Demand Estimation Sub Committee

4.1 Algorithm Performance Gas Year 2021/22
Strand 1 – Weather Analysis

13th December 2022

Contents

Background – Strand 1: Weather Analysis

- Supply Meter Point Demand Formula (NDM Algorithm) – Section H UNC 2.2.1

- Weather Correction Factor (WCF) represents the difference between the Actual Composite Weather Variable and Seasonal Normal CWV (CWV - SNCWV) on a given Gas Day

- Strand 1: Weather Analysis focusses on the WCF values observed in the Gas Year in order to:
  - Summarise the weather experienced in the Gas Year to provide context to Strand 2 & 3 Analysis
  - Identify any insight which DESC may wish to consider as part of the next CWV formula review

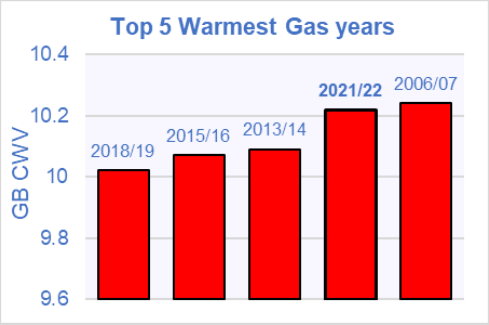
- The analysis includes summarised view of the weather displayed as the "GB CWV“ and “GB SNCWV”, this is a single value of CWV that represents all LDZs based on weighted throughput

Objectives

- Share information on the observed weather conditions for Gas Year 2021/22
- Identify any periods of unusual weather throughout the Gas Year which may help give further context to later strands of analysis
- Share a view of how current Seasonal Normal levels look against observed weather

Executive Summary

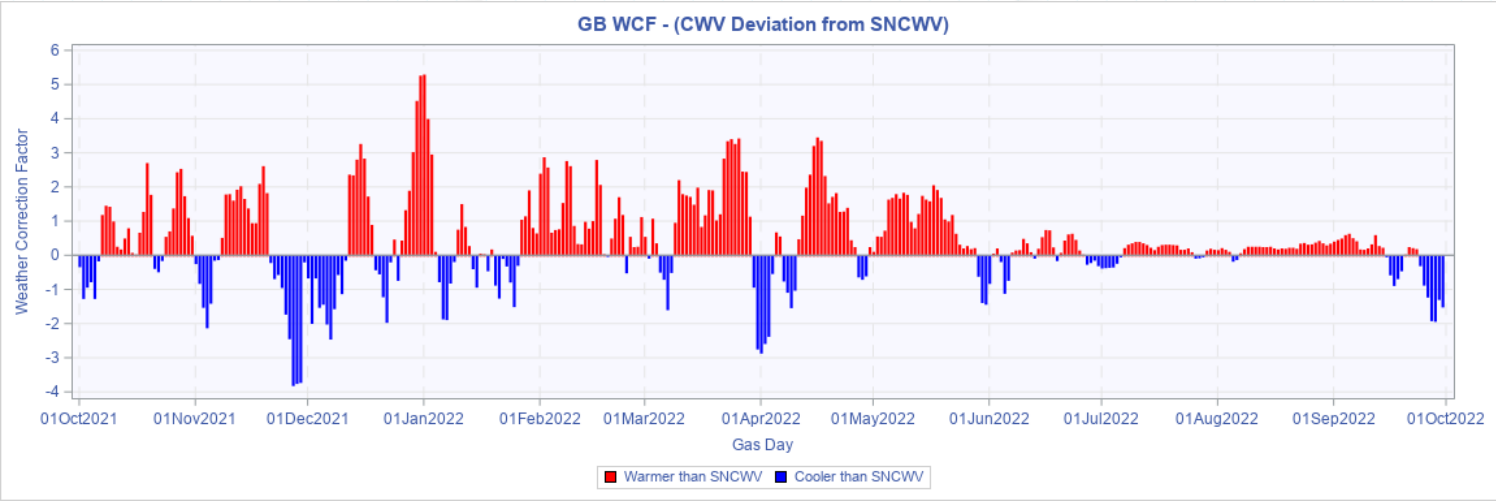
- Other than a few cold spells towards the end of November 2021 and beginning of December 2021, the theme of the Gas Year has generally been warm temperatures. Spring 2022 stood out as particularly warmer than Seasonal Normal



