



Demand Estimation Sub Committee

Seasonal Normal Review 2020:

High Level Approach to SNCWV calculation

5th November 2019

Overview – DESC Obligations

- During 2019 DESC are reviewing / revising the Composite Weather Variable (CWV) formula AND the basis for deriving the Seasonal Normal Composite Weather Variable (SNCWV)
- Why ? - Reminder of DESC's UNC Section H obligations:
 - “1.4.3 The Committee will, at appropriate frequencies determined by it, **review** and where appropriate **revise** (with effect from the start of a Gas Year) the **formula** by which the **Composite Weather Variable** for an LDZ will be determined.”
 - “1.5.3 The Committee will, at appropriate frequencies determined by it, after consultation with the Uniform Network Code Committee, **review** and where appropriate **revise** (with effect from the start of a Gas Year) the **seasonal normal value** (for each Day in a year) of the Composite Weather Variable for an LDZ.”
- More information on background to Seasonal Normal Review 2020 [here](#)

Overview - Milestones

- At the 10th December 2018 meeting DESC approved the following high level approach and work plan for performing this analysis - major milestones below:
- **MILESTONE:** DESC to decide whether to consider a revision to the existing **CWV** formula and confirm the template for its 'benchmark' results (1st April 2019) ✓
- **MILESTONE:** DESC define proposed **CWV** formula for next period i.e. GY 2020/21 onwards (8th July 2019) ✓
- **MILESTONE:** DESC confirm parameters for use in proposed **CWV** formula for Gas Year 2020/21 (7th October 2019): ✓
- **MILESTONE:** DESC decide to revise existing **SNCWV** (8th July 2019) ✓
- **MILESTONE:** DESC confirm revised **SNCWV** values (9th December 2019)

Seasonal Normal Review Meeting Timetable 2019

High Level View of Seasonal Normal Review in 2019 - Key Checkpoints

PHASE	JAN'19	FEB'19	MAR'19	APR'19	MAY'19	JUN'19	JUL'19	AUG'19	SEP'19	OCT'19	NOV'19	DEC'19
TWG REVIEW CWV and SNCWV												
Update on Seasonal Normal Review (DESC)		11th Feb										
DESC MILESTONE												
DESC to confirm plan to Review CWV and SNCWV Review				1st Apr								
TWG REVIEW OPTIONS FOR CWV FORMULA												
Update on review of CWV formula (TWG)				24th Apr								
Update on review of CWV formula (TWG)					13th May							
Update on review of CWV formula (TWG)						10th Jun						
DESC MILESTONE												
DESC define proposed CWV Formula (DESC)							8th Jul					
TWG COMPLETE CWV OPTIMISATION												
Adhoc Meetings									23rd Sep			
DESC MILESTONE												
DESC confirm parameters in CWV formula (DESC)										7th Oct		
TWG CALCULATE SNCWV												
Review High Level Approach to SNCWV (DESC)											5th Nov	
DESC MILESTONE												
DESC confirm SNCWV values (DESC)												9th Dec

- A number of meetings this year where Seasonal Normal Review has been discussed

Objective

- Following DESC's decision to change the CWV formula and agree a revised set of optimised values, it is necessary to revise the SNCWV
- To calculate revised SNCWV values we require a methodology
- Objective of Presentation:
 - Review at a high level the approach to how the SNCWV shall be calculated and identify any dependencies
 - Seek DESC approval of the proposed methodology to Derive the Seasonal Normal Basis to be implemented in Gas Year 2020/21

