# 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](here)

- This presentation relates to the "Data Collection & Validation" and "Model Definition" phases of the Demand Model cycle
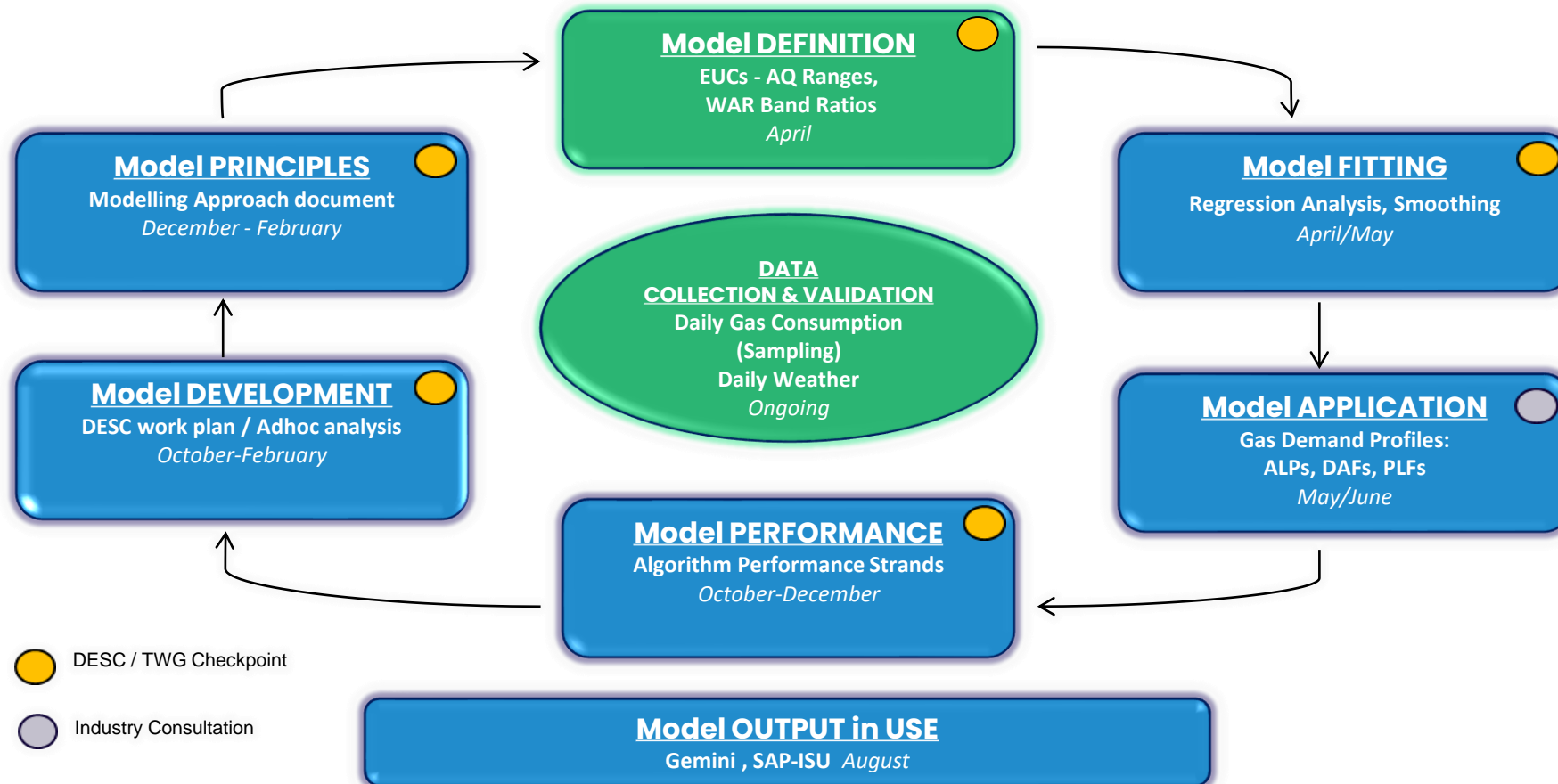
# Demand Estimation: Timetable - 2021

**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 (over 60 in Band 3+)

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

Weather sensitive

Weather insensitive

W04

W01
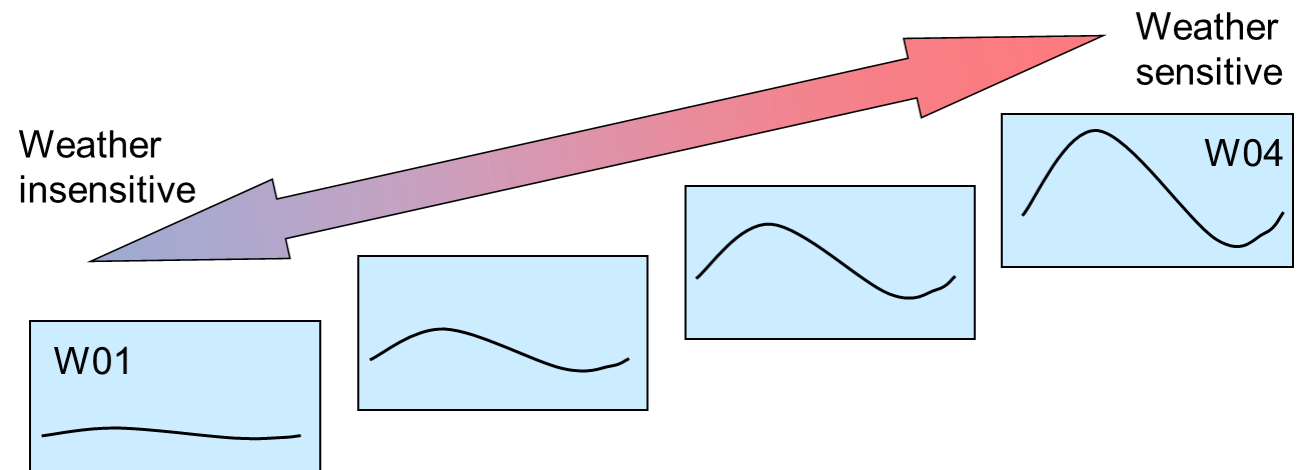
# Movement in WAR Thresholds in 2021

- 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 and combined WS | 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