



Demand Estimation Sub Committee

Approach to EUC Gas Demand Modelling 2021

24th February 2021

Background – Modelling Principles

- The process for determining the EUCs and Demand Models for the following Gas Year begins with the production of a Modelling Approach document
 - The Modelling Approach document provides an ‘end to end’ description from collecting daily gas consumption data from a sample of NDM supply points through to the industry consultation of the proposed gas demand profiles
- Following an introduction to the topic at December’s DESC meeting, a draft version of the Modelling Approach document is shared with DESC and TWG. The first draft reflects the previous year’s approach and is updated to reflect the new dates, it also includes any lessons learnt relevant from the most recent modelling exercise
- DESC is asked to formally approve the document at its meeting in February each year, ahead of the modelling process starting in the Spring
- For the avoidance of doubt, current discussions on the future of the NDM Algorithm and any subsequent recommendations are not being considered to influence the process which produces gas demand profiles for Gas Year 2021/22

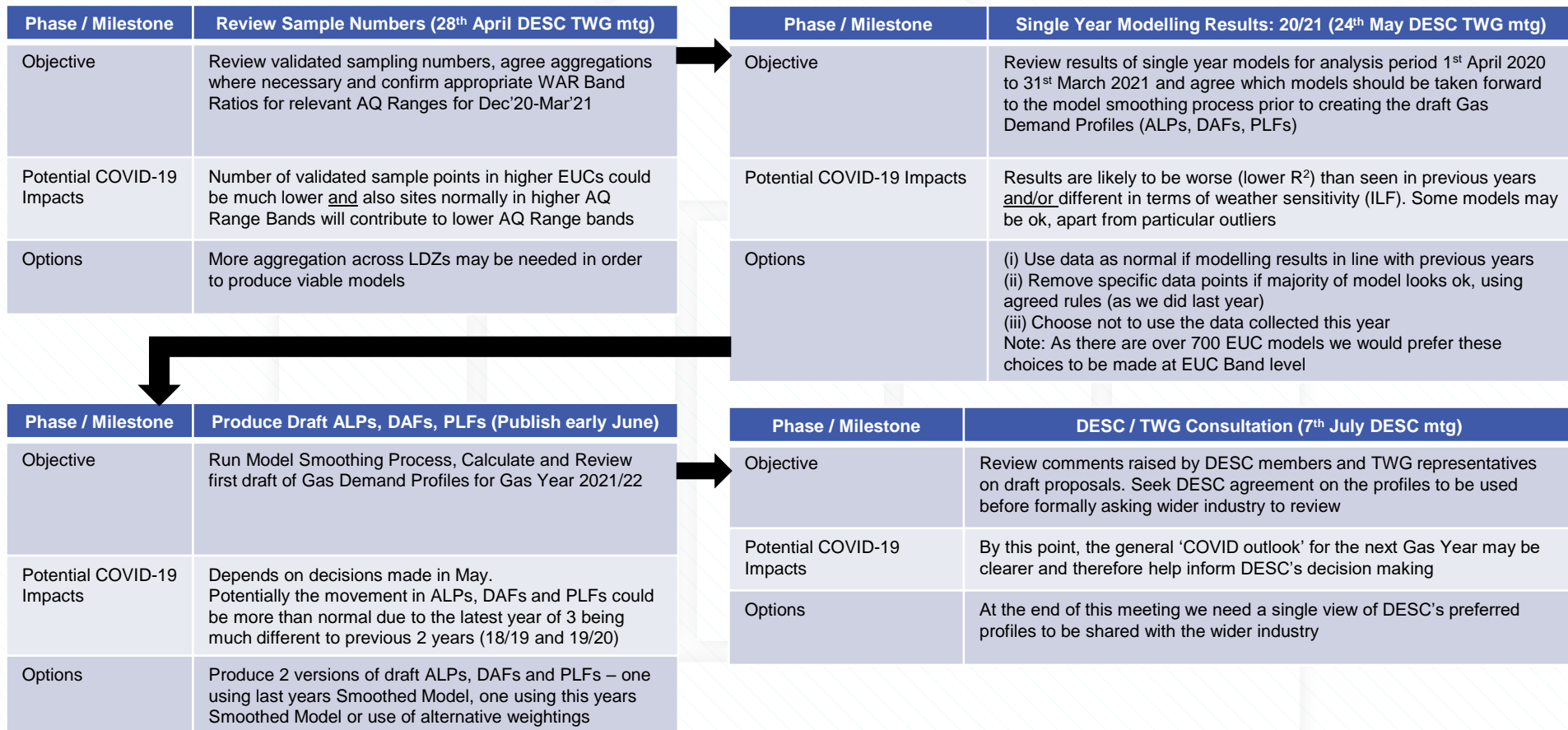
Objective

- To provide a summary of the main sections of the Modelling Approach document, which sets out how the End User Categories (EUCs), Demand Models and Gas Demand Profiles shall be produced for Gas Year 2021/22
- To consider any changes / issues which relate specifically to this year's demand modelling process
- To review any comments that have been received on the draft document since publication in December 2020
- To conclude discussions on the “Model Principles” phase by formally requesting DESC's approval of the Modelling Approach document