- GB experienced it's 2nd warmest Gas Year since gas industry records began, including one of the warmest summers, and record breaking temperatures in July 2022

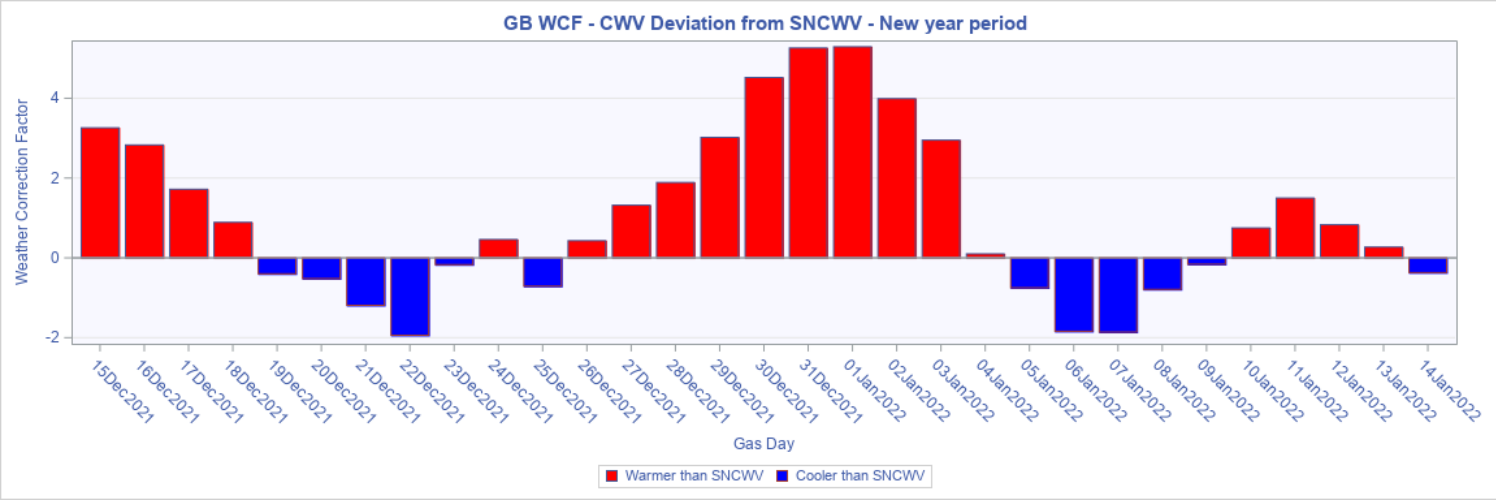
- The difference in weather between Gas Year 2020/21 and 2021/22 was a contributing factor to a roughly 8.5% reduction in gas allocated to the NDM sector

