2.1 Algorithm Performance

(Gas Year 2020/21)

Strand 1 – Weather Analysis

Demand Estimation Sub Committee
14/12/2021

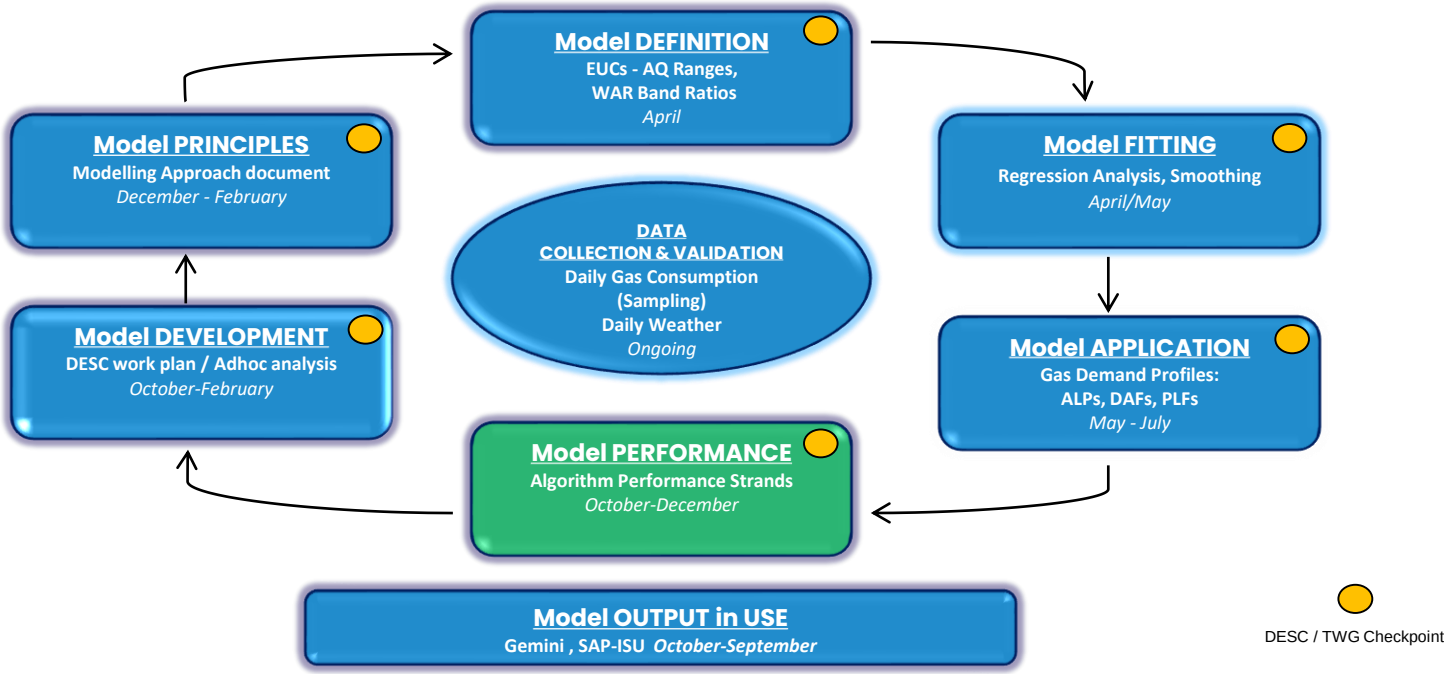
Provided by:

Contents

Section 1: Background

Demand Estimation: Background

- An overview of the Demand Estimation process and output can be found here
- This presentation relates to the "Model Performance" phase 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

Algorithm Performance: Background

The implementation of Project Nexus on 1st June 2017 introduced a revised NDM demand formula, meaning some of the previous Algorithm Performance measures became redundant

Discussions took place at DESC meetings during the build up to Nexus implementation which concluded on the following strands:

- Strand 1 – Weather Analysis
- Strand 2 – Unidentified Gas Analysis
- Strand 3 – NDM Daily Demand Analysis

Section 2: Objectives

Objective of NDM Algorithm Performance

- The purpose of Algorithm Performance is to:
  - Provide confidence in the NDM Supply Meter Demand formula
  - Identify possible areas of improvement for future demand modelling

- Where possible, the aim of each Strand of analysis is to:
  - Provide statistical measures as well as visual representations
  - Develop a more flexible process for Algorithm Performance, allowing us to adapt the data summaries we analyse and how results are presented
  - Carry out 'regional' and 'year on year' comparisons

- Objective of today's session is to review Strands 1, 2, & 3

- Supporting document containing full examples and commentary for each Strand to be published by end of year. This will also be used as Section 12 of next year's NDM Algorithms Booklet.

