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DESC: NDM Algorithm Performance (Gas year 2011/12)

Strand 2: Reconciliation Variance Analysis & NDM Sample Analysis

11th February 2013



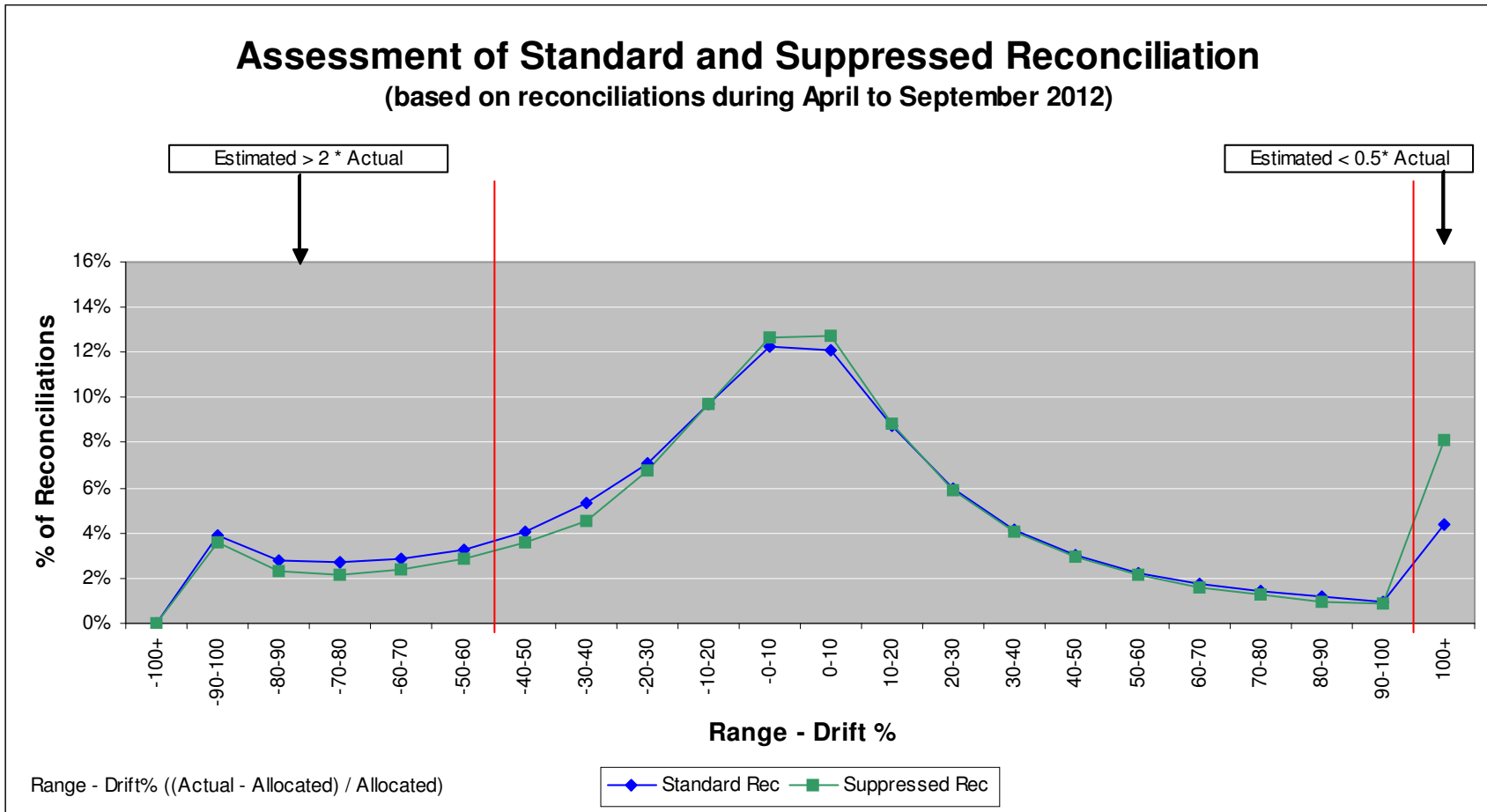
Algorithm Performance 2011/12: Strand 2 Analysis

- Strand 1 (**SF and WCF analysis**) presented at Nov 2012 DESC
 - SF performance during 11/12 was mixed compared with 10/11 (generally closer to the ideal of 1 over summer and further from 1 over winter)
 - WCF deviation generally improved over Winter 11/12 and slightly worsened during the Summer 11/12 (compared with 10/11).
- Strand 2: **Reconciliation Variance Analysis**
 - Compare allocated demand (derived from algorithms) *with*
 - Actual demand obtained from available reconciliation data
- Strand 2: **NDM Sample Consumption Analysis**
 - Compare the actual demand from the NDM sample data *with*
 - Allocated demand for the sample
- Supporting document: detailed explanation with full examples

