Evaluation of algorithm performance - 2015/16 gas year

Introduction

The annual gas year algorithm performance evaluation normally considers three sources of information as follows:

i)   daily values of scaling factor (SF) and weather correction factor (WCF)

ii) reconciliation variance (RV) data for each EUC

iii) daily consumption data collected from the NDM sample

This note presents the result of the review in respect of NDM sample derived daily consumption data, with brief explanatory notes.

1.0 Scaling Factor (SF) and Weather Correction Factor (WCF)

This analysis was not completed for Gas Year 2015/16 as per the decision made at the Demand Estimation Sub Committee (DESC) meeting on 8th July 2015.

2.0 Reconciliation Variance (RV) analysis

This analysis was not completed for Gas Year 2015/16 as per the decision made at the Demand Estimation Sub Committee (DESC) meeting on 8th July 2015.

3.0 Analysis of NDM sample daily consumption data

3.1 Overview

The performance of the NDM profiling algorithms 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 profiling formula) across the range of EUCs. This evaluation covers the period of the gas year 2015/16.

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

i)   As used   - gas year 2015/16 ALPs and DAFs, real system WCF and SF.

ii) Best estimate 15   - gas year 2015/16 ALPs, DAFs, estimated weather correction factor (EWCF) and SF = 1.

iii) Best estimate 16   - as (ii) above but with ALPs, DAFs, EWCFs based on 2016/17 models adjusted to apply to pattern of days/holidays in 2015/16.

Tables showing the error ("actual-allocated") expressed as a percentage of full year demand, for the whole year and for winter and summer separately, for each of the three bases, are attached as Tables 3.1 to 3.9. Note that positive errors denote under allocation and negative errors denote over allocation by the algorithms.

It is worth noting at the outset that results for band 09 are unreliable and are disregarded in this assessment. Only supply points that are NDM and have passed data validation can be used to assess this band and therefore the band is represented by a very small number of supply points distributed in only some of the 13 LDZs.

Figures 3.1, 3.2 and 3.3 are bar charts showing a simple summary of the overall picture given by these three sets of tables. The overall error and apparent winter/summer bias for EUCs in each consumption band is shown averaged across all LDZs.

The bar chart in Figure 3.1 shows that for the "as used" analysis the percentage errors for all consumption bands over the 12 month period as a whole, are negative and lie within a range of -0.38% to -3.27%. The winter errors are negative with the exception of bands 06 and 07 with the summer errors also being negative in all bands except band 08.

3.2 Analysis

The negative errors over 12 months across all consumption bands indicate over allocation by the models. This over allocation in all consumption bands in the "as used" analysis is an indication of population AQs being lower than the NDM sample derived AQs. Moreover, since allocated consumption is a direct function of AQ, the extent of any AQ deficit (in percentage terms) would broadly tend to be of the same order as that

noted for this "as used" analysis. The full year errors in the "as used" analysis, across all applicable consumption bands for each LDZ (excluding WN LDZ for which there is no data for band 01) were also computed and are set out in Table 3.10. These errors range from -0.1% to -1.6% for the individual LDZs (and -0.9% overall across all LDZs excluding WN) suggesting an AQ deficit of the same extent.

The "as used" analysis uses real (i.e. Gemini system) SFs that have taken population AQs into account (i.e. if population AQ was too low then this would have led to an increase of the real SFs from the values that would have otherwise applied).

However, the AQs used in the analysis are not system AQs but are computed from sample data itself. These AQs based on the consumption data of the sample itself would be expected to be lower than the equivalent system AQs. However, over the 2015/16 gas year, the sample derived AQs were marginally higher than the system AQs. This could be due to a combination of minimal system AQ change at the start of gas year 2016/17 (reduction of -0.5% overall) and the more variable weather experienced during gas year 2015/16 (from which the sample AQs were derived). Thus, the resultant "as used" allocations using the real SFs with sample derived AQs, end up being higher than they should be and this gives the negative errors shown in Figure 3.1.

The percentage changes in aggregate NDM AQs at the start of gas year 2016/17 as observed on the Gemini system indicated that a small reduction in aggregate NDM AQs had taken place for gas year 2016/17 in 11 out of 13 LDZs. The reduction was 0.5% overall across all LDZs and the changes ranged from a 1.1% increase in EA LDZ to a 1.9% reduction in WS LDZ.

The "best estimate" analysis is potentially more helpful in assessing the performance of the algorithms themselves, as opposed to the performance of the demand attribution process. For each "best estimate" analysis, a scaling factor of one is used and EWCF is applied instead of WCF. The EWCF is calculated directly from the models of aggregate NDM demand in the LDZ for the period in question, using the relevant aggregate NDM seasonal normal demands and weather sensitivities (the same values used originally to compute the EUC DAF profiles) along with the actual CWV. Use of the EWCF avoids bias which might be introduced in the WCF by any excess or deficiency in EUC AQs in the relevant LDZ, used to compute the sum across all EUCs of ALP weighted daily average demand [$\sum_{EUC} ALP*(AQ/365)$] for each day. (Note that EWCF = (WSENS/SND) * (CWV – SNCWV)).

The "best estimate 15" analysis is based on the algorithms for 2015/16, while the "best estimate 16" analysis is based on algorithms derived for 2016/17 and applied with appropriate adjustment for the pattern of days of the week and holidays in 2015/16.

On the evidence of the bar chart in Figure 3.2 ("best estimate 15"), there was very little overall error in the algorithms for any of the consumption bands over the whole of gas year 2015/16 (full year errors range between -0.03% and +0.18% for all bands). Overall consumption band winter period errors range from -0.35% to +1.73% and overall consumption band summer period errors range from -2.75% to 0.94%. Actual summer demands are lower and hence percentage errors can be somewhat greater in the summer. The signs of the winter and summer period errors suggest that for consumption bands 01, 02, 05, 06, 07 and 08 the profiles in 2015/16 were a little too flat, while for consumption bands 03 and 04 the profiles were a little too peaky. There are (of course) exceptions to this broad generalisation in some individual LDZs (see Tables 3.5 and 3.6)

The bar chart in Figure 3.3 ("best estimate 16") shows that the algorithms derived for 2016/17 would (if applied to gas year 2015/16) have resulted in a similar outcome for the majority of consumption bands overall. Whole year errors are very small overall for all the consumption bands, but for this "best estimate 16" case they range between -0.42% and -0.28%. Winter and summer period errors are slightly improved for bands 01, 06 and 07. However, the winter and summer period errors are slightly worse for bands 02, 03, 04, 05 and 08.

It must be borne in mind that the "best estimate" analyses are based on validated NDM sample data which is not necessarily representative of the population as a whole. Furthermore, this sample dataset suffers from small numbers of contributing meter/supply points at the higher consumption bands.

A selection of monthly charts is also presented: Figures 3.4 to 3.11 are monthly bar charts comparing actual and allocated demands, across all LDZs for consumption bands 01 to 08 respectively. These show for each month, actual demand, and allocated demand on the "as used", "best estimate 15" and "best estimate 16" bases.

In interpreting these monthly charts it is relevant to recall the weather conditions that prevailed during gas year 2015/16. Over the winter six month period, October 2015 was fairly average overall, although it contained a mixture of slightly colder and slightly warmer than normal days. With the exception of a few days, November 2015 was much warmer than normal resulting in the month being ranked 3rd warmest in the last 50 years. December 2015 was an extremely warm month overall, with all days throughout the month being much

warmer than normal which resulted in it being ranked as the warmest December in the last 50 years. The months of January and February 2016 were both fairly average overall, despite a mixture of slightly colder and slightly warmer than normal days. March 2016 was colder than normal overall, with the majority of days experiencing colder than normal temperatures. During the summer six month period, April 2016 was fairly average overall, despite a period of much colder than normal weather towards the end of the month. The months of May and June 2016 were slightly warmer than seasonal normal overall, ranking 9th and 12th warmer than normal, respectively, in the last 50 years. Continuing the theme, the months of July and August 2016 both experienced fairly normal temperatures, whereas September 2016 was consistently warmer than normal, resulting in it ranking as the 2nd warmest September in the last 50 years.

Consideration of these monthly bar charts focuses on the actual consumption compared to the allocations arising from the "best estimate" analyses, which better reflect the performance of the profiles themselves.

The monthly chart for band 01, in Figure 3.4, indicates winter under allocation (except in October 2015 which was particularly variable). It also shows mostly small summer over allocation (most noticeably in September 2016 – the 2nd warmest September in the last 50 years) with the exception being in April & June 2016.

Table 3.11 shows the percentage errors (on the "best estimate 15" basis) for band 01 over the months of April, May and the rest of the summer months (June to September). For band 01 during April, under allocation occurred in all LDZs, with the exception of NT & SE LDZs and during May, over allocation occurred in 8 LDZs. Over allocation was also observed in the majority of LDZs over the rest of the summer months (June to September) except in SE LDZ.

Table 3.12 shows the percentage errors overall across all LDZs (on the "best estimate 15" basis) for each band (except band 09) over the months of April, May and the rest of the summer months (June to September). In this table, the errors are expressed as a percentage of the actual demand over the month or set of months. Under allocations occurred in all bands (01 to 08) in April and in the majority of bands (02 to 06 and 08) in May. Over the rest of the summer period over allocations occurred in all bands (01 to 08).

The monthly chart for band 02, in Figure 3.5, indicates winter under allocation in November, December, January and March and summer over allocation in July, August and September 2016.

Figure 3.6 is the monthly chart for band 03, which shows small over allocation during the winter months of October, December and February but also shows mostly under allocation during the summer months, with the exception being in August and September 2016.

Figure 3.7 is the monthly chart for band 04, which shows over allocation in October, November and December 2015. Over allocation is also evident during the months of July, August and September 2016.

The monthly charts for bands 05 to 08 are in Figures 3.8 to 3.11. Overall, bands 05, 06, 07 and 08 show a predominant small winter under allocation and a small summer over allocation (with exceptions for some months in some bands). For example, over allocation in bands 05 to 07 is evident for October 2015 and under allocation in bands 05 to 08 is evident for April 2016.

