NDM Algorithm Performance 2009/10 – Strand 2

Reconciliation Variance Analysis
NDM Sample Consumption Analysis

Supporting Document:
Evaluation of Algorithm Performance 200910.pdf

DESC 1st February 2011

Algorithm Performance 2009/10: Strand 2 Analysis

- Strand 1 (SF and WCF analysis) presented at Nov DESC
  - SF generally closer to 1 (improvement compared with 08/09)
  - WCF deviation improved in 09/10 (compared with 08/09)

- Strand 2: Reconciliation Variance Analysis
  - Compare allocated demand (derived from algorithms) *with*
  - Actual demand obtained from available reconciliation data

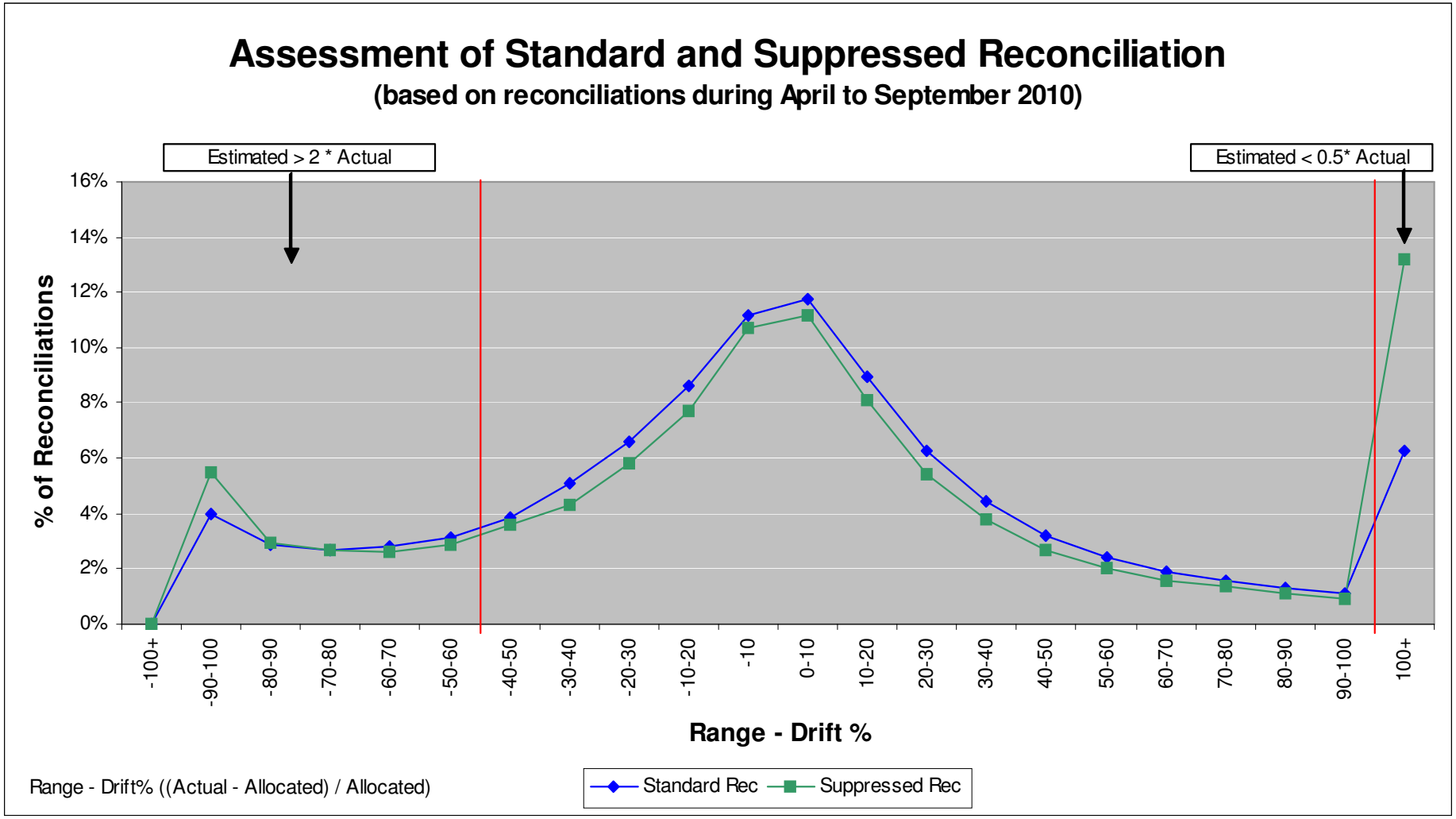
- Strand 2: Analysis of NDM Sample Consumption
  - Compare the actual demand from the NDM sample data *with*
  - Allocated demand for the sample

