Collection of Daily Gas Consumption Data for EUC Modelling

Demand Estimation Sub Committee

Technical Workgroup

28/04/2021

Provided by:

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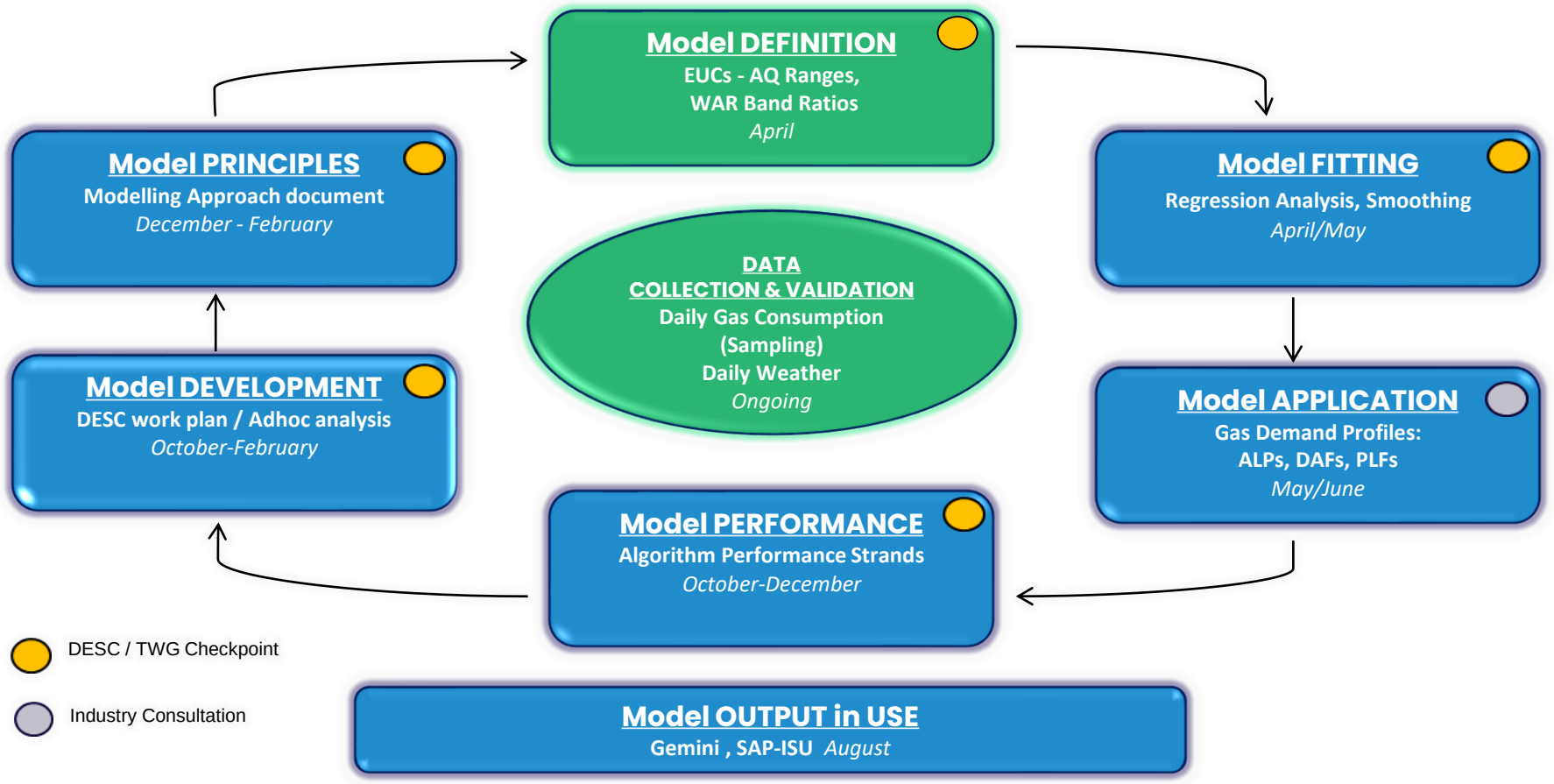
Section 1:
Background, Timetable and Objectives of Meeting

Demand Estimation: Background

- An overview of the Demand Estimation process and output can be found here
- This presentation relates to the "Data Collection & Validation" and "Model Definition" phases of the Demand Model cycle