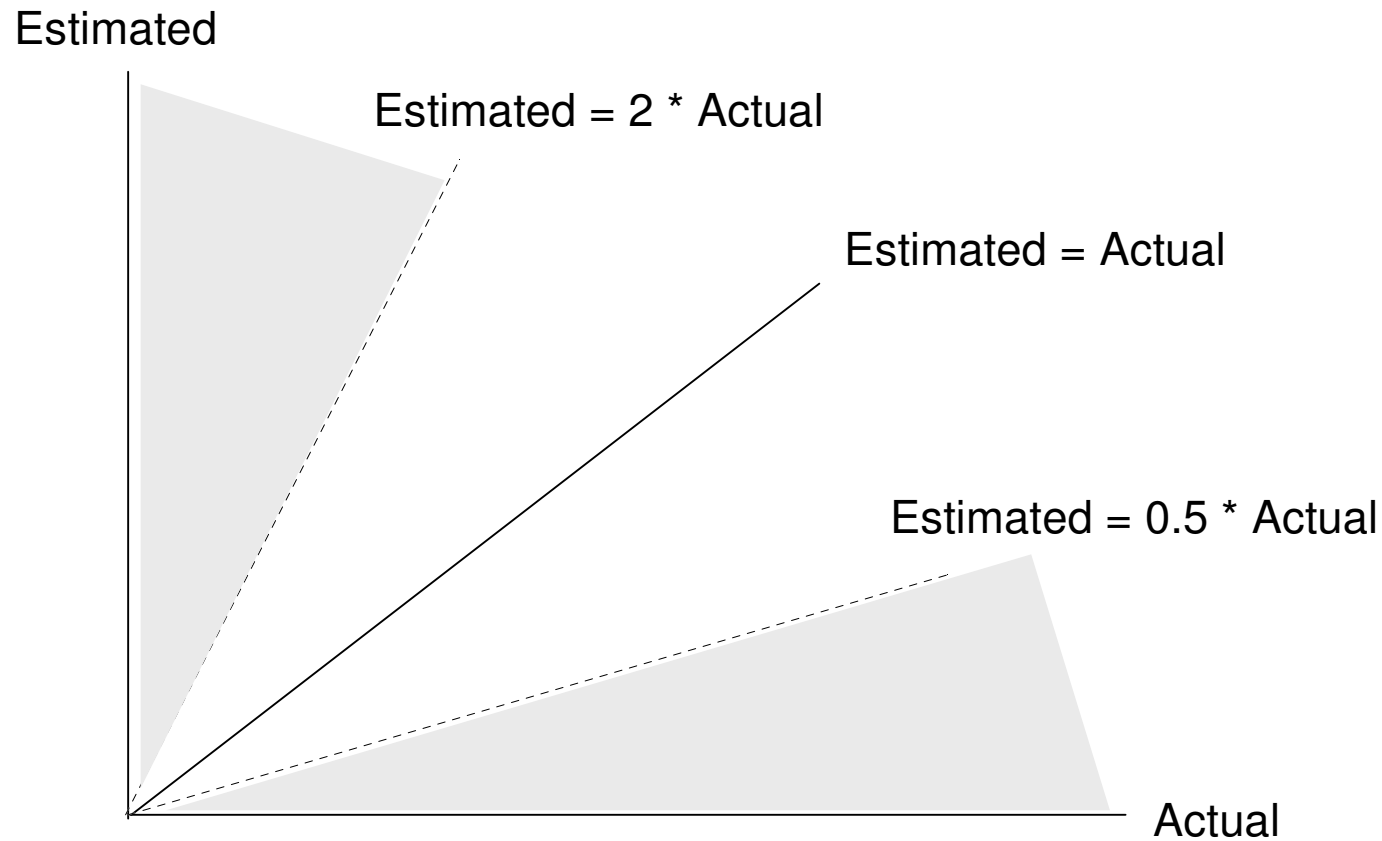
Reconciliation Variance (RV) Analysis

- Compare actual demand (rec.) to allocated demand (algorithms)
- Use *available* Meter Point rec. data for band 'B' EUCs
 - Data available at time of analysis (non-monthly, smaller EUC may not have been received)
 - No analysis for EUC Band 1 (no rec.)
 - Uses Standard & Suppressed rec.
- Rejection criteria applied prior to analysis to remove inappropriate or erroneous rec. data
 - Negative and zero consumptions, actual to allocated ratio
- Profile comparisons are then compared and categorised as:
 - 'Peaky' - 'Flat' - 'Ok'

Assessment of Standard and Suppressed Reconciliation

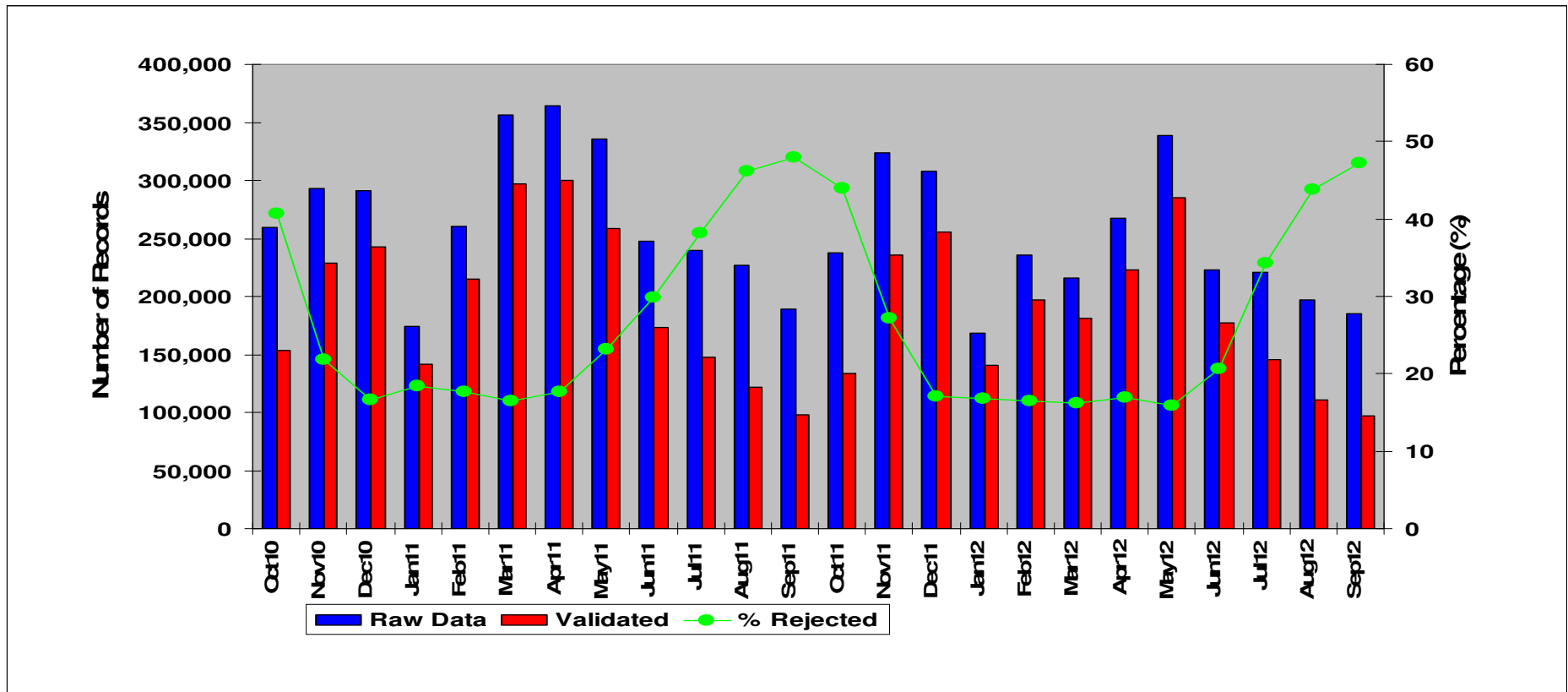


RV Analysis - Data Envelope



RV Analysis: Levels of Validation Fall Out

- Rejection Criteria: AQ ≤ 3 kWh ; Actual ≤ 0 ; Actual > 0 and Allocated $> 2 * \text{Actual}$; Actual > 0 and Allocated $< 0.5 * \text{Actual}$



- Rejection rates higher in summer due to smaller consumptions thereby resulting in greater % differences
- Profiles consistent with previous years and post-validation numbers good