Analysis – Daily Observations



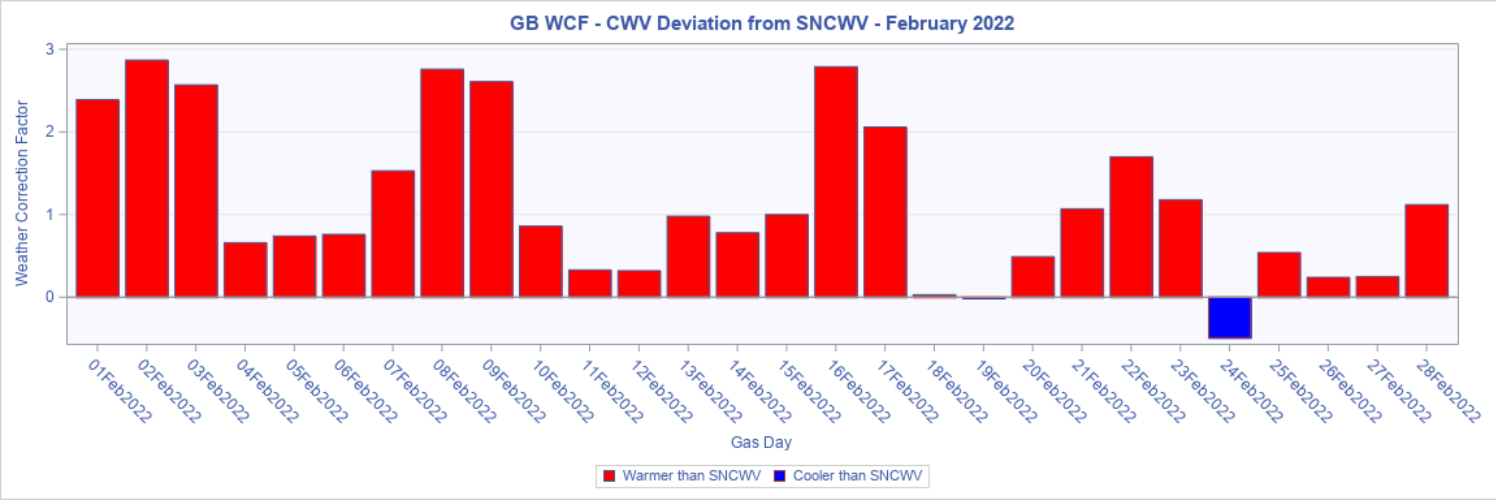
- Chart shows the Weather Correction Factor (WCF) i.e. Composite Weather Variable (CWV) – Seasonal Normal CWV (SNCWV) throughout Gas Year 2021/22
- A spell of much warmer than normal weather was observed over the New Year period, with the UK experiencing it's warmest New Year's Eve and New Year's day on record. (Met office link here for further reading)
- Warm weather was a theme of the Gas Year, February'22 through to June'22 showed CWV values much higher than the seasonal normal. Warm weather persisted through July and August, however the WCF was capped by the Maximum value of the CWV

Analysis – WCF mid-Dec’21 to mid-Jan’22



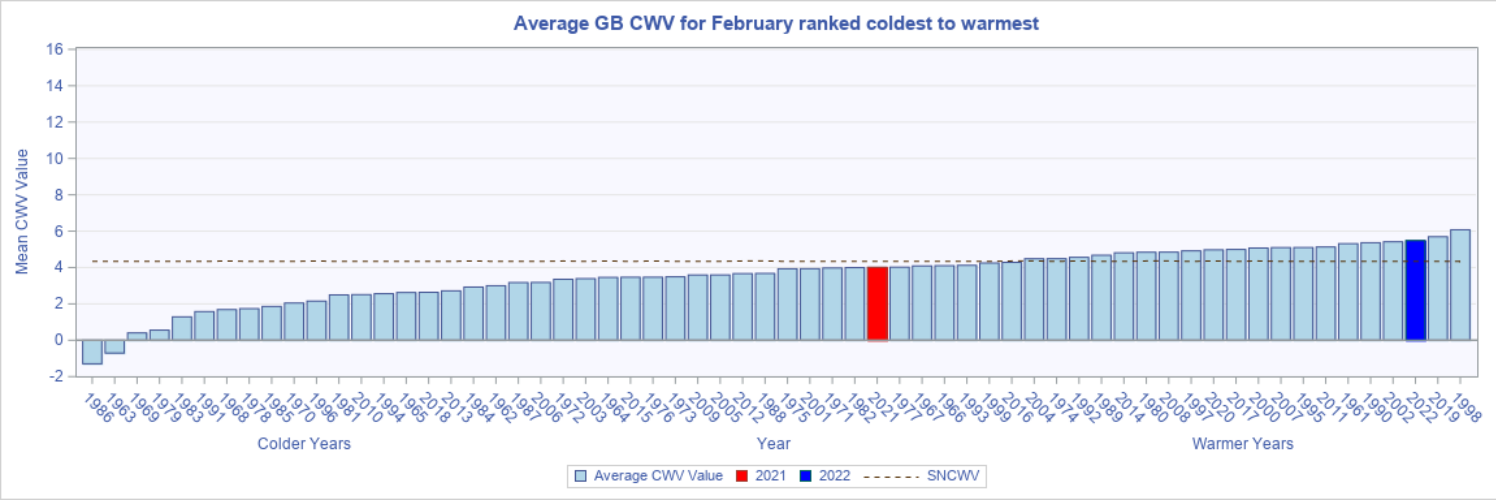
- Charts above show the comparison between CWV and SNCWV for Gas days 15/12/2021 to 14/01/2022
- As can be seen, there is a large positive deviation during the final days of December, and beginning of January where milder temperatures resulted in CWV being much higher than SNCWV
- The single largest WCF in the Gas Year for an individual LDZ was observed in LDZ WM, on Gas Day 31/12/2021; a value of 6.00