NDM Supply Meter Point Demand Formula

- The revised NDM demand formula (effective from 1st June 2017) is shown below:

$$SPD_t = ((AQ/365) * ALP_t * (1 + (DAF_t * WCF_t)))$$

Where:
AQ = Annual Quantity
ALP_t = Annual Load Profile
DAF_t= Daily Adjustment Factor
WCF_t= Weather Correction Factor

- Further detail on the above parameters can be found in the 'NDM Demand Estimation Methodology' document.

Strand 1 – Weather Analysis

Background

- The observed Weather conditions on each day and LDZ (expressed as the CWV) influences the NDM gas demand derived by the allocation formula

Objective

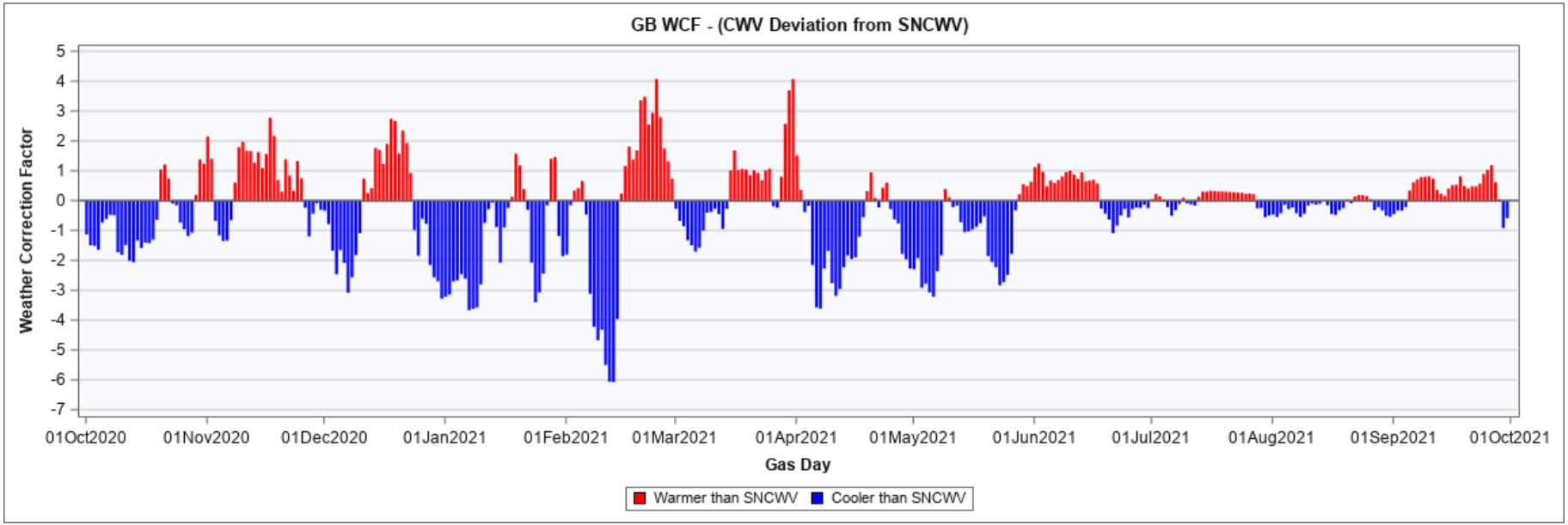
- Share information on the observed weather conditions for Gas Year 2020/21
- Identify periods of unusual weather throughout the Gas Year which may help give further context to further Strands of analysis

Notes

- In order to derive charts/ summaries depicting a national view, 'GB CWV' and 'GB SNCWV' values have been derived based on NDM throughput
- Gas Year 2020/21 has been the first Gas Year to have utilised the new CWV formula including a Solar Radiation term