Additionally examples of monthly bar charts for individual EUCs, for some of the EUC bands (namely WM:E1502B, SC:E1503B, SE:E1504B, NO:E1505B, EA:E1506B, SO:E1507B and NE:E1508B) are shown in Figures 3.12 to 3.18 respectively. There is no consistent monthly pattern across all these examples, but in a majority of the examples March 2016 shows an under allocation and August and September 2016 an over allocation.

The final set of graphs (Figures 3.19 to 3.26) show actual demand and allocated demand on the "best estimate 15" and "best estimate 16" basis for each consumption band. In general, the allocated demand for both bases was close to the actual demand for each consumption band on most days. For band 01, the most notable exceptions occurred during the particularly variable weather in March 2016 and the much warmer weather throughout September 2016. For bands 02, 03 and 04 there appears to be a tendency for slight over allocation during the winter and the summer months, whereas bands 05, 06 and 07 show a tendency for slight under allocation in the winter months and a slight over allocation in the summer months. Band 08 displays a tendency for slight over allocation in the winter and under allocation in the summer.

Table 3.1 – Oct 15 to Sep 16: Actual WCF and SF, ALPs and DAFs 'As Used'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	-2.35%	-4.07%	-4.83%	-4.10%	-4.55%	-2.37%	-	-2.42%	-3.74%	-4.44%	-2.68%	-1.71%	-1.95%	-3.29%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	-2.07%	-3.78%	-4.38%	-4.18%	-4.25%	-2.28%	-3.81%	-2.43%	-3.54%	-3.37%	-2.24%	-1.44%	-1.41%	-3.01%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	-2.07%	-3.15%	-4.18%	-3.66%	-4.12%	-2.82%	-3.58%	-3.49%	-3.49%	-3.26%	-2.19%	-2.04%	-2.09%	-3.01%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	-1.88%	-3.39%	-3.82%	-3.27%	-3.80%	-1.80%	-3.22%	-2.28%	-2.85%	-2.65%	-1.60%	-1.26%	-1.40%	-2.52%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	-1.24%	-2.48%	-2.42%	-2.11%	-2.56%	-1.10%	-1.77%	-1.42%	-2.31%	-2.32%	-0.73%	-0.75%	-0.72%	-1.69%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	-0.36%	-1.33%	-1.35%	-0.57%	-1.56%	-0.56%	-0.67%	-0.31%	-1.14%	-1.72%	-0.79%	-0.16%	-0.29%	-0.89%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	-0.06%	-0.68%	-0.93%	0.15%	-0.66%	-0.06%	-0.30%	-0.06%	-0.71%	-0.96%	-0.14%	0.15%	-0.03%	-0.38%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	0.05%	-0.57%	-0.81%	0.20%	-0.61%	-0.03%	-0.19%	0.10%	-0.84%	-1.11%	-0.33%	0.30%	0.07%	-0.39%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.2 – Oct 15 to Mar 16: Actual WCF and SF, ALPs and DAFs 'As Used'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	-2.06%	-4.28%	-5.23%	-4.31%	-3.70%	-2.20%	-	-2.11%	-4.58%	-1.75%	-2.09%	-2.41%	-2.49%	-3.14%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	-3.15%	-5.80%	-6.53%	-6.32%	-3.36%	-2.96%	-8.58%	-2.18%	-3.51%	-4.47%	-0.79%	-1.48%	-1.32%	-3.51%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	-3.29%	-1.62%	-4.45%	-5.17%	-3.11%	-3.66%	-6.28%	-6.91%	-3.48%	-5.10%	-1.93%	-4.34%	-8.58%	-3.96%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	-2.48%	-3.88%	-5.19%	-5.59%	-5.71%	-0.87%	0.67%	-3.71%	-5.46%	-1.59%	-0.33%	-2.61%	-4.29%	-3.28%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	-2.48%	-3.18%	-2.71%	-4.89%	-1.11%	2.13%	-0.75%	-3.65%	-1.18%	-1.95%	-2.40%	-4.44%	-2.44%	-2.16%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	1.61%	1.48%	-1.30%	-2.39%	-0.47%	1.38%	2.43%	-4.71%	0.99%	-1.20%	-2.30%	-2.44%	5.86%	0.04%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	-1.79%	-1.80%	1.96%	-3.43%	3.76%	1.79%	-8.54%	0.48%	-1.93%	0.45%	7.35%	2.28%	-5.97%	0.33%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	-2.22%	0.07%	-2.79%	-4.82%	1.02%	-2.09%	-10.70%	-2.06%	-8.09%	1.06%	4.17%	4.91%	3.94%	-1.07%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.3 – Apr 16 to Sep 16: Actual WCF and SF, ALPs and DAFs 'As Used'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	-3.12%	-3.49%	-3.72%	-3.53%	-7.09%	-2.89%	-	-3.30%	-1.38%	-12.45%	-4.46%	0.26%	-0.37%	-3.72%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	0.43%	0.77%	0.77%	1.17%	-6.75%	-0.43%	6.71%	-3.14%	-3.63%	-0.93%	-5.80%	-1.33%	-1.65%	-1.77%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	0.57%	-6.84%	-3.51%	0.05%	-6.83%	-0.54%	2.63%	6.41%	-3.52%	0.81%	-2.85%	3.72%	13.77%	-0.68%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	-0.62%	-2.31%	-0.79%	1.65%	0.25%	-3.99%	-13.49%	0.97%	2.94%	-4.98%	-4.45%	1.91%	4.59%	-0.85%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	0.95%	-1.22%	-1.91%	2.71%	-5.16%	-7.47%	-3.62%	2.58%	-4.56%	-3.07%	2.24%	5.91%	2.12%	-0.84%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	-3.41%	-5.68%	-1.41%	1.85%	-3.16%	-3.57%	-5.49%	5.32%	-4.39%	-2.60%	1.86%	3.79%	-11.05%	-2.30%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	2.19%	0.70%	-4.93%	4.17%	-6.55%	-2.46%	8.73%	-0.80%	0.83%	-2.87%	-14.09%	-3.38%	7.05%	-1.32%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	2.91%	-1.36%	1.59%	5.60%	-2.62%	2.37%	10.65%	2.79%	7.54%	-4.23%	-8.39%	-7.41%	-5.47%	0.46%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.4 – Oct 15 to Sep 16: EWCF, with SF=1: 2015/16 ALPs and DAFs 'Best Estimate 15'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	0.15%	0.16%	0.15%	0.20%	0.20%	0.18%	-	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	0.21%	0.11%	0.08%	0.09%	0.08%	0.07%	0.08%	0.10%	0.04%	0.13%	0.04%	0.04%	0.11%	0.09%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	0.20%	0.13%	0.10%	0.15%	-0.01%	-0.47%	0.10%	-0.06%	0.11%	0.17%	0.13%	-0.16%	0.05%	0.05%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	0.22%	0.12%	0.08%	0.09%	0.07%	-0.06%	0.08%	-0.02%	0.12%	0.16%	0.13%	0.06%	0.01%	0.10%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	0.15%	0.06%	0.02%	0.08%	0.00%	-0.02%	0.02%	-0.07%	0.03%	0.15%	0.14%	0.00%	-0.06%	0.06%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	0.10%	0.00%	-0.02%	-0.02%	-0.04%	-0.10%	-0.02%	-0.12%	-0.02%	0.09%	0.08%	0.10%	-0.06%	0.00%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	0.04%	-0.01%	-0.03%	-0.02%	-0.02%	-0.06%	-0.03%	-0.03%	-0.06%	-0.05%	0.00%	0.01%	-0.03%	-0.03%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	0.04%	-0.01%	-0.03%	-0.03%	-0.03%	-0.06%	-0.03%	-0.05%	-0.04%	-0.03%	0.04%	-0.02%	-0.05%	-0.03%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.5 – Oct 15 to Mar 16: EWCF, with SF=1: 2015/16 ALPs and DAFs 'Best Estimate 15'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	0.52%	-0.56%	1.15%	1.50%	1.23%	0.04%	-	1.00%	-0.01%	1.99%	0.42%	0.43%	0.30%	0.67%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	-0.71%	-2.26%	-0.44%	-0.23%	1.24%	-0.79%	-2.85%	0.90%	0.83%	-1.22%	1.46%	1.01%	0.92%	0.08%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	-0.84%	1.45%	1.38%	0.35%	1.45%	-1.34%	-0.83%	-3.00%	0.87%	-1.87%	0.36%	-1.45%	-5.67%	-0.35%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	-0.16%	-0.63%	0.35%	-0.31%	-1.34%	0.93%	5.46%	-0.71%	-1.67%	1.13%	1.57%	-0.22%	-1.97%	-0.02%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	-0.59%	-0.57%	1.32%	-0.72%	1.98%	3.41%	2.79%	-1.37%	2.00%	0.54%	-0.90%	-2.42%	-0.81%	0.36%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	2.75%	3.08%	1.43%	-0.08%	1.61%	2.21%	4.68%	-3.51%	2.91%	0.77%	-0.78%	-1.00%	6.94%	1.73%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	-0.89%	-0.70%	4.03%	-2.06%	4.76%	2.17%	-6.61%	1.41%	-0.52%	1.66%	8.45%	3.36%	-5.05%	1.52%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	-1.41%	1.05%	-0.78%	-3.53%	1.98%	-1.74%	-8.90%	-1.29%	-6.42%	2.41%	5.41%	5.78%	4.64%	0.07%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.6 – Apr 16 to Sep 16: EWCF, with SF=1: 2015/16 ALPs and DAFs 'Best Estimate 15'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	-0.79%	2.08%	-2.69%	-3.40%	-2.91%	0.59%	-	-2.16%	0.70%	-5.25%	-0.54%	-0.50%	-0.16%	-1.23%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	2.31%	5.42%	1.32%	0.90%	-3.14%	2.40%	6.55%	-2.15%	-2.02%	3.14%	-3.43%	-2.42%	-1.86%	0.11%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	2.45%	-3.05%	-3.09%	-0.33%	-3.94%	1.90%	2.23%	8.47%	-1.88%	4.67%	-0.45%	3.07%	14.06%	1.02%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	1.02%	1.76%	-0.53%	0.94%	3.06%	-2.43%	-14.15%	1.56%	4.11%	-1.95%	-3.10%	0.71%	4.11%	0.36%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	1.46%	1.20%	-2.25%	1.46%	-3.57%	-6.78%	-4.98%	2.28%	-3.92%	-0.62%	1.98%	4.36%	1.19%	-0.48%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	-4.01%	-4.77%	-2.08%	0.05%	-2.45%	-3.68%	-7.31%	4.22%	-4.50%	-1.07%	1.58%	1.99%	-12.32%	-2.66%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	1.26%	0.84%	-5.66%	2.27%	-6.41%	-2.93%	7.20%	-2.03%	0.53%	-2.38%	-15.71%	-5.51%	5.95%	-2.05%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	1.85%	-1.33%	0.89%	3.75%	-2.50%	1.90%	9.12%	1.51%	7.32%	-3.55%	-9.57%	-9.70%	-6.75%	-0.15%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.7 – Oct 15 to Sep 16: EWCF, with SF=1: 2016/17 ALPs and DAFs 'Best Estimate 16'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	-0.28%	-0.29%	-0.28%	-0.26%	-0.26%	-0.28%	-	-0.28%	-0.29%	-0.28%	-0.28%	-0.27%	-0.28%	-0.28%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	-0.23%	-0.33%	-0.35%	-0.38%	-0.36%	-0.40%	-0.35%	-0.39%	-0.40%	-0.33%	-0.40%	-0.44%	-0.35%	-0.36%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	-0.22%	-0.36%	-0.34%	-0.29%	-0.54%	-0.81%	-0.34%	-0.39%	-0.36%	-0.35%	-0.39%	-0.63%	-0.43%	-0.42%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	-0.17%	-0.32%	-0.33%	-0.38%	-0.35%	-0.49%	-0.33%	-0.41%	-0.33%	-0.27%	-0.29%	-0.44%	-0.40%	-0.33%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	-0.22%	-0.31%	-0.34%	-0.30%	-0.38%	-0.40%	-0.34%	-0.44%	-0.37%	-0.26%	-0.27%	-0.41%	-0.44%	-0.32%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	-0.23%	-0.34%	-0.35%	-0.35%	-0.38%	-0.44%	-0.35%	-0.45%	-0.37%	-0.34%	-0.36%	-0.36%	-0.44%	-0.36%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	-0.28%	-0.32%	-0.35%	-0.34%	-0.34%	-0.39%	-0.35%	-0.37%	-0.38%	-0.37%	-0.32%	-0.33%	-0.37%	-0.35%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	-0.28%	-0.32%	-0.35%	-0.34%	-0.34%	-0.39%	-0.35%	-0.37%	-0.38%	-0.37%	-0.32%	-0.33%	-0.37%	-0.35%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.8 – Oct 15 to Mar 16: EWCF, with SF=1: 2016/17 ALPs and DAFs 'Best Estimate 16'