Modelling Approach 2021: COVID-19 Impacts (1 of 3)

- The analysis period for the collection of daily gas consumption data will clearly include a significant number of days which will have been impacted by the national and local restrictions as a result of the COVID-19 pandemic
- NDM Algorithm Performance analysis (Strand 3) shared at December's DESC meeting revealed that some of the I&C EUCs in particular will contain demand levels much lower than 'normal' and are likely to produce sporadic results due to being 'in and out of lockdown' which DESC may feel should not be used to influence Gas Demand Profiles for Gas Year 2021/22
- Potential options this year for DESC to consider
 - Continue 'as-is' if data looks ok, maybe removing certain data points (as we did last year)
 - Do not use the data collected for analysis period 20/21 if things look like they will return to 'normal' in 21/22 and carry forward previous years models (20/21 sample data still needs to be validated and assessed before making any decisions)
 - Hybrid of above where some EUC Band models use this year's data and others use previous years models
 - In the event DESC cannot agree in July when the profiles need to be finalised then UNC H 1.9.3 would apply ('Fall-back' means use of previous year's models for ALL EUCs)
- The target profiles are for Gas Year 2021/22 and so we suggest DESC needs to remain flexible in its approach this year (see slides 6 and 7 for view of how this year's process could 'play out')

Modelling Approach 2021: COVID-19 Impacts (2 of 3)



Modelling Approach 2021: Potential COVID-19 Impacts (3 of 3)

Phase / Milestone	DESC / TWG Consultation (7 th July DESC mtg)
Objective	Review comments raised by DESC members and TWG representatives on draft proposals. Seek DESC agreement on the profiles to be used before formally asking wider industry to review
Potential COVID-19 Impacts	By this point, the general 'COVID outlook' for the next Gas Year may be clearer and therefore help inform DESC's decision making
Options	None, at the end of this meeting we need a single view of DESC's preferred profiles to be shared with the wider industry



Phase / Milestone	Industry Consultation (21 st July DESC mtg)
Objective	DESC to review comments / representations received from wider industry. DESC to formally vote on the Gas Year 2021/22 profiles
Potential COVID-19 Impacts	There is not agreement from DESC on which profiles to use
Options	UNC H 1.9.3 will be needed, which states the demand models used from the previous year will be used in the event agreement cannot be reached (referred to as "fallback")



Phase / Milestone	Systems Updates (early August)
Objective	Update UK Link and Gemini with Gas Demand Profiles and EUC Definitions including Winter Annual Ratios (WAR)
Potential COVID-19 Impacts	In the event DESC decide to use previous year's models or fallback is invoked, we need to consider that the population will be calculating WARs from the most recent Winter (Dec'20 to Mar'21) period)
Options	Use WAR ratios agreed at this year's April TWG meeting and not those from last year's Demand Modelling process

Modelling Approach 2021: Contents

- The remainder of the presentation provides a high level summary of the Modelling Approach document, assuming all data collected will be used, and follows the same logical flow in the document, covering the following areas:
 - Daily Gas Consumption Data
 - Daily Weather Data
 - End User Categories (EUCs)
 - Gas Demand EUC Modelling
 - Demand Model Smoothing
 - Gas Demand Profiles
 - NDM Algorithms Booklet
 - Industry Consultation

Modelling Approach 2021: Daily Gas Consumption Data

- Analysis Period:
 - Daily Gas Consumption Data is a critical input to the Demand Modelling process and will be required for the period 25th March 2020 to 7th April 2021, with the main analysis period being **1st April 2020 to 31st March 2021**
- Sources:
 - As usual, Transporters and CDSP sampling will contribute towards the target numbers
 - In addition, consumption data will be required from eligible Shippers (portfolio >25K) who are now mandated to contribute to the NDM sampling
- Priority:
 - The CDSP requires daily consumption data for all EUCs, particularly the newer definitions e.g. **Domestic Prepayment** supply points – the model for this EUC is currently based on data which is now nearly 10 years old
- Validation:
 - Appendix 2 sets out the proposed validation to be applied to the collated data prior to being used in demand modelling
 - Aim is to strike the balance of ensuring vast majority of data errors are removed yet maximising the number of sample points available for modelling

Modelling Approach 2021: Daily Gas Consumption Data cont.