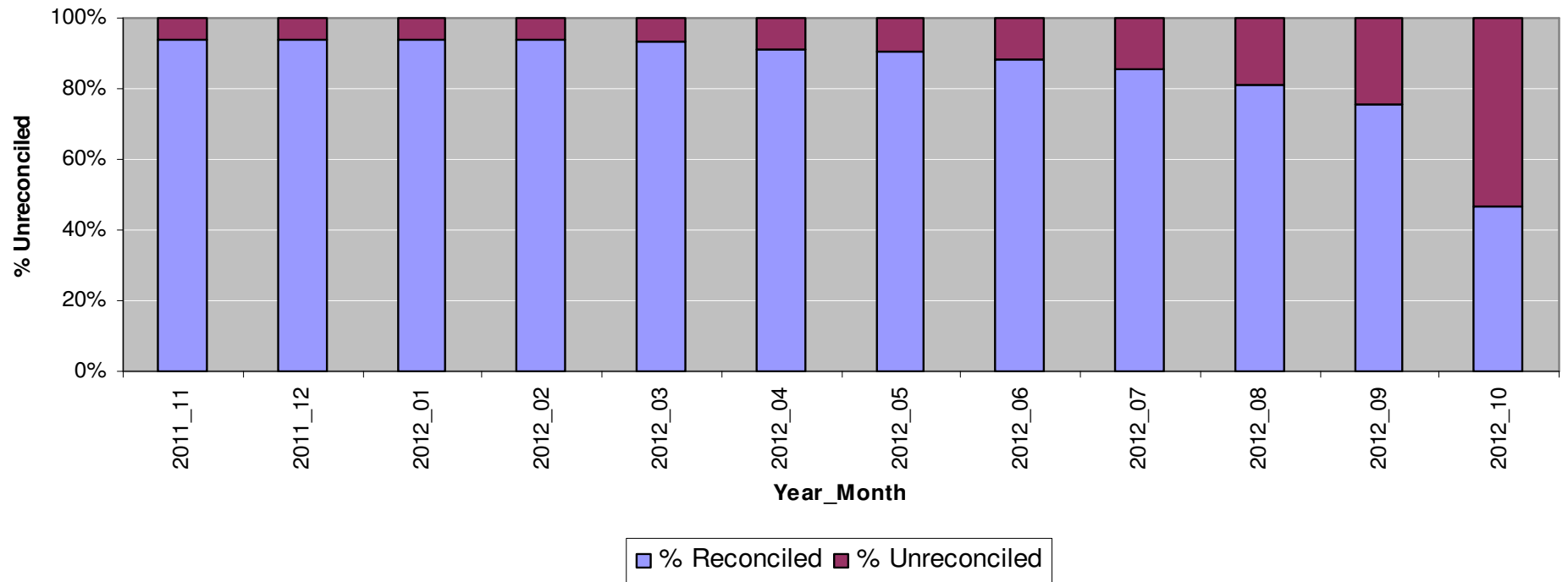
RV Analysis: Rejections – approx. breakdown

Rejection category	Minimum 15.9% (May 2012)	Maximum 47.3% (September 2012)
AQ \leq 3 kWh pa	1.4%	1.2%
Actual $<$ 0	1.0%	1.5%
Actual = 0	3.1%	9.2%
Actual $>$ 0 and Allocated $>$ 2 x Actual	7.3%	22.6%
Actual $>$ 0 and Allocated $<$ 0.5 x Actual	3.2%	12.8%

- Table shows the rejection category breakdown for:
 - May 2012 - which had the smallest rejection %
 - September 2012 - which had the largest rejection %

RV Analysis: Unreconciled Energy Profile

Unreconciled Energy Profile (upto and incl Oct 2012 Rec Invoice)

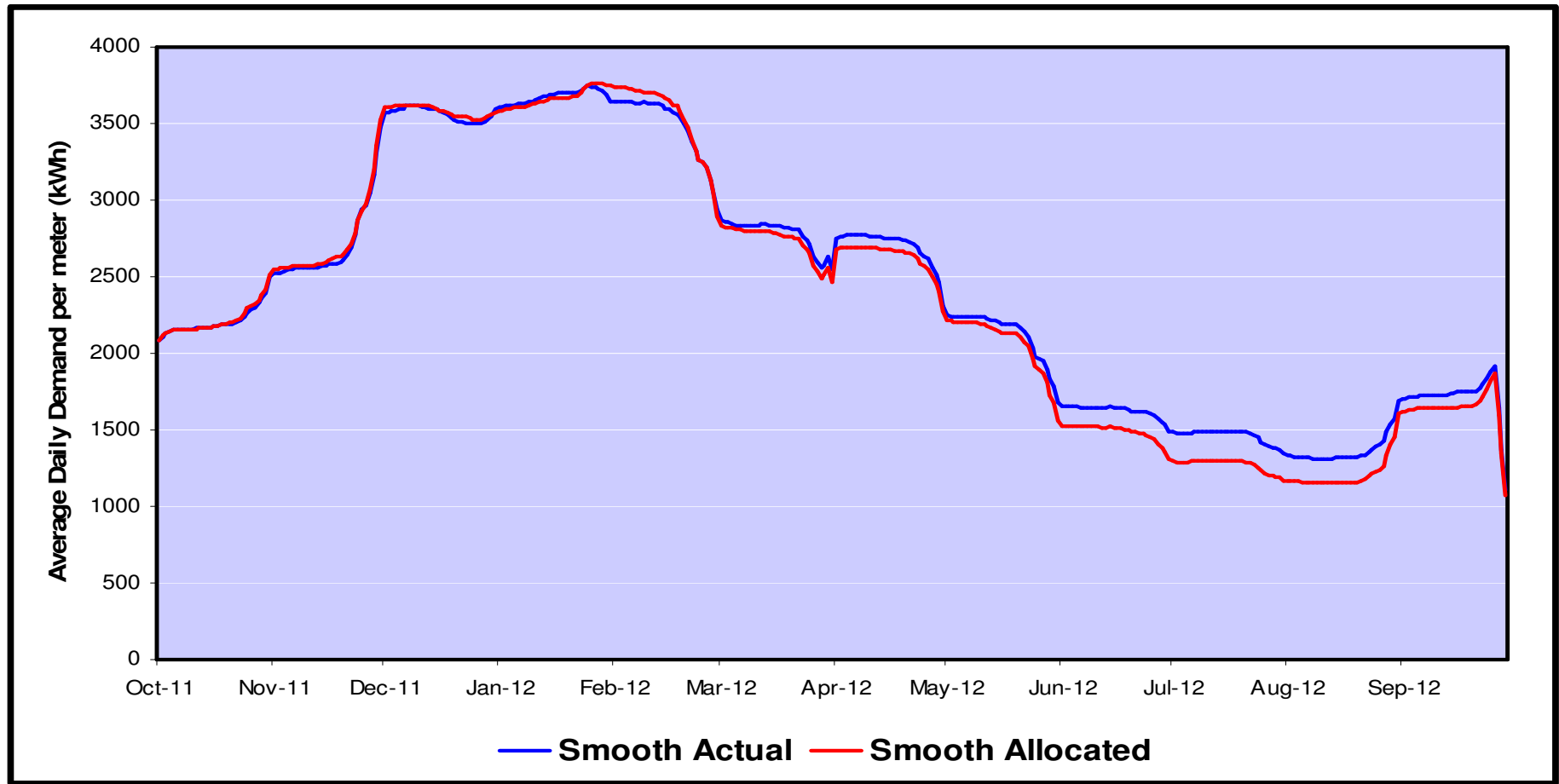


RV Analysis: Methodology

- Following removal of rejected reconciliations, for each meter point:
 - Reconciled energy is identified
 - Allocated Energy calculated
 - Values are then applied evenly to each day of the reconciliation period
 - Average for each of the meter points in the specific EUC is calculated
- Profile is 'scaled'
 - Level of allocated demand (based on AQ) = actual demand (actual)
- Scaling allows profile comparisons and analysis of algorithm performance
 - Without scaling analysis would primarily highlight differences in demand levels (affected by other factors)
- Example charts for cross section of EUC Bands (B) and LDZs provided in supporting document

SC : Consumption Band 04 (Pre-Scaling)