Analysis of daily percentage error: Statistic is total errors as percentage of full period

EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	-0.88%	-1.47%	-0.62%	0.19%	0.26%	-0.77%	-	-1.12%	-0.39%	1.03%	-0.08%	-0.12%	-1.46%	-0.43%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	-0.77%	-1.28%	-0.54%	-0.72%	-0.03%	-0.78%	-2.96%	-0.28%	0.06%	-0.52%	1.83%	-0.02%	-0.80%	-0.26%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	-1.59%	0.63%	0.55%	-0.16%	0.36%	-1.72%	-1.68%	-1.03%	-0.18%	-2.23%	0.55%	-2.06%	-5.16%	-0.85%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	-1.20%	-1.69%	-0.53%	-2.01%	-1.28%	0.38%	4.63%	-1.85%	-1.53%	0.90%	0.60%	-0.12%	-2.04%	-0.68%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	-1.24%	-1.43%	1.03%	-1.92%	1.50%	2.66%	2.50%	-1.29%	1.99%	0.31%	-0.58%	-1.11%	-1.67%	0.00%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	1.60%	2.18%	0.53%	0.57%	1.19%	1.35%	3.82%	-3.58%	2.48%	0.21%	0.91%	-1.06%	4.66%	1.22%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	-2.30%	-0.05%	3.93%	-1.25%	4.55%	1.15%	-6.72%	2.51%	-0.24%	0.35%	4.59%	0.37%	-3.91%	1.09%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	-3.86%	0.77%	-1.81%	-3.29%	1.19%	-3.44%	-10.01%	-2.06%	-4.45%	2.72%	3.27%	0.76%	3.94%	-0.85%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.9 – Apr 16 to Sep 16: EWCF, with SF=1: 2016/17 ALPs and DAFs 'Best Estimate 16'

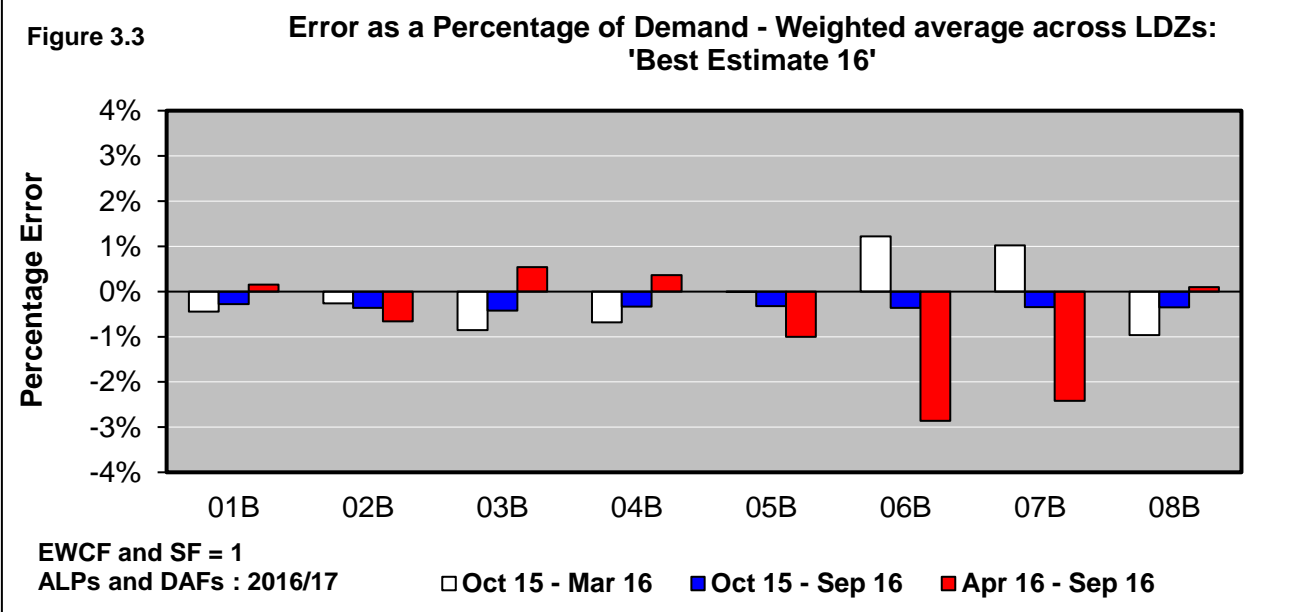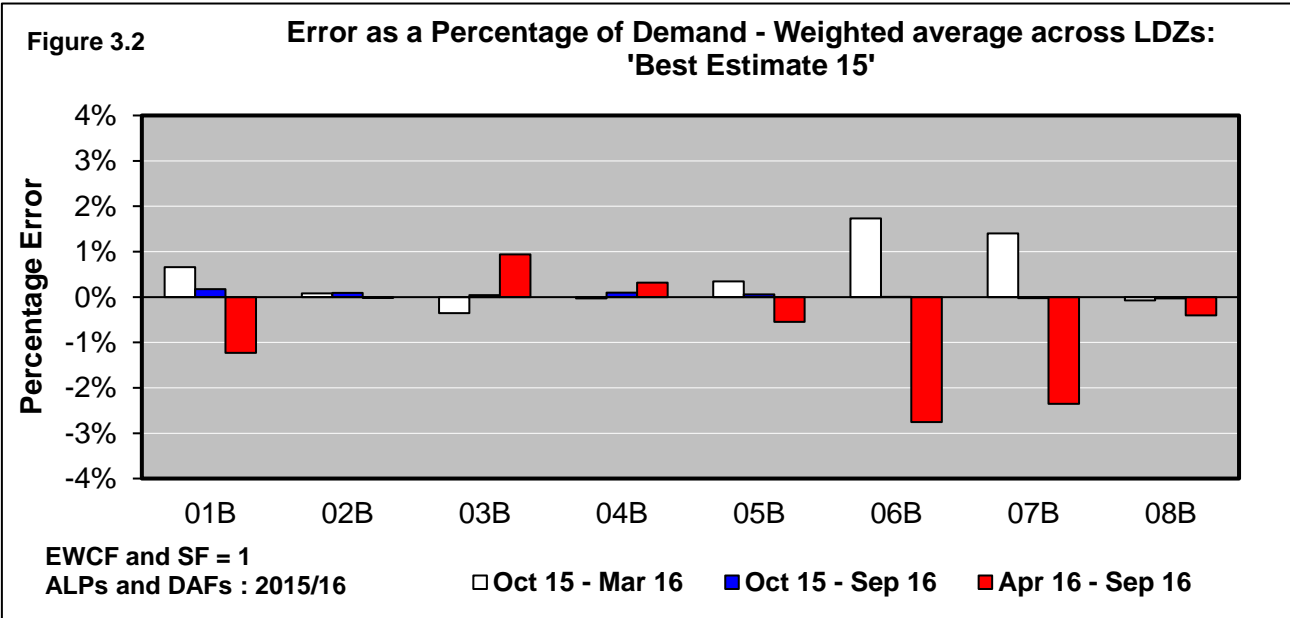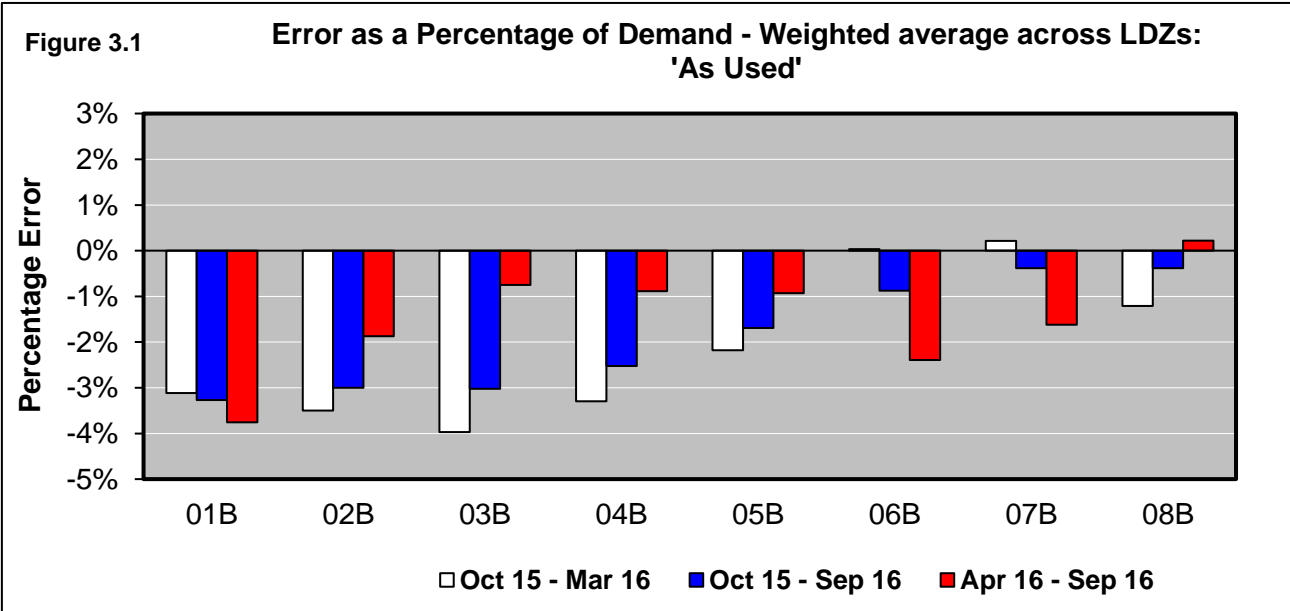*Analysis of daily percentage error: Statistic is total errors as percentage of full period*

