NDM Algorithm Consultation

Industry Responses Summary and Conclusions
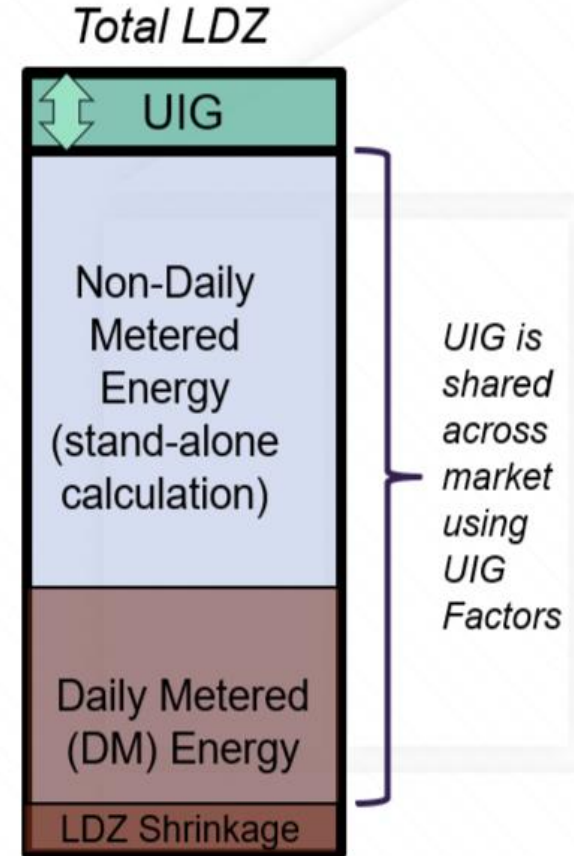
December 2020

Objective

- Reminder of reasons for Industry Consultation on the future of NDM Algorithm and the Consultation objectives

- Provide Summary of Key Messages from Industry Responses and Conclusions

- Provide Update on recent DESC enhancements to Demand Modelling

- Provide suggested Next Steps and Indicative Timeline

NDM Algorithm Consultation

Background, Objectives and Timetable

NDM Algorithm – Background to Consultation

- The Unidentified Gas (UIG) Task Force undertook several phases of Machine Learning investigation. Aims were to better understand drivers of UIG and identify options to reduce levels/volatility of daily UIG

- After initial investigations the focus of Machine Learning has been on improving the Non-Daily Metered (NDM) estimation algorithm to reduce UIG, as this was shown to be a major contributor to daily UIG – Task Force finding 13.2.6 suggests a reduction in base UIG of up to 70% on average

- UNC Demand Estimation Sub-Committee (DESC) now has an obligation to review the NDM Algorithm formula every three years (UNC H2.2.2)

- An Industry consultation on the future of the NDM Algorithm was established to understand industry's 'red-lines'

- More background information to the consultation is available here

Total LDZ

UIG

Non-Daily Metered Energy (stand-alone calculation)

Daily Metered (DM) Energy

LDZ Shrinkage

UIG is shared across market using UIG Factors

NDM Algorithm - Consultation Objectives

- All participants in the Gas Industry were invited to provide their views on the future of the NDM Algorithm via a 4 week consultation which concluded on Friday 20th November

- Consultation objectives:

  - To gather quantitative information from a wide range of gas industry participants on the level of support for improvements in the Non-Daily Metered (NDM) gas allocation algorithm, including the use of Machine Learning techniques

  - To gather additional information on whether there is a requirement to retain the existing NDM gas allocation formula and its component parameters

  - To gather industry participants' views on the future direction of the NDM sector of the GB gas market, to help assess the business case for changes to it

  - To quantify any financial benefits of a reduction in UIG due to improvements in the NDM allocation algorithm

NDM Algorithm - Consultation Timetable

- Advanced Notice of Consultation issued: **16th October 2020**

- Invitation to Consultation issued : **23rd October 2020**

- Background Briefing / Q&A Sessions: **26th October 2020 and 3rd November 2020**

- Consultation Closes for Responses: **20th November 2020**

- Summary of Results / Responses published: **w/c 30th November 2020**

- Results/Conclusions presented to Industry Forums:

    - Demand Estimation Sub-Committee (DESC): 7th December 2020
    - Results presented to Distribution Work Group: 14th December 2020
    - Results presented to DSC Contract Management Committee: 16th December 2020