- Representative Sample:
 - Appendix 3 provides an updated view of the ideal sample size based on the latest population numbers
 - It is proposed the principle of a 'Stratification approach' (introduced in 2019), which attempts to match the composition of the NDM sample with the NDM population, will continue with data collected for EUCs in Bands 1 and 2 with some additional clarifications
- Stratification of Band 1 and 2 - Clarifications:
 - The principle of attempting to match the sample proportions at sub band levels within the most populated EUCs of Domestic Non-Prepayment ("01BND") and I&C Non-Prepayment ("02BNI") is a good one
 - However, now that we have performed stratification a couple of times, we have some concerns around the volume of validated data that is being excluded from the process
 - During the validation performed in 2020, nearly 1K sample points were removed from the process for the "01BND" EUC in the search for the 'perfect' stratification, when in fact the proportions were generally already quite reflective of the population (see slide 11 for example)
 - Another consequence of stratification can also mean the 'ideal minimum' target of 30 sample points for creating a demand model is breached (more of an issue for Band 2 stratification)

Modelling Approach 2021: Daily Gas Consumption Data cont.

2020 Band 1 Assessment (Population - Sample)				
LDZ	0 – 10 MWh pa	10 – 20 MWh pa	20 – 30 MWh pa	30 – 73.2 MWh pa
EA	-9.38%	5.91%	-1.03%	4.50%
EM	-9.45%	4.79%	0.76%	3.90%
NE	-8.65%	1.61%	3.18%	3.86%
NO	-1.05%	-0.19%	-0.09%	1.34%
NT	-10.85%	7.20%	1.76%	1.89%
NW	-2.70%	1.26%	-2.27%	3.71%
SC	-7.84%	4.55%	-0.32%	3.61%
SE	-6.98%	5.26%	-0.72%	2.44%
SO	-10.05%	4.09%	-0.16%	6.12%
SW	-3.72%	1.42%	0.43%	1.87%
WM	1.55%	0.22%	-3.62%	1.86%
WN	-12.51%	15.59%	-0.48%	-2.60%
WS	-6.34%	-0.33%	1.79%	4.88%

- Suggested improvements for Band 1:
 - Review the number of validated sample points in sub-bandings and compare with population
 - To minimize reduction in number of validated sample points, do not apply stratification where difference from population for all sub bands are <(+ or -) 5% e.g. those LDZs highlighted in green
 - Applying the new approach to 2020 data ‘saves’ c.500 sites across all LDZs and means NO, NW, SW and WM would not ‘lose’ any

- Band 2 Stratification Principles:

- Band 2 Stratification will be applied where possible using agreed sub bands of 140 and 210 MWh
- We will not apply stratification at all if as a result, in the search for a perfect sub-band representation, the overall EUC demand model is <30 sample points

Modelling Approach 2021: Daily Weather Data

- Daily Weather Data is a critical input to the production of Gas Demand Profiles
- The Composite Weather Variables (CWVs) and SNCWVs used in the EUC demand modelling process will be those derived using the new formula (i.e. including Solar Radiation) and optimised parameters effective from 1st October 2020
- The Weather Stations used will reflect the recent changes following the implementation of the Seasonal Normal Review, namely, Yeovilton is now used for LDZ 'SW' and Durham is used for the Solar Radiation data for LDZ 'NO'
- Details of all Weather Stations can be found in Section 11 of the NDM Algorithms Booklet

Modelling Approach 2021: End User Categories

EUC Band	AQ Range From: (Kwh pa)	AQ Range To: (Kwh pa)	Market Sector	Meter Type	Default ('Bucket')	WAR Bands W01 to W04	No. of Demand Models req'd
01	0	73,200	Domestic & Non-Domestic	PrePayment & Non-PrePayment	x	x	4
02	73,201	293,000			x	x	4
03	293,001	732,000	Non-Domestic	Non-PrePayment	✓	✓	5
04	732,001	2,196,000			✓	✓	5
05	2,196,001	5,860,000			✓	✓	5
06	5,860,001	14,650,000			✓	✓	5
07	14,650,001	29,300,000			✓	✓	5
08	29,300,001	58,600,000			✓	✓	5
09	58,600,001				✓	x	1

- No plans to amend the current EUC Definitions (39 per LDZ) for Gas Year 2021/22
- To support more accurate NDM Allocation, focus is required by the industry on the key data items used in 'EUC assignment' e.g. Market Sector Code, Meter Mechanism and Payment Method, Monthly Read submissions for Winter Consumption