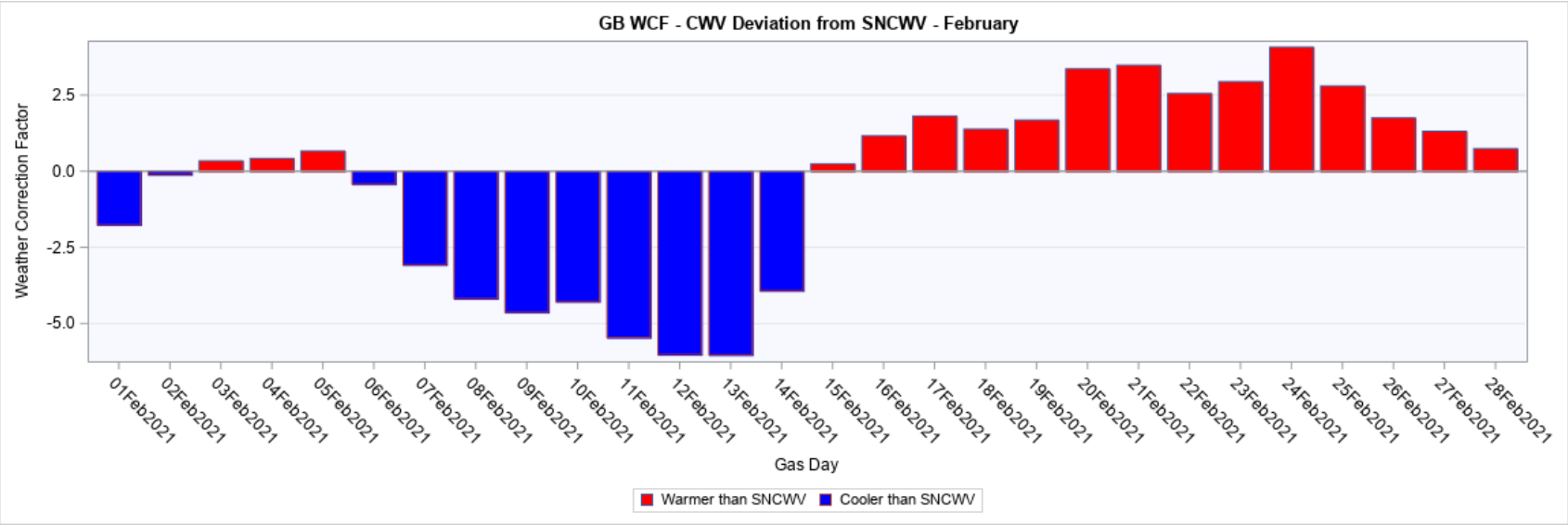
Section 3: Weather Analysis

Strand 1 – Weather Analysis: Daily observations



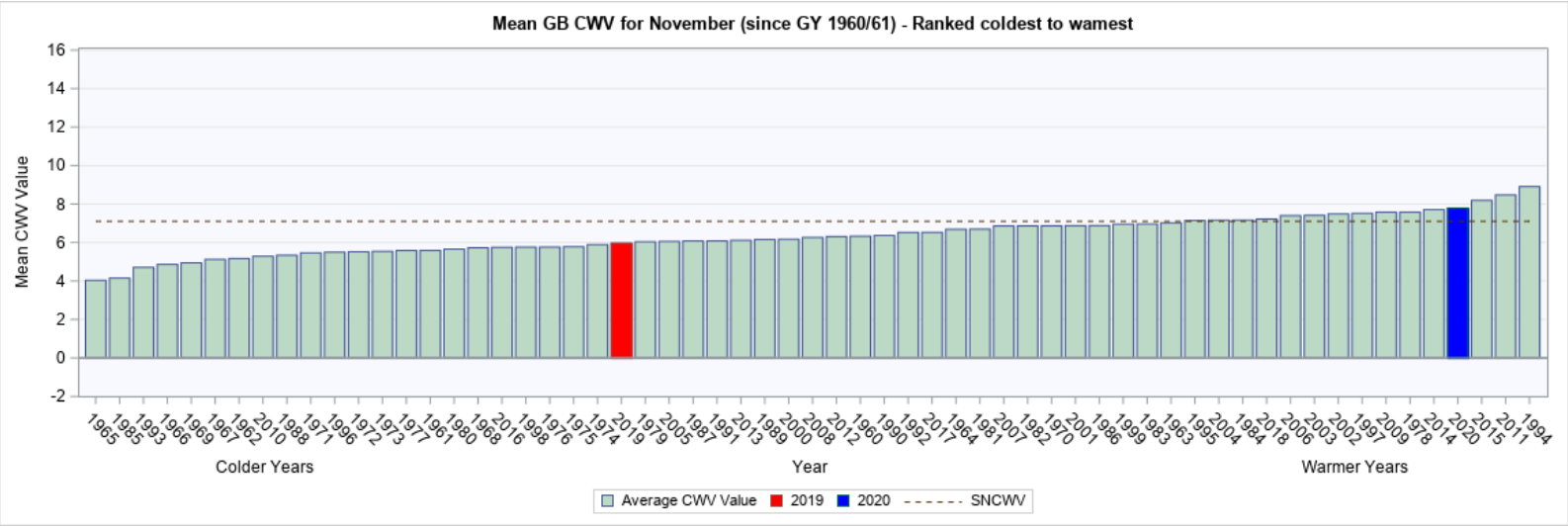
- Chart shows the Weather Correction Factor (WCF) i.e. Actual weather (CWV) – Seasonal Normal weather (SNCWV) throughout Gas Year 2020/21
- April'21 to June'21 appears mostly colder than normal
- A large deviation from the seasonal normal, both positive and negative, can be observed during February 2021

Strand 1 – Weather Analysis – Monthly Assessment