NDM Algorithm Consultation

Industry Responses - Results, Key Messages and Conclusions

NDM Algorithm – Industry Responses

- Responses were gratefully received from 8 UNC parties. Thanks to E.ON, Gazprom Energy, SSE Energy, Scottish Power, Total Gas & Power, Cadent and 2 other parties

- Where permission was granted, the individual responses are available to view here

- A summarised conclusions document has been produced which provides an analysis of the responses and brings comments together in one place, this can be viewed here

- Slides 9 to 14 provide a summary of the results and conclusions

NDM Algorithm – Summary of Industry Responses

- **Consultation Objective:**

  "To gather quantitative information from a wide range of gas industry participants on the level of support for improvements in the Non-Daily Metered (NDM) gas allocation algorithm, including the use of Machine Learning (M/L) techniques"

Question 1	Answer	Responses	Result
"Do you support the industry's efforts to improve the accuracy of the NDM gas allocation algorithm?"	Yes	8	100%
	No	0	0%

Question 2	Answer	Responses	Result
"How strongly do you support the industry's efforts to improve the accuracy of the NDM gas allocation algorithm, on a scale of 1 to 5? Please provide a brief explanation of your reasons"	5 – Strongly Support	6	75%
	4 – Somewhat Support	1	12.5%
	3 – Neither oppose nor support	1	12.5%
	2 – Somewhat oppose	0	0%
	1 – Strongly oppose	0	0%

- **High Level Verdict (based on scores/comments):**

  - Overwhelming support to continue to explore options for improving the accuracy of NDM allocation

  - Acknowledgement of the benefits this can have in reducing volatility and overall levels of UIG

9

NDM Algorithm – Summary of Industry Responses

- **Consultation Objective:**

  "To gather quantitative information from a wide range of gas industry participants on the level of support for improvements in the Non-Daily Metered (NDM) gas allocation algorithm, including the use of Machine Learning (M/L) techniques"

Question 3	Answer	Responses	Result
"Do you support the use of Machine Learning as the future approach to NDM demand modelling?"	Yes	7	88%
	No	1	12%

Question 4	Answer	Responses	Result
"How strongly do you support the use of Machine Learning as the future approach to NDM demand modelling, on a scale of 1 to 5? Please provide a brief explanation of your reasons"	5 – Strongly Support	2	25%
	4 – Somewhat Support	1	12.5%
	3 – Neither oppose nor support	4	50%
	2 – Somewhat oppose	0	0%
	1 – Strongly oppose	1	12.5%

- **High Level Verdict (based on scores/comments):**

  - Support for M/L was only supported in a regime where the annual parameters (i.e. ALPs/DAFs) are retained

  - Any changes from existing modelling approach needs to be proven with parallel running alongside a full industry impact assessment to customer's systems

NDM Algorithm – Summary of Industry Responses

- **Consultation Objective:**

  "To gather additional information on whether there is a requirement to retain the existing NDM gas allocation formula and its component parameters "

Question 5	Answer	Responses	Result
"Do you require access to a set of parameters ahead of the gas year to allow you to forecast/ simulate NDM gas allocation (as currently provided by Annual Load Profiles and Daily Adjustment Factors - ALPs and DAFs?"	Yes	7	88%
	No	1	12%

Question 6	Answer	Responses	Result
"How strongly do you support the need to retain a set of annual parameters (e.g. ALPs and DAFs) in the NDM gas allocation algorithm, on a scale of 1 to 5? *Please provide a brief explanation of your reasons"*	5 – Strongly Support	6	75%
	4 – Somewhat Support	0	0%
	3 – Neither oppose nor support	1	12.5%
	2 – Somewhat oppose	1	12.5%
	1 – Strongly oppose	0	0%

- **High Level Verdict (based on scores/comments):**

  - It was clear from all the comments that retaining access to a set of parameters ahead of the Gas Year, specifically the ALPs and DAFs, is very important to customers

  - Moving away from this approach will have significant impacts to customers' systems as the parameters are used in several areas of the business (not just NDM settlement)

11

NDM Algorithm – Summary of Industry Responses

- **Consultation Objective:**

  "To gather industry participants' views on the future direction of the NDM sector of the GB gas market to help assess the business case for changes to it"

Question 7	Years from now	% of market which is NDM (avge of responses)
"What proportion of the GB gas market do you believe will still be NDM in 2, 5 and 10 years? Please provide a brief explanation of your reasons?"	2	*Insufficient Data received to make assessment
	5	
	10	