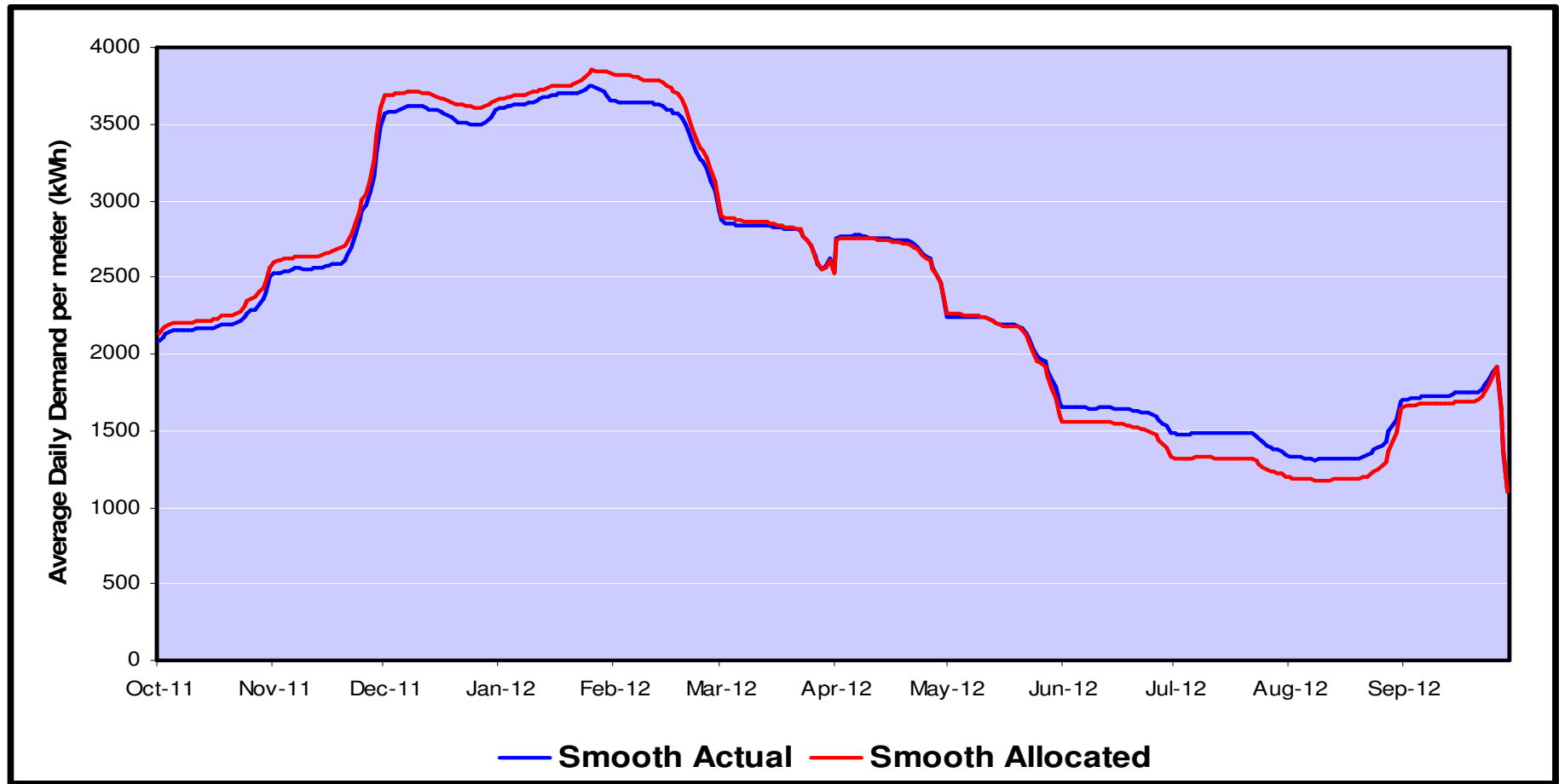
RV Analysis – Allocated to Actual



- 1st chart highlights where scaling has not occurred and profile of demand through the year.
- Following scaling.....

SC : Consumption Band 04 (After Scaling)

RV Analysis – Allocated to Actual



- Analysis allows comparison of the profiles rather than demand levels
- Indicates an over allocation in the Winter & under allocation in the summer
- **'Peaky' allocated profile:** Winter over, Summer under (predominant profile)

RV Categorisation: LDZ / EUC Profile & Error Levels

Gas Year 2011/12

EUC	BAND	SC	NO	NW	NE	EM	WM	WN	WS	EA	NT	SE	SO	SW
02	B	↑	~	↑	↑	↑	~	↑	↑	~	↑	↑	↑	↑
03	B	~	↑	↑	↑	↑	↑	↑↑	↑↑	↑	↑	↑	↑	↑↑
04	B	↑	~	~	~	~	~	~	↑	~	↑	~	~	↑
05	B	~	~	↑	~	~	~	~	~	~	↑	~	~	~
06	B	↑↑	↓	↑	~	~	↑	↑↑	↓	~	~	~	↑	↓
07	B	↓	↑	↑	~	↓	↓↓			~	↑	↓	↓	↑
08	B	↑↑		↓	~	~	~						~	↑↑
09	B													↓↓

OK / Good	~	5% Level	↑ Too Peaky	10% Level	↑↑ Too Peaky
No Data (<3)			↓ Too Flat		↓↓ Too Flat

- ‘% level’ = average difference of allocated to actual over the winter and summer differences (measures ‘peakiness’)
- 2011/12: ‘Peaky’ profile 37%, ‘Ok’ profile 34%, ‘Flat’ 10%, No data for analysis 19%
- 2010/11: ‘Peaky’ profile 50%, ‘Ok’ profile 26%, ‘Flat’ 5%, No data for analysis 19%
- 2009/10: ‘Peaky’ profile 53%, ‘Ok’ Profile 28%, ‘Flat’ 5%, No data for analysis 14%
- Profiles overall for 2011/12 tend to be ‘OK’ or ‘Peaky’



RV Analysis: Conclusions

- RV analysis highlights a ‘peaky’ trend of:
 - Over Allocation – Winter
 - Under Allocation – Summer
- 2011/12 saw 37% of profiles defined as ‘peaky’ (50% in 10/11):
 - Levels of rec. rejected similar to previous years
 - Available rec. for analysis incomplete, particularly Bands 2/3 (non-monthly read meters)
- BUT – analysis not necessarily representative of population
 - Consider with SF and WCF analysis *and* NDM Sample data...