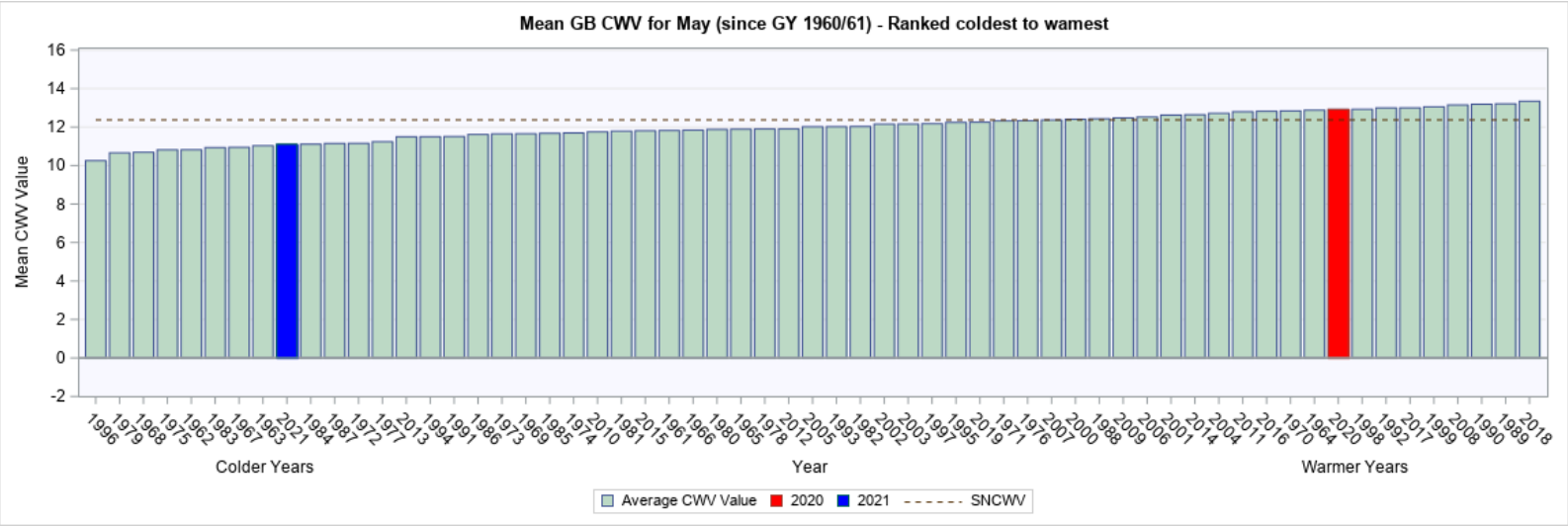
- Chart shows daily comparisons of CWV vs SNCWV throughout February 2021
- Storm Darcy began on 6th February and bought a spell of cold weather lasting until the 14th Feb with weather warnings in place for large parts of the nation. The second half of February was largely warmer than normal.
- Weather correction factors ranged from –6.03 on 13th Feb to +4.07 on 24th Feb. These two gas days are the largest negative and largest positive deviations from SNCWV respectively in Gas Year 2020/21 for GB.

