



# Demand Estimation Sub-Committee

19<sup>th</sup> September 2005

## Model Smoothing History

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Model smoothing was instituted each year since 1999/00 to help mitigate year on year volatility.

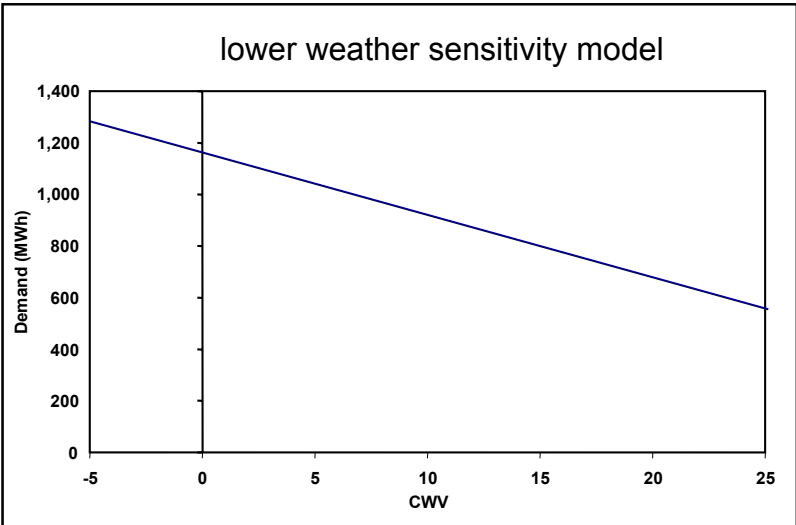
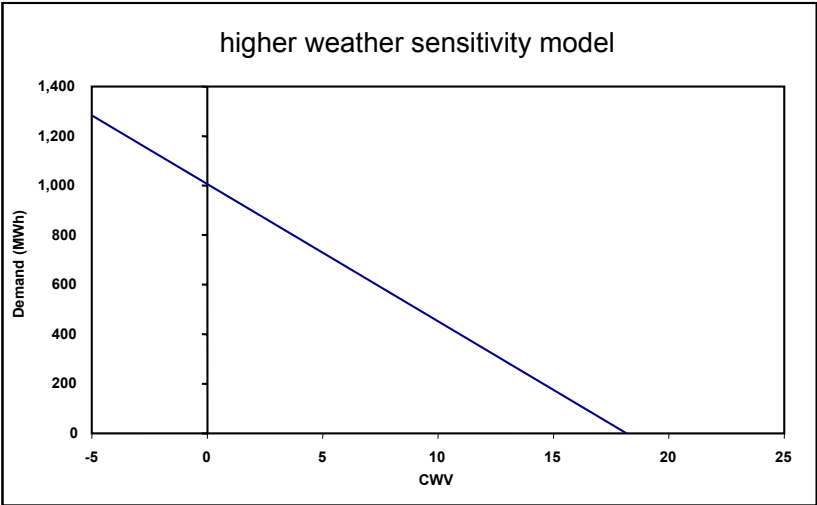
At the time, a commitment was made to Ofgem to make an annual assessment of model smoothing, and decide annually at DESC whether to continue its application.

Damping down volatility rather improving predictive ability is the particular strength of model smoothing. Although in the main predictive ability is no worse than with single year models.

Model smoothing assessments are undertaken using the CWV intercept differences from the relevant single year or smoothed models.

# CWV Intercepts

Appendix 6 of annual NDM report contains individual year and smoothed model CWV intercepts



# Assessment of Model Smoothing - Predictive Ability

## Single Year Data Sets

2001/02  
2002/03  
2003/04

2002/03  
2003/04  
2004/05

## Smoothed Model

for gas year 2004/05

for gas year 2005/06

Most recent data set available is 2004/05

Predictive ability test examines 2004/05 single year models against:

2003/04 single year models (these would have been the models used for gas year 2004/05 if there had been no model smoothing)

Smoothed models derived for gas year 2004/05 (i.e. the corresponding alternative to the single year model)

# Predictive Ability Assessment - Consumption Band EUCs

Figure 1: Small NDM Consumption Band EUCs - Predictive Ability

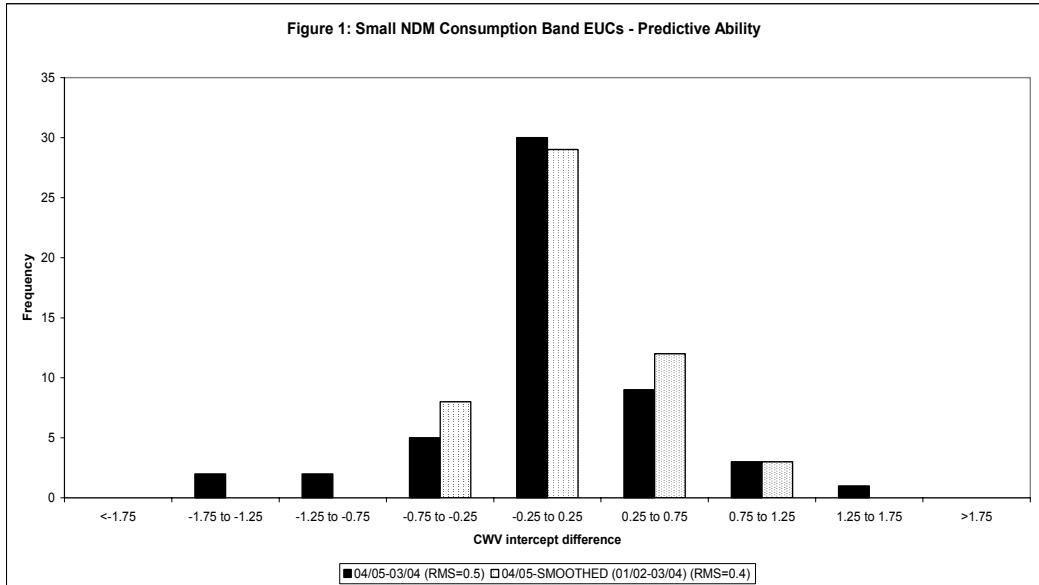
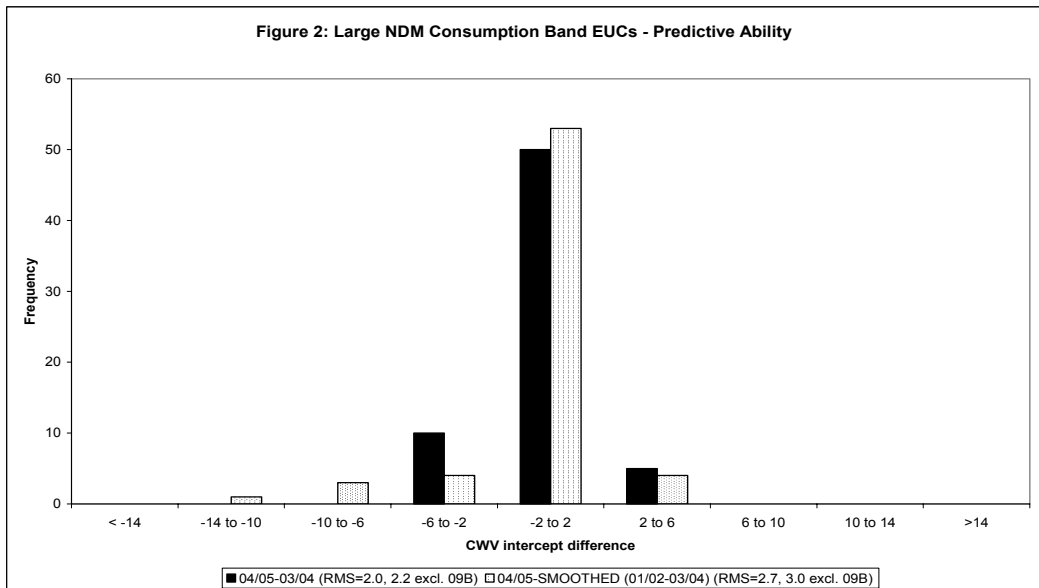