Demand Estimation: Timetable - 2021

High Level View of Demand Estimation Timetable 2021 – Key Checkpoints												
PHASE	**JAN'21**	**FEB'21**	**MAR'21**	**APR'21**	**MAY'21**	**JUN'21**	**JUL'21**	**AUG'21**	**SEP'21**	**OCT'21**	**NOV'21**	**DEC'21**
1. MODEL PRINCIPLES												
Modelling Approach 2021 Approved (DESC)		24-Feb										
2. Data COLLECTION & VALIDATION												
Daily Gas Consumption Data validated (CDSP)				15-Apr								
3. MODEL DEFINITION												
Agree Data Aggregations / WAR Band Limits (TWG)				28-Apr								
4. MODEL FITTING												
Gas Demand EUC Modelling review (TWG)					24-May							
5. MODEL APPLICATION												
Publication of Draft Gas Demand Profiles (CDSP)						04-Jun						
Gas Demand Profiles Approved for wider industry (TWG/DESC)							07-Jul					
Final Approval of Gas Demand Profiles (DESC)							21-Jul					
6. MODEL OUTPUT IN USE												
SAP-ISU and Gemini updated (CDSP)								15-Aug				
7. MODEL DEVELOPMENT												
Adhoc Work-plan approved (DESC)							21-Jul			06-Oct		
8. MODEL PERFORMANCE												
NDM Algorithm Performance - Strands 1 to 3 reviewed (DESC)												14-Dec

Objective of Meeting

- The objective of the “Model Definition” phase is to agree how the sample points available for modelling (post validation) should be deployed in the next phase “Model Fitting”
- Objective of today’s meeting is for TWG to:
  - Review the no. of sample points available for period 1st April 2020 to 31st March 2021
  - Based on data available confirm the EUC definitions which require demand models
  - Agree the most appropriate data sets / aggregations to be used to represent the demand models
  - Agree the Winter Annual Ratio (WAR) Thresholds for EUC Bands 3 and above

Section 2: Summary of Validated Daily Gas Consumption

Demand Estimation: Daily Gas Consumption Data

- The requirement to develop Demand Models and End User Categories relies upon certain key inputs, these are daily gas consumption data and daily weather data
- At this meeting the focus is on the daily gas consumption data which this year covers the period 1st April 2020 to 31st March 2021. This includes a full Easter holiday period (as defined by the modelling system)
- The daily gas consumption data has been provided from the following sources:
    - Xoserve-managed sample data sets
    - Transporter-managed sample data sets
    - Third party provided sample data sets
- Validation is applied to the daily gas consumption data in order to minimise data errors and therefore enhance the accuracy of the subsequent EUC gas demand models.
- The validation is set out in the Modelling Approach document here (Appendix 2)

Demand Estimation: Target Numbers and Stratification

- DESC agreed at its meeting on 10th December 2018 to apply a stratification method to Band 1 Domestic and Band 2 Non-Domestic sites. The following sub bands were agreed:
  - Band 1: 0-10, 10-20, 20-30 and 30-73.2 MWh
  - Band 2: 73.2-140, 140-210 and 210-293 MWh
- Where the validated sample points for a particular EUC band are well in excess of the ideal target numbers, DESC agreed that a process should be created to select the required number of sample points needed to be representative of the population (which means in these cases not using all of the sample points available).
- Xoserve and Network managed samples will be prioritised ahead of third party data. Any additional sites obtained from third party provided data will be randomly selected to avoid any shipper bias in the demand profiles created.

Demand Estimation: Validation Audit Trail

TABLE A.1 - VALIDATION SUMMARY OF DAILY GAS CONSUMPTION DATA	
Analysis Period	**01/04/20 to 31/03/21**
START: MPRs with at least 300 'Daily Gas Consumption Data' records present within the analysis period	**42,961**
REMOVED: MPRs not on SAP-ISU	**58**
REMOVED: Exceeds Missing Read Tolerance	**7,988**
REMOVED: Exceeds Consecutive Zero Consumption Tolerance	**2,496**
REMOVED: Exceeds Maximum vs Average Consumption Tolerance (Spikes)	**1,754**
REMOVED: AQ Ratio Failures	**3,510**
REMOVED: Winter vs Summer Consumpiton Ratio Tolerance (Band 09B sites)	**29**
REMOVED: Winter Annual Ratio (WAR) less than 20%	**111**
REMOVED: Other (i.e. Scottish Independent LDZs; AQ Too Small; PrePayment above Band 02)	**4,625**
REMOVED: TOTAL	**20,571**
PASSED VALIDATION (Pre Stratification)	**22,390**
REMOVED: MPRs not required following Stratification	**1,970**
PASSED VALIDATION (Post Stratification)	**20,420**

Summary of Validated Data

Validated sample counts – numbers provided are supply points

Notes:

- During the validation process it was apparent again that the Market Sector Code (MSC) held on UK Link is not always reliable (67 "Domestic" in Band 3 and above)

  Accuracy of the EUC demand models and also now EUC assignment will be impacted by these inaccuracies

- A number of data issues with 3rd party data continued, prior to submission please ensure the data is quality checked as customer's know their data / systems better than us

  A document highlighting common errors can be found here.