Analysis – Monthly Assessment: Feb 2022



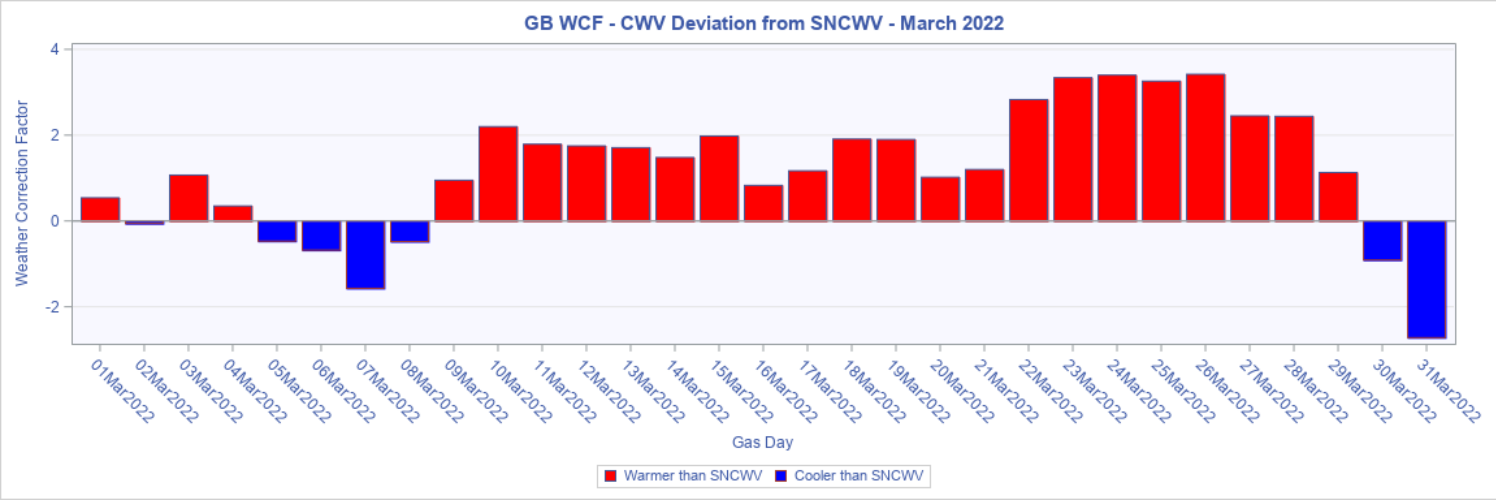
- Chart shows daily comparisons of CWV vs SNCWV throughout February 2022
- As can be seen, almost all Gas Days were warmer than Seasonal Normal, with only 2 Gas Days in February colder than the Seasonal Normal basis

