



# Splitting EUC Band 1 (0 to 73.2 MWh) Modelling Impacts

Supporting Document: Modelling Implications of Splitting EUC Band 1.pdf

DESC 8<sup>th</sup> November 2007

# Splitting EUC Band 1 (0 to 73.2 MWh): Background

- Spring 2007 NDM analysis considered the impact of splitting EUC Band 1
  - 4 Sub Bands: 0-10, 10-20, 20-30, 30-73.2 MWh pa
  - Results indicated:
    - Require aggregation of LDZs for analysis
    - Degradation in modelling
    - Reduced differentiation of ILF
  - Agreed to model based on geographical differentiation and not by sub-band
- DESC agreed, due to the impact of Band 1, further investigation required
  - Split at 20 MWh pa – Domestic data sets only, roughly equally to overall population split
  - Split at 30 MWh pa – Domestic data sets only for lower band, some non-domestics in data sets for upper band
- Analysis: Compare results from sub band models & single band models
- *Full analysis document: Modelling Implications of Splitting EUC Band 1*

# Splitting EUC Band 1: Methodology

- Analysis undertaken compares the following:
  - Indicative Load Factors (ILF) – indication of spread of Load Factors
    - Higher spread between sub bands greater distinction of consumption characteristics
  - Root Mean Square Error (RMSE)
    - Difference between fitted model & data point spread (compare ‘error’)
  - R<sup>2</sup> Value
    - Identifies model fit to observed data points (analysis shown in document)
- Justification of sub band modelling appropriateness requires:
  - Same or better spread of ILF
  - Same or better R<sup>2</sup> values
  - No degradation identified by RMSE

# Splitting EUC Band 1

## Analysis 1 Results: 0-20 and 20-73.2 MWh pa

	0-73.2 MWh			0 – 20 MWh		20 – 73.2 MWh		RMSE (Both Bands)	RMSE: Improvement (+) or Degradation (-) Using 2 Sub Bands
	Sample	ILF	RMSE	Sample	ILF	Sample	ILF		
SC	228	41	5971343744	122	39	106	42	6496256525	-8.8%
NO	208	34	5080241734	109	34	99	35	5283652955	-4.0%
NW/WN	196	38	11301582066	117	37	79	39	11978690816	-6.0%
NE	208	38	6124844609	124	37	84	39	6286487717	-2.6%
EM	200	37	8290109281	128	36	72	38	8900893719	-7.4%
WM	187	34	6525570595	110	32	77	36	7400998581	-13.4%
WS	223	33	7228928347	151	33	72	34	7667916822	-6.1%
EA	228	32	7410969168	141	31	87	33	8020576953	-8.2%
NT	202	32	9759366159	126	32	76	33	10553251730	-8.1%
SE	217	34	3196519414	123	33	94	36	3441242628	-7.7%
SO	220	30	5417316441	143	29	77	31	5740541096	-6.0%
SW	204	33	5489818462	137	31	67	35	6064546877	-10.5%

- Differences in sub band ILF values are small indicating minimal spread (2 points or less in 8 of 12 LDZs)
- No unexpected distinction between ILF for each sub compared to single band
- All LDZs: RMSE (and some R<sup>2</sup>) shows degradation in model fit when two sub bands are applied
- Similar results for the second analysis.....

# Splitting EUC Band 1

## Analysis 2 Results: 0-30 and 30-73.2 MWh pa

	0-73.2 MWh	0 – 30 MWh	30 – 73.2 MWh
	Sample Size		
SC	232	180	52
NO	212	180	32
NW/WN	200	163	37
NE	212	181	31
EM	204	176	28
WM	191	158	33
WS	227	204	23
EA	232	196	36
NT	206	178	28
SE	221	186	35
SO	224	195	29
SW	208	179	29

- Single LDZ analysis not possible
- Smaller counts > 30 MWh pa as reflected in market population
- LDZ groupings would be required
- Proportion of non domestic supply points included in the 30 – 73.2 MWh
- Approx 2 %: Reflective of market population analysis undertaken as per MSF
- Aggregation undertaken
- Single & grouped LDZ models presented...