- Supporting document: detailed explanation with full examples

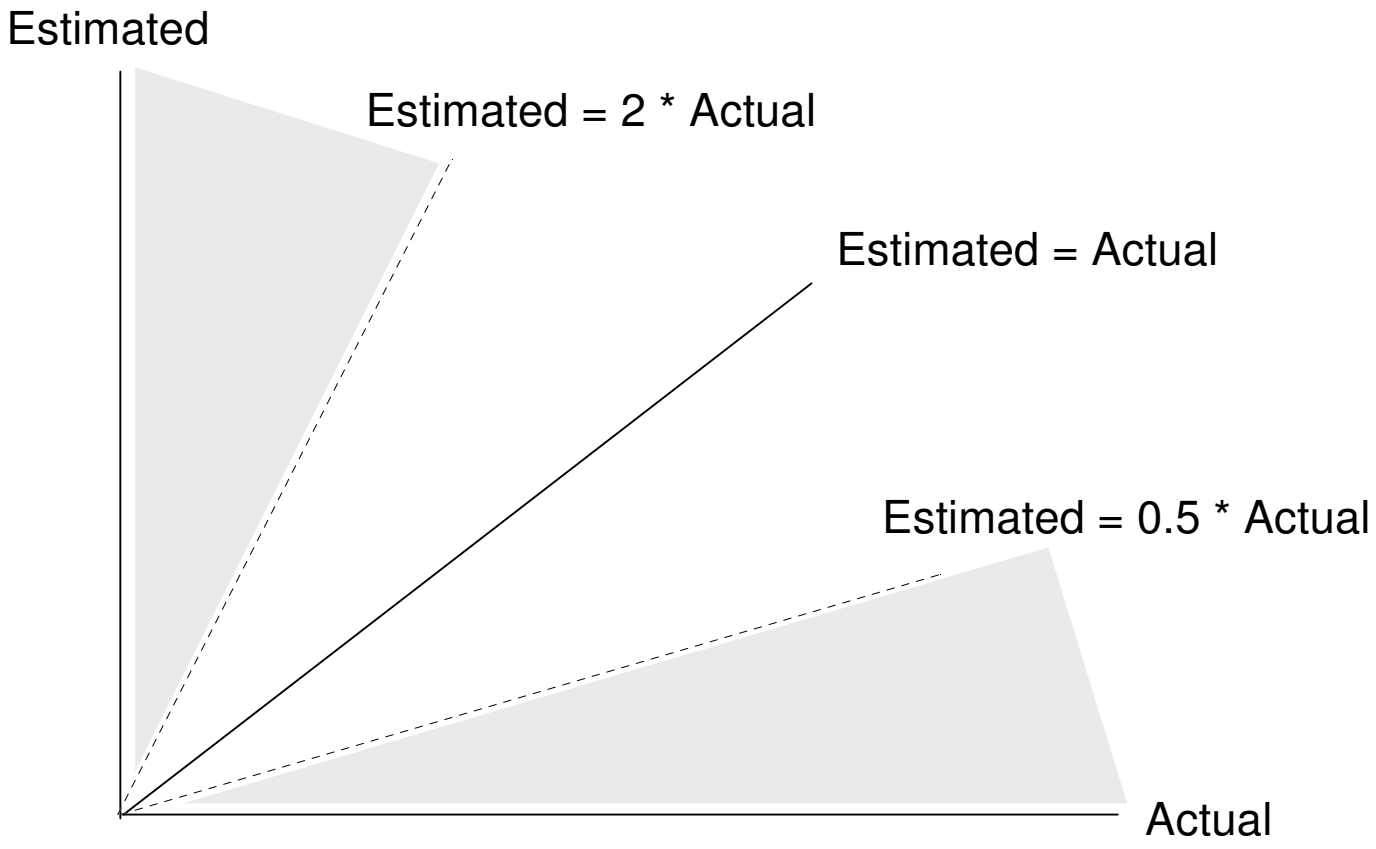
Reconciliation Variance (RV) 09/10: Actual to Allocated