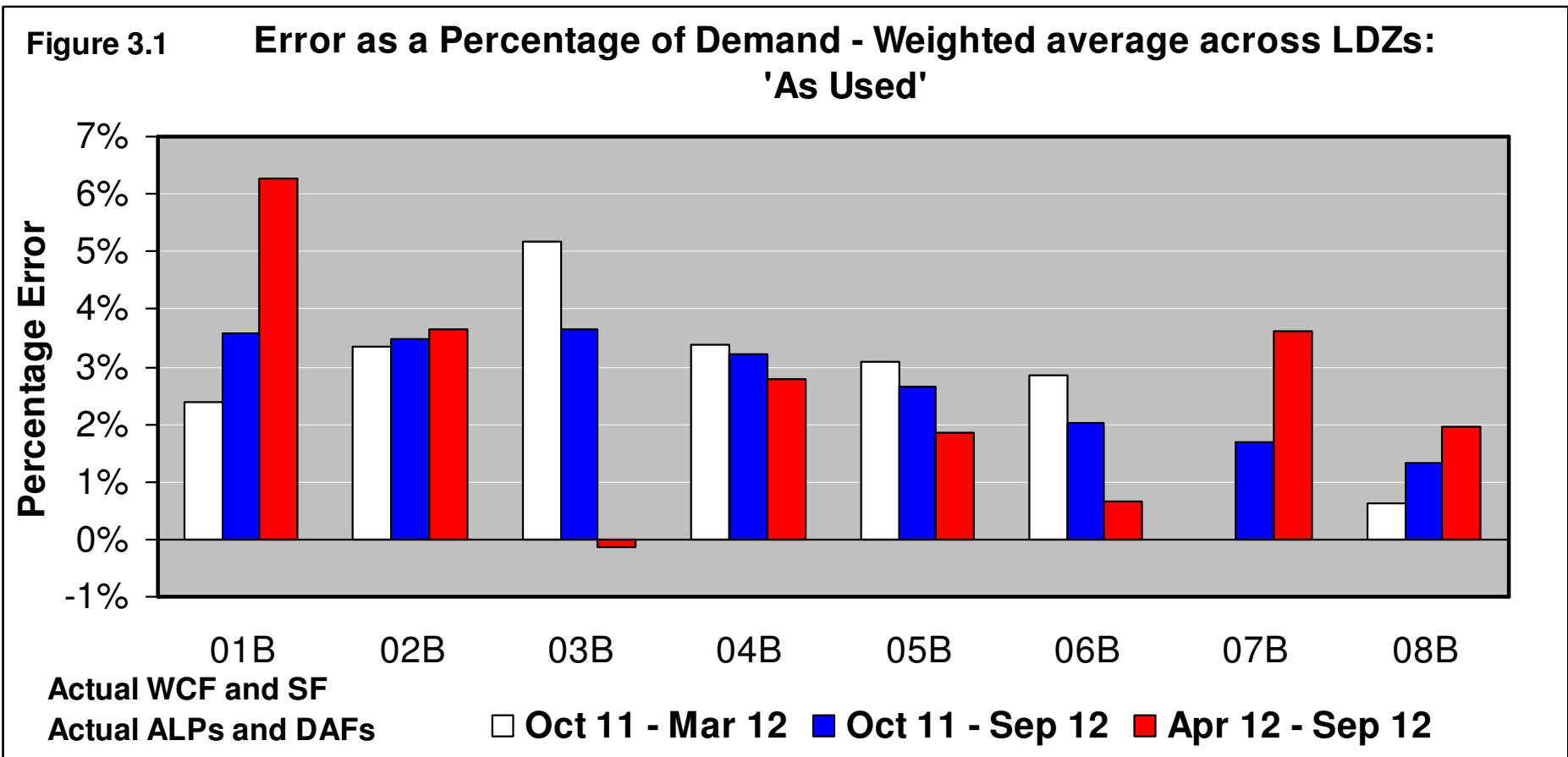
NDM Sample Consumption Analysis

- Using the actual NDM Sample consumption for 11/12
 - Compare the % error of sample consumption against three models :
 - Allocated using 11/12 ALPs & DAFs, real system WCF and SF - (“As Used”)
 - Allocated using 11/12 ALPs & DAFs, EWCF and SF = 1 – (Best Estimate '11)
 - Allocated using 12/13 ALPs & DAFs, 11/12 EWCF and SF = 1 – (Best Estimate '12)
 - This is completed by EUC for all LDZs and also by month by LDZ
- Supporting document - detailed explanation with full examples

Allocated Error As % of Actual Demand

Weighted average across LDZs. 'As Used'

System WCF and SF – ALPs and DAFs 11/12 Algorithms - NDM Sample derived AQs (not system AQs)



- Positive errors = Under allocation; Negative errors = Over allocation.
- Over year: Positive errors across all consumption bands (indicate population AQs too high)
- 'As Used' model uses real system SFs which have taken population AQs into account.
- AQs used based on sample consumption which is also expected to be lower than equivalent system AQs
- 'As Used' model does not assess EUC profiles, however can provide indicator of system AQ excess.....

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As Used Model – AQ Assessment

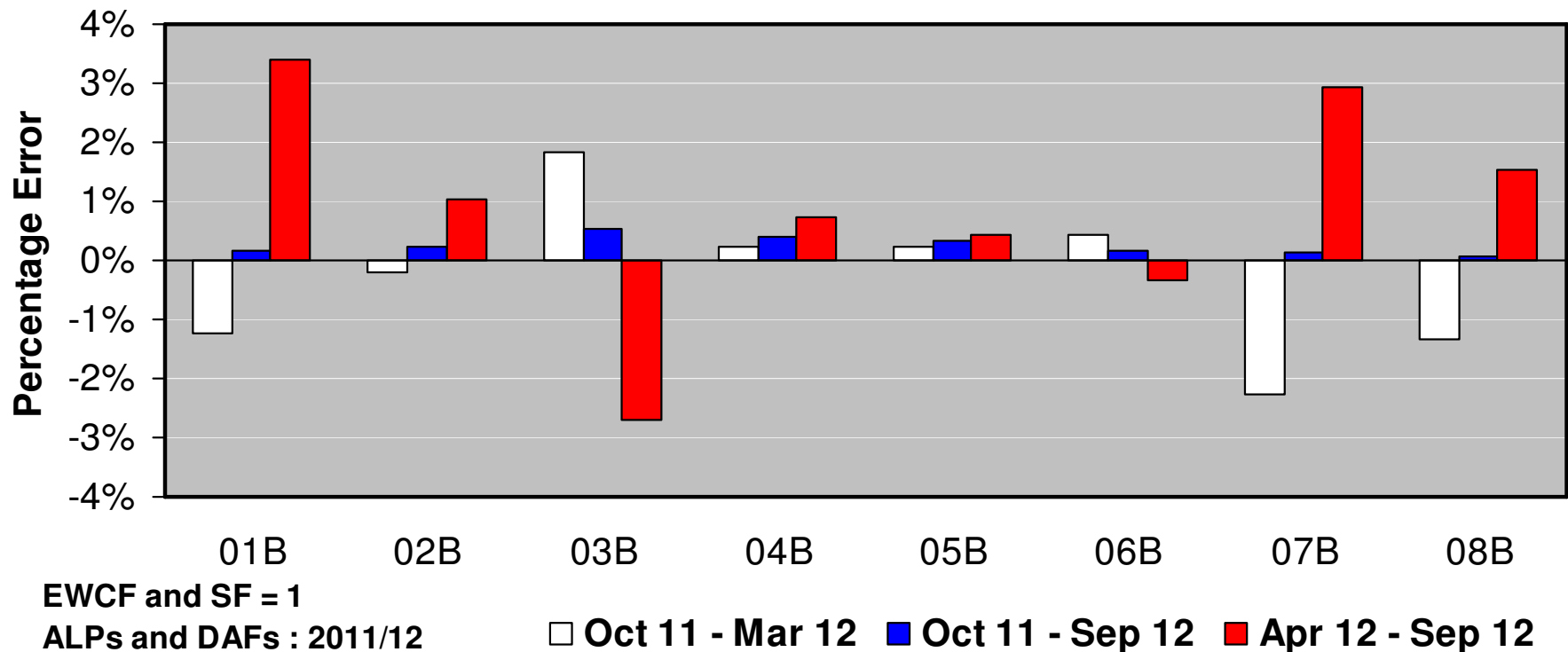
LDZ	Estimated AQ Excess (+) or Deficit (-) (‘as used’ analysis full year errors)	Observed AQ Reductions in Gemini at start of gas year 2012/13
SC	1.2%	-4.7%
NO	1.8%	-5.6%
NW	2.0%	-6.4%
NE	1.0%	-4.5%
EM	1.9%	-5.4%
WM	1.3%	-5.0%
WN	-	-8.0%
WS	2.6%	-6.5%
EA	2.3%	-5.9%
NT	2.7%	-6.0%
SE	3.5%	-6.6%
SO	2.3%	-5.6%
SW	3.3%	-7.3%
Overall	2.2%	-5.8%