Figure 2: Large NDM Consumption Band EUCs - Predictive Ability



# Predictive Ability Assessment – All EUCs

Figure 3: Small NDM EUCs - Predictive Ability

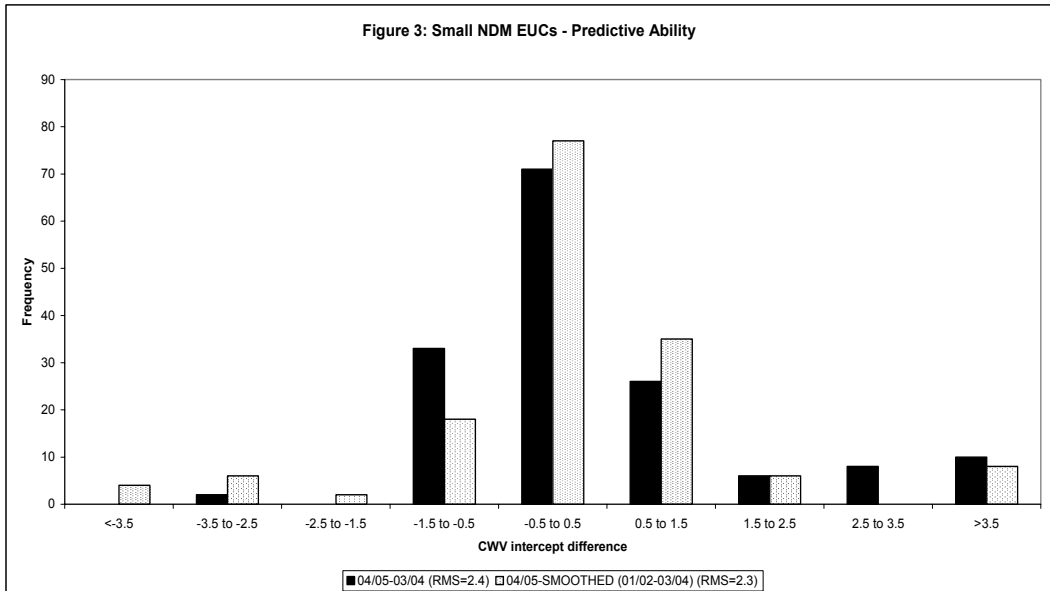
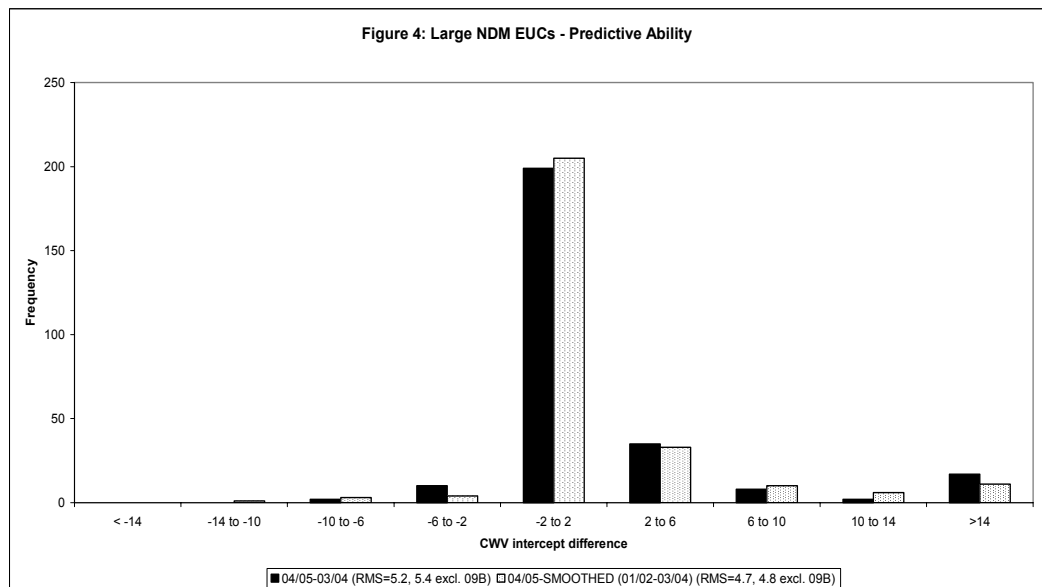


Figure 4: Large NDM EUCs - Predictive Ability



## Predictive Ability Assessment

For small NDM consumption band only EUCs (Figure 1) the spread of CWV intercept differences for the smoothed model for 2004/05 is only marginally better than that for the single year model for 2004/05 (i.e. the 2003/04 dataset).

For large NDM consumption band only EUCs (Figure 2) the RMS values are not as good for the smoothed model.

When all EUCs are considered, both small NDM and large NDM EUCs, show slightly narrower (CWV intercept differences (i.e. better RMS values) for the smoothed model.

These comparisons do not provide strong evidence of the superior predictive ability of the smoothed models.