- 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

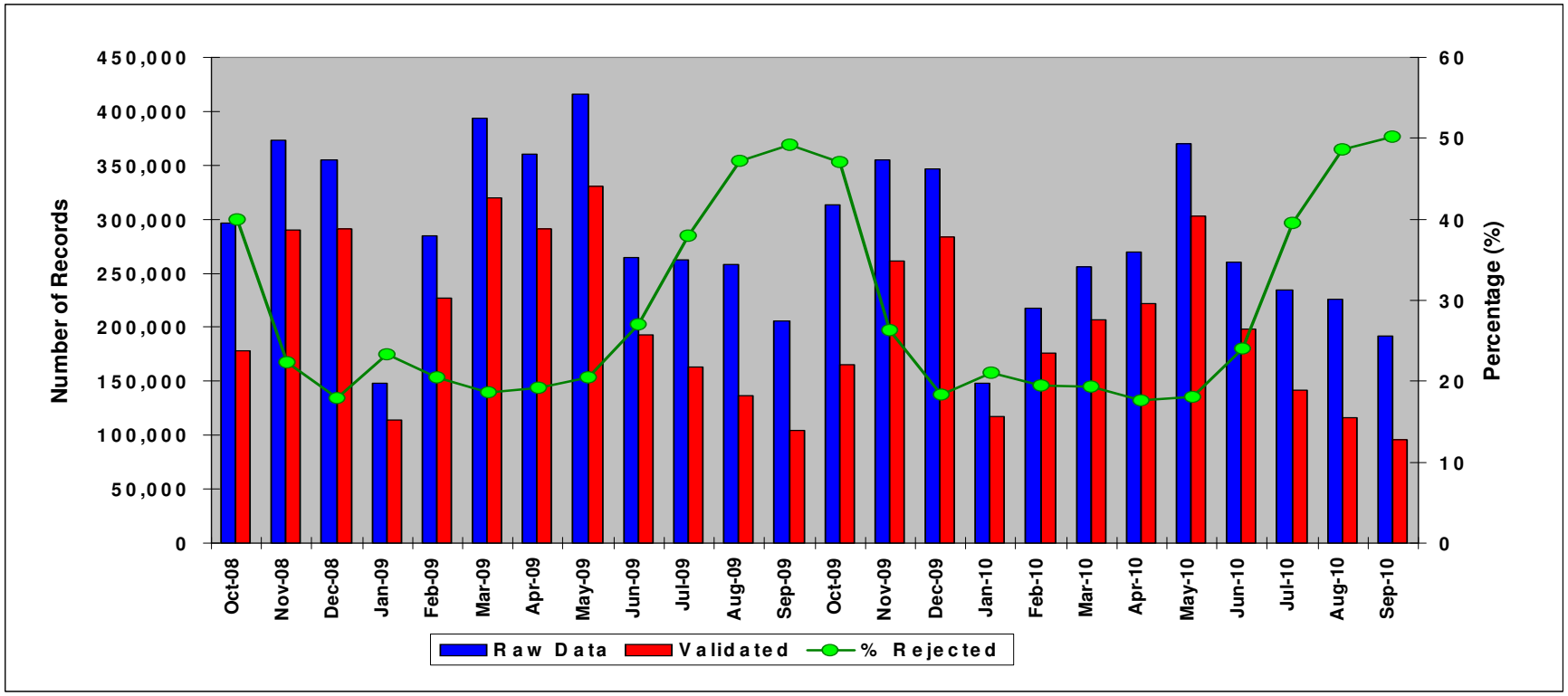


RV Analysis - Data Envelope



RV Analysis: Levels of Validation Fall Out

- Rejection Criteria: AQ <=3 kWh ; Actual <=0 ; Actual >0 and Allocated > 2*Actual ; Actual >0 and Allocated <0.5*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 17.7% (April 2010)	Maximum 50.2% (September 2010)
AQ <= 3 kWh pa	1.2%	1.2%
Actual < 0	1.6%	1.4%
Actual = 0	3.1%	9.9%
Actual > 0 and Allocated > 2 * Actual	7.6%	21.8%
Actual > 0 and Allocated < 0.5 * Actual	4.2%	15.9%

- Table shows the rejection category breakdown for April 2010 – which had the smallest rejection % and September 2010 which had the largest rejection %

RV Analysis Methodology

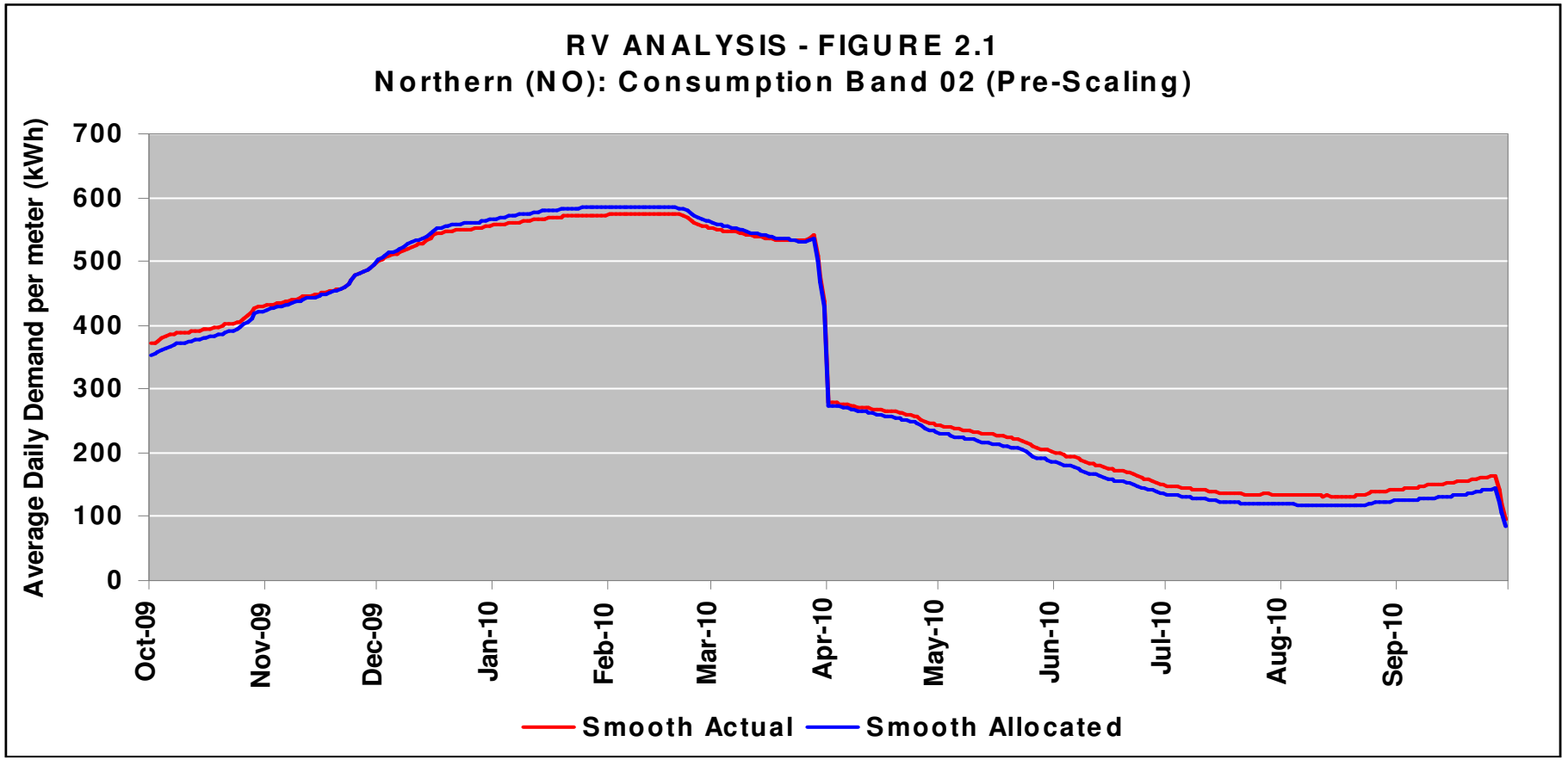
- Following removal of rejected reconciliations, for each meter point:
  - Reconciled energy is identified
  - Allocated Energy calculated
  - Values are then applied evenly to each day of the reconciliation period
  - Average for each of the meter points in the specific EUC is calculated

- 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)

