Demand Estimation Sub Committee

Modelling Approach 2020
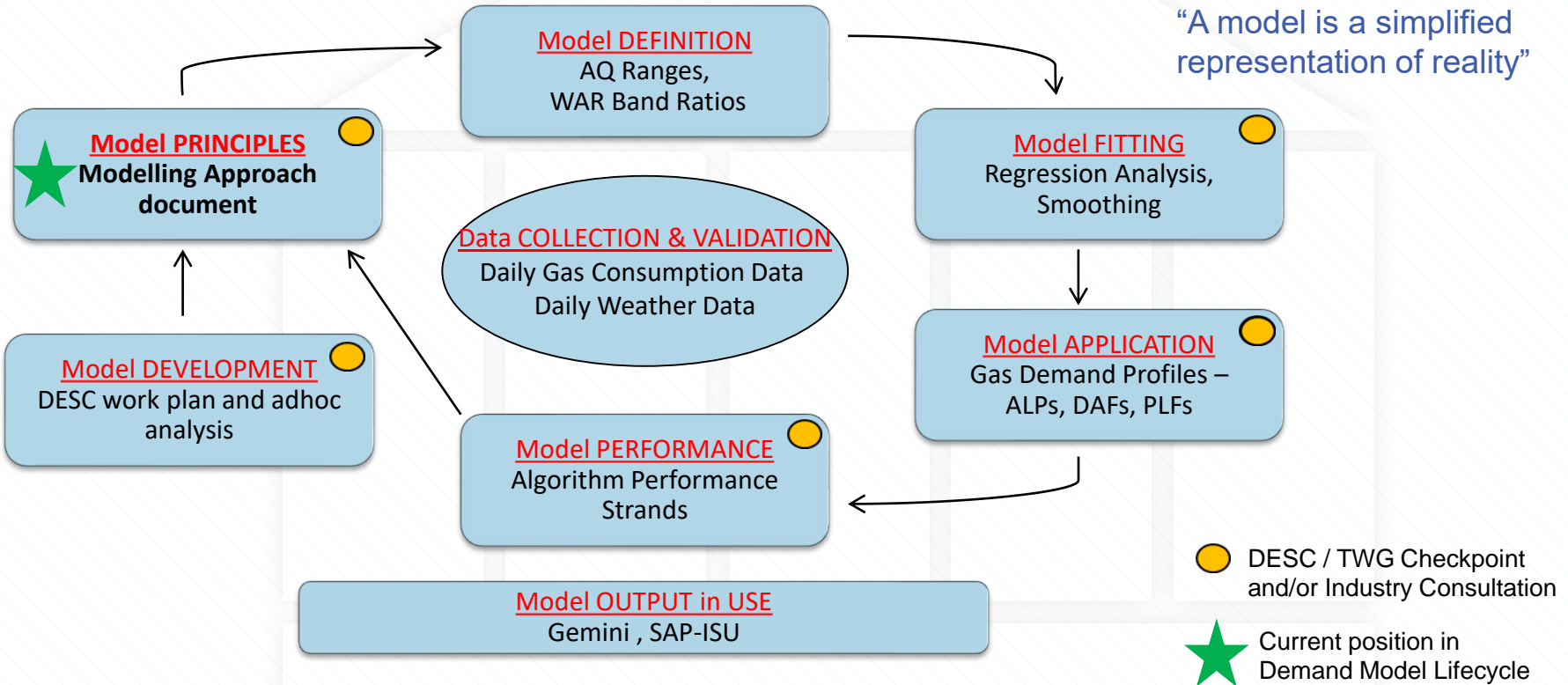
10th February 2020

Background – Demand Estimation

- Key industry processes require various types of gas demand estimation at NDM Supply Points. These processes include:
  - Determining Supply Point Capacity
  - Daily Nominations and Allocations i.e. NDM Supply Meter Point Demand Formula
  - Determining Annual Quantities (AQs)

- To achieve this estimation, each NDM Supply Point belongs to an End User Category (EUC)

- EUCs are used to categorise NDM Supply Points in an LDZ and are defined by reference to variables which are maintained in the Supply Point Register

- Each EUC requires an associated Gas Demand Model which represents its gas usage characteristics e.g. weather sensitivity, consumption profile etc

- Gas Demand Models are mathematical models which provides an estimate of gas demand for each EUC by reference to variables determined by DESC

Background – Demand Estimation cont.