Question 8	Years from now	% of portfolio which is NDM (avge of responses)
"What proportion of your portfolio do you believe will still be Non-Daily Metered in 2, 5 and 10 years?"	2	*Insufficient Data received to make assessment
	5	
	10	

*Majority of responses did not include a view of forecast market or portfolio numbers

- **High Level Verdict (based on scores/comments):**

  - Several responses refer to SMART meter roll out and the expectation of easier remote access to more granular read information

  - Responses suggest that the requirement to estimate NDM demand will continue to be needed in the short/medium term, confirming there is enough 'life' left in the NDM Algorithm to seek more improvements in the approach to demand modelling

NDM Algorithm – Summary of Industry Responses

- **Consultation Objective:**

  "To quantify any financial benefits of a reduction in UIG due to improvements in the NDM allocation algorithm"

Question 9	Financial Benefit (avge of responses)
"Can you attribute a financial benefit to a reduction in UIG levels, even if this is due to an increase in NDM Allocation? (a more accurate NDM Algorithm could result in higher NDM Allocations and lower UIG). If so, please quantify (e.g. a reduction of x% in average UIG would result in a cost saving of £y per annum	***Insufficient Data received to make assessment**

*Majority of responses did not include a financial benefit or felt it was commercially sensitive

- **High Level Verdict (based on scores/comments):**

  - Limited information provided due to commercial sensitivity

  - Clear that there is less risk to the industry if the initial allocation / UIG can be improved thus reducing subsequent reconciliation / UIG volumes

NDM Algorithm – Headline Conclusions

- Strong support from all respondents to seek improvements to the performance of the NDM Algorithm, with many referencing the consequential benefits of lower/less volatile UIG

- Qualified support for Machine Learning (M/L). Most responses happy to consider an option where M/L is used to improve the existing parameters (i.e. ALPs/DAFs) but **NOT** to move to a fully 'Blackbox' approach

- Any significant changes from the current approach to Demand Modelling which results in the use of advanced analytical techniques (e.g. Machine Learning) should be proven using simulation and/or parallel running with clear benefits to the industry demonstrated

- Strong support from most respondents to continue with the current NDM Algorithm and to retain its existing parameters i.e. ALPs and DAFs. Very clear that these are embedded across the industry for not just NDM allocation but several other processes

- Responses suggest there will continue to be a requirement to estimate NDM demand for several years to come and so investigating alternative options would not be wasted effort
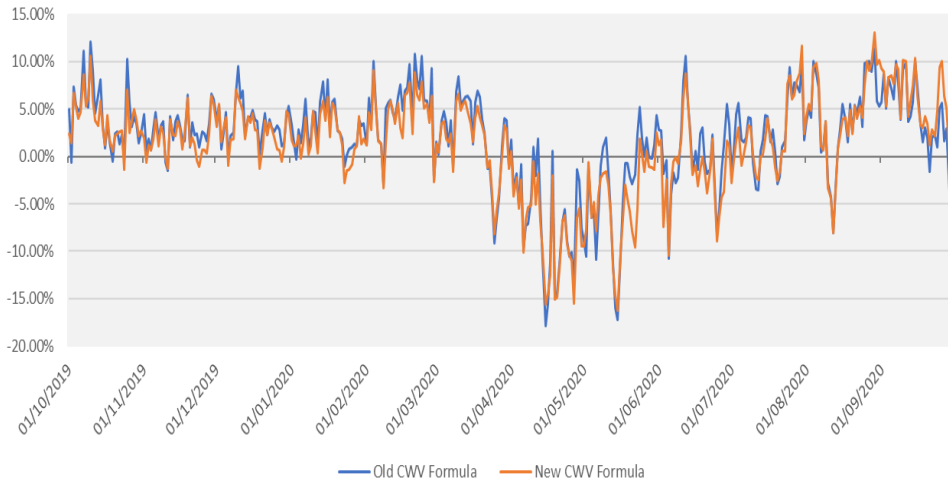
NDM Algorithm Consultation

Update on DESC Demand Modelling Initiatives

NDM Algorithm – DESC Improvements

- In recent Gas Years there have been developments to the EUC demand modelling approach which are increasing the accuracy of the NDM Allocation process (and therefore UIG)

- Gas Year 2019/20 saw the introduction of additional End User Categories (EUCs) for Bands 1 and 2 (0-293 MWh pa). This further refinement has allowed more suitable profiles to be applied
  - Further improvements can be made here by ensuring the industry's view of key data items is maintained to keep EUC assignment upto date and accurate