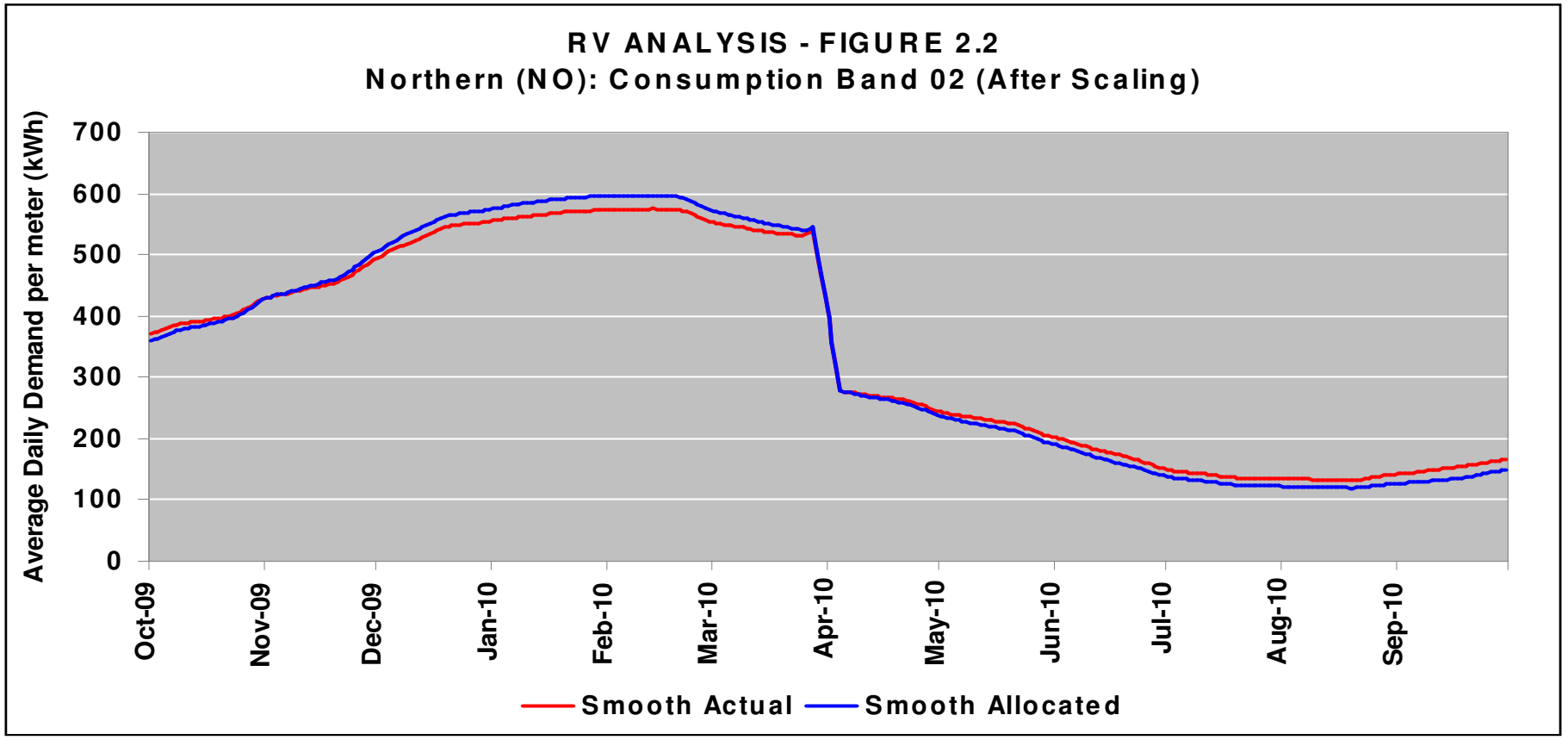
- Example charts for cross section of EUC Bands (B) and LDZs provided in supporting document

NO: Consumption Band 02 (Pre-Scaling)
RV Analysis – Allocated to Actual



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

NO: Consumption Band 02 (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 2009/10

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 (<2)			↓	Too Flat		⇓	Too Flat

- '% level' = average difference of allocated to actual over the winter and summer differences (measures 'peakiness')
- 2009/10: 'Peaky' profile 53%, 'Ok' Profile 28%, 'Flat' 5%, No data for analysis 14%
- 2008/09: 'Peaky' profile 47%, 'Ok' profile 30%, 'Flat' 12%, No data for analysis 11%
- Profiles overall more 'Peaky'

RV Analysis Conclusions

- RV analysis highlights a 'peaky' trend of:
  - Over Allocation – Winter
  - Under Allocation – Summer
- 2009/10 saw 53% of profiles defined as 'peaky' (47% in 08/09):
  - Levels of rec. rejected similar to previous years
  - Available rec. for analysis incomplete, particularly Bands 2/3 (non-monthly read meters)
    - Analysis is revised in Spring 2011 - more data will be available
- BUT – analysis not necessarily representative of population
  - Consider with SF and WCF analysis *and* NDM Sample data…