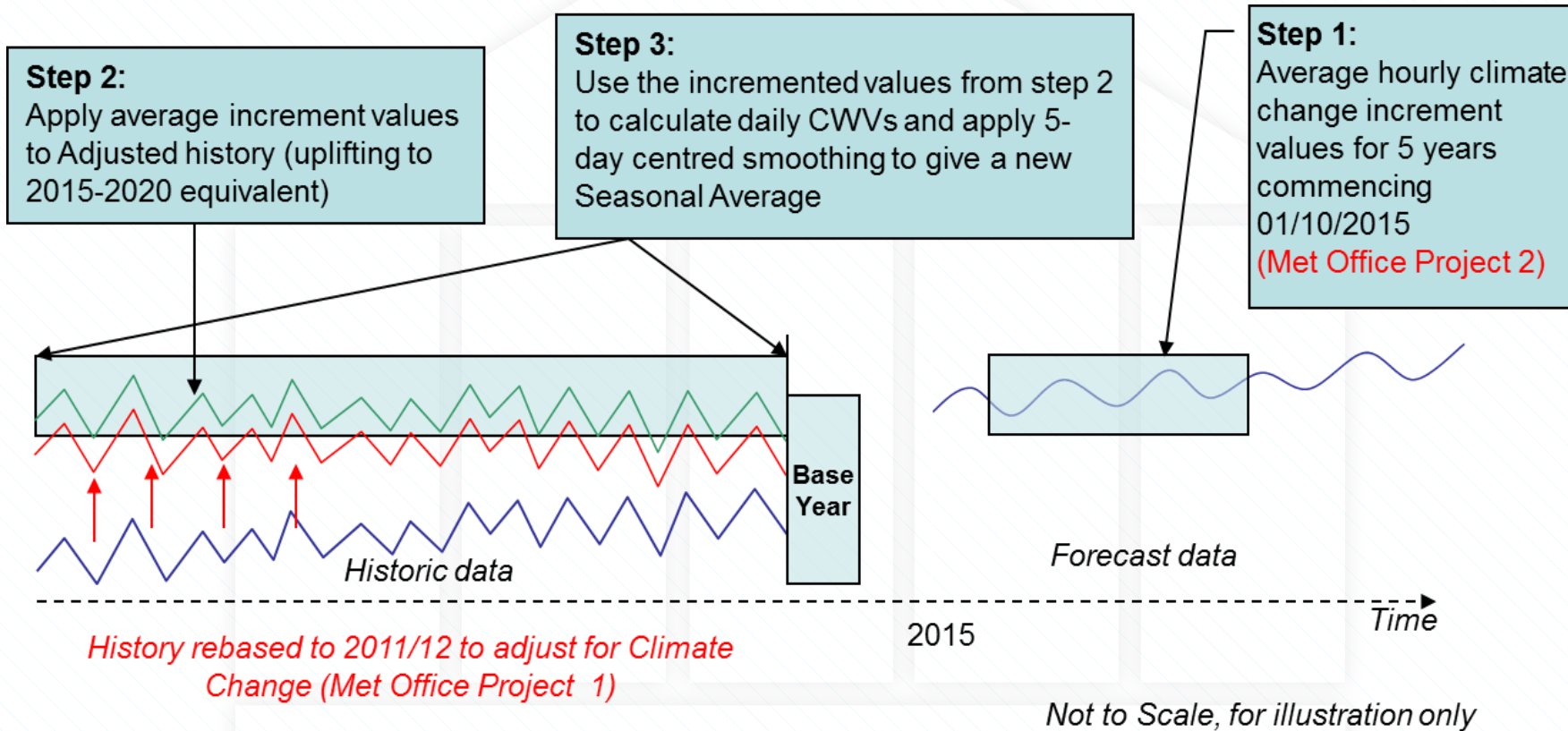
Background – Calculating the SNCWV

- To calculate the Seasonal Normal Composite Weather Variable (SNCWV) you require:
 - An agreed formula for calculating the Composite Weather Variable (CWV)
 - Agreed optimised CWV parameters
 - Historic weather data (1960 onwards)
 - View of future average weather
 - Agreed methodology for calculating SNCWV

Background - Current Approach to SNCWV

- In 2014, DESC procured a Climate Change Methodology (CCM) and a series of datasets for the gas industry weather stations, including future temperature projections for the period 2015 to 2025 (deliberately covering 2 SN Review periods)
- In addition to the projections the historical weather data was adjusted to a 'base year' of 2011/12
- The increments along with adjusted historical weather were used to calculate a set of CWVs for the period 1st October 1960 to 30th September 2012
- Average values of CWV for each day along with a smoothing approach derived the SNCWV values we use today