Analysis – Monthly Assessment: Feb 2022



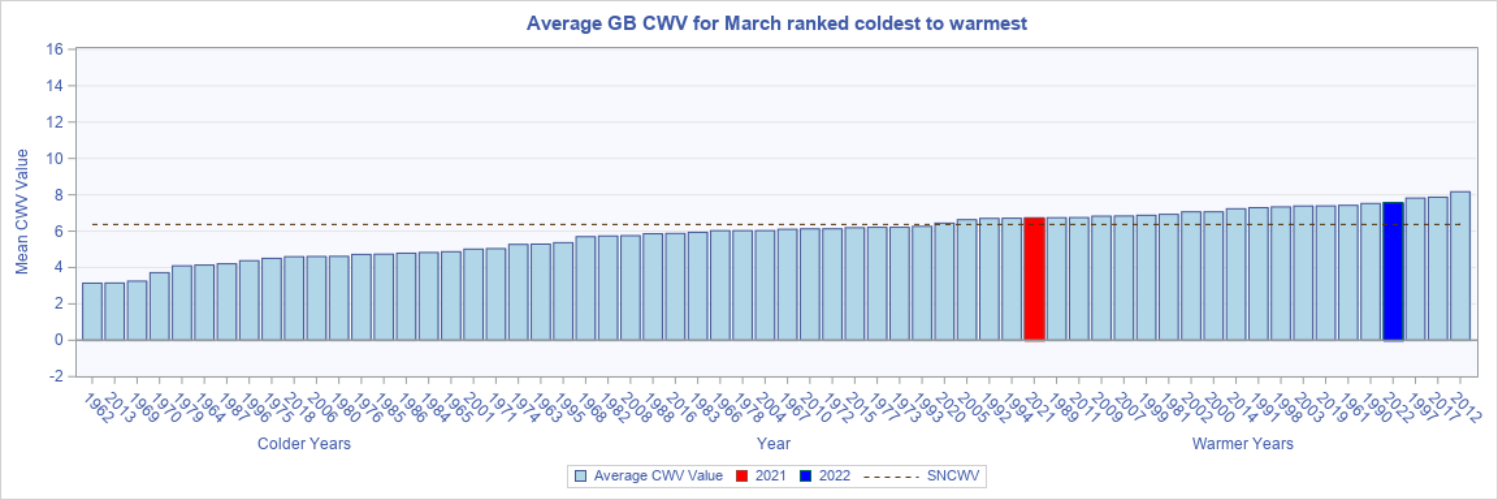
- Chart shows national monthly CWV average for each February since Gas Year 1960/61 (i.e. February 1961)
- As seen on the previous slide, the majority of Gas days in February 2022 were much warmer than the Seasonal Normal
- 2022 ranked as the 3rd warmest February since CWV records began

Analysis – Monthly Assessment: Mar 2022



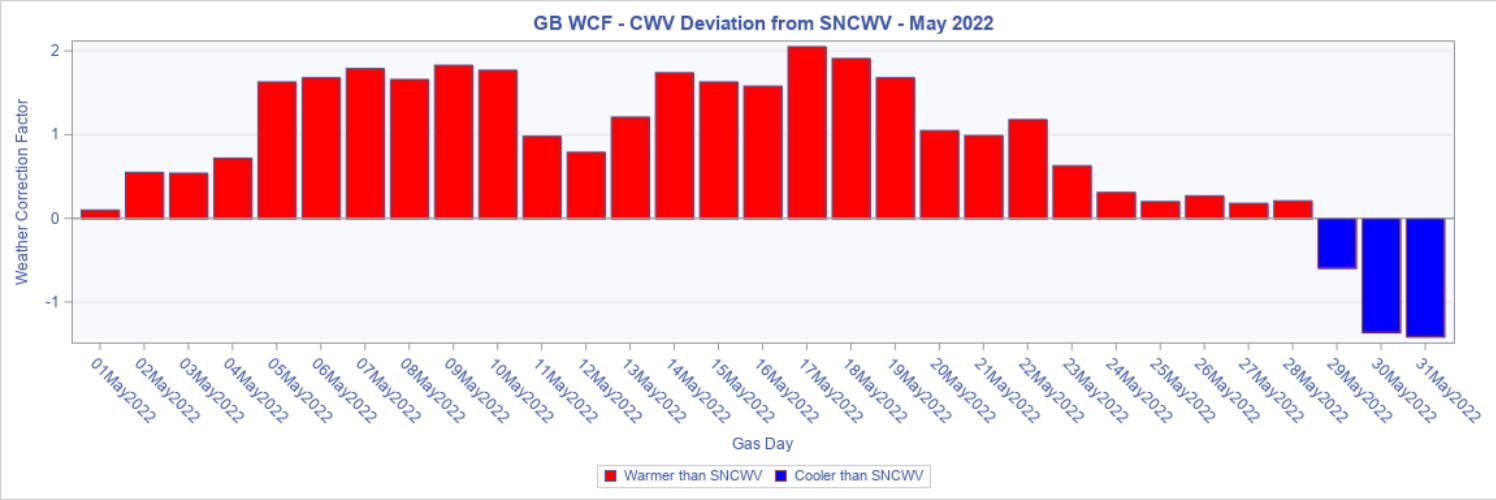
- Chart shows daily comparison of CWV vs SNCWV throughout March 2022
- Following on from a warm February, GB experienced a sustained period of warmer than usual weather through March 2022
- 7 days in March were cooler than Seasonal Normal, with a stretch of warm weather lasting from 9th to 29th March