EUC Bands: Range Source data	**2020/21 data**	**2019/20 data**
Band 1: 0 to 73.2 MWh pa Xoserve-managed, Third party provided	4,894 Domestic 3,127 Non-Domestic 3 Domestic Pre-Payment 0 Non-Domestic Pre-Payment	4,052 Domestic 3,432 Non-Domestic 22 Pre-Payment
Band 2: 73.2 to 293 MWh pa Xoserve-managed, Transporter-managed and Third party provided	140 Domestic 4,100 Non-Domestic 0 Domestic Pre-Payment 1 Non-Domestic Pre-Payment	109 Domestic 4,968 Non-Domestic 1 Pre-Payment
Bands 3 to 4: 293 to 2,196 MWh pa Transporter-managed and Third party provided	5,575	6,265
Bands 5 to 9: > 2,196 MWh pa Transporter-managed and Third party provided	2,580	2,776

DESC Action 0201

- "Xoserve (SB) to provide comparison of sample composition across the I&C EUC Bands from 2020 to 2021"
- The impacts of COVID-19 means that sample points are likely to have dropped EUC Bands in comparison to the validated datasets from 2020.
- The tables below summarise the number of sites that are available for modelling post validation in 2020 and again in 2021 and provides a comparison of the EUC differences in UK Link and also the sample derived AQ (which is used to determine the EUC demand models)
- As expected, there are a number of sites which are in lower EUC Bands than in 2020

On UK Link

Consumption Band 2020	-2	-1	0	1	2	Grand Total
01			2255	43		**2298**
02		255	1516	51	1	**1823**
03	2	347	674	37	1	**1061**
04		64	632	16		**712**
05		44	149	3		**196**
06		6	31	1		**38**
07		1	11			**12**
08		1	6			**7**
09			1			**1**
Grand Total	**2**	**718**	**5275**	**151**	**2**	**6148**

Derived from Sample AQ

Consumption Band 2020	-2	-1	0	1	2	Grand Total
01			2250	49		**2299**
02		245	1548	56	1	**1850**
03	2	320	673	32		**1027**
04	1	66	626	18		**711**
05		50	148	4		**202**
06		9	30	1		**40**
07		1	10			**11**
08		1	6			**7**
09			1			**1**
Grand Total	**3**	**692**	**5292**	**160**	**1**	**6148**

Section 3:
Review Approach to Small NDM Modelling

Sample Numbers & Proposed Aggregations

for **EUC Consumptions Bands: 1 to 4**

AQ Range: <2,196 MWh pa

Total NDM Population Counts: AQ & Supply Point

- Small NDM is the main component of the overall NDM:
  - Band 1 (0-73.2 MWh pa) constitutes nearly 3/4 of overall NDM (on an AQ basis)
  - Bands 1 to 2 (0-293 MWh pa) constitutes nearly 4/5 of overall NDM
  - Bands 1 to 4 (0-2196 MWh pa) constitutes nearly 9/10 of overall NDM
- Large NDM is very much a minority component of overall NDM
- Note:
  Due to the impacts of COVID-19 and subsequent reductions in AQ there has been an increase in the number of supply points in Bands 1 to 2 (AQ and SP Count)

EUC Bands: Range	**% of Total NDM**	
	Total AQ	Total SP Count
Band 1: 0 to 73.2 MWh pa	74.00%	98.95%
Bands 1 to 2: 0 to 293 MWh pa	79.80%	99.74%
Bands 1 to 4: 0 to 2,196 MWh pa	88.59%	99.97%
Bands 5 to 9: >2,196 MWh pa	11.41%	0.03%

Proposed EUC Bands / Consumption Ranges for Small NDM (<2,196 MWh pa)