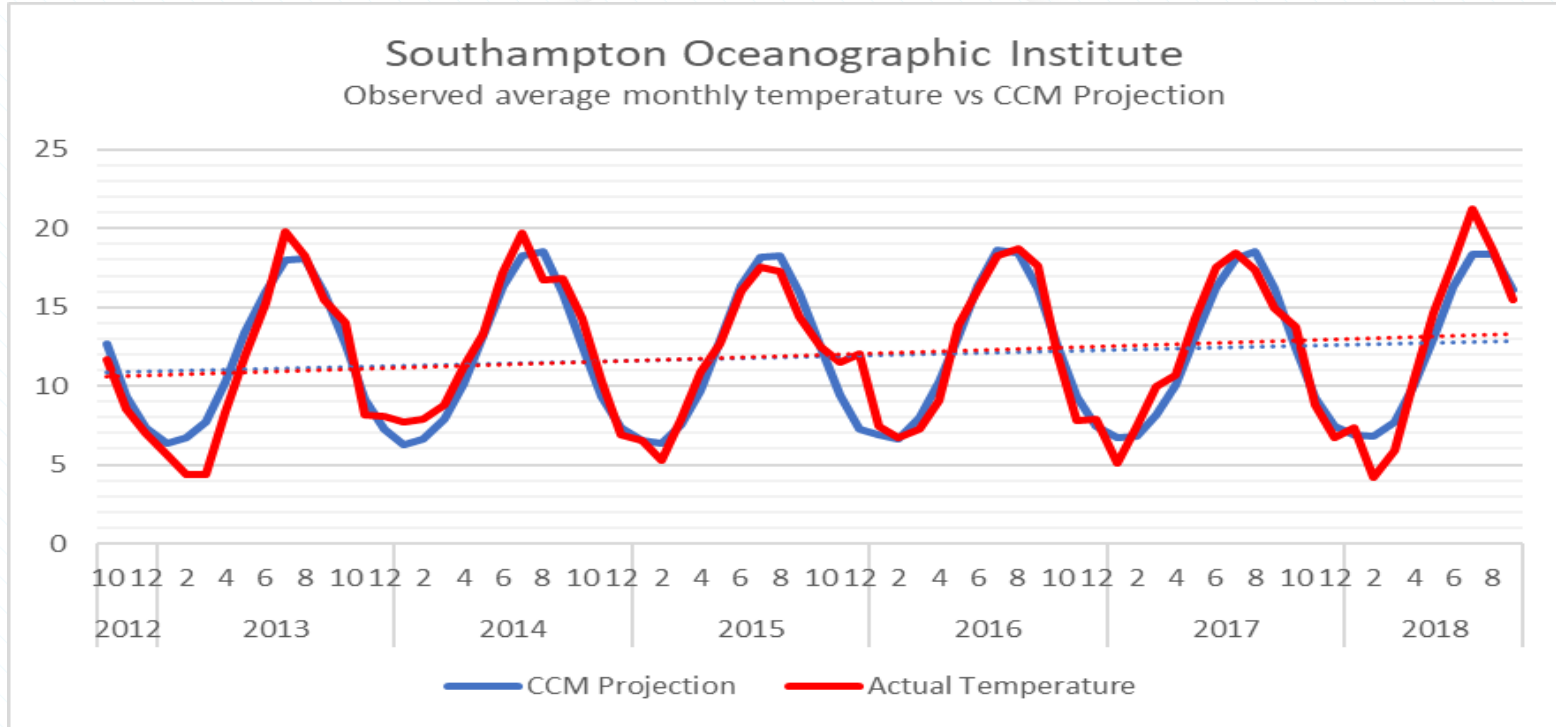
Background - Previous Approach to SNCWV (visual)



Review of CCM Data

- DESC reviewed the CCM output in November 2017 and were satisfied it remained valid without the requirement for a fresh procurement – see results [here](#)
- The current SNCWV values have also recently been analysed at DESC in July 2019. Results confirmed it was a good benchmark of average weather in terms of ‘shape’ and ‘levels’ - see results [here](#)
- In addition to the above Xoserve has performed some additional analysis to provide further confidence in the existing CCM outputs, particularly temperature (the one weather data item which the Met Office concluded was impacted by climate change)
- Xoserve has compared the CCM temperature projections from 2012/13 to 2018/19 with the actual observed temperatures and applied the Met Office’s own test for validating the correlation (as defined in the CCM document)