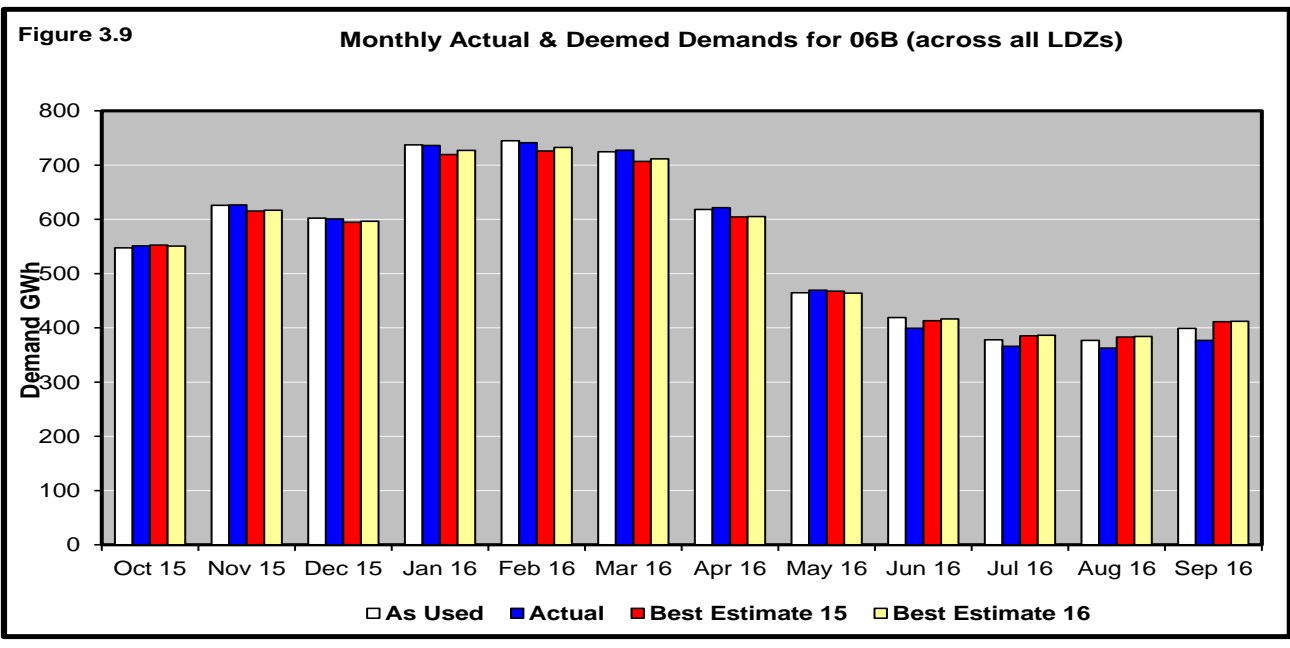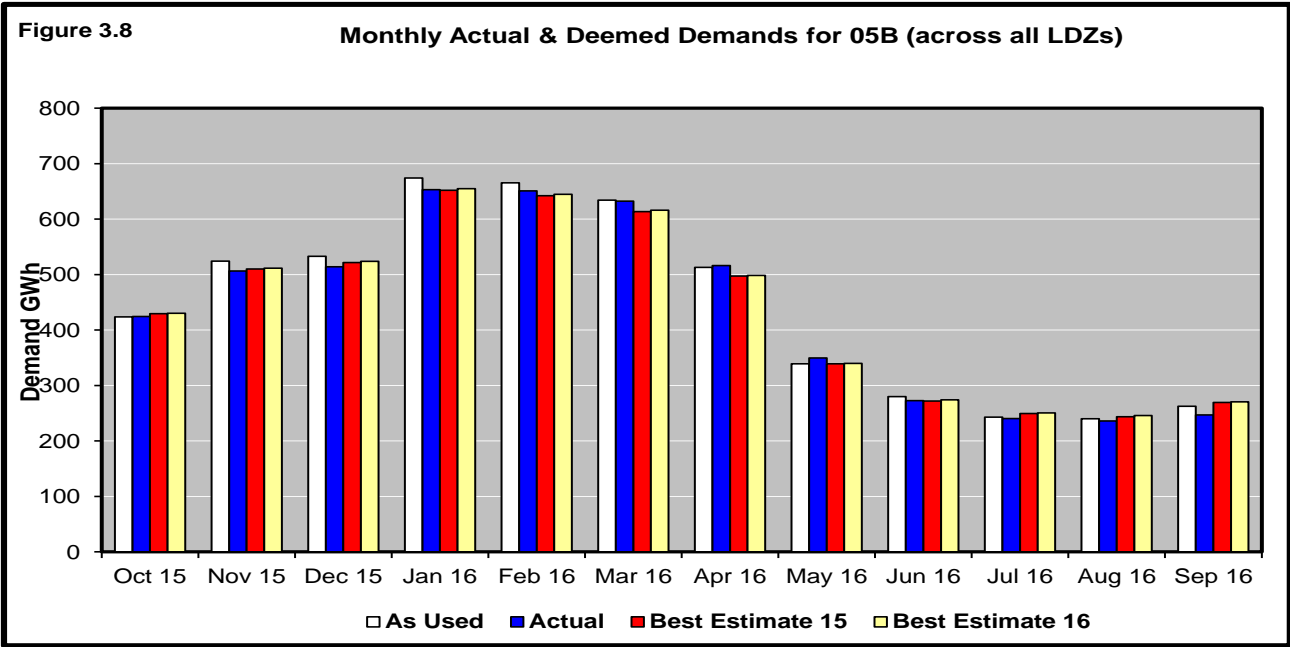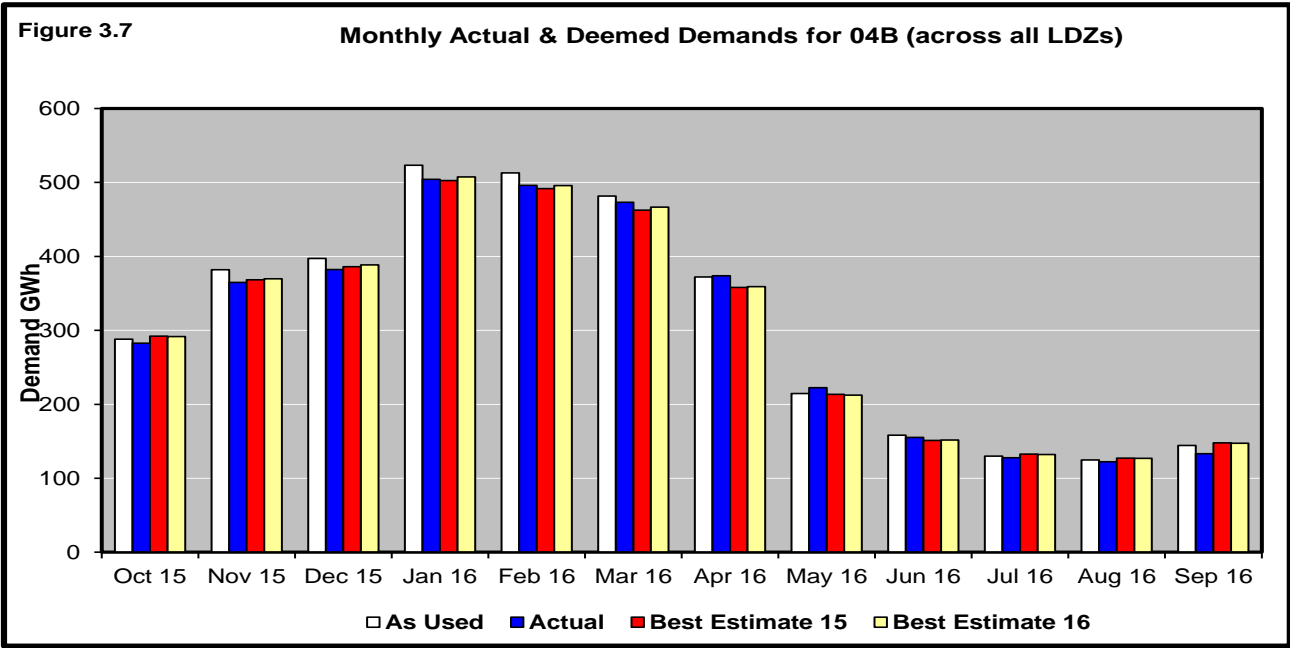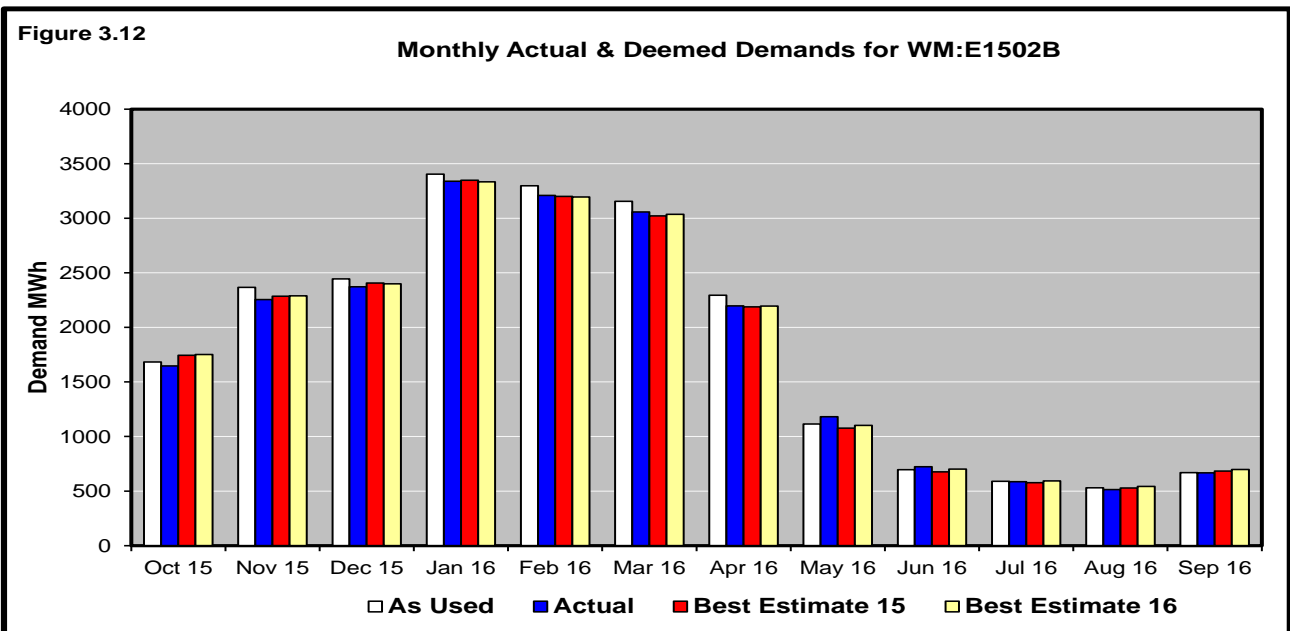| EUC	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW	ALL
01B	1.26%	2.82%	0.65%	-1.49%	-1.84%	1.21%	-	2.14%	0.02%	-4.17%	-0.88%	-0.69%	3.17%	0.16%
Num S.pts	205	194	198	200	228	207	-	203	248	202	203	218	206	2512
02B	1.02%	1.80%	0.11%	0.46%	-1.29%	0.63%	5.41%	-0.70%	-1.60%	0.11%	-5.87%	-1.50%	0.74%	-0.63%
Num S.pts	145	132	172	120	182	141	6	77	191	193	187	158	140	1844
03B	2.78%	-2.76%	-2.54%	-0.63%	-2.96%	1.64%	2.75%	1.47%	-0.84%	3.80%	-2.80%	2.93%	11.15%	0.63%
Num S.pts	168	115	172	142	163	135	18	28	188	169	220	175	102	1795
04B	2.00%	2.71%	0.11%	3.09%	1.61%	-2.53%	13.42%	2.86%	2.33%	-2.83%	-2.29%	-1.19%	2.99%	0.42%
Num S.pts	345	215	249	328	226	235	19	61	221	279	312	267	114	2871
05B	1.58%	1.71%	-2.73%	2.49%	-3.76%	-6.43%	-5.48%	1.08%	-5.08%	-1.39%	0.28%	0.85%	1.61%	-0.91%
Num S.pts	240	100	150	139	142	157	20	26	85	153	146	114	66	1538
06B	-3.07%	-4.24%	-1.61%	-1.57%	-2.67%	-3.23%	-6.82%	3.56%	-4.74%	-1.27%	-2.60%	0.85%	-9.37%	-2.79%
Num S.pts	91	56	81	79	76	86	9	18	56	55	47	43	50	747
07B	2.34%	-0.65%	-6.28%	0.69%	-6.86%	-2.38%	6.65%	-4.37%	-0.56%	-1.35%	-9.44%	-1.47%	3.84%	-2.24%
Num S.pts	23	20	51	43	53	39	5	13	26	23	17	17	26	356
08B	4.21%	-1.69%	1.43%	2.85%	-2.21%	3.17%	9.62%	1.75%	4.31%	-4.81%	-6.73%	-2.13%	-6.54%	0.28%
Num S.pts	13	15	39	22	38	36	4	10	15	22	8	11	14	247