# Splitting EUC Band 1

## Analysis 2 Results: 0-30 and 30-73.2 MWh pa (Individual LDZ)

	0-73.2 MWh			0 – 30 MWh		30 – 73.2 MWh		RMSE (Both Bands)	RMSE: Improvement (+) or Degradation (-) Using 2 Sub Bands Based on LDZ CWV
	Sample Size	ILF	RMSE (Single Band)	Sample Size	ILF	Sample Size	ILF		
SC	232	41	5971343744	180	39	52	44	6728016686	-12.7%
NO	212	35	5080241734	180	34	32	35	5227988331	-2.9%
NW / WN	200	38	11301582066	163	39	37	37	12336034747	-9.2%
NE	212	39	6124844609	181	38	31	40	6249006491	-2.0%
EM	204	37	8290109281	176	37	28	37	9053343600	-9.2%
WM	191	34	6525570595	158	33	33	35	7238181112	-10.9%
EA	227	33	7228928347	204	33	23	31	7943939214	-9.9%
NT	232	32	7410969168	196	32	36	32	7798109204	-5.2%
SE	206	32	9759366159	178	32	28	32	10203980925	-4.6%
WS	221	34	3196519414	186	33	35	37	3397114990	-6.3%
SO	224	30	5417316441	195	30	29	30	6248813973	-15.3%
SW	208	33	5489818462	179	32	29	35	5754310314	-4.8%

- Expected - Lack of consistency in spread of ILF values in sub bands
- High level of degradation indicated by RMSE

# Splitting EUC Band 1

## Analysis 2 Results: 0-30 and 30-73.2 MWh pa (5 Grouped LDZ)

	0-73.2 MWh			0 – 30 MWh		30 – 73.2 MWh		RMSE (Both Bands)	RMSE: Improvement (+) or Degradation (-) Using 2 Sub Bands Based on LDZ CWV
	Sample Size	ILF	RMSE (Single Band)	Sample Size	ILF	Sample Size	ILF		
SC	228	41	5971343744	122	39	106	44	6496256525	-12.7%
NO	412	37	4934126199	343	37	69	37	5123574514	-3.8%
NW / WN			11323172901					11549400278	-2.0%
NE	607	36	4745192643	515	36	92	37	4880303752	-2.8%
EM			7904315857					8019412209	-1.5%
WM			7237333204					7335027889	-1.3%
EA	665	33	6165390788	578	32	87	32	6271169729	-1.7%
NT			7684866914					7883319188	-2.6%
SE			8624642859					8731451668	-1.2%
WS	653	33	3146712755	560	32	93	34	3278286661	-4.2%
SO			5919986678					6025763797	-1.8%
SW			5109080563					5281563923	-3.4%

- Aggregation - lack of consistency in ILF values and narrower spread of ILF values in each sub band
- High level of degradation indicated by RMSE

# Splitting EUC Band 1

## Analysis 2 Results: 0-30 and 30-73.2 MWh pa

- Results:
  - Inconsistent & narrower ILF results
    - Individual LDZ basis: ILFs between sub bands are inconsistent and only 3 LDZs have ILF differences >2 points
    - Grouped LDZ basis: ILF differentiation reduced as a result of sub bands when compared to single band model
  - RMSE analysis shows degradation in model fit across all LDZs
    - Individual LDZ basis: RMSE spread -2.0% and -15.3% (expected)
    - Grouped LDZ basis: RMSE spread -1.2% and -12.7%
  - $R^2$  values also shows some degradation when instigate sub band split



# Splitting EUC Band 1

## Conclusions

- No compelling statistical grounds for representing EUC Band 1 by applying two sub band splits
  - Investigation purpose as defined in UNC Section H 1.7.3:
    - 1.7.3 The objectives referred to in paragraph 1.7.1(c) are:
      - (a) to define End User Categories so as to recognise significant differences in the annual profile of daily demand at different groups of NDM Supply Point Components; and
      - (b) to maximise the goodness of fit (in statistical terms) of the Demand Model applicable to each End User Category to the relevant updated data referred to in paragraph 1.7.1(a).
- Recommend: Retain current approach of representing 0 - 73.2 MWh pa as a single EUC in each LDZ.
- However: Merit in continuing to undertake this analysis in the future
- Recommend: Undertake similar analysis on a bi-annual basis