- For each Gas Year, DESC will develop or revise the definitions of the EUCs for the LDZ <u>and</u> the Gas Demand Models for each EUC. The CDSP will then implement these decisions

- The annual process for determining the EUCs and Gas Demand Models for the following gas year begins with the production of a Modelling Approach document

- The Modelling Approach provides an overview of the EUC definitions and how the modelling shall be performed, which DESC is asked to formally approve at its meeting in February each year

- Prior to this, DESC's Technical Workgroup (TWG) are sent a draft of the document to review and comment on

- Section H of UNC and the NDM Demand Estimation Methodology document provides more detail of the Demand Estimation process

Overview: EUC & Demand Model Lifecycle

The purpose of the Gas Demand EUC Model is to represent the behaviour and reactions of the EUC Population

"A model is a simplified representation of reality"

Model DEFINITION
AQ Ranges,
WAR Band Ratios

Model PRINCIPLES
Modelling Approach document

Model FITTING
Regression Analysis,
Smoothing

Data COLLECTION & VALIDATION
Daily Gas Consumption Data
Daily Weather Data

Model DEVELOPMENT
DESC work plan and adhoc analysis

Model APPLICATION
Gas Demand Profiles –
ALPs, DAFs, PLFs

Model PERFORMANCE
Algorithm Performance Strands

Model OUTPUT in USE
Gemini , SAP-ISU

DESC / TWG Checkpoint and/or Industry Consultation

Current position in Demand Model Lifecycle

Demand Modelling Framework

- DESC's obligation of producing a set of End User Categories and Gas Demand Models for the next gas year have to be delivered within certain timescales:

    – The Daily Gas Consumption Data collected for analysis must include the most recent Winter period (December to March), meaning the collation and validation cannot start until **early April**

    – The Final EUCs and Gas Demand Profiles must be approved and submitted to the Authority and loaded to CDSP's systems **by 15th August**

    – In between April and August is when the Daily Gas Consumption Data validation results are reviewed, WAR Band ratios are set, End User Categories (EUCs) are defined, Gas Demand EUC Modelling is performed and reviewed, Demand Model Smoothing is applied, draft Gas Demand Profiles are produced and reviewed, followed by an Industry Consultation **commencing early June**

- The above explains why it is necessary to agree modelling principles and methodologies in February, as it would be challenging to make fundamental modelling decisions and gain agreement from all DESC members during the Spring/Summer

Objective

- The final objective of the "Model Principles" phase is to produce a Modelling Approach document for the derivation of EUCs and Gas Demand Models effective for Gas Year 2020/21

- DESC were invited to start considering this objective at its meeting on 9th December and a draft document "Modelling Approach 2020" was circulated for comment on Monday 20th January

- Objective of today's session is for DESC to:
    - Provide a summary of the main sections of the Modelling Approach
    - Review any comments that have been received on the draft document
    - Formally request DESC's approval in order to conclude the "Model Principles" phase

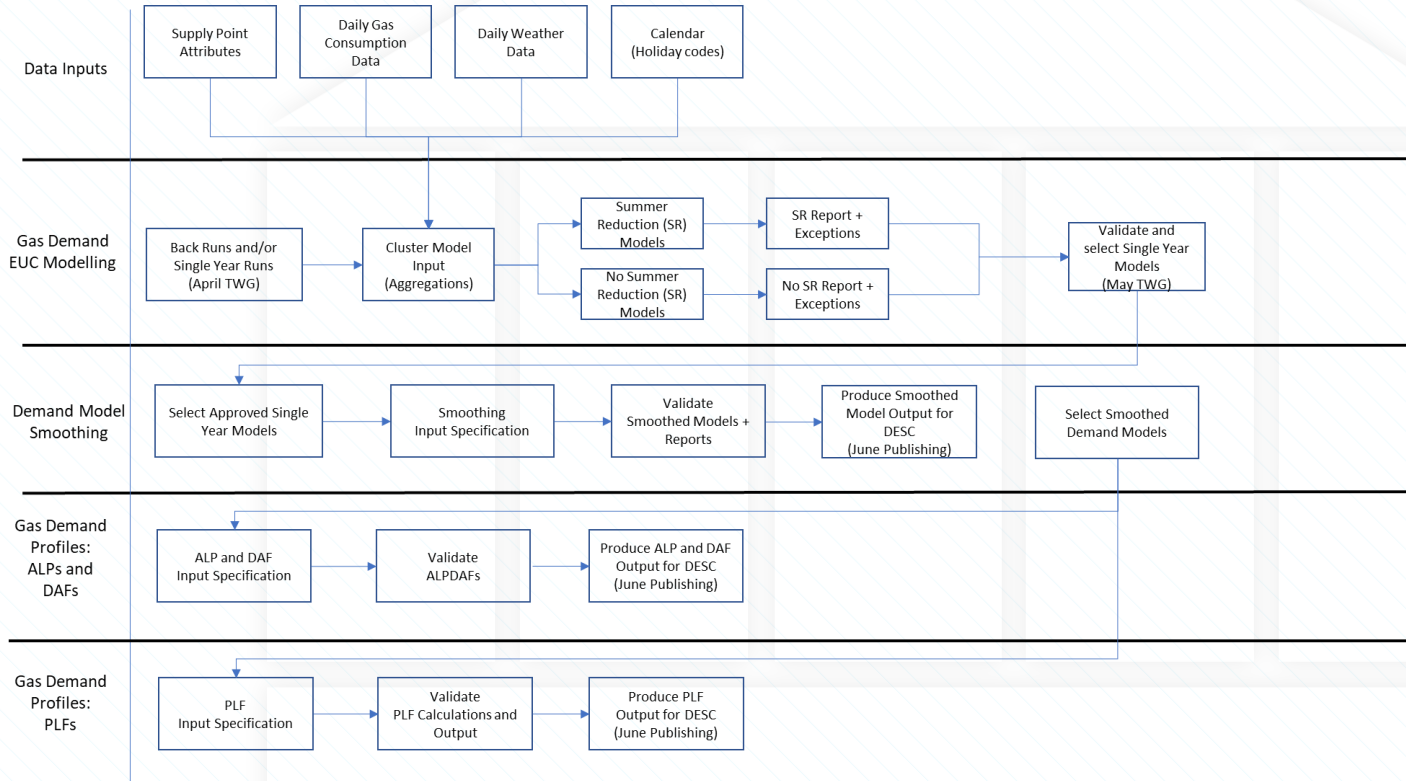# Modelling Approach 2020 – Demand Estimation Changes