- EUC consumption ranges not prescribed in Uniform Network Code
- Band 1: 0 – 73.2 MWh pa
  - Prepayment Domestic
  - Non Prepayment Domestic
  - Prepayment I&C
  - Non Prepayment I&C
- Band 2: 73.2 – 293 MWh pa
  - Prepayment Domestic
  - Non Prepayment Domestic
  - Prepayment I&C
  - Non Prepayment I&C
- Band 3: 293 – 732 MWh pa
- Band 4: 732 – 2,196 MWh pa

Small NDM Consumption Bands: Review of EUC Band 1

EUC Bands: Range	**Comments on 2020/21 data Proposed Aggregations**	**Final Aggregations for 2019/20**
Band 1 PPM Domestic: 0 to 73.2 MWh pa	Sample size issues - No model viable	Sample size issues - No model viable
Band 1 Non PPM Domestic: 0 to 73.2 MWh pa	Individual LDZ analysis for all LDZs	Individual LDZ analysis for all LDZs
Band 1 PPM I&C: 0 to 73.2 MWh pa	Sample size issues - No model viable	Sample size issues - No model viable
Band 1 Non PPM I&C: 0 to 73.2 MWh pa	Individual LDZ analysis for all LDZs	Individual LDZ analysis for all LDZs

- Spreadsheet TW_B_SAMPLE_POP_SMALL_280421.xlsx provides sample numbers per LDZ for Bands 1 to 4 and any recommendations for additional runs

Pre-Payment EUC Demand Models

- The current EUC demand model uses consumption data that was provided to support UNC Modification 0451AV
- Unfortunately, once again, we have not been able to source enough sample points to derive an EUC demand model for the Domestic Pre-Payment consumer base
- As the expectation this year is a number of EUC models (if not all) will refer back to last year's demand models, we would recommend rolling forward the current version (i.e. 0451AV)
- There are c. 2.1m supply points which are currently assigned this EUC. Since it's introduction Gas Year 2019/20 we have been unable to 'train' or 'test' demand models using current behaviours from this population
- We recommend this topic is added to the Adhoc Workplan to investigate how DESC wish to address this going forward, as using a dataset which is nearly a decade old is not sustainable in the long-term

Small NDM Consumption Bands: Review of Bands 2-4

EUC Bands: Range	**Comments on 2020/21 data Proposed Aggregations**	**Final Aggregations for 2019/20**
Band 2 PPM Domestic: 73.2 to 293 MWh pa	Sample size issues - No model viable	Sample size issues - No model viable
Band 2 Non PPM Domestic: 73.2 to 293 MWh pa	1) 2 LDZ Group (SC/NO/NW/WN/NE/EM/WM & EA/NT/SE/WS/SO/SW) 2) National	2 LDZ Group (SC/NO/NW/WN/NE/EM/WM & EA/NT/SE/WS/SO/SW)
Band 2 PPM I&C: 73.2 to 293 MWh pa	Sample size issues - No model viable	Sample size issues - No model viable
Band 2 Non PPM I&C: 73.2 to 293 MWh pa	Individual LDZ analysis for all LDZs	Individual LDZ analysis for all LDZs
Band 3: 293 to 732 MWh pa	Individual LDZ analysis for all LDZs	Individual LDZ analysis for all LDZs
Band 4: 732 to 2,196 MWh pa	Individual LDZ analysis for all LDZs	Individual LDZ analysis for all LDZs

- **Spreadsheet TW_B_SAMPLE_POP_SMALL_280421.xlsx provides sample numbers per LDZ for Bands 1 to 4 and any recommendations for additional runs**