However, clearly, the smoothed models are on the whole no worse than than single year models.

Moreover, the main driver for using a smoothed model is the mitigation of year on year volatility.

# Assessment of Model Smoothing – Volatility

## Single Year Data Sets

2002/03  
2003/04  
2004/05

2001/02  
2002/03  
2003/04

## Smoothed Model

for gas year 2005/06

for gas year 2004/05

**Most recent data set available is 2004/05**

Volatility test examines:

2004/05 single year models

against

2003/04 single year models

(indicating extent of year on year change if single year modelling was in place)

Smoothed models derived for gas year 2005/06

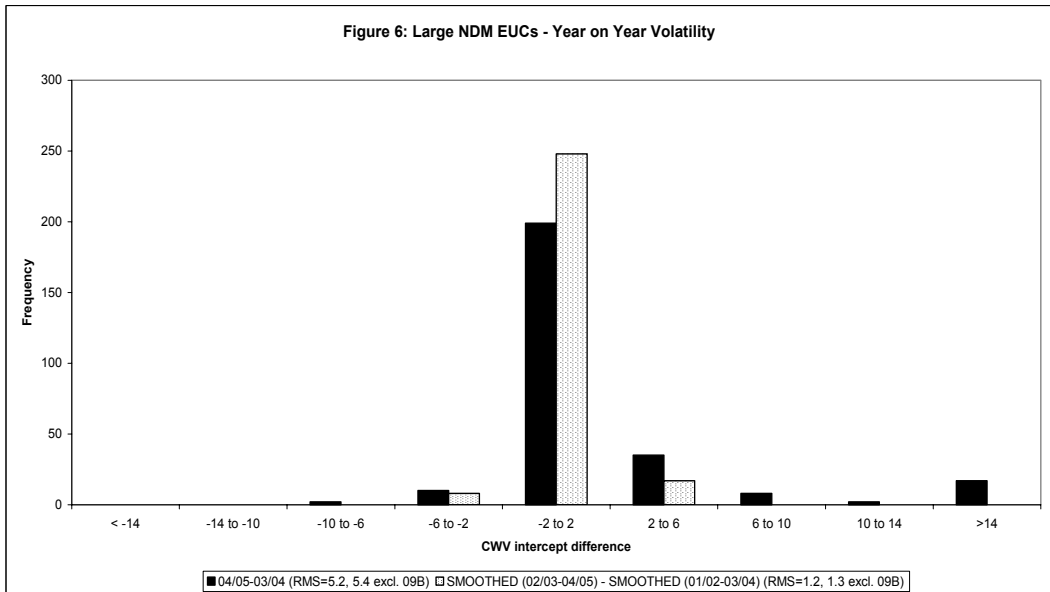
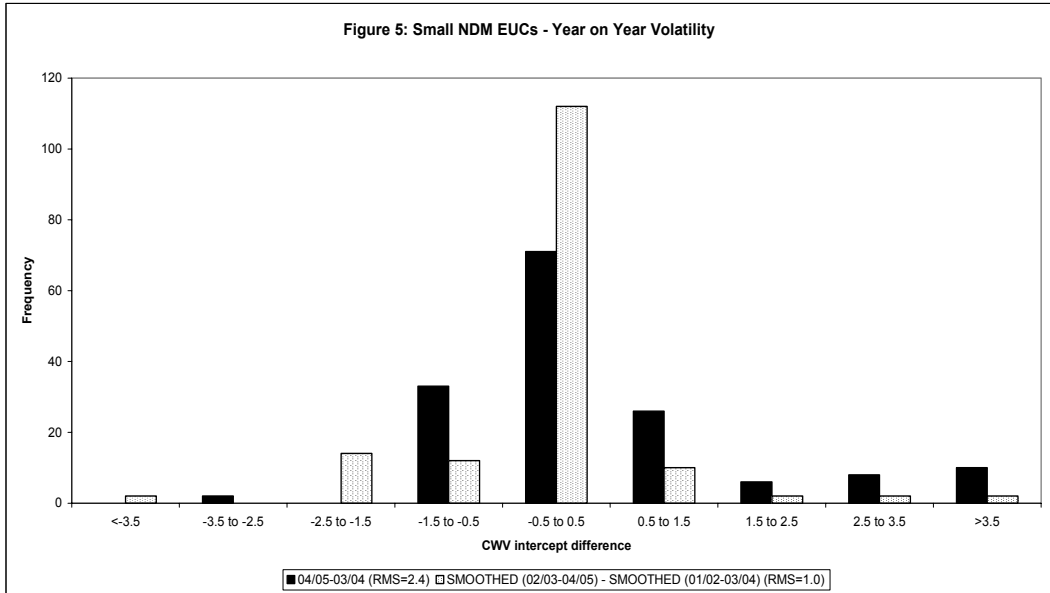
against

Smoothed models derived for gas year 2004/05

(indicating the extent of year on year change with model smoothing as applied)