Table 3.10 - Aggregate NDM AQs 2015/16		
LDZ	**Estimated AQ Excess (+) or Deficit (-) ('as used' analysis full year errors)**	**Observed AQ Changes in Gemini at start of gas year 2016/17**
SC	-0.6%	-1.4%
NO	-1.4%	-0.9%
NW	-1.4%	-0.6%
NE	-0.8%	-0.3%
EM	-1.3%	-1.0%
WM	-0.5%	-0.6%
WN	-	-0.1%
WS	-0.4%	-1.9%
EA	-1.4%	1.1%
NT	-1.6%	-0.4%
SE	-0.7%	0.5%
SO	-0.1%	-0.5%
SW	-0.3%	-1.0%
Overall	-0.9%	-0.5%

Table 3.11 - Apr 16 - Sep 16: EWCF, with SF=1: 2015/16 ALPs and DAFs 'Best Estimate 15'
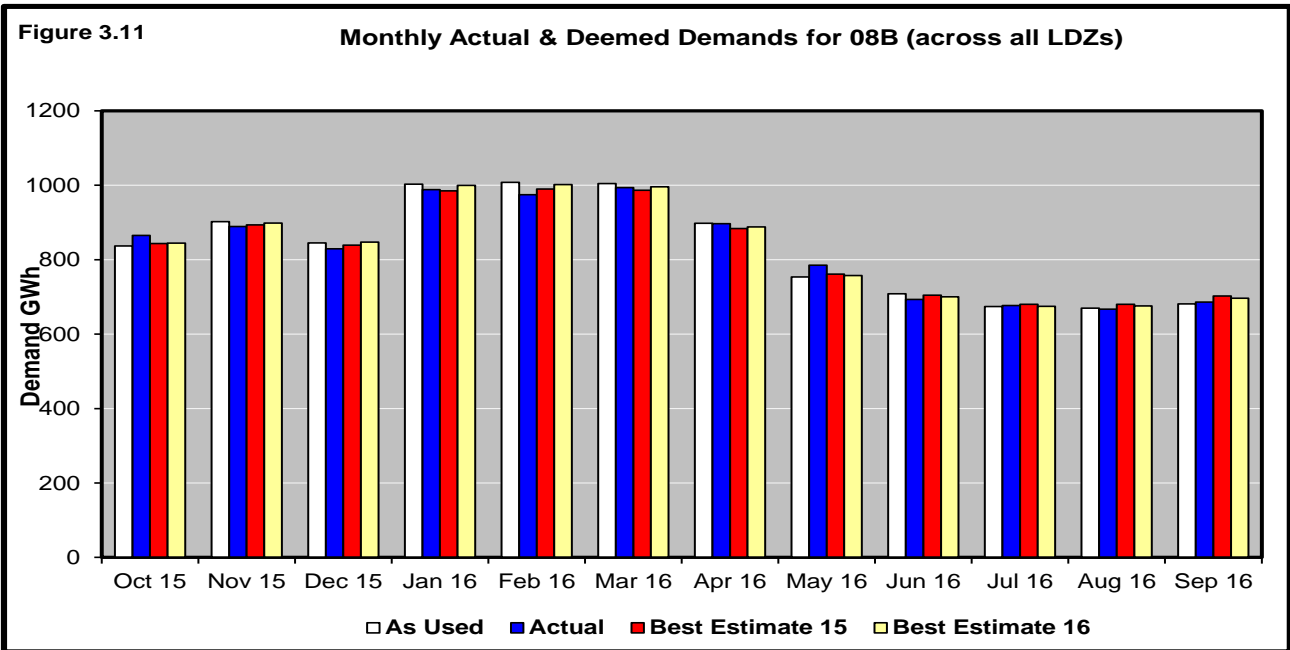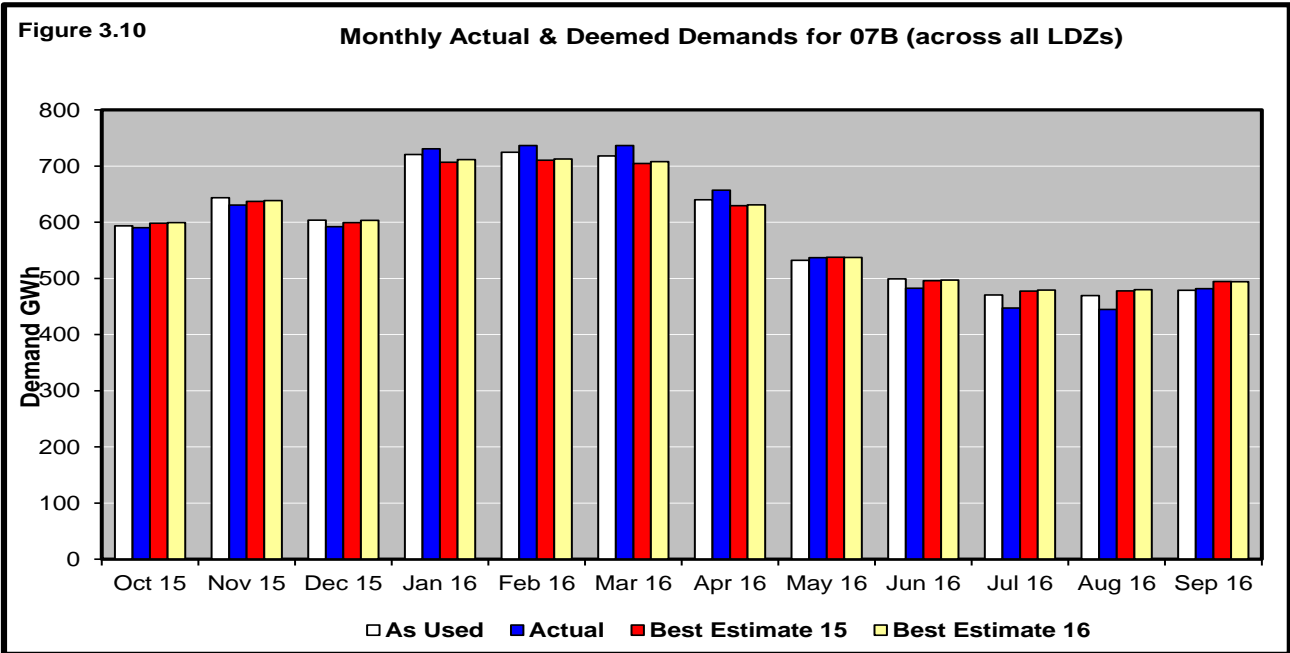
Analysis of Daily Percentage Error: Statistic is Total Errors as Percentage of Actual Demand in Specified Period