- Gas Year 2020/21 has seen the introduction of a revised Composite Weather Variable (CWV) formula. This includes the use of a Solar Radiation term which helps to 'explain' more of the gas demand behaviour, particularly around 'shoulder periods'
  - Simulation of UIG levels in Gas Year 2019/20 has been performed as part of DESC's Algorithm Performance analysis and this has shown the new CWV and 2020 EUC Demand Models would have reduced average UIG and volatility overall and particularly so in the 'pre-COVID' period

- 'Bitesize' extracts of key slides from 7th December 2020 DESC results shown overleaf

Daily Observed UIG and New CWV Formula UIG Simulation

National UIG % by Gas Day 2019/20

LDZ Average UIG (Autumn & Winter)			
LDZ	Old CWV Formula	New CWV Formula	% Improvement
EA	1.89%	1.33%	▲ 29.70%
EM	2.15%	0.93%	▲ 56.87%
NE	5.43%	4.06%	▲ 25.16%
NO	4.77%	4.77%	▬ 0.00%
NT	2.04%	1.74%	▲ 14.41%
NW	6.60%	5.98%	▲ 9.29%
SC	4.84%	3.99%	▲ 17.58%
SE	0.68%	-0.29%	▲ 56.81%
SO	3.37%	2.70%	▲ 19.68%
SW	4.16%	2.34%	▲ 43.73%*
WM	2.68%	2.18%	▲ 18.70%
WN	3.47%	3.08%	▲ 11.38%
WS	4.15%	3.16%	▲ 23.80%

- A reduction in the negative and positive peaks would have been seen using the 2020 Demand Models <u>and</u> New CWV Formula

- Daily national average UIG at D+5 on the new weather basis would have been 1.31% compared to the actual 1.91% on the old weather basis

- This simulated result equates to a reduction in UIG of c.31% which is a very positive outcome and supports DESC's changes to the CWV formula

- During more 'normal' times, prior to the impacts of COVID-19, (i.e. October 2019 to March 2020) the average UIG for 12 of 13 LDZs would have reduced significantly – also represents the period where UIG volumes are its highest

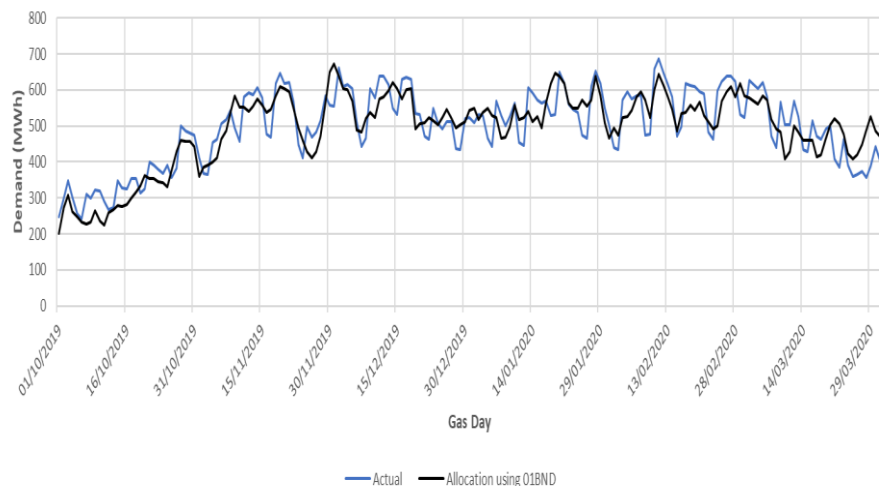- Results are encouraging and supports the changes to the CWV formula made by DESC

* Different Weather Stations for 'SW' (Old CWV – 'Filton', New CWV – 'Yeovilton')