Modelling Approach 2021: Gas Demand EUC Modelling

- Review and agree the most appropriate aggregations to represent each EUC and to determine the Winter Annual Ratio thresholds for relevant EUCs – this will be concluded at the 28th April Technical Workgroup (TWG) meeting
- Where possible individual LDZ analysis for each EUC will be prioritised
- The approach to Gas Demand EUC Modelling is set out in Appendix 4
- In summary, analysis is performed to assess the impacts of:
 - Warm weather analysis in order to identify those models which exhibit ‘Summer Reductions’ and / or ‘Cut-Offs’
 - Weekend and Holiday effects
 - Holiday code rules are set out in Appendix 5 which, following discussions during the 2020 industry consultation, now includes additional detail of how the Christmas and New Year period will be treated for the ‘training’ analysis periods and target year (see next slide)
- Results of the Gas Demand EUC Modelling will be presented for review and approval at the 24th May Technical Workgroup (TWG) meeting

Modelling Approach 2021: Gas Demand EUC Modelling cont.

- Application of Christmas/New Year holiday period rules (below) to relevant periods in the 2021 EUC Demand Modelling process (right)

Christmas/New Year (Holiday codes 1, 2, 3, 4, and 5)

Holiday period starts on the Monday before 25th December (but if 25th December falls on a Monday, Tuesday or Wednesday, starts on the Friday before 25th December) and ends on the first Friday on or after the second New Year bank holiday in Scotland.

Holiday code 1:
25th December

Holiday code 2:
26th December, January 1st and any remaining bank holidays (except second Scotland New Year bank holiday) and any other Saturdays and Sundays in the period

Holiday code 3:
Any remaining Mondays to Fridays between 24th December and day before second Scotland New Year bank holiday inclusive

Holiday code 4:
Remaining days before 24th December

Holiday code 5:
Remaining days (will always include second Scotland New Year bank holiday)

Following feedback during the 2020 representation process, we have provided the following table to show the Christmas holiday codes and how they are used in training the model (2018-2020) and also how it is applied in calculating derived factors for Gas Year 2021/22 (2021)

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Training Periods				Target Year			
Christmas 2018		Christmas 2019		Christmas 2020		Christmas 2021	
Date	Hol Code	Date	Hol Code	Date	Hol Code	Date	Hol Code
Tue 18/12/2018		Wed 18/12/2019		Fri 18/12/2020		Sat 18/12/2021	
Wed 19/12/2018		Thu 19/12/2019		Sat 19/12/2020		Sun 19/12/2021	
Thu 20/12/2018		Fri 20/12/2019	4	Sun 20/12/2020		Mon 20/12/2021	4
Fri 21/12/2018	4	Sat 21/12/2019	2	Mon 21/12/2020	4	Tue 21/12/2021	4
Sat 22/12/2018	2	Sun 22/12/2019	2	Tue 22/12/2020	4	Wed 22/12/2021	4
Sun 23/12/2018	2	Mon 23/12/2019	4	Wed 23/12/2020	4	Thu 23/12/2021	4
Mon 24/12/2018	3	Tue 24/12/2019	3	Thu 24/12/2020	3	Fri 24/12/2021	3
Tue 25/12/2018	1	Wed 25/12/2019	1	Fri 25/12/2020	1	Sat 25/12/2021	1
Wed 26/12/2018	2	Thu 26/12/2019	2	Sat 26/12/2020	2	Sun 26/12/2021	2
Thu 27/12/2018	3	Fri 27/12/2019	3	Sun 27/12/2020	2	Mon 27/12/2021	2
Fri 28/12/2018	3	Sat 28/12/2019	2	Mon 28/12/2020	2	Tue 28/12/2021	2
Sat 29/12/2018	2	Sun 29/12/2019	2	Tue 29/12/2020	3	Wed 29/12/2021	3
Sun 30/12/2018	2	Mon 30/12/2019	3	Wed 30/12/2020	3	Thu 30/12/2021	3
Mon 31/12/2018	3	Tue 31/12/2019	3	Thu 31/12/2020	3	Fri 31/12/2021	3
Tue 01/01/2019	2	Wed 01/01/2020	2	Fri 01/01/2021	2	Sat 01/01/2022	2
Wed 02/01/2019	5	Thu 02/01/2020	5	Sat 02/01/2021	2	Sun 02/01/2022	2
Thu 03/01/2019	5	Fri 03/01/2020	5	Sun 03/01/2021	2	Mon 03/01/2022	2
Fri 04/01/2019	5	Sat 04/01/2020		Mon 04/01/2021	5	Tue 04/01/2022	5
Sat 05/01/2019		Sun 05/01/2020		Tue 05/01/2021	5	Wed 05/01/2022	5
Sun 06/01/2019		Mon 06/01/2020		Wed 06/01/2021	5	Thu 06/01/2022	5
Mon 07/01/2019		Tue 07/01/2020		Thu 07/01/2021	5	Fri 07/01/2022	5
Tue 08/01/2019		Wed 08/01/2020		Fri 08/01/2021	5	Sat 08/01/2022	
Wed 09/01/2019		Thu 09/01/2020		Sat 09/01/2021		Sun 09/01/2022	
Thu 10/01/2019		Fri 10/01/2020		Sun 10/01/2021		Mon 10/01/2022	