Section 3 continued: Review Approach to Small NDM Modelling

Sample Numbers, Proposed Aggregations &

WAR Thresholds for **EUC WAR Bands: 3 to 4**

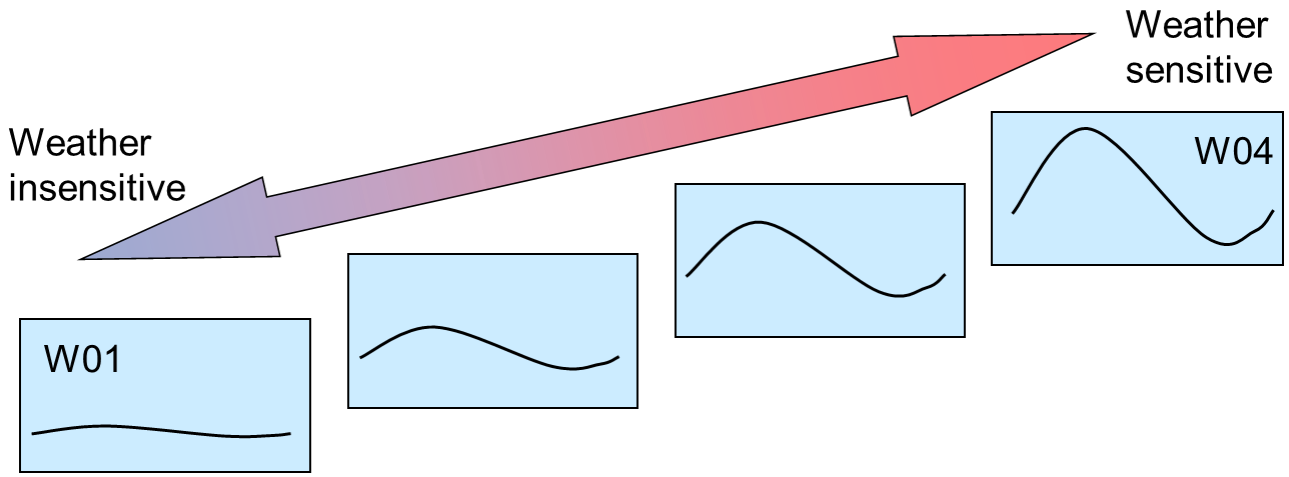
AQ Range: 293 to 2,196 MWh pa

Winter: Annual Ratio (WAR) Band EUCs

- Higher AQ Bands where meter points are monthly read have a standard EUC plus 4 differential EUCs based on ratio of winter consumption to total annual consumption
- Sites with adequate read history are allocated automatically to a WAR Band based on system calculation during AQ review
- The WAR value of a supply point is defined as the actual consumption in the months December to March divided by the new supply point AQ
- Since the numerator is actual demand and the denominator is weather corrected annual consumption, WAR values change from year to year
- The limits defining WAR band EUCs are those applicable to the most recent winter (in this case winter 2020/21)

Setting WAR Thresholds

- When setting WAR Thresholds, DESC's approach is to aim for a 20%:30%:30%:20% split of sample numbers on a national basis
- There are practical limitations due to the actual distribution of WAR values of individual sample supply points in the consumption band
- WAR Thresholds will again be defined at 3 decimal points to make it easier to get closer to the target % splits
- For practical reasons we can only proceed to the modelling stage with one WAR Threshold per EUC band



Movement in WAR Thresholds in 2021

- WAR Thresholds are affected by December to March weather experience:

  Winter 20/21 was generally COLDER than 2019/20, so thresholds would be expected to increase this year

- Due to the potential 'disconnect' between (i) Winter Consumptions calculated during the lockdown period and (ii) the AQs calculated during 2021 when sites start to increase consumption, it is possible that sites for a period of time may be assigned to unsuitable WAR Bands during EUC assignment later this year, until all of the COVID related impacts unwind

Advice from AQ Focus Group – WC Correction Process

- The Correction process (reason 5) can be used to alter a sites WC (and in turn WAR band) in line with the Rolling AQ
- This can be achieved by applying a new WC value using the correction process which will trigger a re-calculation of the EUC. As there is no limit in the number of WC corrections that can be raised, a new WC can be proposed in line with any changes to the monthly Rolling AQ
- The WC calculation is undertaken in May with the results communicated to Shippers in the May .NRL file (T50 & T51 records). It is important to note that any challenges to these new/proposed values should be raised between 11th Aug – 10th Sept'21 to be effective from 1st October'21
- In terms of the WC value that should be requested, it is recommended to request a value in line with the ratio of a sites normal WAR band based on the current/latest Rolling AQ
- There is a training pack on the WAR Band process and how to correct the WC if required here

Small NDM WAR Bands: Review of Bands 3-4

EUC Bands: Range	**Comments on 2020/21 data Proposed Aggregations**	**Final Aggregations for 2019/20**
Band 1: 0 to 73.2 MWh pa	Not generally Monthly read – no WAR Bands	
Band 2: 73.2 to 293 MWh pa	Not generally Monthly read – no WAR Bands	
Band 3 and Band 4 (combined): 293 to 2196 MWh pa	Individual LDZ for most LDZs except WN being combined with NW (Table B.11)	Individual LDZ for most LDZs except WN being combined with NW

- Spreadsheet TW_B_SAMPLE_POP_SMALL_280421.xlsx (Table B.11) for recommendation on aggregations and WAR Band thresholds

Section 4:
Review Approach to Large NDM Modelling

Sample Numbers & Proposed Aggregations

for **EUC Consumptions Bands: 5 to 9**

AQ Range: >2,196 MWh pa

Proposed EUC Bands / Consumption Ranges for Large NDM (>2,196 MWh pa)