Example of CCM comparison



- Charts for other Gas Industry weather stations available if required

Met Office: Actual vs Projected Temperature

- Validation used in the Climate Change Methodology (CCM) by the Met Office to assess the temperature projections are described below (as referenced in their Executive Summary)
 - Replications of CCM validations performed on the Projected datasets show that the methodology has performed well, with a high correlation (0.95 – 0.97) between projected and observed average monthly temperatures
 - In addition, approximately $10\pm 5\%$ of observations fall outside of the model-derived 5th - 95th percentile confidence interval, the results agree with theoretical expectations and suggest that the model-derived percentiles are representative of the distribution of observations
- The above metrics used as guidelines for Xoserve comparison

Comparison of Actual vs Projected Temperature

LDZ	Temperature Weather Station	Correlation between the Projected and Observed average monthly values	Percentage of Hourly observations which fall outside of the model-derived 5th to 95th percentile Confidence Intervals
NO	Albemarle	0.9597	11.97%
WM	Birmingham Winterbourne	0.9575	10.33%
SC	Glasgow Bishopton	0.9607	10.42%
EA, NT, SE	London Heathrow	0.9564	9.73%
EM, NE	Nottingham Watnall	0.9612	10.13%
NW, WN	Rostherne No2	0.9556	13.18%
SO	Southampton	0.9576	8.26%
WS	St Athan	0.9561	8.07%
SW	Yeovilton	0.9528	11.73%

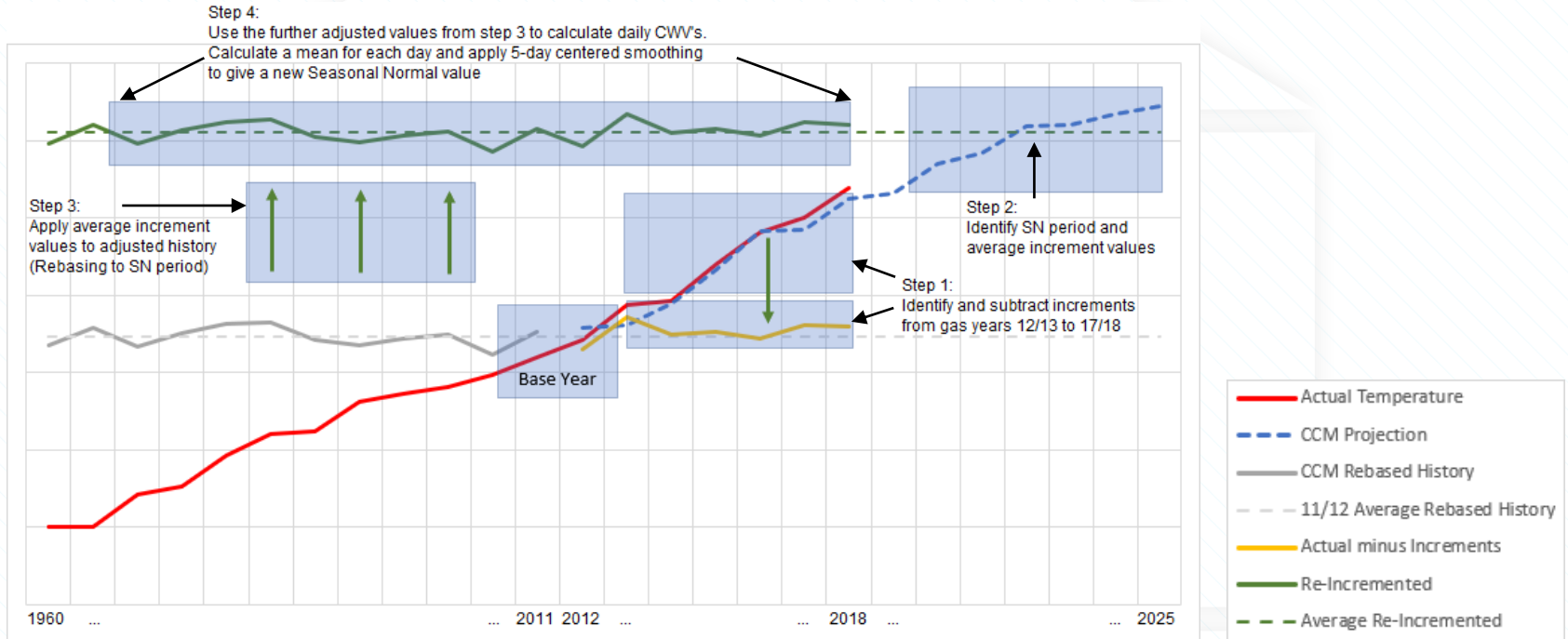
- Results from the Xoserve comparison reveal that all weather stations still maintain a high correlation and fall within the ranges described in the CCM