17

New EUC Definitions – Band 1 I&C

Daily Actual & Allocated Demands (Model) - Band 01BNI (Winter - assessed against I&C Sites)
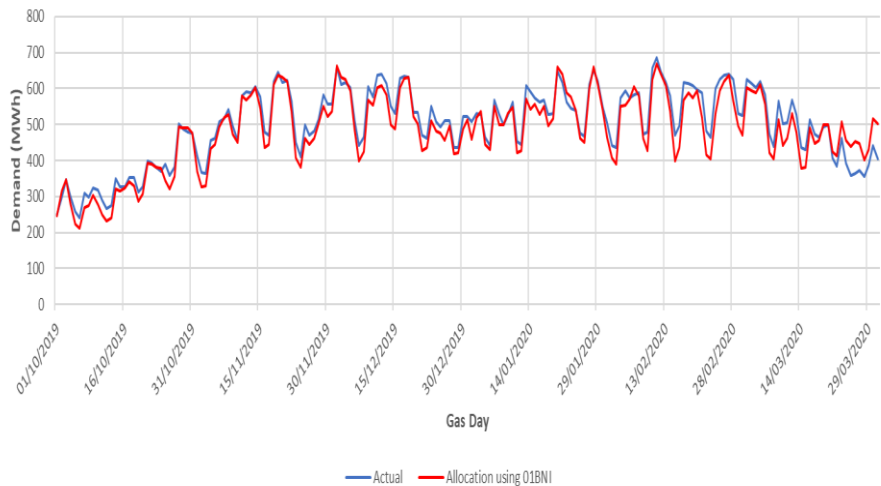
Daily Actual & Allocated Demands (Model) - Band 01BND (Winter - assessed against I&C Sites)

- These charts show a comparison of the "01BNI" sites against its assigned EUC (left) and the 'traditional' "01BND" profile (right)

- The closer alignment between 'Actual' and the '01BNI Allocation' confirm that the decision to introduce more refined EUCs into Bands 1 and 2 was necessary

- Prior to Gas Year 2019/20 the whole Band 1 population was allocated using 1 Domestic profile ("01B")

- There are circa 560,000 meter points now benefiting from a more appropriate I&C profile (as at 1st Nov 2020)

18

NDM Algorithm – DESC Improvements

- Results clearly show that DESC are implementing initiatives that are improving the Demand Modelling process and these changes should be given time to allow an assessment

- The full set of Algorithm Performance results for 7th December 2020 DESC are available [here](#)

- Further DESC initiatives could include enhancing the CWV formula again by implementing a 'precipitation term' should analysis reveal more improvement could be gained in the CWV vs Demand relationship

- DESC's current Autumn/Winter workplan also includes reviewing the effectiveness of Holiday Code rules and the Model Smoothing Methodology

- The industry could also support the improvement of NDM allocation further by:
    - Providing Prepayment data to allow more accurate upto date "01BPD" demand profiles to be built
    - Ensuring all key data items on the Supply Point Register are upto date and accurate e.g. Market Sector Code, Meter Mechanism and Payment Method
    - Ensuring all sampling data provided to CDSP is quality checked prior to submission

- DESC initiatives do not detract from exploring more advanced analytical techniques (e.g. Machine Learning) but does show that improvements are being made and support some of the UIG task Force recommendations

NDM Algorithm Consultation

Modelling Timeline and Next Steps

Reminder of Demand Modelling Annual Timetable

- The 'Approach' for performing the Demand Modelling in preparation for the calculation of Gas Demand Profiles for Gas Year 2021/22 needs to be approved at the end of February 2021 meaning no significant changes can be made for that Gas Year, however recent DESC initiatives will be making a difference

Calendar Year 2021: Production of Gas Demand Profiles for Gas Year 2021/22											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	Approve Demand Modelling Approach										
		NDM Sampling Data Collection and Validation									
			Demand Modelling and Production of Gas Demand Profiles								
					DESC and Industry Consultation						
							Update Systems / Submit EUC Definitions to Customers				
								New AQs / EUCs calculated for NDM Population			
									Gas Year 2021/22 Go Live		

- Any alternative Demand Modelling Approach to be used for Gas Year 2022/23, using more advanced analytical techniques will need to be investigated, tested, reviewed and agreed by the industry in time for February 2022

NDM Algorithm – Next Steps

- Assess feedback from customers at industry forums in December

- DESC's review of the NDM Algorithm will be difficult to complete during it's 'normal business' and current meeting schedule in 2021 (not frequent enough)

- To keep focus, quick progress and to increase visibility of options and discussions the CDSP is recommending a UNC Review Group be established

- Objective would be to investigate whether the use of advanced analytical technique options e.g. Machine Learning, in the derivation of the parameters used in the current NDM Algorithm could further improve the accuracy of the NDM allocation and subsequent UIG
    - Simulation and parallel running, similar to the results on slides 17/18, would be necessary to demonstrate the benefits of any alternative options

- An industry party would be required to sponsor the UNC Review Group

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Any Questions ?