# Volatility Assessment - All EUCs



# Volatility Assessment – Consumption Band EUCs

Figure 7: Small NDM Consumption Band EUCs - Year on Year Volatility

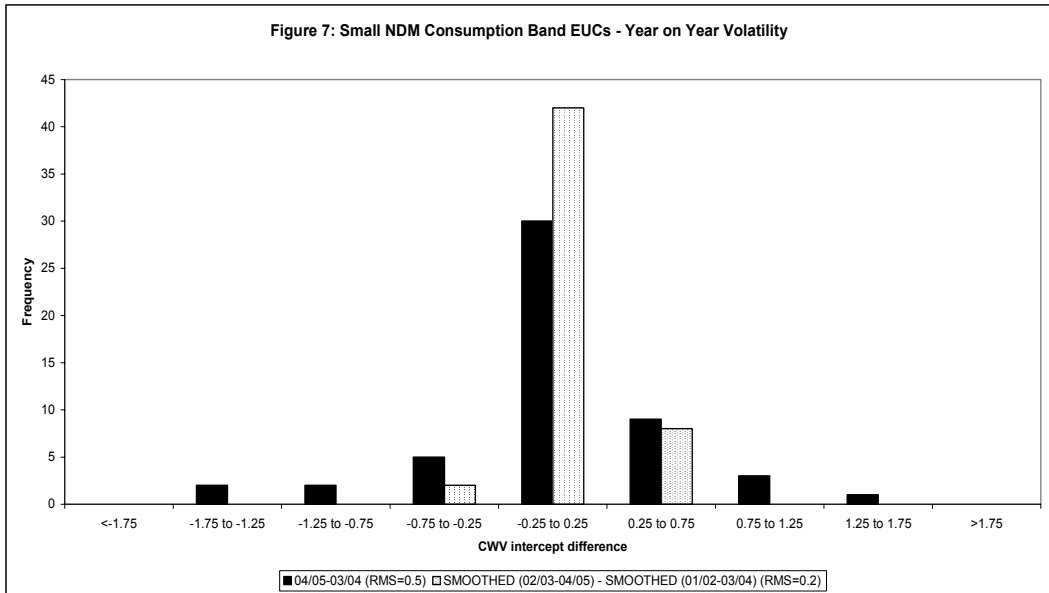
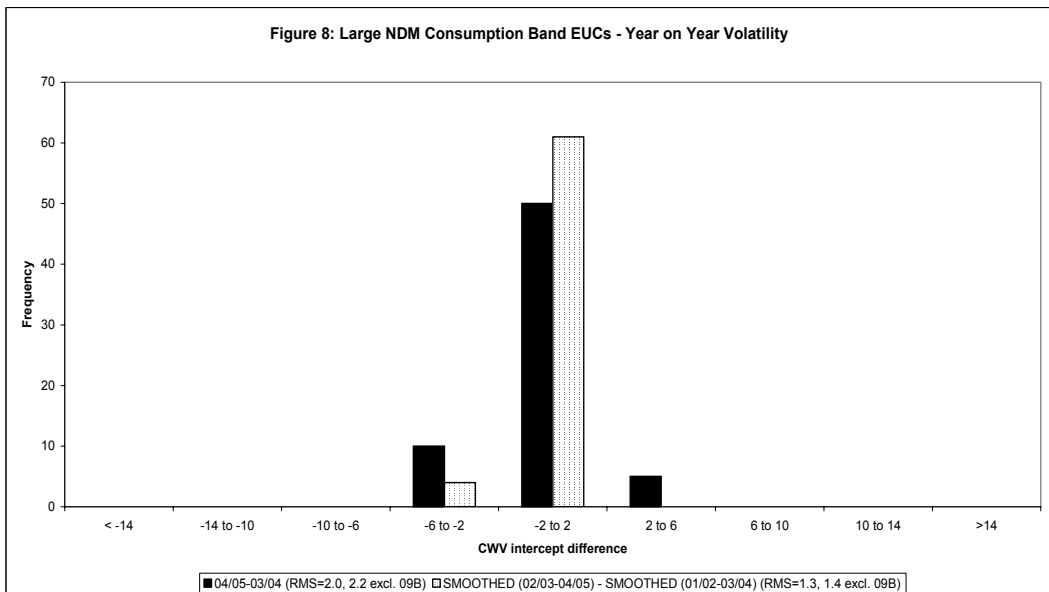


Figure 8: Large NDM Consumption Band EUCs - Year on Year Volatility



## Volatility Assessment

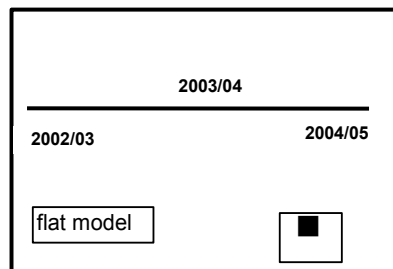
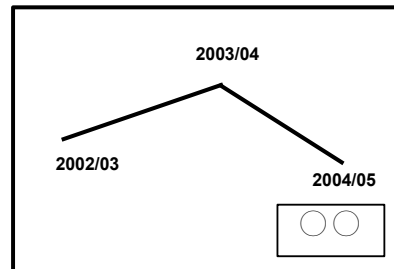
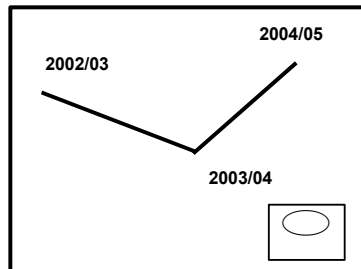
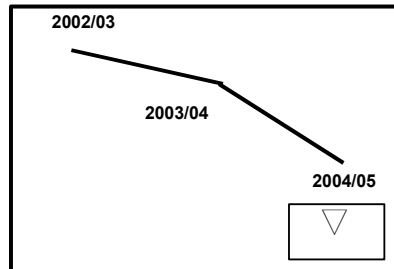
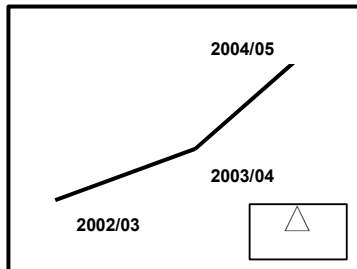
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Bar charts in Figures 5 & 7 (small NDM) and Figures 6 & 8 (large NDM) show the difference in CWV intercepts between the smoothed models for gas year 2004/05 (based on 01/02, 02/03 and 03/04) and the smoothed models for gas year 2005/06 (based on 02/03, 03/04 and 04/05); and also between individual year models for 2003/04 and 2004/05, that would have been applied if model smoothing had not been implemented.

Results in Figures 5 and 6 relate to all EUCs (both consumption band and WAR band), while the results in Figures 7 and 8 relate to just the consumption band EUCs.

The smoothed models are associated with significantly lower year-on-year volatility as shown by both the generally narrower distribution of CWV intercept differences and reductions in the corresponding RMS values.

