in the analysis is that the current population of default WAR bands is representative of the current WAR band population. However if the majority of supply points in the default WAR band are more likely to be WAR Band 3 or 4, and less likely to be WAR Band 1, underestimation of demand response would occur.

Therefore, the default bands have been assigned to WAR bands based upon a 10%, 30%, 30%, 30% spilt. The results are shown in Figure 2. With the movement of more AQ into WAR bands 3 and 4 the demand response is greater for the winter months and less for the summer months. For WAR bands 3 and 4 winter consumption is much higher and thus via the multiplication interaction with DAF the demand response is less in the summer.

Figure 2 National Demand Response – after the movement of default AQ into WAR bands 1,2,3,4 in the following proportions 10%, 30%, 30% and 30%.



Again the scale of the variance is not significant given the levels of UIG. The seasonality is of interest, if correct.

Table 2: Daily Demand Response from Demand Estimation GWh

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Current National Aqs	-148	-148	-146	-147	-143	-148	-147	-147	-142	-140	-139	-143
Corrected	-149	-149	-147	-148	-144	-149	-148	-147	-141	-138	-138	-142
Δ GWh	0.72	0.75	0.79	0.76	0.72	0.75	0.67	0.37	-0.94	-1.29	-1.32	-0.70

Conclusions

The two parts of this analysis give a sense of the potential size of the issue use of default WAR bands. There is a small potential impact on the accuracy of Demand Estimation and therefore UIG.

Although the impact is small, work should progress on reducing the number of supply points in the default WAR bands. Demand Estimation has been built on a refined approach improved over 10 years and there are unlikely to be major significant findings or wins on improving the approach. This is one small gains that could be improved along with others to reduce level of UIG and its volatility.

Appendix 1: Detailed LDZ Results

Assumption 1 - based upon the proportion of the current WAR band population

Table 3: Demand response per month for a 1 degree change in CWV for each LDZ

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
EA	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
EM	-15	-15	-15	-15	-14	-15	-15	-15	-13	-13	-13	-13
NE	-8	-8	-8	-8	-8	-8	-8	-8	-7	-7	-7	-7
NT	-16	-16	-16	-16	-15	-16	-16	-16	-15	-15	-15	-15
NO	-8	-8	-8	-8	-8	-8	-8	-8	-8	-7	-7	-8
NW	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
SC	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13
SE	-17	-17	-16	-16	-16	-17	-16	-16	-16	-16	-16	-16
SO	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
SW	-10	-10	-10	-10	-9	-10	-10	-10	-9	-9	-9	-9
WM	-14	-14	-14	-14	-14	-14	-14	-14	-14	-13	-13	-14
WN	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
WS	-6	-6	-5	-6	-5	-6	-6	-5	-5	-5	-5	-5
National	-148	-148	-146	-147	-143	-148	-147	-147	-142	-140	-139	-143

Table 4: Demand response per month for a 1 degree change in CWV for each LDZ

After moving "Bucket" WAR bands proportionally into WAR Bands

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
EA	-12	-12	-12	-12	-12	-12	-12	-12	-12	-11	-11	-12
EM	-15	-15	-15	-15	-14	-15	-15	-15	-13	-13	-13	-13
NE	-8	-8	-8	-8	-8	-8	-8	-8	-7	-7	-7	-7
NT	-16	-16	-16	-16	-15	-16	-16	-16	-15	-15	-15	-15
NO	-8	-8	-8	-8	-8	-8	-8	-8	-8	-7	-7	-8
NW	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-15	-16
SC	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13
SE	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
SO	-12	-12	-12	-12	-11	-12	-12	-12	-11	-11	-11	-11
SW	-10	-10	-10	-10	-9	-10	-10	-10	-9	-9	-9	-9
WM	-14	-14	-14	-14	-14	-14	-14	-14	-13	-13	-13	-14
WN	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
WS	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
National	-147	-147	-146	-147	-142	-147	-147	-146	-140	-138	-137	-141

Assumption 2 - the default bands have been assigned to WAR bands based upon a 10%, 30%, 30%, 30% spilt

Table 5: Demand response per month for a 1 degree change in CWV for each LDZ

After the movement of default AQ into WAR bands 1,2,3,4 in the following proportions 10%, 30%, 30% and 30%.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
EA	-12	-12	-12	-12	-12	-12	-12	-12	-12	-11	-11	-12
EM	-15	-15	-15	-15	-15	-15	-15	-15	-13	-13	-13	-13
NE	-8	-8	-8	-8	-8	-8	-8	-8	-7	-7	-7	-7
NT	-16	-16	-16	-16	-15	-16	-16	-16	-15	-15	-15	-15
NO	-8	-8	-8	-8	-8	-8	-8	-8	-8	-7	-7	-8
NW	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
SC	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13
SE	-17	-17	-16	-16	-16	-17	-16	-16	-16	-16	-16	-16
SO	-12	-12	-12	-12	-12	-12	-12	-12	-12	-11	-11	-12
SW	-10	-10	-10	-10	-9	-10	-10	-10	-9	-9	-9	-9
WM	-14	-14	-14	-14	-14	-14	-14	-14	-14	-13	-13	-14
WN	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
WS	-6	-6	-6	-6	-5	-6	-6	-6	-5	-5	-5	-5
National	-149	-149	-147	-148	-144	-149	-148	-147	-141	-138	-138	-142