Allocated Error As % of Actual Demand

Weighted average across LDZs. 'Best Estimate 11'

EWCF and SF =1 – ALPs and DAFs 11/12 Algorithms - NDM Sample derived AQs (not system AQs)

Figure 3.2 Error as a Percentage of Demand - Weighted average across LDZs: 'Best Estimate 11'



- Remove SF impact and use EWCF which avoids potential bias in WCF
- Positive errors = Under allocation ; Negative errors = Over allocation
- Winter/Summer analysis indicates bands 03 & 06 little too flat and bands 01,02,04,05,07 & 08 little too peaky
- Over year: Little overall error in each band (Range +0.06% and +0.53% for all bands)

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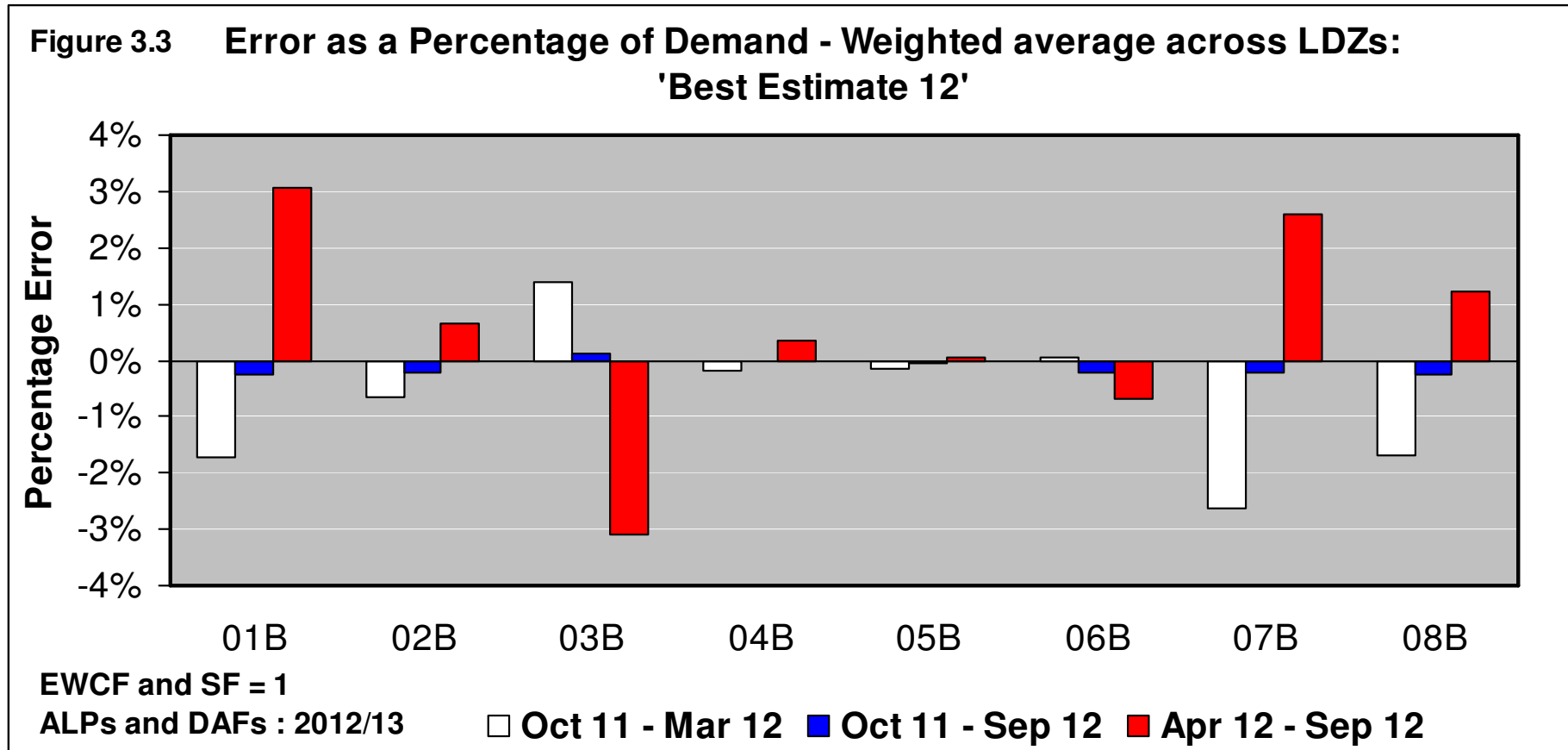


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Allocated Error As % of Actual Demand

Weighted average across LDZs. 'Best Estimate 12'

EWCF and SF = 1 – ALPs and DAFs 12/13 Algorithms - NDM Sample derived AQs (not system AQs)



- ALPs and DAFs for 2012/13 applied to 2011/12 consumption data
- Should provide less error as ALPs and DAFs were derived from this consumption data
- Winter / Summer errors are slightly improved for bands 03,04,05 and 06. Slightly worse for 01,02,07 and 08
- Over whole year, on average, extent of error across all EUCs is slightly reduced using 12/13 algorithms
- Monthly analysis also completed...

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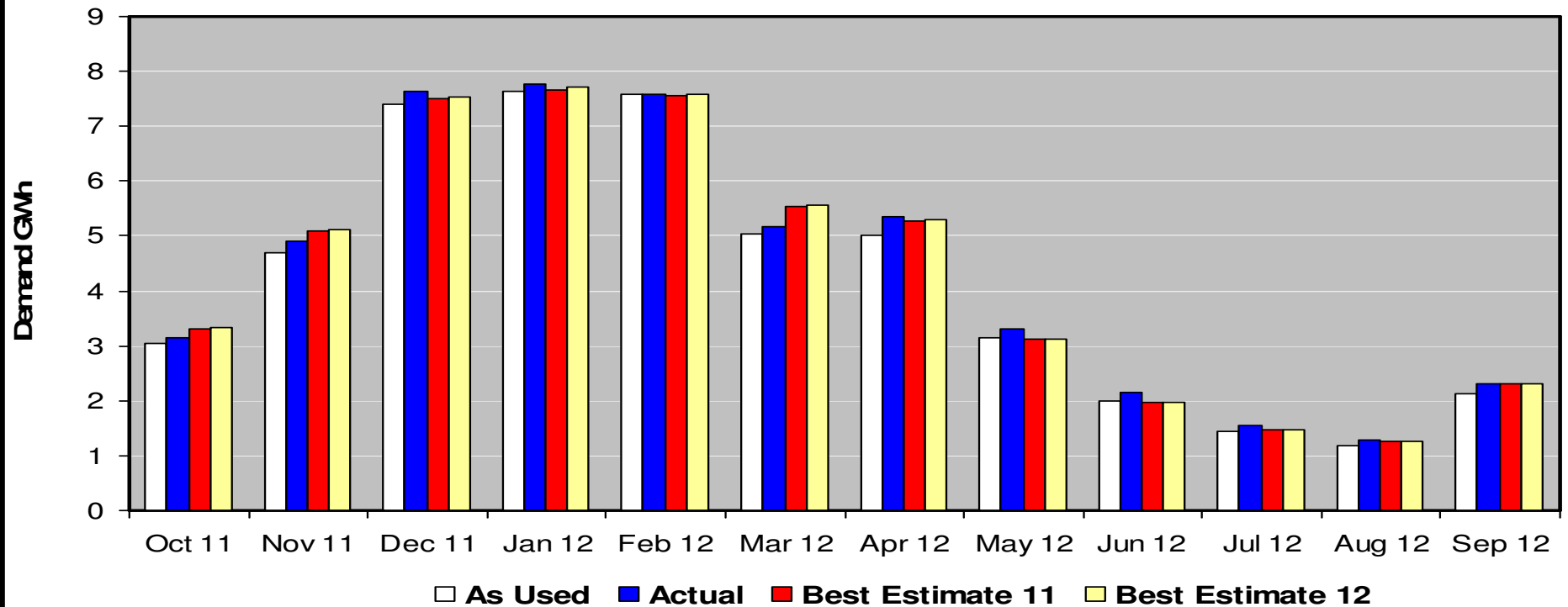
Monthly Actual & Deemed Demand