# Key for CWV Intercept Pattern Types - 3 Years of NDM Models



# Counts of CWV Intercept Pattern Types by EUC & by LDZ NDM Demand Models for 2002/03, 2003/04, 2004/05

EUC	Type					Total
	△	○○	○	▽	■	
xx:E0501B	0	4	8	1	0	13
xx:E0502B	2	7	2	2	0	13
xx:E0503B	1	5	6	1	0	13
xx:E0503W01	0	3	9	1	0	13
xx:E0503W02	5	4	0	4	0	13
xx:E0503W03	5	6	2	0	0	13
xx:E0503W04	4	6	3	0	0	13
xx:E0504B	0	6	6	1	0	13
xx:E0504W01	0	3	9	1	0	13
xx:E0504W02	5	4	0	4	0	13
xx:E0504W03	5	6	2	0	0	13
xx:E0504W04	4	6	3	0	0	13
xx:E0505B	4	0	5	4	0	13
xx:E0505W01	8	2	3	0	0	13
xx:E0505W02	7	1	3	2	0	13
xx:E0505W03	6	5	2	0	0	13
xx:E0505W04	5	6	2	0	0	13
xx:E0506B	3	3	6	1	0	13
xx:E0506W01	1	3	0	0	9	13
xx:E0506W02	9	4	0	0	0	13
xx:E0506W03	7	5	1	0	0	13
xx:E0506W04	7	6	0	0	0	13
xx:E0507B	3	1	9	0	0	13
xx:E0507W01	0	0	0	0	13	13
xx:E0507W02	6	0	7	0	0	13
xx:E0507W03	1	0	12	0	0	13
xx:E0507W04	1	7	5	0	0	13
xx:E0508B	0	6	3	4	0	13
xx:E0508W01	0	0	0	0	13	13
xx:E0508W02	0	0	13	0	0	13
xx:E0508W03	0	0	13	0	0	13
xx:E0508W04	0	2	5	6	0	13
xx:E0509B	0	0	12	1	0	13
<b>Total by Type</b>	<b>99</b>	<b>111</b>	<b>151</b>	<b>33</b>	<b>35</b>	<b>429</b>

LDZ	Type					Total
	△	○○	○	▽	■	
SC	2	9	14	6	2	33
NO	2	14	6	9	2	33
NW	4	18	7	2	2	33
NE	8	6	11	5	3	33
EM	3	8	17	2	3	33
WM	14	7	9	0	3	33
WN	4	18	7	2	2	33
WS	3	10	12	5	3	33
EA	8	2	19	1	3	33
NT	15	1	14	0	3	33
SE	12	4	13	1	3	33
SO	12	6	12	0	3	33
SW	12	8	10	0	3	33
<b>Totals</b>	<b>99</b>	<b>111</b>	<b>151</b>	<b>33</b>	<b>35</b>	<b>429</b>

**Key**

- △ 2002/03 < 2003/04 < 2004/05
- 2002/03 < 2003/04 >= 2004/05
- 2002/03 >= 2003/04 < 2004/05
- ▽ 2002/03 > 2003/04 > 2004/05
- flat models

<b>Total by Type for 2002/03, 2003/04 and 2004/05 Analysis Years</b>	62	95	182	57	33	429
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Autumn 2005 Investigation of Model Smoothing

<b>Total by Type for 2000/01, 2002/03 and 2003/04 Analysis Years</b>	21	145	130	94	39	429
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Autumn 2004 Investigation of Model Smoothing

<b>Total by Type for 1999/00, 2000/01 and 2002/03 Analysis Years</b>	66	194	80	50	39	429
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Autumn 2003 Investigation of Model Smoothing

<b>Total by Type for 1998/99, 1999/00 and 2000/01 Analysis Years</b>	39	83	186	82	39	429
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Autumn 2002 Investigation of Model Smoothing

<b>Total by Type for 1997/98, 1998/99 and 1999/00 Analysis Years</b>	77	223	58	31	40	429
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Autumn 2001 Investigation of Model Smoothing

<b>Total by Type for 1996/97, 1997/98 and 1998/99 Analysis Years</b>	57	46	233	54	39	429
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Autumn 2000 Investigation of Model Smoothing

Autumn 1999 Investigation of Model Smoothing

# Counts of CWV Intercept Pattern Types by EUC & by LDZ NDM Demand Models for 2001/02, 2002/03, 2003/04 and 2004/05

EUC	Type				Total
	☒	▽	△	■	
xx:E0501B	12	1	0	0	13
xx:E0502B	11	0	2	0	13
xx:E0503B	12	0	1	0	13
xx:E0503W01	12	1	0	0	13
xx:E0503W02	10	1	2	0	13
xx:E0503W03	10	0	3	0	13
xx:E0503W04	13	0	0	0	13
xx:E0504B	12	1	0	0	13
xx:E0504W01	12	1	0	0	13
xx:E0504W02	10	1	2	0	13
xx:E0504W03	10	0	3	0	13
xx:E0504W04	13	0	0	0	13
xx:E0505B	12	1	0	0	13
xx:E0505W01	11	0	2	0	13
xx:E0505W02	10	1	2	0	13
xx:E0505W03	12	0	1	0	13
xx:E0505W04	13	0	0	0	13
xx:E0506B	12	1	0	0	13
xx:E0506W01	4	0	0	9	13
xx:E0506W02	13	0	0	0	13
xx:E0506W03	10	0	3	0	13
xx:E0506W04	10	0	3	0	13
xx:E0507B	13	0	0	0	13
xx:E0507W01	0	0	0	13	13
xx:E0507W02	13	0	0	0	13
xx:E0507W03	12	0	1	0	13
xx:E0507W04	13	0	0	0	13
xx:E0508B	13	0	0	0	13
xx:E0508W01	0	0	0	13	13
xx:E0508W02	13	0	0	0	13
xx:E0508W03	13	0	0	0	13
xx:E0508W04	13	0	0	0	13
xx:E0509B	13	0	0	0	13
<b>Total by Type</b>	<b>360</b>	<b>9</b>	<b>25</b>	<b>35</b>	<b>429</b>

Total by Type for 2000/01, 2001/02, 2002/03 and 2003/04 Analysis Years	364	23	9	33	429
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Total by Type for 1999/00, 2000/01, 2001/02 and 2002/03 Analysis Years	353	32	5	39	429
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Total by Type for 1998/99, 1999/00, 2000/01 and 2001/02 Analysis Years	352	26	12	39	429
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Total by Type for 1997/98, 1998/99, 1999/00 and 2000/01 Analysis Years	348	15	27	39	429
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Total by Type for 1996/97, 1997/98, 1998/99 and 1999/00 Analysis Years	361	15	14	39	429
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LDZ	Type				Total
	☒	▽	△	■	
SC	30	1	0	2	33
NO	29	2	0	2	33
NW	31	0	0	2	33
NE	28	0	2	3	33
EM	28	1	1	3	33
WM	26	0	4	3	33
WN	31	0	0	2	33
WS	25	4	1	3	33
EA	26	0	4	3	33
NT	26	0	4	3	33
SE	27	1	2	3	33
SO	24	0	6	3	33
SW	29	0	1	3	33
<b>Totals</b>	<b>360</b>	<b>9</b>	<b>25</b>	<b>35</b>	<b>429</b>

**Key**

- ☒ No consistent trend over 4 years
- △ increasing values over 4 years
- ▽ decreasing values over 4 years
- flat models

Autumn 2005 Investigation of Model Smoothing

Autumn 2004 Investigation of Model Smoothing

Autumn 2003 Investigation of Model Smoothing

Autumn 2002 Investigation of Model Smoothing

Autumn 2001 Investigation of Model Smoothing

Autumn 2000 Investigation of Model Smoothing

## Model Smoothing - Trends

This year (as with all previous years) the occurrences over three years of a consistent pattern (i.e. “up/up” or “down/down”) are no greater in each instance than what might be expected simply on a random basis.