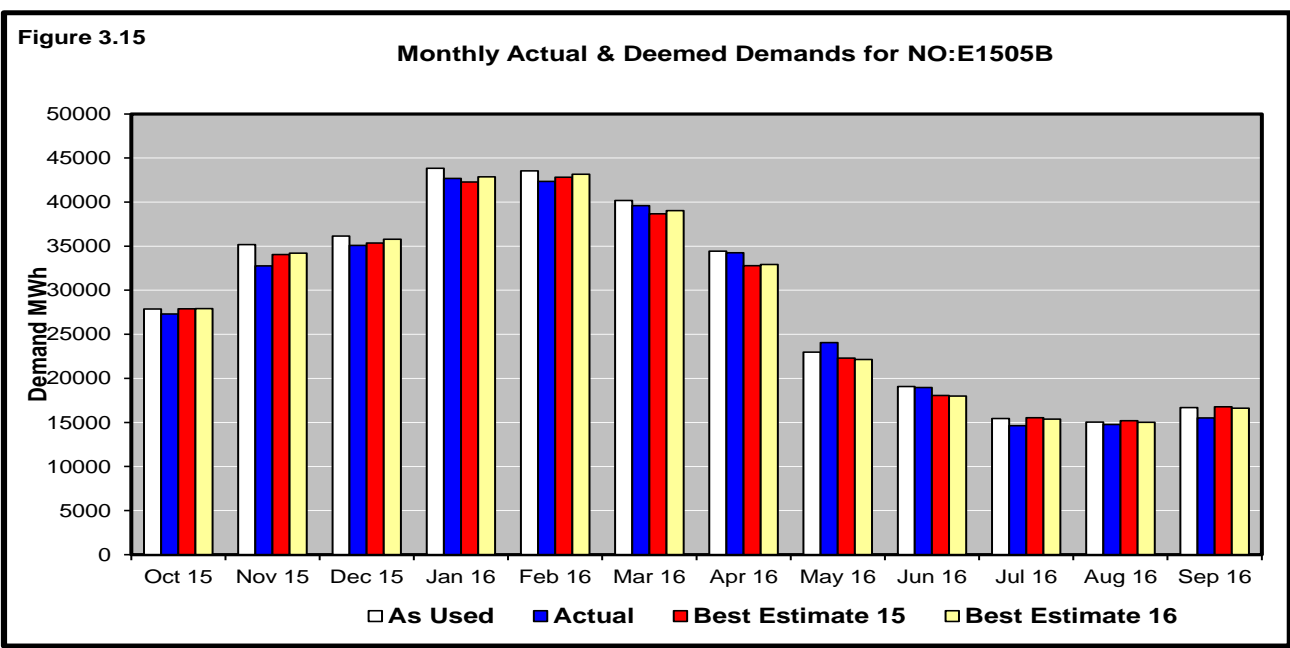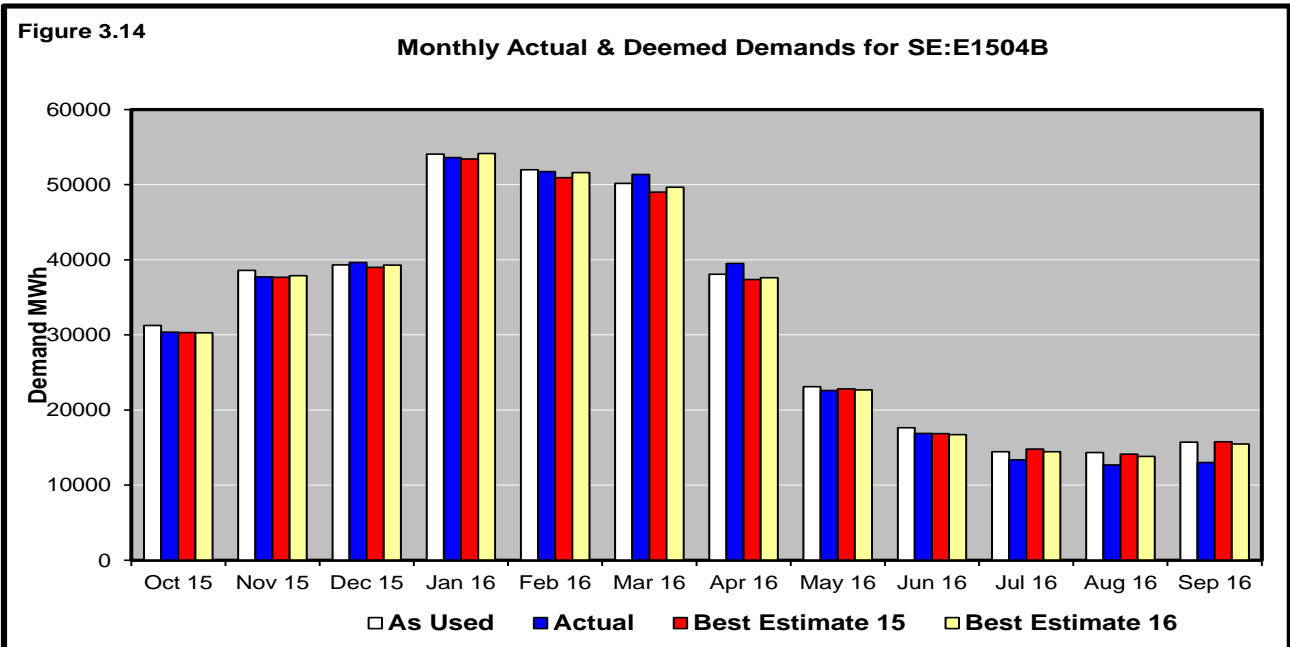| Band 01B	Apr 16	May 16	Jun 16 - Sep 16
SC	0.40%	-0.01%	-1.18%
NO	1.98%	0.89%	-0.80%
NW	0.17%	-1.19%	-1.67%
NE	0.41%	-1.77%	-2.04%
EM	0.27%	-0.58%	-2.61%
WM	1.01%	0.29%	-0.71%
WN	-	-	-
WS	2.37%	-0.95%	-3.59%
EA	1.27%	1.52%	-2.09%
NT	-1.40%	-1.28%	-2.57%
SE	-0.13%	-0.51%	0.10%
SO	1.73%	-0.36%	-1.88%
SW	0.74%	0.03%	-0.93%

Table 3.12 - Apr 16 - Sep 16: EWCF, with SF=1: 2015/16 ALPs and DAFs 'Best Estimate 15'

Analysis of Daily Percentage Error: Statistic is Total Errors as Percentage of Actual Demand in Specified Period