01B (All LDZs)

As previous but by EUC and By Month

Figure 3.4

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



- Results also provided for previous models but by EUC Band and Month - Equivalent charts for all consumption bands included in supporting document
- Band 01B profile – indicates winter over allocation (except Dec & Jan) and summer under allocation
- Relevant to recall weather conditions in 11/12 when interpreting results
 - During Winter months October , November and March were warmer than seasonal normal (warmest March in last 50 years) with Dec and Jan experiencing notable periods of colder than normal weather
 - Summer months generally colder than seasonal normal (April was unusually colder than March)

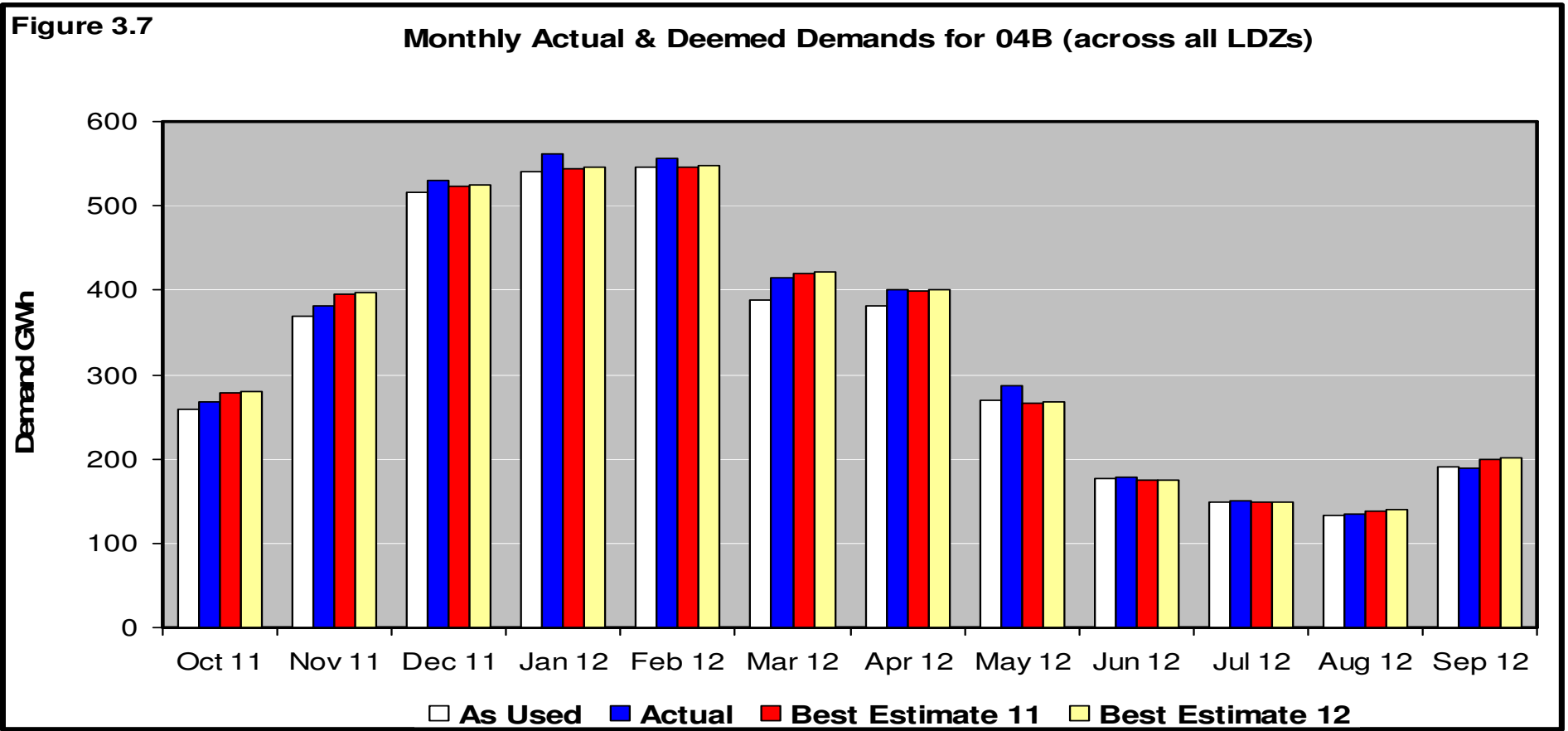


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Monthly Actual & Deemed Demand

04B (All LDZs)

As previous but by EUC and By Month



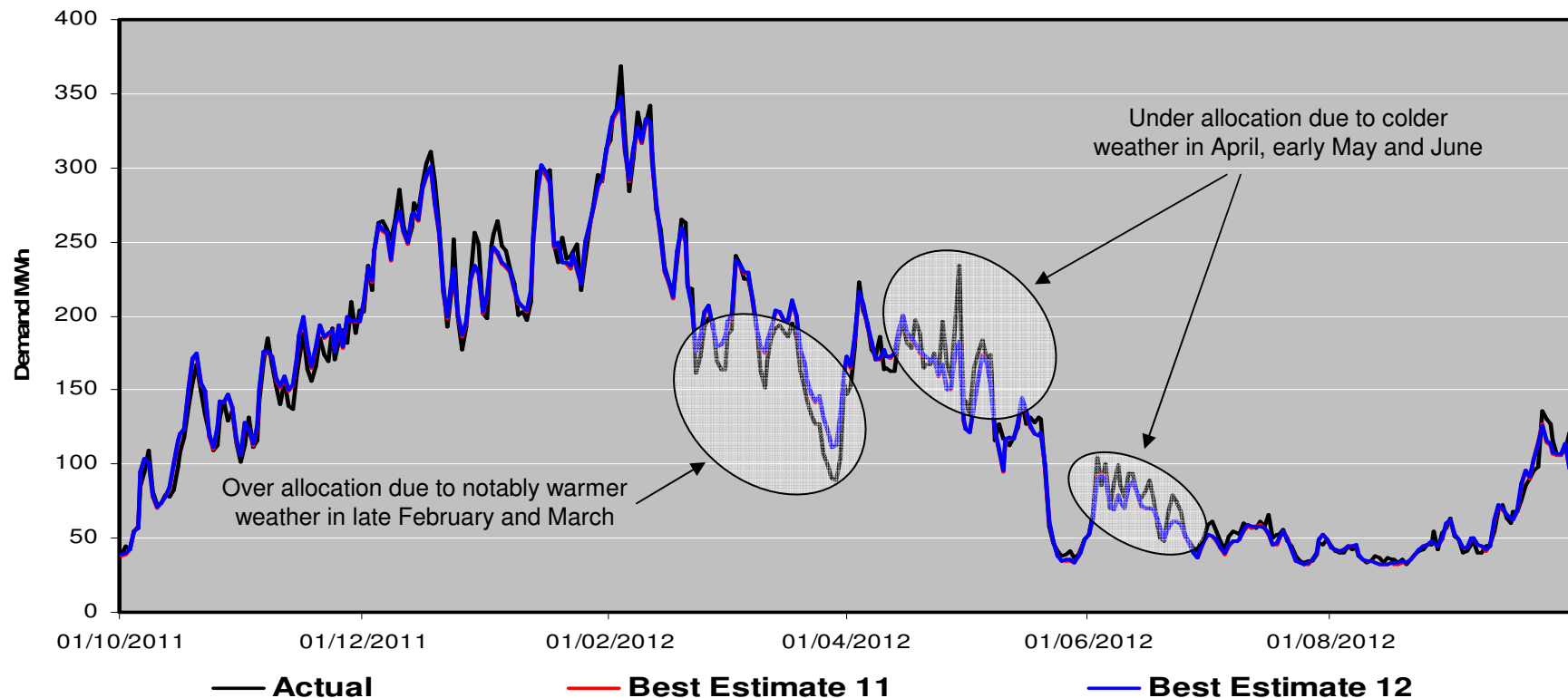
- Band 04B profile – indicates winter over allocation (except for colder months of December, January and February) and summer under allocation (with the exception of August and September)