Over the three years, there are only a very small number of instances of specific EUCs and specific LDZs, where a “down/down” pattern or an “up/up” pattern occurs to a notable extent.

When examined over four years (Table 3 in paper) the predominant effect is one of no consistent pattern across each LDZ and each EUC.

No individual EUC shows a majority of occurrences of a downward or upward pattern in CWV intercepts over four years across all LDZs.

The graphs of load factors (Figures 10 to 18 in paper) confirm the evidence of the CWV intercept differences - the predominant effect is one of no consistent trend.

## Model Smoothing - No. of Years

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Each year up to and including 2002, the predominant pattern over three years alternated between “up/down” and “down/up”.

In 2003, this “zig-zag” tendency was partially interrupted in so far as the “down/up” pattern was not predominant as might otherwise have been expected.

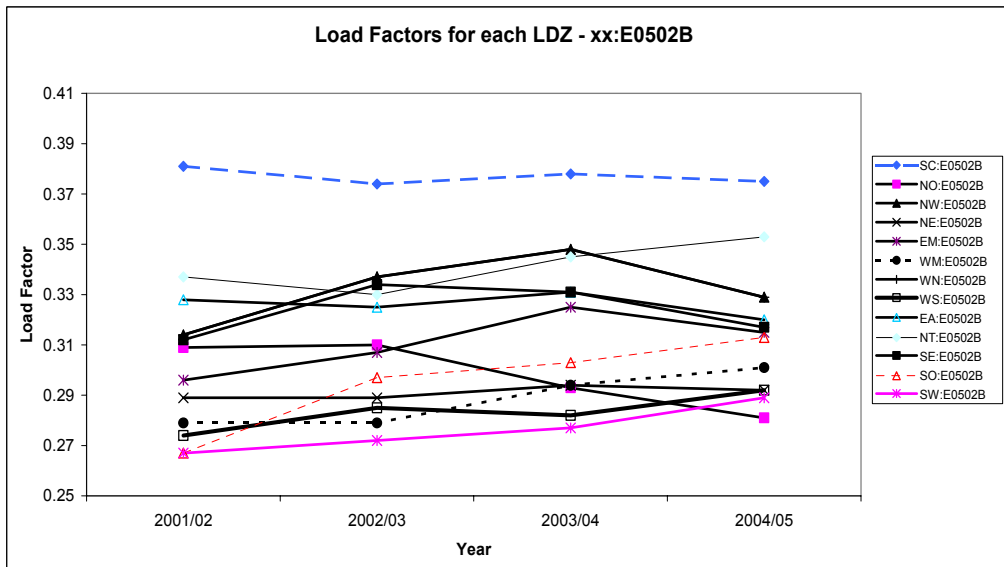
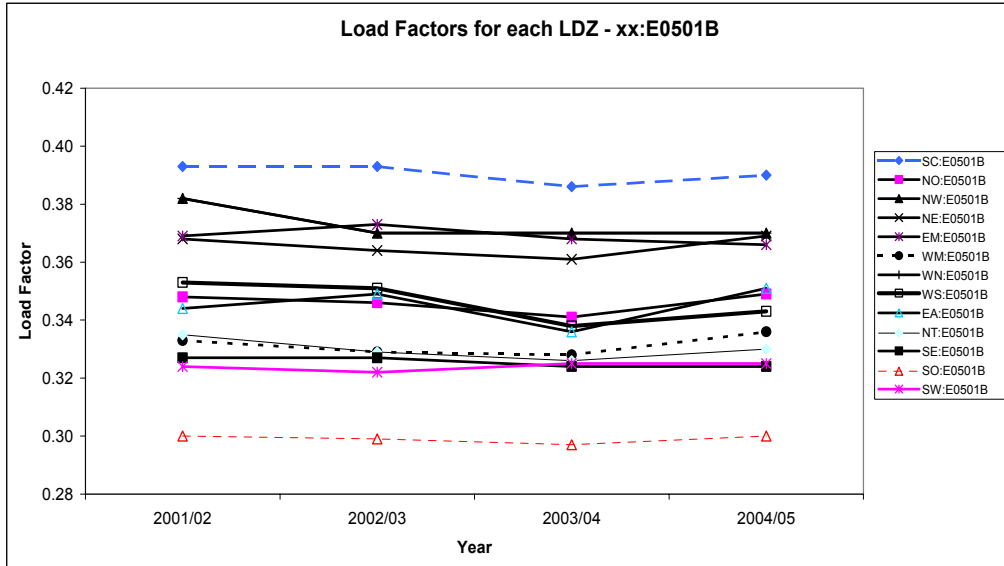
In 2004 the analysis seemed to indicate a resumption of the “zig-zag” tendency previously observed year on year, with one case (that of “down/up”) clearly predominant.

However, this year’s analysis indicates that the expectation of a “zig-zag” pattern has once again **not** materialised. For the second year running the “down/up” case predominates.