- Band 5: 2,196 to 5,860 MWh
- Band 6: 5,860 to 14,650 MWh
- Band 7: 14,650 to 29,300 MWh
- Band 8: 29,300 to 58,600 MWh

Each with:
- 1 Consumption Band
- x4 Winter Annual Ratio (WAR) Bands

- Band 9: >58,600 MWh (1 Contingency Band for sites which should be DM)

- Note:
  Underlying demand modelling can be done on basis of more broadly aggregated bands
- DESC agreed in Spring 2014, as part of the adhoc analysis of EUC Definitions, that the bands 14,650 to 29,300 (Band 7) and 29,300 to 58,600 (Band 8) could be merged for modelling purposes if necessary

- Large NDM remains very much a minority component of overall NDM
  - Bands 5 to 9 (>2,196 MWh pa) constitutes approx. 1/10 of overall NDM (on an AQ basis)

EUC Bands: Range	**% of Total NDM**	
	Total AQ	Total SP Count
Band 1: 0 to 73.2 MWh pa	74.00%	98.95%
Bands 1 to 2: 0 to 293 MWh pa	79.80%	99.74%
Bands 1 to 4: 0 to 2,196 MWh pa	88.59%	99.97%
Bands 5 to 9: >2,196 MWh pa	11.41%	0.03%

Large NDM Consumption Bands: Review of Bands 5-9

EUC Bands: Range	**Comments on 2020/21 data Proposed Aggregations**	**Final Aggregations for 2019/20**
Band 5: 2,196 to 5,860 MWh pa	Individual LDZ for most LDZs except WN being combined with NW	Individual LDZ analysis (NW/WN combined)
Band 6: 5,860 to 14,650 MWh pa	Individual LDZ analysis with WN combined with NW, and WS combined with SW	Individual LDZ for most LDZs except WN combined with NW and WS being combined with SW
Band 7 and Band 8 (combined): 14,650 to 58,600 MWh pa	Individual LDZs with the following WS/SW, EA/NT, SE/SO and NW/WN combined	Individual LDZs with the following WS/SW, EA/NT, SE/SO and NW/WN combined
Band 9: >58,600 MWh pa	National	National

- Spreadsheet TW_C_SAMPLE_POP_LARGE_280421.xlsx provides sample numbers per LDZ for Bands 5 to 9 and any recommendations for additional runs

Section 4 continued: Review Approach to Large NDM Modelling

Sample Numbers, Proposed Aggregations &

WAR Thresholds for **EUC WAR Bands: 5 to 8**

AQ Range: 2,196 to 58,600 MWh

Large NDM WAR Bands: Review of Bands 5-8

EUC Bands: Range	**Comments on 2020/21 data Proposed Aggregations**	**Final Aggregations for 2019/20**
Band 5: 2,196 to 5,860 MWh pa	5 LDZ group	5 LDZ GROUP with SC as an individual LDZ
Band 6: 5,860 to 14,650 MWh pa	3 LDZ group (SC/NO/NW/WN, NE/EM/WM & EA/NT/SE/WS/SO/SW)	3 LDZ group (SC/NO/NW/WN, NE/EM/WM & EA/NT/SE/WS/SO/SW)
Band 7 and Band 8 (combined): 14,650 to 58,600 MWh pa	2 LDZ group (SC/NO/NW/WN/NE/EM/WM & EA/NT/SE/WS/SO/SW)	2 LDZ group (SC/NO/NW/WN/NE/EM/WM & EA/NT/SE/WS/SO/SW)
Band 9: >58,600 MWh pa	N/A - No WAR Bands	

- **Spreadsheet TW_C_SAMPLE_POP_LARGE_280421.xlsx provides sample numbers per LDZ for Bands 5 to 8 and any recommendations for additional runs**

Section 5:

Meeting Summary – Review, Conclusions and Next Steps

Meeting Summary

- Summary of decisions reached
- Recap on agreed actions, owners and timescales
- Any further questions about this stage ?

Next Steps

01) Demand Estimation Team to commence EUC demand modelling based on today's decisions

28/04 to 14/05

02) Demand Estimation Team to publish EUC demand modelling results for TWG to review

17/05 to 21/05

03) TWG meeting where EUC demand modelling results will be presented and discussed

24/05

04) Demand Estimation Team to prepare draft profiles for Gas Year 2021/22

25/05 to 04/06

Thank you