Table 6: WAR Band Percentages based on National AQs

	WAR Band Percentages Based on National AQs											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
EA:E03W01	16.97%	16.98%	17.00%	16.94%	16.92%	16.89%	16.84%	16.82%	16.77%	15.57%	15.79%	16.20%
EA:E03W02	37.58%	37.59%	37.47%	37.48%	37.52%	37.53%	37.52%	37.55%	37.55%	33.56%	32.12%	31.29%
EA:E03W03	27.98%	27.98%	28.18%	28.32%	28.32%	28.33%	28.33%	28.31%	28.34%	28.82%	28.68%	29.16%
EA:E03W04	17.47%	17.45%	17.35%	17.26%	17.24%	17.25%	17.31%	17.32%	17.34%	22.05%	23.41%	23.36%
EA:E04W01	23.04%	23.00%	23.06%	23.28%	23.33%	23.36%	23.37%	23.36%	23.39%	25.57%	26.12%	26.89%
EA:E04W02	34.28%	34.31%	34.12%	33.94%	33.92%	33.97%	34.03%	33.91%	34.00%	31.82%	31.39%	29.97%
EA:E04W03	32.15%	32.16%	32.25%	32.26%	32.24%	32.16%	32.08%	31.96%	31.91%	27.72%	27.35%	27.87%
EA:E04W04	10.53%	10.53%	10.58%	10.52%	10.51%	10.51%	10.52%	10.77%	10.70%	14.88%	15.14%	15.27%
EA:E05W01	23.99%	23.99%	23.72%	23.49%	23.53%	23.43%	23.29%	23.63%	23.72%	25.01%	27.19%	26.29%
EA:E05W02	32.59%	32.59%	32.40%	32.76%	32.65%	32.58%	32.60%	32.96%	32.71%	23.73%	21.59%	20.73%
EA:E05W03	26.14%	26.14%	26.96%	27.08%	27.13%	27.24%	27.32%	26.88%	26.98%	28.87%	28.90%	29.54%
EA:E05W04	17.28%	17.28%	16.92%	16.67%	16.69%	16.75%	16.79%	16.53%	16.59%	22.39%	22.33%	23.44%
EA:E06W01	21.01%	21.01%	20.97%	20.70%	20.70%	20.70%	19.90%	20.88%	20.88%	23.45%	24.96%	25.58%
EA:E06W02	28.42%	28.42%	28.44%	28.14%	28.14%	28.14%	28.43%	28.08%	28.08%	22.48%	23.28%	20.24%
EA:E06W03	31.30%	31.30%	31.34%	32.13%	32.13%	32.13%	32.46%	32.06%	32.06%	37.59%	33.08%	35.54%
EA:E06W04	19.27%	19.27%	19.25%	19.02%	19.02%	19.02%	19.21%	18.98%	18.98%	16.48%	18.67%	18.63%
EA:E07W01	10.56%	10.56%	10.24%	10.23%	10.23%	10.23%	10.23%	14.18%	14.18%	13.59%	11.87%	12.35%
EA:E07W02	30.48%	30.48%	29.68%	29.74%	29.74%	29.74%	29.74%	28.43%	28.43%	18.42%	16.81%	17.48%
EA:E07W03	27.87%	27.87%	33.67%	33.62%	33.62%	33.62%	33.62%	32.14%	32.14%	44.06%	42.68%	34.36%
EA:E07W04	31.09%	31.09%	26.41%	26.42%	26.42%	26.42%	26.42%	25.25%	25.25%	23.93%	28.64%	35.81%
EA:E08W01	20.83%	19.70%	19.70%	19.70%	19.70%	19.70%	19.70%	18.12%	18.12%	11.77%	0.00%	0.00%
EA:E08W02	22.22%	21.02%	21.02%	21.02%	21.02%	21.02%	21.02%	19.34%	19.34%	22.97%	30.03%	29.98%
EA:E08W03	45.33%	48.29%	48.29%	48.29%	48.29%	48.29%	48.29%	52.42%	52.42%	53.24%	69.97%	70.02%
EA:E08W04	11.62%	10.99%	10.99%	10.99%	10.99%	10.99%	10.99%	10.12%	10.12%	12.02%	0.00%	0.00%