Proposed Approach for SNCWV

- Xoserve propose to use the existing CCM datasets which contain temperature projections up to 2025 - the period the next SNCWV is likely to cover
- Following on from the 2015 review of the Seasonal Normal Basis, a rebased history for temperature observations at a Gas Year 2011/12 level exists (GY 1960 to GY 2011)
- Subsequent Gas Years which will be used in the derivation of a new Seasonal Normal Basis (2012/13 – 2017/18) will no longer be at this base level, having been 'affected' by the impacts of climate change. There is therefore a need to reduce this data to a '2011/12 level' in line with the rebased history
- Once all data is rebased to a consistent level, the data can then be incremented to an average level which lies between Gas Years 2020/21 to 2024/25, in order to produce a Seasonal Normal value for Gas Year 2020/21 onwards

Proposed Approach for SNCWV Cont.

- The visual below displays the proposed methodology for recalculating the Seasonal Normal
Fig.1 – Not to scale, exaggerated values for illustration only



Proposed Approach for SNCWV Cont.

- In 2014 the Increment values produced in the CCM dataset were derived from a Projected temperature series minus an average 2011/12 base year. Therefore subtracting the Increment values from the projected series will rebase the projections to a 2011/12 level

In 2019 the Actual observed temperature values seen since 2011/12 have a strong correlation with the projected series, it should follow that removing the Increments from the actual temperature values will also rebase them to a 2011/12 level.

- **Step 1** – Subtract CCM increments from the Actual observed temperatures, thus rebasing Gas Years 2012/13 to 2017/18, to a 2011/12 level in line with the CCM output. There will now exist datasets for all weather stations which have a temperature history spanning 1960/61 to 2017/18, all at a common base level of 2011/12.

Proposed Approach for SNCWV Cont.

- **Step 2** – Identify a set of average increments required to rebase the entire history. This rebased history will be used in the calculation of rebased CWV histories and subsequent derivation of the Seasonal Normal Basis, it is therefore required to lie between gas years 2020/21 and 2024/25 inclusive

Following on from the aforementioned review of the current Seasonal Normal basis, the proposed approach is to replicate the previously used methodology which is to average increment values across the entire target period (GY 2020/21 to GY 2024/25)

- **Step 3** – Now that a set of increments have been identified, the values are added to the entire dataset which will re-base it to an appropriate level to be used in derivation of the Seasonal Normal Basis. This is done by adding the hourly values of the increments to the history which has been recalculated at the end of step 1

Proposed Approach for SNCWV Cont.

- **Step 4** – Recalculate a set of revised historical CWVs for the period GY1960 to GY 2017/18 using the rebased Temperatures from the end of step 3 and the unaltered Windspeed and Solar Radiation history (using recently approved infill methodology)

Note: Precipitation is not included in this calculation as it will not be immediately included in the CWV calculation from Gas Year 2020/21 – more DESC analysis needed

- Calculate the mean CWV value for each day for the 58 year history to produce an initial Seasonal Normal profile and smooth using a 5-day centred moving average (in line with previous approach)
- Any questions on the proposed approach ? Are DESC happy to approve ?

Next Steps – Seasonal Normal Review

- Once approval has been gained on the high level approach, a revised version of the 'DESC approach to derivation of Seasonal Normal Basis' document will be produced, detailing every step followed in re-calculating the Seasonal Normal
- No objections to Xoserve's proposed Solar Infill methodology were received

The complete Solar history will be calculated for every weather station and details of infilled data will be published on the secure area of Xoserve's website

- The revised SNCWVs for use from GY 2020/21 will be presented for approval at DESC on 9th December