Modelling Approach 2021: Demand Model Smoothing

- The objective of the Demand Model Smoothing process is to produce an output which represents the 'average effect' of the behaviours observed from [3] years of Daily Gas Consumption Data
- This approach is used in order to provide a stability in the Gas Demand Profiles which are used from one year to the next, and as presented earlier, continues to be a more suitable approach to using the latest year only
- The [3] years used in Demand Model Smoothing will use Daily Gas Consumption Data from years 2018/19, 2019/20 and 2020/21
- 3 year model smoothing will be applied along with existing weightings for each individual year (i.e. 33:33:34), in line with the recommendations from this year's review of the Model Smoothing methodology
- Appendix 6 of the Modelling Approach 2020 document provides a detailed description of how the Demand Model Smoothing shall be applied

Modelling Approach 2021: Gas Demand Profiles

- The main key output that DESC are responsible for producing for each EUC are the Annual Load Profile (ALPs), the Daily Adjustment Factors (DAFs) and the Peak Load Factors (PLFs)
- This year it is proposed the ALP, DAF and PLF formulas remain unchanged
 - Note: Any differences in ALPs, DAFs and PLFs calculated this year will reflect the behaviour observed in the latest [3] years of Gas Demand EUC Models
- The publication of the first draft of Gas Demand Profiles is expected by 4th June, pending no additional work required as a result of COVID-19 impacts following 24th May TWG meeting

Modelling Approach 2021: NDM Algorithms Booklet

- NDM Algorithms Booklet summarising the end to end modelling process will be produced
- Parameters for all Smoothed Demand Models to be published in an Appendix to the 2021 NDM Algorithms Booklet. All other Gas Demand EUC Model parameters to be provided in electronic form
- The performance evaluation summary (Section 12) to reflect the review of Algorithm Performance (Strands 1 to 3) for Gas Year 2019/20
- The location of all supporting documents and files to be published on Xoserve's secure SharePoint site (UK Link Documentation):
 - 18.NDM Profiling and Capacity Estimation Algorithms / 2021-22 Gas Year
- Gas Demand Profiles will also be available in the public area of Xoserve's website [here](#) following DESC's decision in 2019 to share them more widely

Modelling Approach 2021: Industry Consultation

- The modelling approach will include regular checkpoints for TWG and DESC to review and approve. Please review the timetable on Page 9 of the Modelling Approach 2020 document which provides summary of the anticipated DESC / TWG involvement during the EUC and Demand Modelling cycle
- To ensure that the correspondence during the modelling period (April to July) between Xoserve and the TWG remains productive, please ensure the TWG representative within your organisation (as displayed on the master list on the Joint Office website) is still the most appropriate contact – review this [here](#)
- Fall-back position:
 - In the event DESC cannot agree at its meeting at the end of July which profiles should be used then the underlying demand models from 2020 would be used - referred to as 'Fall-back' proposals (UNC Section H 1.9.3). Impacts of COVID-19 pandemic on this year's analysis period mean this is a potential outcome, however hopefully this won't be necessary
 - The effect of the above could still happen, if earlier in the process DESC agree to not use this years single year modelling results but that would be based on mutual agreement and not where a UNC backstop position is invoked

Modelling Approach 2021: Timetable

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

Modelling Approach 2021: DESC Decision

- The first 'change marked' draft of the Modelling Approach document for the 2021 analysis was published in December and Xoserve invited DESC Members and TWG representatives to review and comment on the document
- At the point of publishing there have been no comments received on the proposed approach
- The next phase of work is to make preparations for collecting the Daily Gas Consumption Data and for implementing the new EUC Gas Demand Modelling system
- Are DESC happy to approve the principles as set out in the Modelling Approach 2021 document ?
 - DESC Members to vote