Strand 1 – Weather Analysis – Monthly Assessment



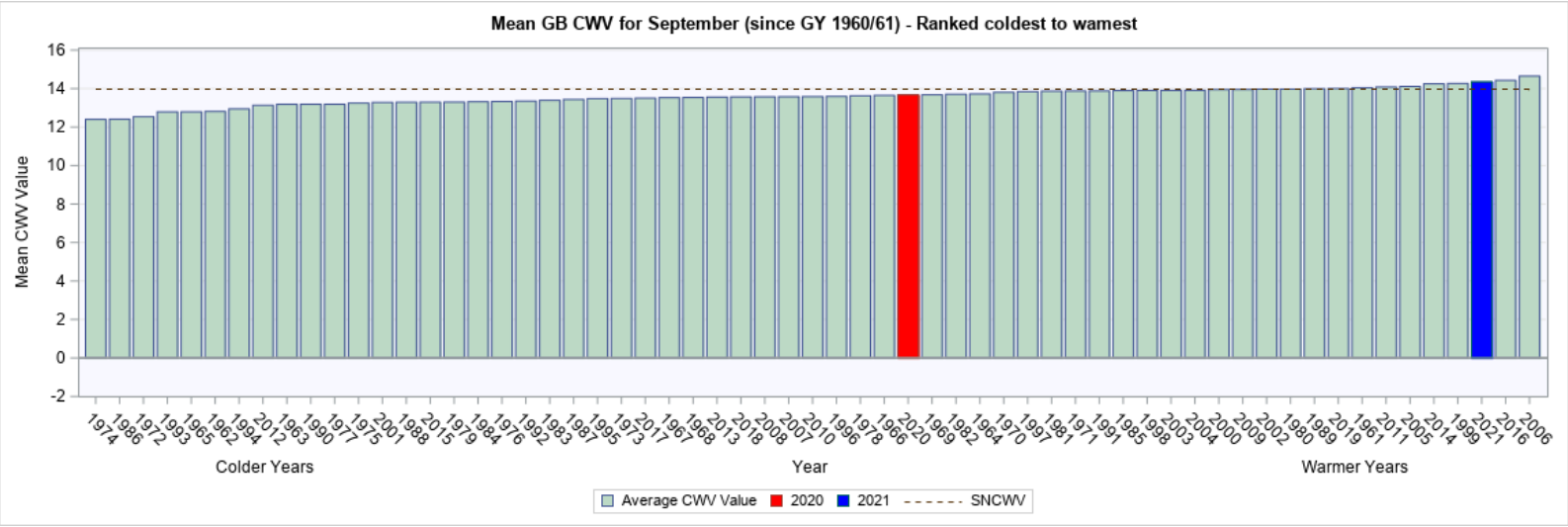
- Chart shows national monthly CWV assessment for each November since Gas Year 1960/61 (November 1960)
- November 2020 was warmer than the seasonal normal basis.
- Ranked as the 4th warmest November since CWV records began.

Strand 1 – Weather Analysis – Monthly Assessment



- Chart shows national monthly CWV assessment for each May since Gas Year 1960/61 (May 1961)
- May 2021 was colder than the seasonal normal basis, the average weather correction factor in May was -1.27 for the calculated GB CWV
- May 2021 Ranked as the 9th coldest May since CWV records began.