Daily Actual & Deemed Demand

01B (All LDZs)

Figure 3.19: Daily Actual and Deemed Demands for 01B (across all LDZs)

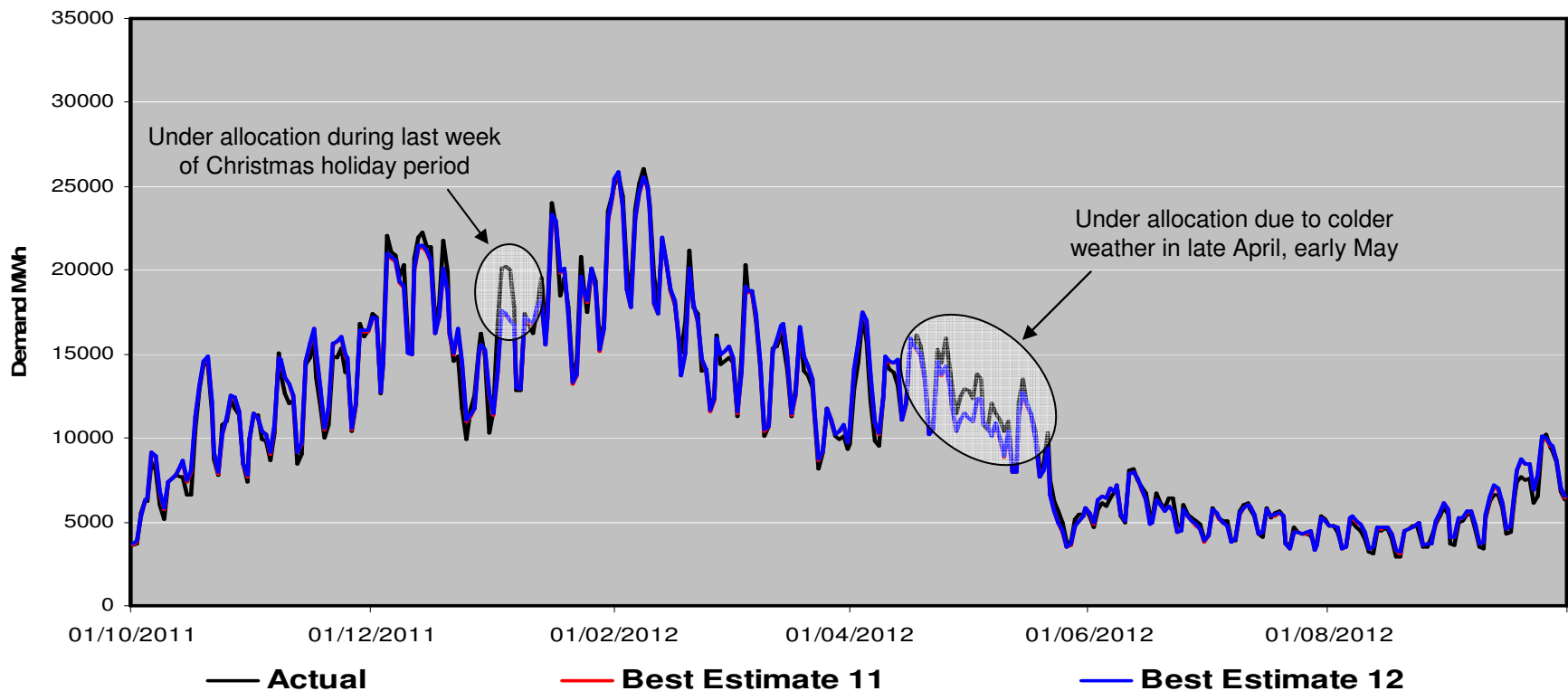


- The daily chart for Band 01 shows that allocated demand was generally close to actual demand. The most notable exception to this occurred during the warmest March in last 50 years and the unseasonably colder weather during April, early May and June.

Daily Actual & Deemed Demand

04B (All LDZs)

Figure 3.22: Daily Actual and Deemed Demands for 04B (across all LDZs)



- The daily chart for Band 04 shows that allocated demand was generally close to actual demand. The most notable exception to this occurred during the last week of the Christmas holiday period and the cold weather in late April and early May 2012.

RV Analysis & NDM Sample Analysis

- The “best estimate 11” & “best estimate 12” analyses suggest:
 - For bands 01, 02, 04, 05, 07 & 08: over allocation (-ve errors) in the winter and under allocation (+ve errors) in the summer. → profile too peaky.
 - For bands 03 & 06: under allocation (+ve errors) in the winter and over allocation (-ve errors) in the summer. → profile too flat.
- The RV analysis indicated profiles that were:
 - too peaky in most LDZs in bands 02 & 03 (overall too peaky in bands 02 & 03, at 5% level)
 - good in most LDZs in bands 04 & 05 (overall slightly too peaky in bands 04 & 05, below 5% level)
 - mixture of good, too peaky and too flat profiles in bands 06, 07, 08 (overall slightly too peaky, below 5% level in bands 06 & 07 and overall too peaky in band 08, at 5% level)

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RV Analysis & NDM Sample Analysis Conclusions

- Limitations - different, restricted data sets
 - Analyses based on different data sets - neither are necessarily representative of population as a whole
 - RV analysis excludes band 01B & based on a sub-set of rec data
 - NDM sample analysis is based on validated NDM SAMPLE data
 - Both analyses suffer from small numbers of contributing meter/supply points at the higher consumption bands
- Important Point: Both approaches, subject to their limitations, suggest only small inaccuracies over the year as a whole
- Full explanatory document on Joint Office website:
 - 'Algorithm Performance Strand 2 Evaluation 2011-12.pdf'