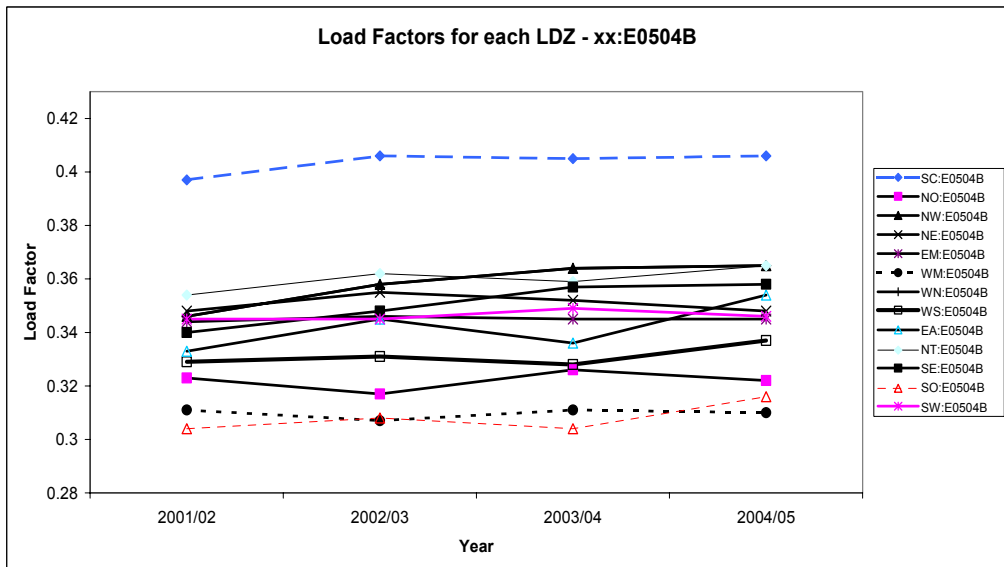
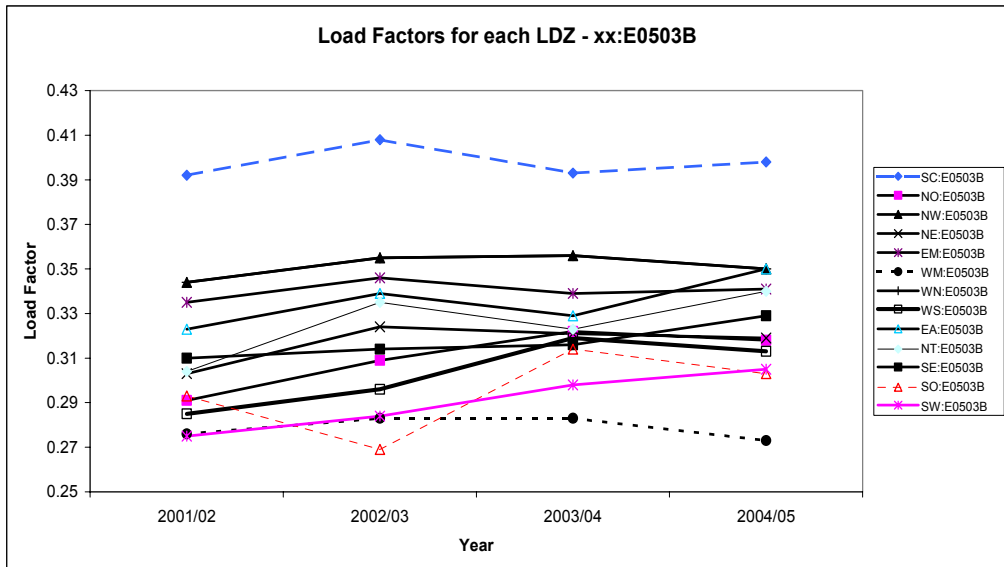
Thus, there are no strong grounds, on the basis of these patterns, for changing to an even number of years - the current approach of using three years of models in model smoothing remains appropriate.



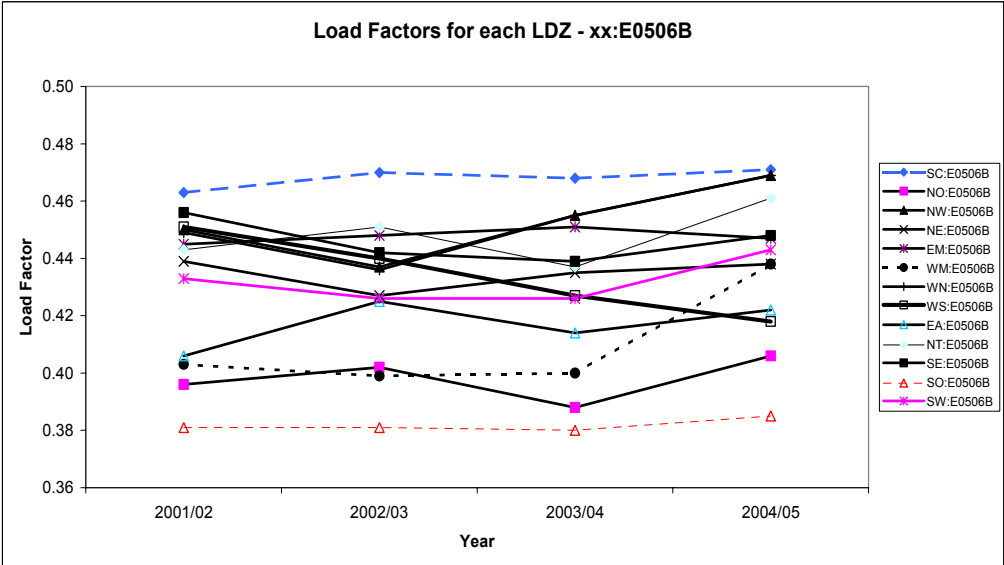
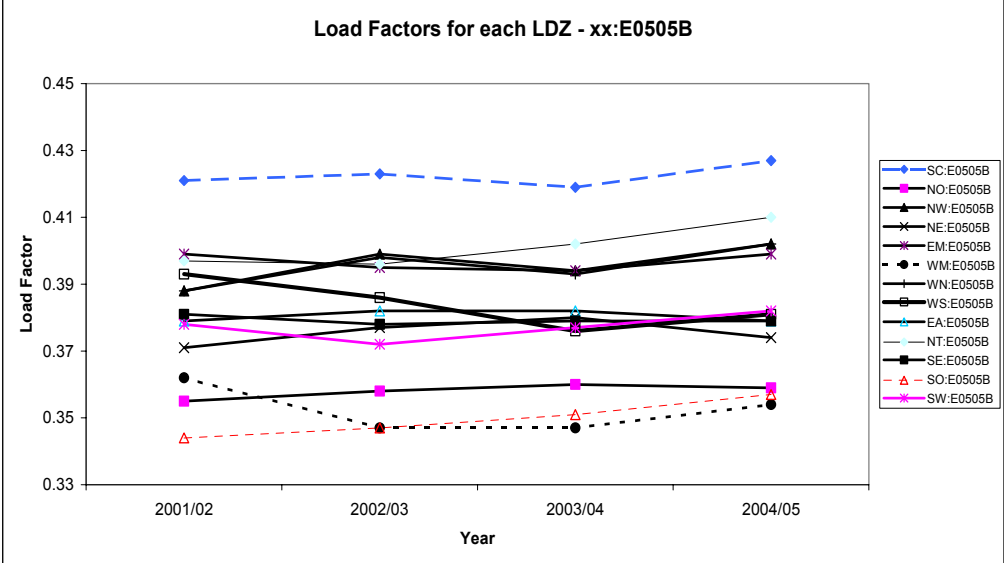
# Consumption Band EUC Load Factors - 01B & 02B