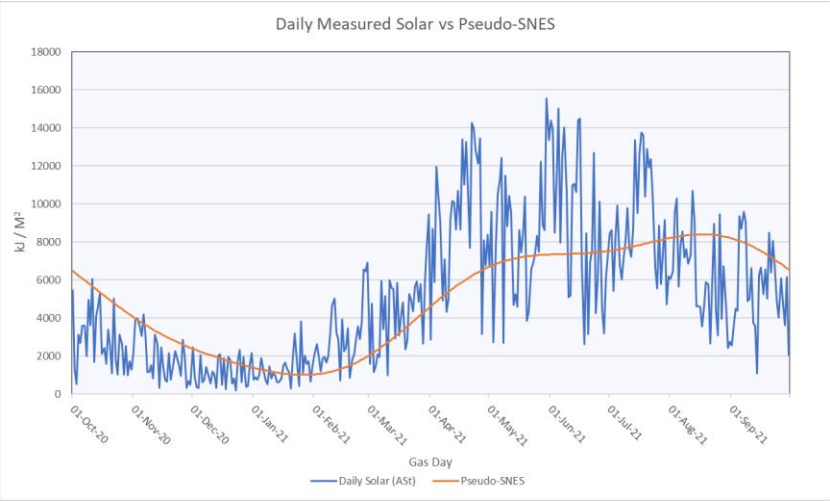
Strand 1 – Weather Analysis – Monthly Assessment

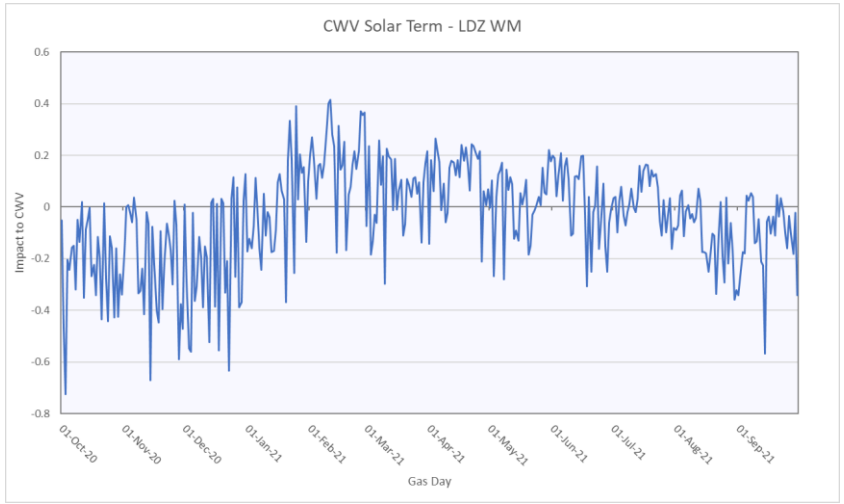


- Chart shows national monthly CWV assessment for each September since Gas Year 1960/61 (September 1961)
- September 2021 was warmer than the seasonal normal basis.
- Ranked as the 3rd warmest September since CWV records began.

Solar Radiation impact on CWV – Gas Year 2020/21

- Following Analysis in 2019 and 2020, Gas Year 2020/21 was the first Gas Year to include a Solar Radiation term in the CWV formula.
- The following charts show the impact Solar Radiation has had on the CWV for LDZ WM