- Modelling Approach 2020 is required ultimately to deliver a set of Gas Demand Profiles ("Derived Factors" – UNC Term) for use in Gemini and SAP-ISU for <u>Gas Year 2020/21</u> and will be impacted this year by the following changes:

    - Change to Composite Weather Variable (CWV) formula to include Solar Radiation and the new optimised parameters

    - Change to the Seasonal Normal basis (SNCWV)

    - CDSP will be using new platform/software for performing the end to end Gas Demand EUC Modelling process

        - Reminder: Opportunity still exists for TWG and DESC members to shape some of the output provided at the May TWG meeting and June publication of modelling output information as we finalise the reporting details in new EUC Gas Demand Modelling system

Modelling Approach 2020 – EUC Gas Demand Modelling System

- Since the completion of last years process to produce Gas Demand Profiles for Gas Year 2019/20 the Demand Estimation team has been working with a third party supplier on the implementation of a new SAS platform/system for delivering some of DESC's key obligations

- In February it is anticipated that the 'Back Runs' for this years process will be done using the new system ahead of the main analysis for this year during April, May and June

- New arrangements should provide the Demand Estimation team with more stability and efficiency and remove the requirement to maintain multiple applications, some of which had become outdated and unsupported

- In addition the data structure and system design should help us react to DESC's suggestions/ideas easier (e.g. parameterisation) and provide more statistical information from the end to end process

- Note: Out of scope of this years implementation is the handling and processing of Daily Gas Consumption Data and Daily Weather Data, however it is the intention that these processes will also be maintained on the SAS platform (to be discussed with Adhoc workplan)

- We are also looking at the ability to trial different approaches/models and assess the impact to Demand Attribution i.e. changes in EUC Allocation/ UiG

Modelling Approach 2020 – EUC Gas Demand Modelling System

- An overview of the areas covered by the new system is provided below:

- To follow on SAS platform:

  Management of Daily Gas Consumption Data

  Management of Daily Weather Data

  Gas Demand Profiles Performance and impacts to Demand Attribution

Modelling Approach 2020 – Document Changes

- This years document has been changed to hopefully provide a more logical 'flow', in addition we have standardised some of the language/naming in order to make it easier for new/existing parties to understand the process

- The document covers 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
    - Appendices

Modelling Approach 2020 – Daily Gas Consumption Data

- Daily Gas Consumption Data sampled from the NDM population is a critical input to the production of Gas Demand Profiles

- CDSP have refreshed the view of ideal sample size numbers based on the latest view of the population (as at January 2020) – Appendix 3 of the Modelling Approach 2020 document

- Expected sources are from sampling managed by Xoserve and the Distribution Networks and from mandatory submissions received from Shippers (with a portfolio >25K)

- To support the Gas Demand EUC Modelling, the CDSP requires Daily Gas Consumption Data for all EUCs, particularly those new definitions relating to Pre Payment Meter Points (more info. on this in "NDM Sample Update" agenda item)

- For Spring 2020 analysis, Daily Gas Consumption Data will be required for the period 25th March 2019 to 7th April 2020, with the main analysis period being 1st April 2019 to 31st March 2020