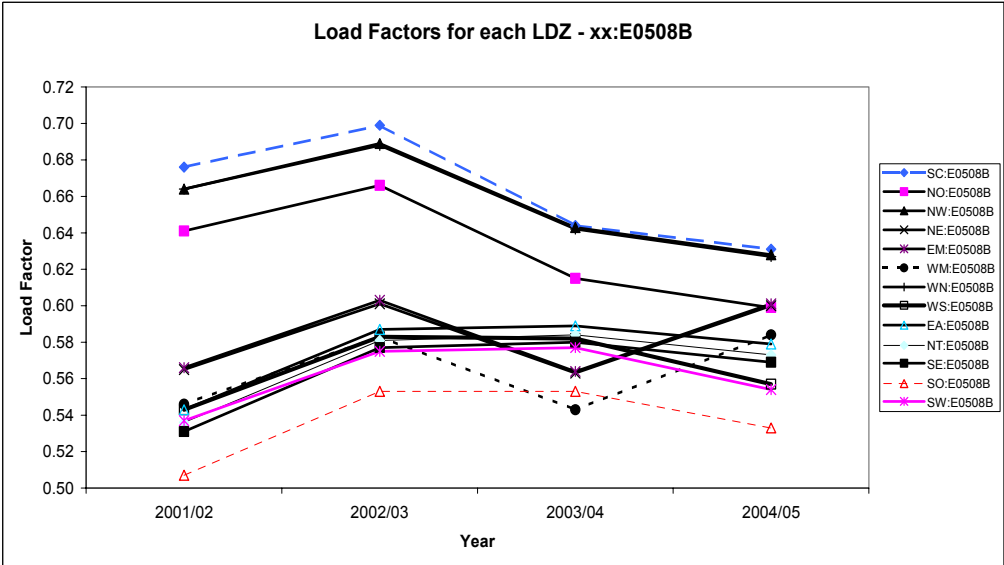
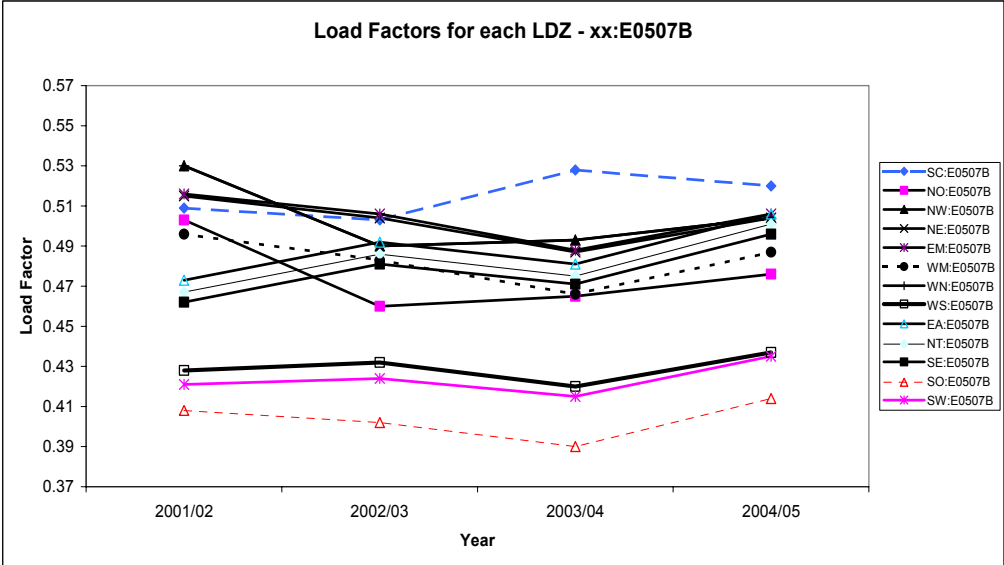
# Consumption Band EUC Load Factors - 03B & 04B



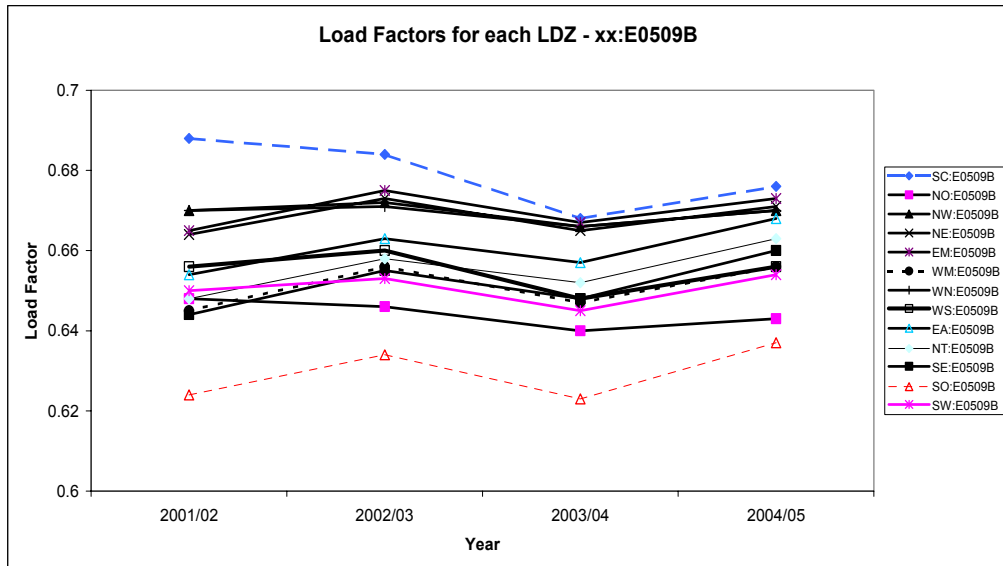
# Consumption Band EUC Load Factors - 05B & 06B



# Consumption Band EUC Load Factors - 07B & 08B



## Consumption Band EUC Load Factors – 09B



These graphs of load factors (Figures 10 to 18 in paper) confirm the evidence of the CWV intercept differences previously presented.

The predominant effect is one of no consistent trend.

## Model Smoothing - Proposed Way Forward

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It is the collective view of Transporters, on the basis of the material presented here, supported also by the results of this same analysis undertaken in each of the last four previous years, that there are no signs of trends in the demand models of sufficient clarity to influence the manner in which model smoothing is applied.

Consequently, Transporters believe that the current averaging approach to model smoothing continues to be appropriate and fit for purpose.

Moreover, Transporters recommend retention of the current basis to model smoothing of three years, which continues to be appropriate and fit for purpose.