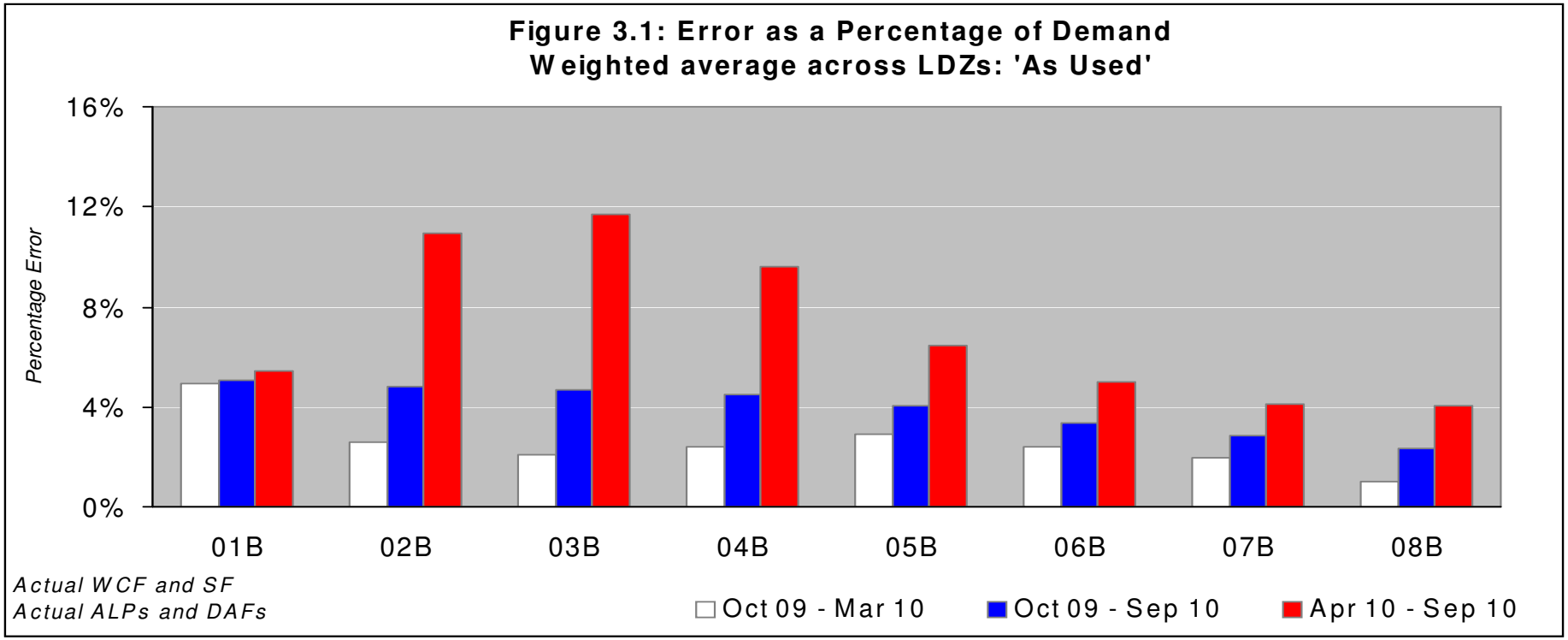
NDM Sample Consumption Analysis

- Using the actual NDM Sample consumption for 09/10
  - Compare the % error of sample consumption against three models :
    - Allocated using 09/10 ALPs & DAFs, real system WCF and SF - (“As Used”)
    - Allocated using 09/10 ALPs & DAFs, EWCF and SF = 1 – (Best Estimate ’09)
    - Allocated using 10/11 ALPs & DAFs, 09/10 EWCF and SF = 1 – (Best Estimate ’10)
  - 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 09/10 Algorithms - NDM Sample derived AQs (not system AQs)



- Positive errors = Under allocation
- Positive errors across all consumption bands over 12 month period 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…..

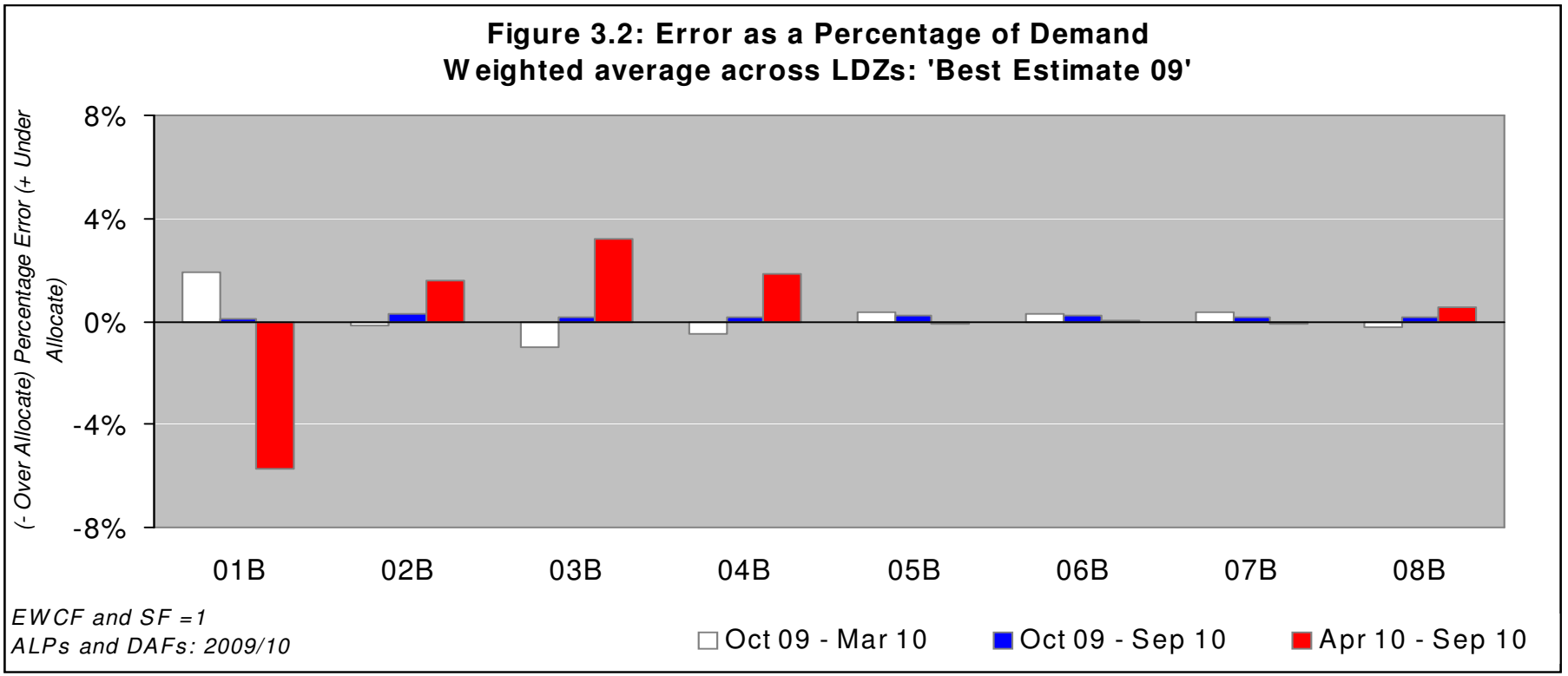
As Used Model – AQ Assessment

LDZ	Estimated AQ Excess (+) or Deficit (-) ('as used' analysis full year errors)	Observed AQ Reductions in Gemini at start of gas year 2010/11
SC	6.5%	9.2%
NO	2.8%	9.2%
NW	3.6%	9.7%
NE	2.2%	8.8%
EM	2.8%	8.7%
WM	3.4%	9.4%
WN	-	-
WS	3.5%	10.1%
EA	2.7%	8.1%
NT	1.9%	7.7%
SE	3.0%	8.5%
SO	5.7%	10.0%
SW	3.1%	9.6%
Overall	3.4%	9.0%