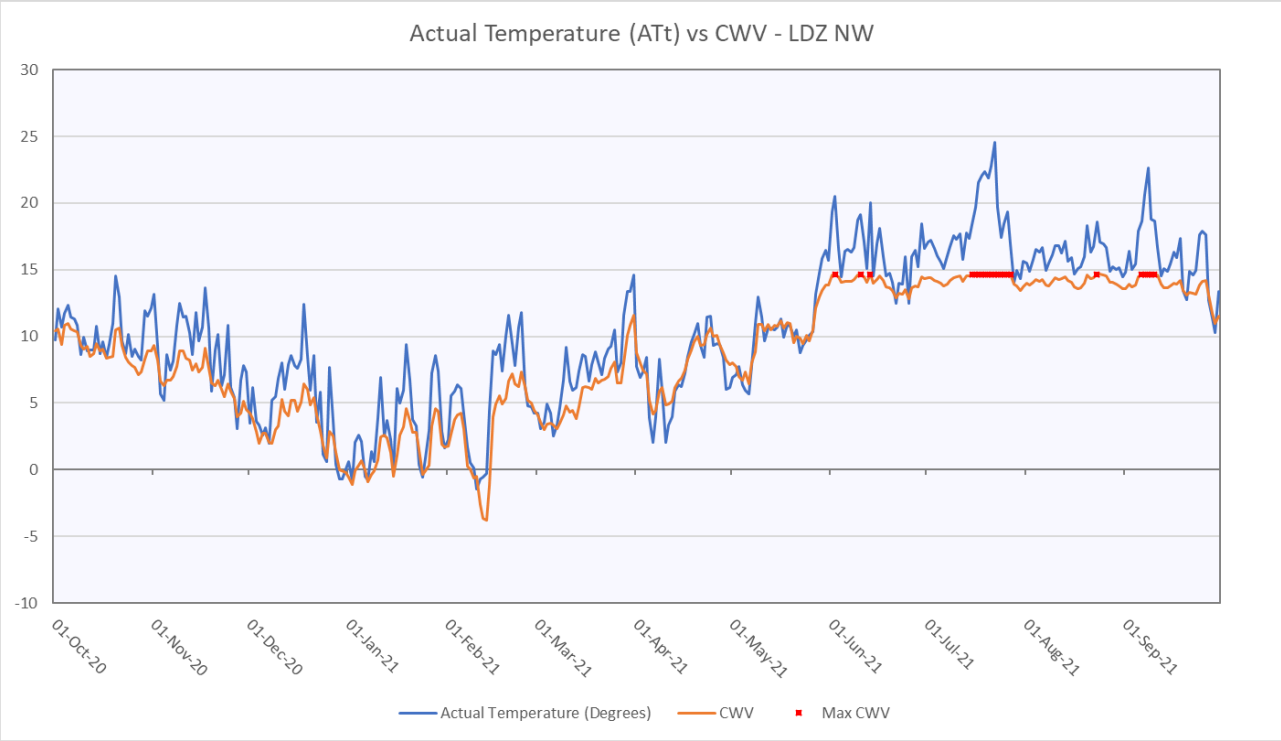




- The effects of demand correction can be seen mainly during the months of September to January, where the SNES profile has caused the Solar Radiation term to be consistently negative.

Temperature vs CWV – Gas Year 2020/21

- Chart shows the daily weighted temperature values, (AT_t) vs the calculated CWV
- Highlighted in red are Gas Days where the CWV has hit it's maximum value and has not increased despite the increase in temperature.
- Max CWV is commonly hit during Summer months. During September 2021, the max CWV was reached for multiple LDZs across multiple Gas Days (Roughly 6th to 10th Sep)



Strand 1 – Weather Analysis: Conclusions

- Overall, the observed weather during Gas Year 2020/21 when compared to current seasonal normal by Degree Day analysis is as follows:
  - Quarter 1 (Oct'20 to Dec '20) was approximately 1.5% cooler than Seasonal Normal
  - Quarter 2 (Jan'21 to Mar '21) was approximately 3.5% cooler than Seasonal Normal
  - Quarter 3 (Apr'21 to Jun '21) was approximately 11.9% cooler than Seasonal Normal
  - Quarter 4 (Jul'21 to Sep '21) was approximately 3.1% warmer than Seasonal Normal

- Top 5 colder than Seasonal Normal days (Lowest WCF), in descending rank:
  - 13th Feb 2021, 12th Feb 2021, 11th Feb 2021, 9th Feb 2021, and 10th Feb 2021

- Top 5 warmer than Seasonal Normal days (Highest WCF) in descending rank:
  - 24th Feb 2021, 31st Mar 2021, 30th Mar 2021, 21st Feb 2021, and 20th Feb 2021

- The stand out Periods of unusual weather were:
  - November 2020 – 4th warmest November since Gas Year 1960/61
  - May 2021 – 9th coldest May since Gas Year 1960/61
  - September 2021 – 3rd warmest September since Gas Year 1960/61
  - February 2021 – Contains the five Gas Days with the lowest WCF (in the analysis year) , and 3 of the 5 Gas Days with the highest WCF (in the analysis year)

- When interpreting the various strands of Algorithm Performance, it is relevant to recall the weather conditions that prevailed during the Gas Year being analysed.