- Validation as set out in Appendix 2 of the Modelling Approach 2020 document will be performed during the first 2 weeks of April 2020. It is proposed the Stratification approach, introduced in 2019, will continue for EUCs in Bands 1 and 2

Modelling Approach 2020 – Daily Weather Data

- Daily Weather Data is a critical input to the production of Gas Demand Profiles

- The Composite Weather Variables (CWVs) used will be the version approved by DESC on 7th October 2019 i.e. using the new formula (including Solar Radiation but not Precipitation) and the new optimised parameters

- The Seasonal Normal Composite Weather Variables (SNCWVs) used will be the version approved by DESC on 9th December 2019 i.e. using the most recent Climate Change Methodology projections

- The Weather Stations will generally be the same, other than Yeovilton which will now be used for LDZ SW <u>and</u> Durham will be used for the Solar Radiation data for LDZ NO.

Modelling Approach 2020 – End User Categories

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

- Based on the above 'EUC line-up' there would be 39 EUCs per LDZ

Modelling Approach 2020 – Gas Demand EUC Modelling

- Post validation of the Daily Gas Consumption Data it will be necessary to 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 27th 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 detail in Appendix 4 of the Modelling Approach 2020 document

- In summary analysis is performed to assess the impacts of:
  - Warm Weather 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 of the Modelling Approach 2020 document

- Results of the Gas Demand EUC Modelling will be presented for review and approval at the 18th May Technical Workgroup (TWG) meeting

Modelling Approach 2020 – 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 (review of this approach scheduled in Autumn 2020)

- The [3] years used in Demand Model Smoothing will use Daily Gas Consumption Data from years 2017/18, 2018/19 and 2019/20

- [3] year Demand Model Smoothing will be applied along with existing weightings for each individual year (i.e. 33:33:34) - as agreed in Autumn 2018 (DESC approved continued use of Demand Model Smoothing)

- Appendix 6 of the Modelling Approach 2020 document provides a detailed description of how the Demand Model Smoothing shall be applied

Modelling Approach 2020 – 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: The differences in ALPs, DAFs and PLFs calculated this years will reflect the behaviour observed in the latest [3] years of Gas Demand EUC Models and the changes as a result of the new CWVs and SNCWV

- The publication of the first draft of Gas Demand Profiles is expected by 5th June

- Discussions around the ongoing need (or not) for the application of 'Uplift Factors' in order to influence UiG will need to be considered by DESC

- Fall-back position:
  - In the event the Gas Demand Profiles derived from the 2020 analysis are rejected by DESC, the underlying demand models from 2019 would be used - referred to as 'fall-back' proposals (UNC Section H) – but re-stated on the new weather basis

Modelling Approach 2020 – NDM Algorithms Booklet

- NDM Algorithms Booklet summarising the end to end process followed will be produced

- Parameters for all Smoothed Demand Models to be published in an Appendix to the 2020 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 2018/19

- 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 / 2020-21 Gas Year

- Note: Gas Demand Profiles are now available in the public area of Xoserve's website following DESC's decision last year here (scroll to the bottom of the page)

Modelling Approach 2020 – Industry Consultation

- The modelling approach will include regular checkpoints for TWG and DESC to review and approve as well as wider Industry Consultation

- 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

Demand Estimation Timetable 2020

High Level View of Demand Estimation Timetable 2020 - Key Checkpoints

PHASE	JAN'20	FEB'20	MAR'20	APR'20	MAY'20	JUN'20	JUL'20	AUG'20	SEP'20	OCT'20	NOV'20	DEC'20
1. MODEL PRINCIPLES												
Modelling Approach 2020 Approved (DESC)		10th Feb										
2. Data COLLECTION & VALIDATION												
Daily Gas Consumption Data validated (CDSP)				15th Apr								
3. MODEL DEFINITION												
Agree Data Aggregations / WAR Band Limits (TWG)				27th Apr								
4. MODEL FITTING												
Gas Demand EUC Modelling review (TWG)					18th May							
5. MODEL APPLICATION												
Publication of Draft Gas Demand Profiles (CDSP)						5th Jun						
Gas Demand Profiles Approved for wider industry (TWG/DESC)							6th Jul					
Final Approval of Gas Demand Profiles (DESC)							22nd Jul					
6. MODEL OUTPUT IN USE												
SAP-ISU and Gemini updated (CDSP)								15th Aug				
7. MODEL DEVELOPMENT												
Adhoc Work-plan approved (DESC)							22nd Jul			5th Oct		
8. MODEL PERFORMANCE												
Strands 1 to 3 reviewed (DESC)												7th Dec

Modelling Approach 2020 – DESC Decision

- 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 of the Modelling Approach 2020 ?

    – DESC Members to vote