Allocated Error As % of Actual Demand

Weighted average across LDZs. 'Best Estimate 09'

EWCF and SF =1 – ALPs and DAFs 09/10 Algorithms - NDM Sample derived AQs (not system AQs)

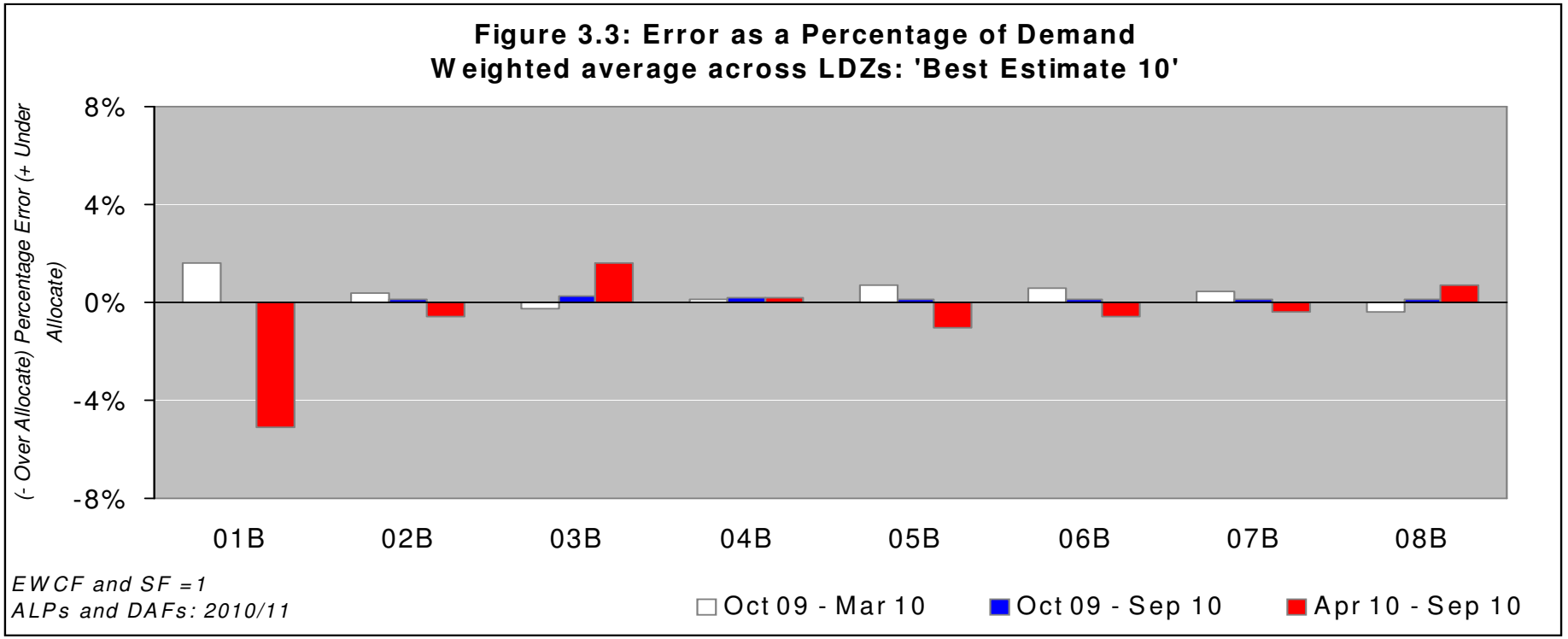


- Remove SF impact and use EWCF which avoids potential bias in WCF
- Positive errors = Under allocation ; Negative errors = Over allocation
- Winter/Summer analysis indicates bands 01,05,06 and 07 little too flat and 02, 03, 04 and 08 little too peaky
- Over year: Little overall error in each band (Range 0.08% and 0.29% for all bands)

Allocated Error As % of Actual Demand

Weighted average across LDZs. 'Best Estimate 10'

EWCF and SF =1 – ALPs and DAFs 10/11 Algorithms - NDM Sample derived AQs (not system AQs)