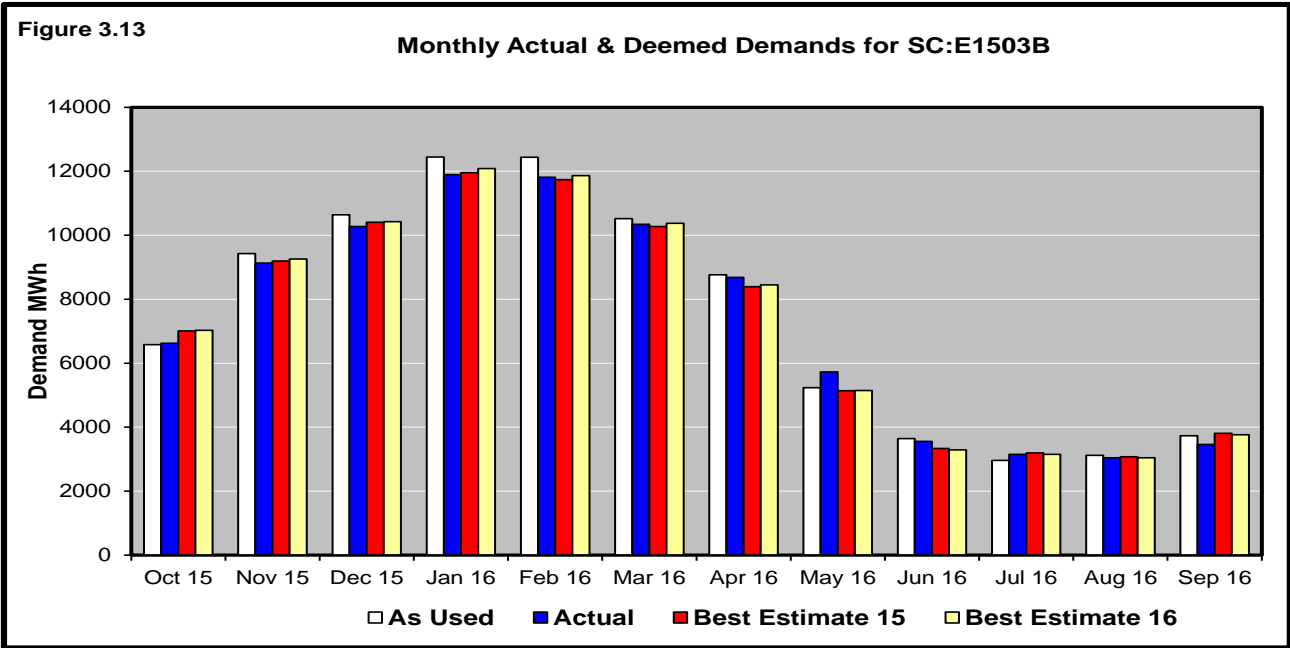| All LDZs	Apr 16	May 16	Jun 16 - Sep 16
01B	1.87%	-1.58%	-4.14%
02B	0.42%	2.73%	-1.82%
03B	2.21%	4.20%	-1.69%
04B	4.24%	3.84%	-3.97%
05B	3.62%	2.73%	-3.90%
06B	2.79%	0.21%	-6.16%
07B	3.82%	-0.54%	-5.55%
08B	0.96%	2.52%	-2.11%
09B	-	-	-

Figure 3.1

Error as a Percentage of Demand - Weighted average across LDZs: 'As Used'

□ Oct 15 - Mar 16   ■ Oct 15 - Sep 16   ■ Apr 16 - Sep 16

Figure 3.2

Error as a Percentage of Demand - Weighted average across LDZs: 'Best Estimate 15'

EWCF and SF = 1
ALPs and DAFs : 2015/16   □ Oct 15 - Mar 16   ■ Oct 15 - Sep 16   ■ Apr 16 - Sep 16

Figure 3.3

Error as a Percentage of Demand - Weighted average across LDZs: 'Best Estimate 16'

EWCF and SF = 1
ALPs and DAFs : 2016/17   □ Oct 15 - Mar 16   ■ Oct 15 - Sep 16   ■ Apr 16 - Sep 16

Figure 3.4

Monthly Actual & Deemed Demands for 01B (across all LDZs)

Figure 3.5

Monthly Actual & Deemed Demands for 02B (across all LDZs)

Figure 3.6

Monthly Actual & Deemed Demands for 03B (across all LDZs)

Figure 3.7

Monthly Actual & Deemed Demands for 04B (across all LDZs)

Figure 3.8

Monthly Actual & Deemed Demands for 05B (across all LDZs)

Figure 3.9

Monthly Actual & Deemed Demands for 06B (across all LDZs)

Figure 3.10

Monthly Actual & Deemed Demands for 07B (across all LDZs)

Figure 3.11

Monthly Actual & Deemed Demands for 08B (across all LDZs)

Figure 3.12

Monthly Actual & Deemed Demands for WM:E1502B

Figure 3.13

Monthly Actual & Deemed Demands for SC:E1503B

Figure 3.14

Monthly Actual & Deemed Demands for SE:E1504B

Figure 3.15

Monthly Actual & Deemed Demands for NO:E1505B

Figure 3.16

Monthly Actual & Deemed Demands for EA:E1506B

Figure 3.17

Monthly Actual & Deemed Demands for SO:E1507B

Figure 3.18

Monthly Actual & Deemed Demands for NE:E1508B

Figure 3.19

Daily Actual and Deemed Demands for 01B (across all LDZs)
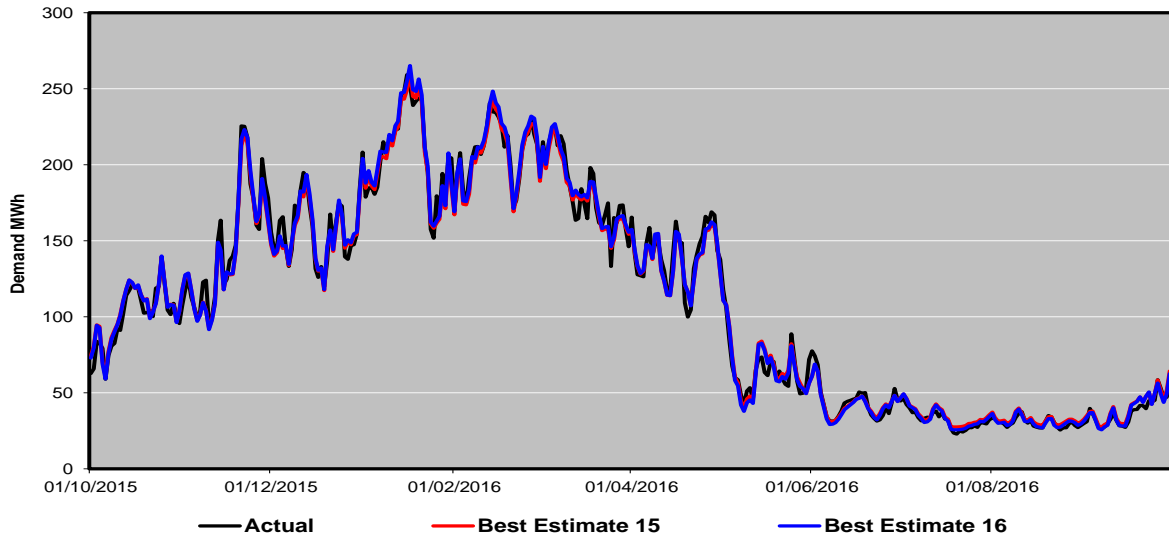
Figure 3.20

Daily Actual and Deemed Demands for 02B (across all LDZs)
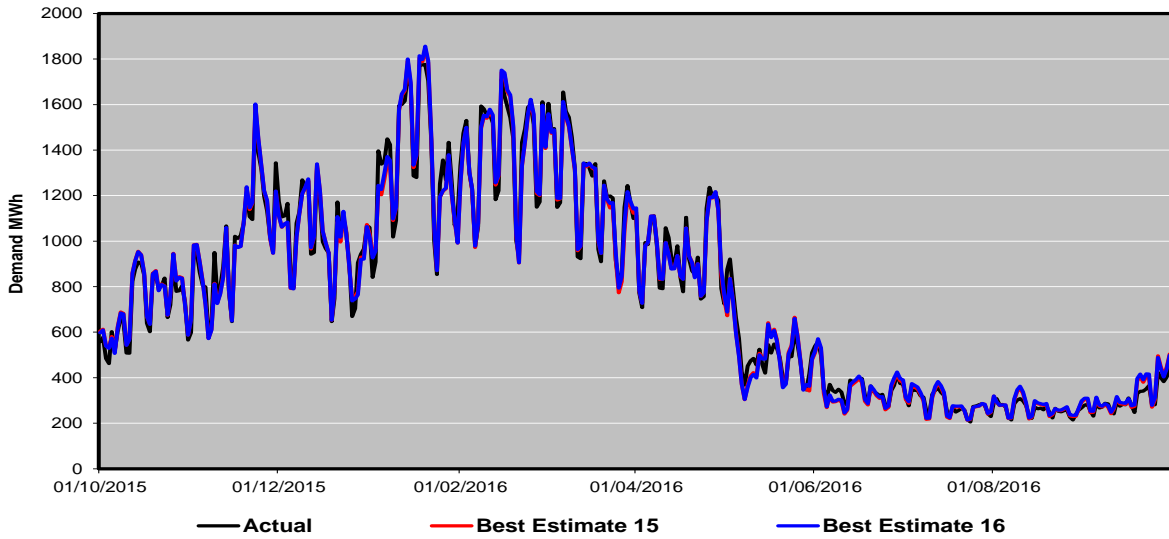
Figure 3.21