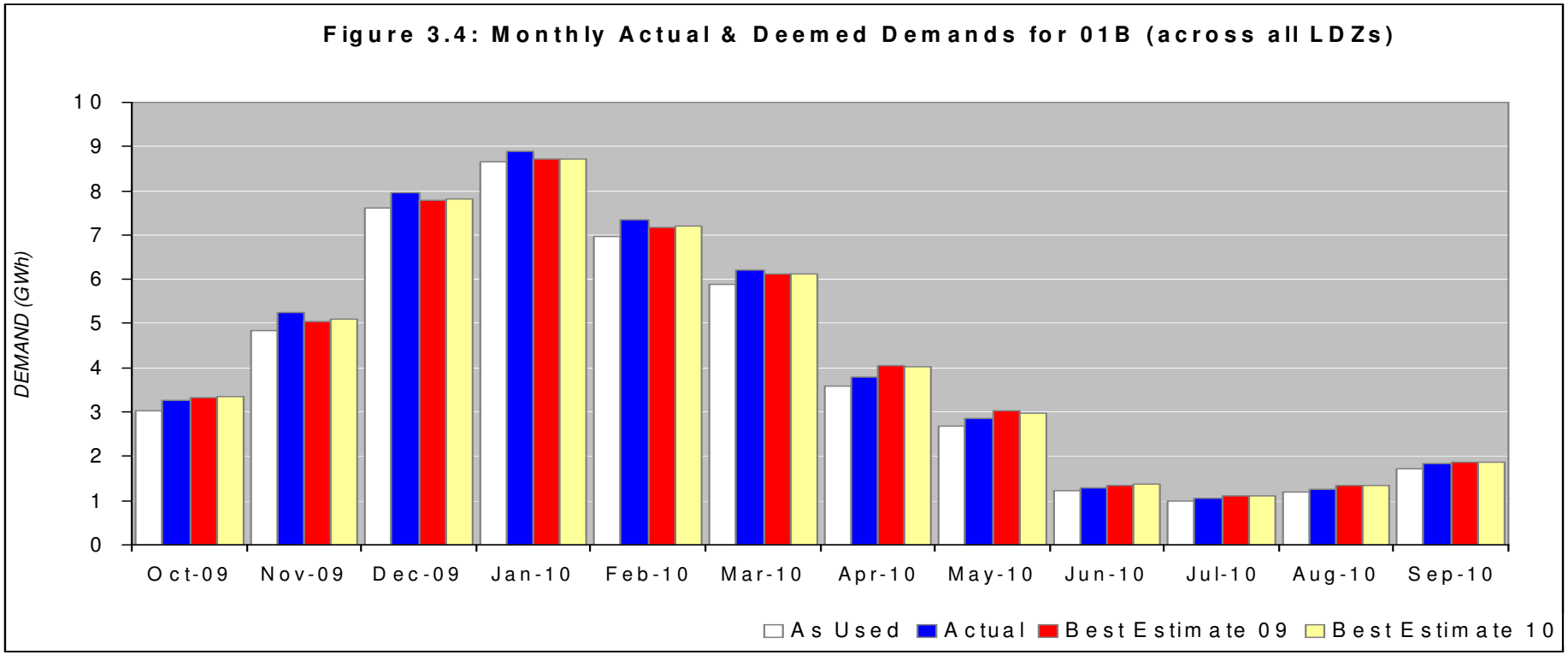


- ALPs and DAFs for 2010/11 applied to 2009/10 consumption data
- Should provide less error as ALPs and DAFs were derived from this consumption data
- Winter / Summer errors are slightly improved for bands 01,02,03 and 04. Slightly worse for 05,06,07 and 08
- Over whole year extent of error is slightly reduced using 10/11 algorithms in most EUCs
- Monthly analysis also completed…

Monthly Actual & Deemed Demand

01B (All LDZs)

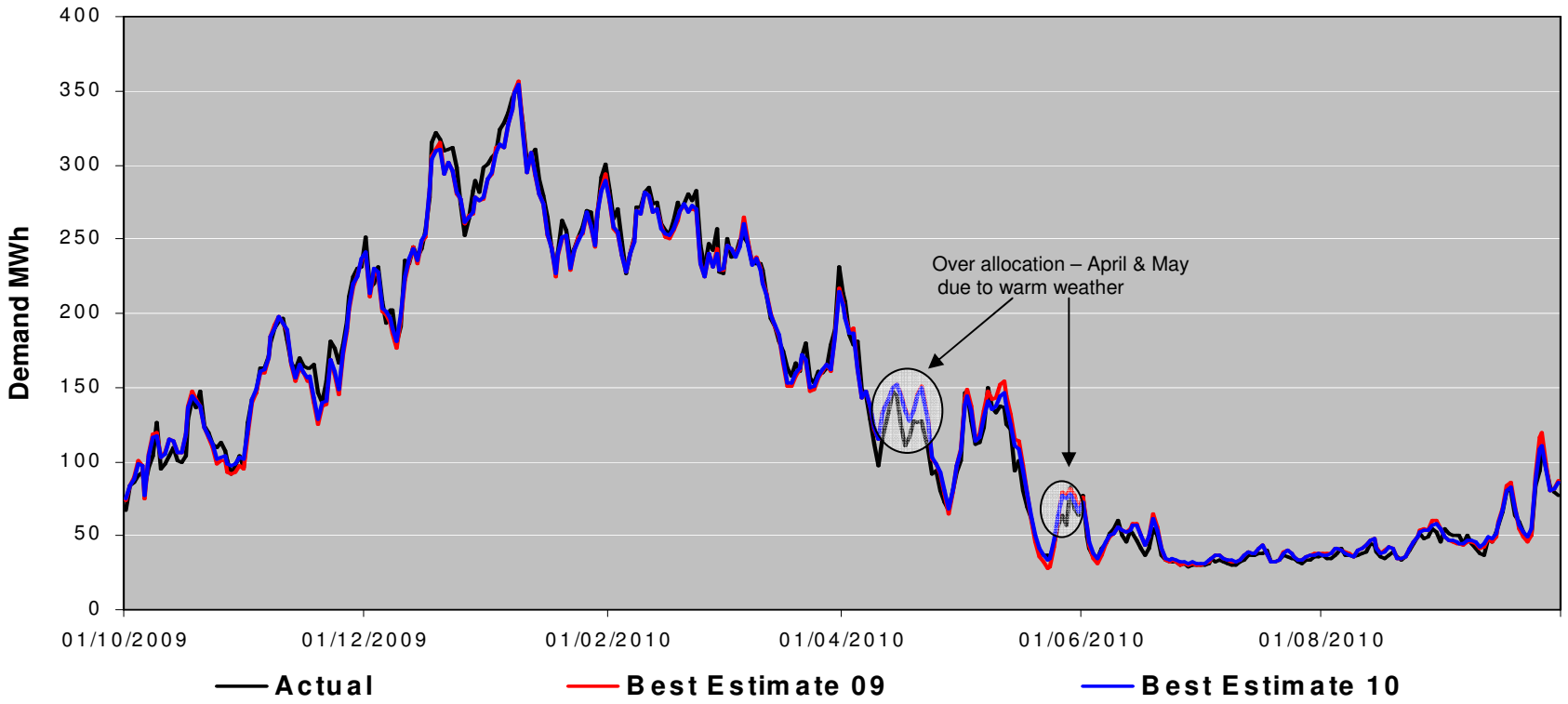
As previous but by EUC Band and By Month



- 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 under allocation and summer over allocation
- Relevant to recall weather conditions in 09/10 when interpreting results
  - Weather from mid December through to March was clearly colder than seasonal normal
  - Summer months generally warmer than seasonal normal basis (except August)

Daily Actual & Deemed Demand
01B (All LDZs)

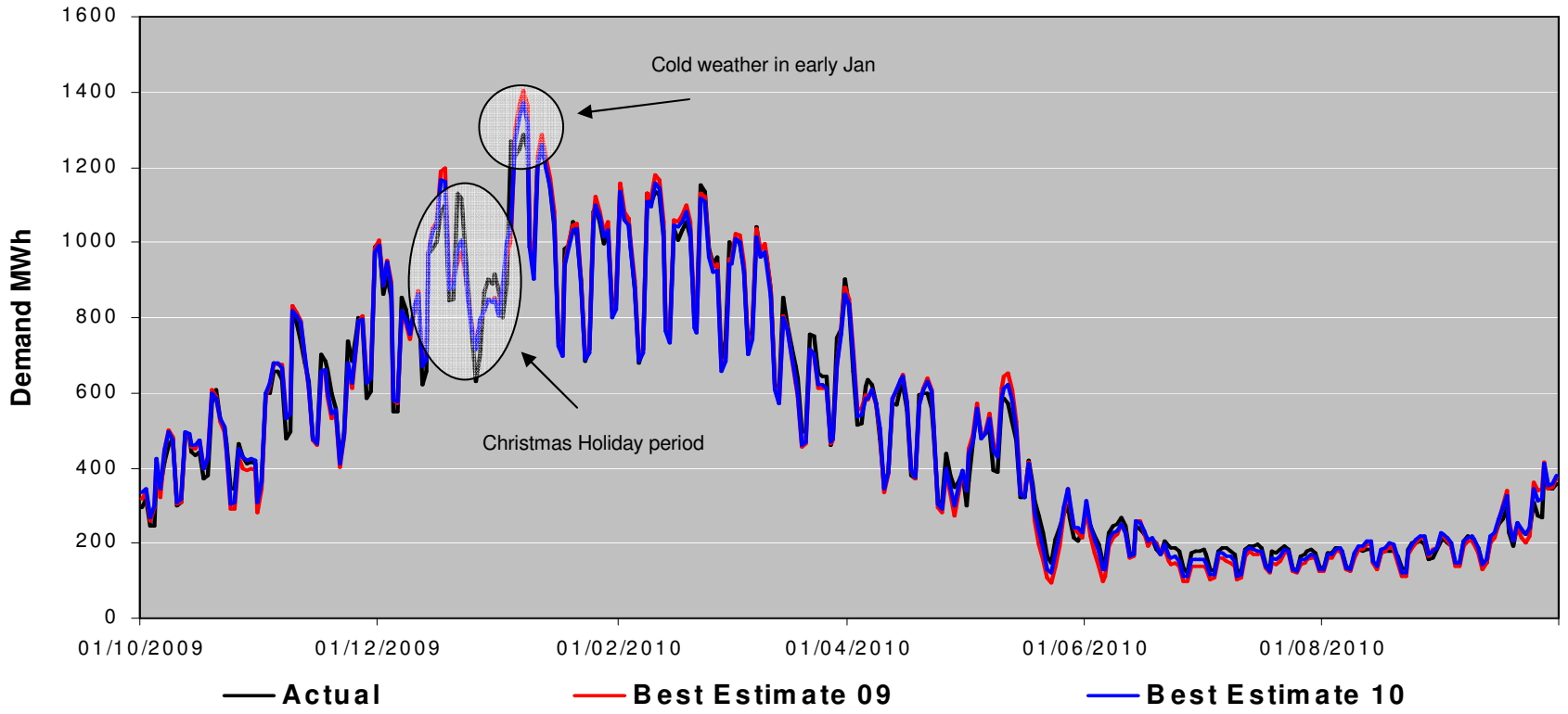
Figure 3.19: Daily Actual and Deemed Demands for 01B (across all LDZs)



- 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 unseasonably warm weather during April and late May

Daily Actual & Deemed Demand
02B (All LDZs)

Figure 3.20: Daily Actual and Deemed Demands for 02B (across all LDZs)



- The daily chart for Band 02 shows that allocated demand was generally close to actual demand.
- The most notable exception to this occurred during the Christmas period and unseasonably cold weather in early January.

RV Analysis & NDM Sample Analysis

- The “Best Estimate 09” & “Best Estimate 10” analyses suggest:
  - For bands 01, 05, 06 & 07: under allocation (+ve errors) in the winter and over allocation (-ve errors) in the summer. → profile too flat.
  - For band 02, 03, 04 & 08: over allocation (+ve errors) in the winter and under allocation (-ve errors) in the summer. → profile too peaky.

- The RV analysis indicated profiles that were:
  - Too peaky in most LDZs in bands 02 & 03 (and overall below or at 5% level)
  - Good in most LDZs (8 or more instances of 13) in bands 04 & 05 (overall slightly too peaky in bands 04 & 05, well below 5% level)
  - Mixture of good, too peaky and too flat profiles in bands 06 & 07 (overall too peaky, well below 5% level in band 06, at 5% level in band 07)
  - Mixed picture in band 08 (overall a little too peaky, well below 5% level)

RV Analysis & NDM Sample Analysis Conclusions

- Limitations - different, restricted data sets
  - 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
- Spring 2011 RV analysis is updated to provide better representation
- Full explanatory document on Joint Office website:
  - 'Evaluation of Algorithm Performance 200910.pdf'