Daily Actual and Deemed Demands for 03B (across all LDZs)
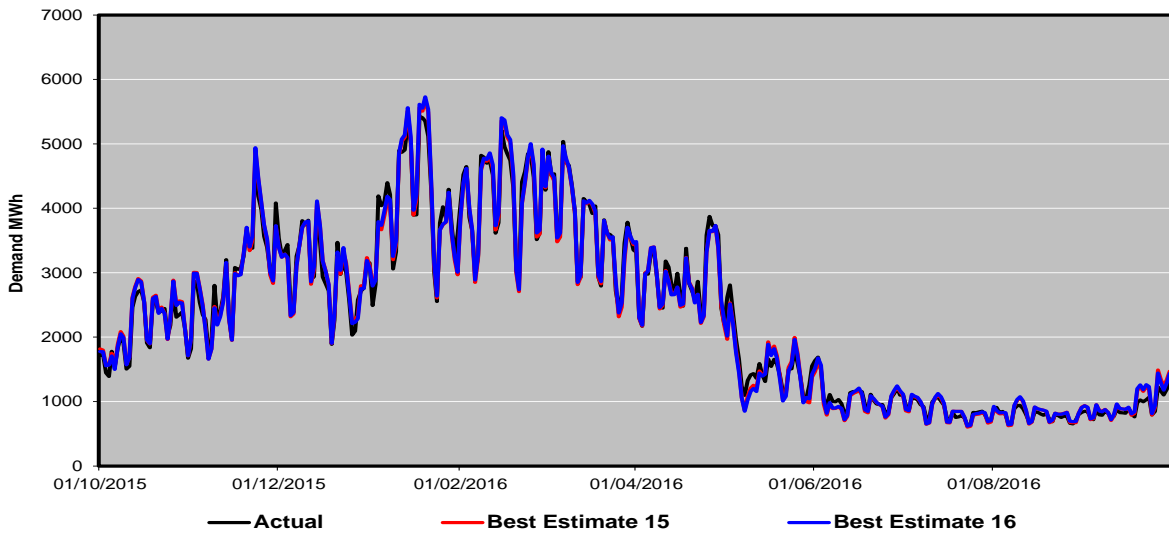
Figure 3.22

Daily Actual and Deemed Demands for 04B (across all LDZs)
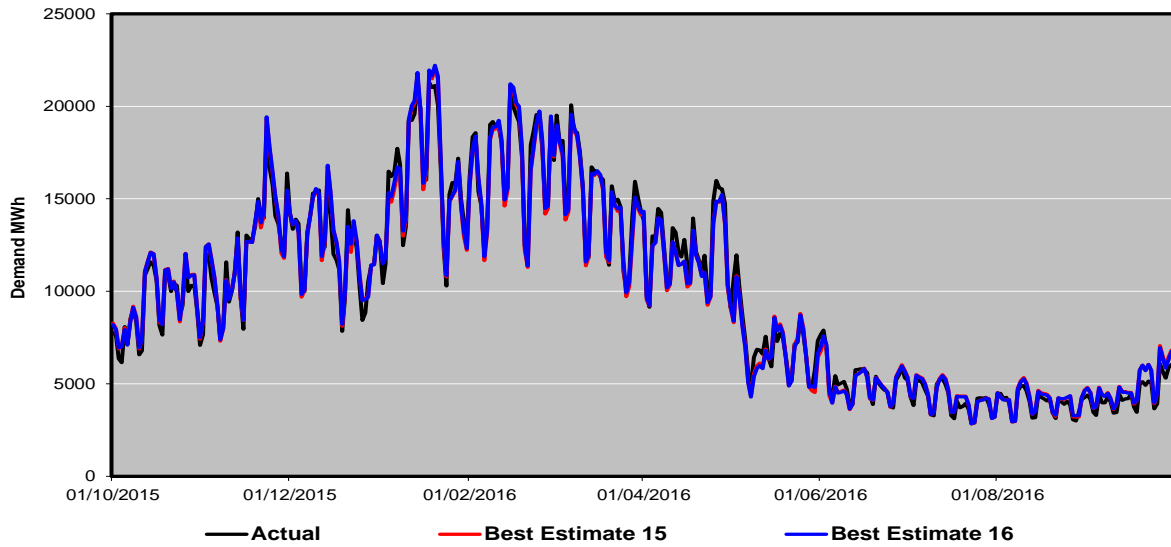
Figure 3.23

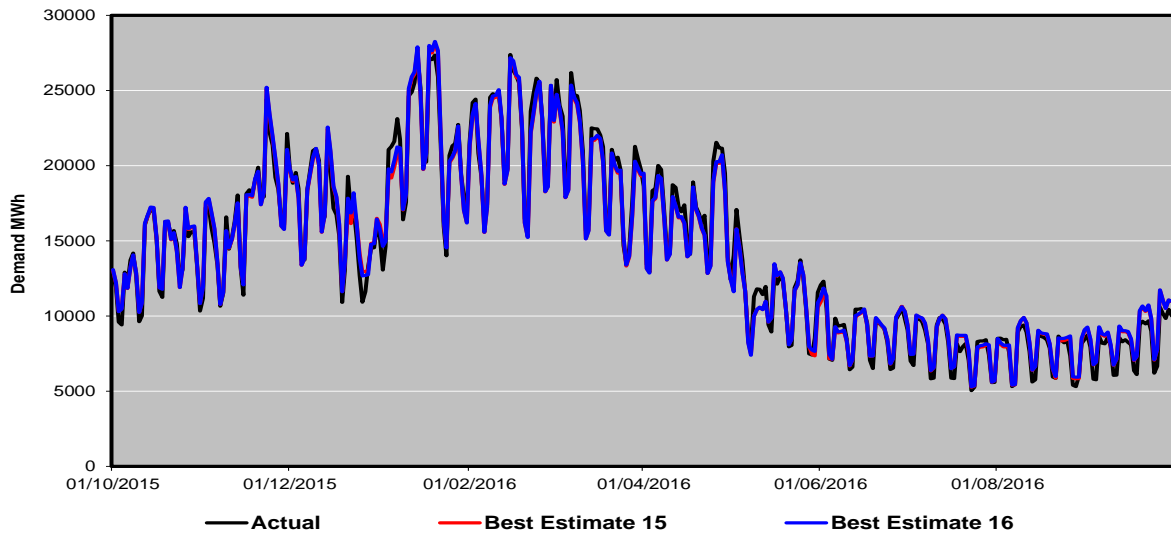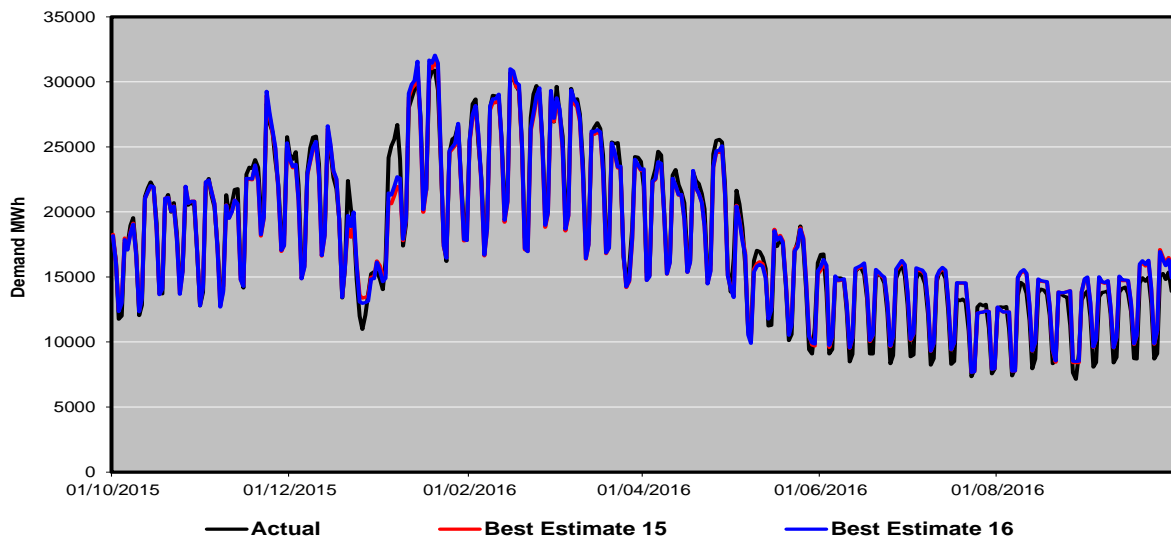**Daily Actual and Deemed Demands for 05B (across all LDZs)**

Figure 3.24

Daily Actual and Deemed Demands for 06B (across all LDZs)

Figure 3.25

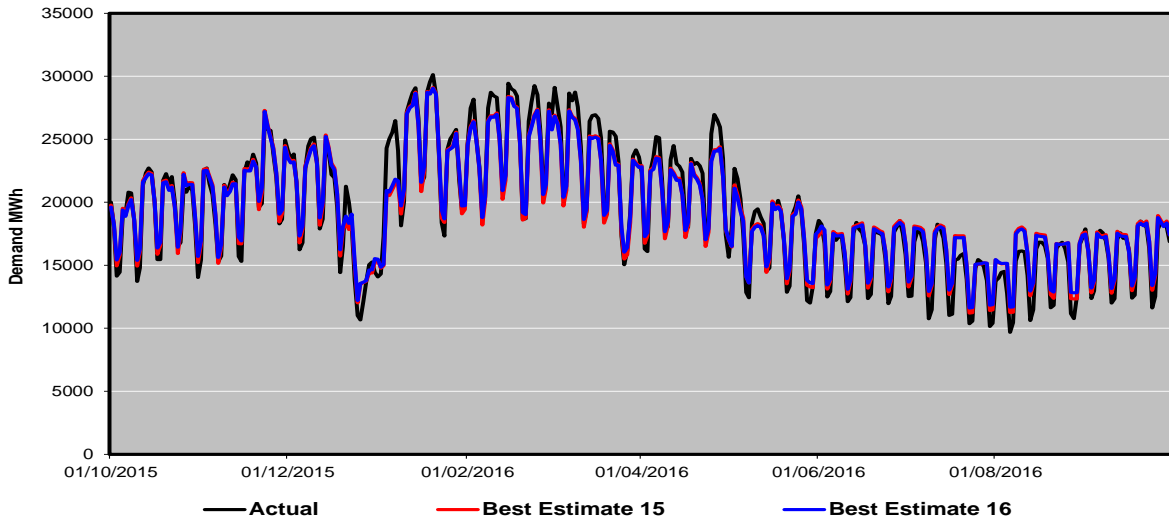**Daily Actual and Deemed Demands for 07B (across all LDZs)**

Figure 3.26

Daily Actual and Deemed Demands for 08B (across all LDZs)