Analysis – Monthly Assessment: Mar 2022



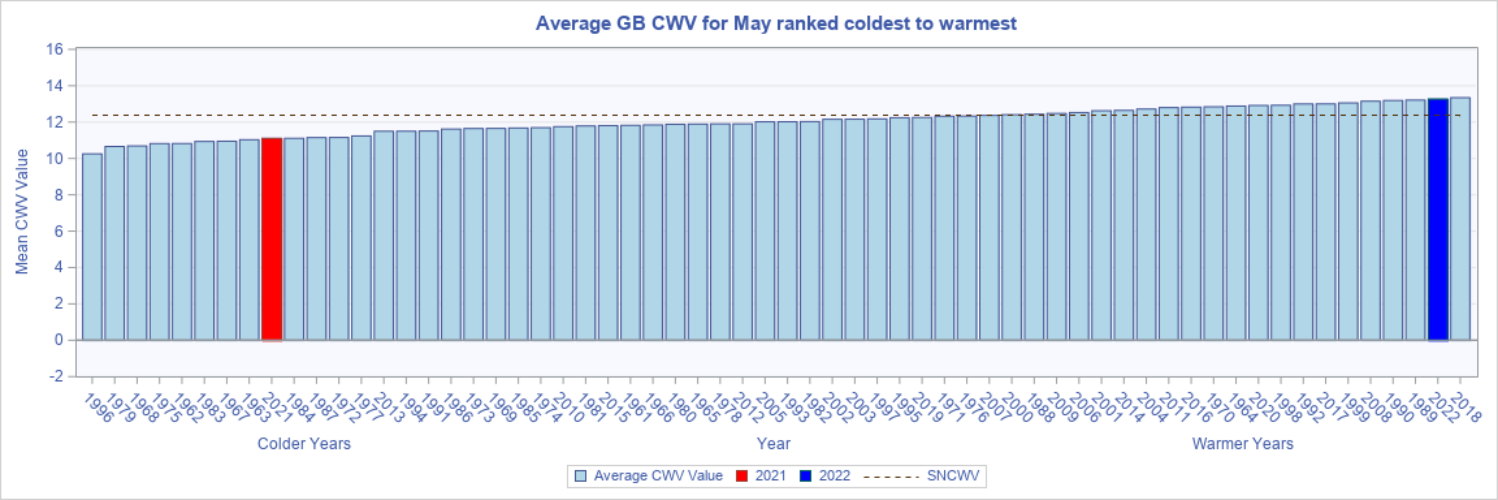
- Chart shows national monthly CWV average for each March since Gas Year 1960/61 (March 1961)
- March 2022 was, on average, much warmer than the seasonal normal
- Ranked as the 4th warmest March since Gas Industry records began

Analysis – Monthly Assessment: May 2022



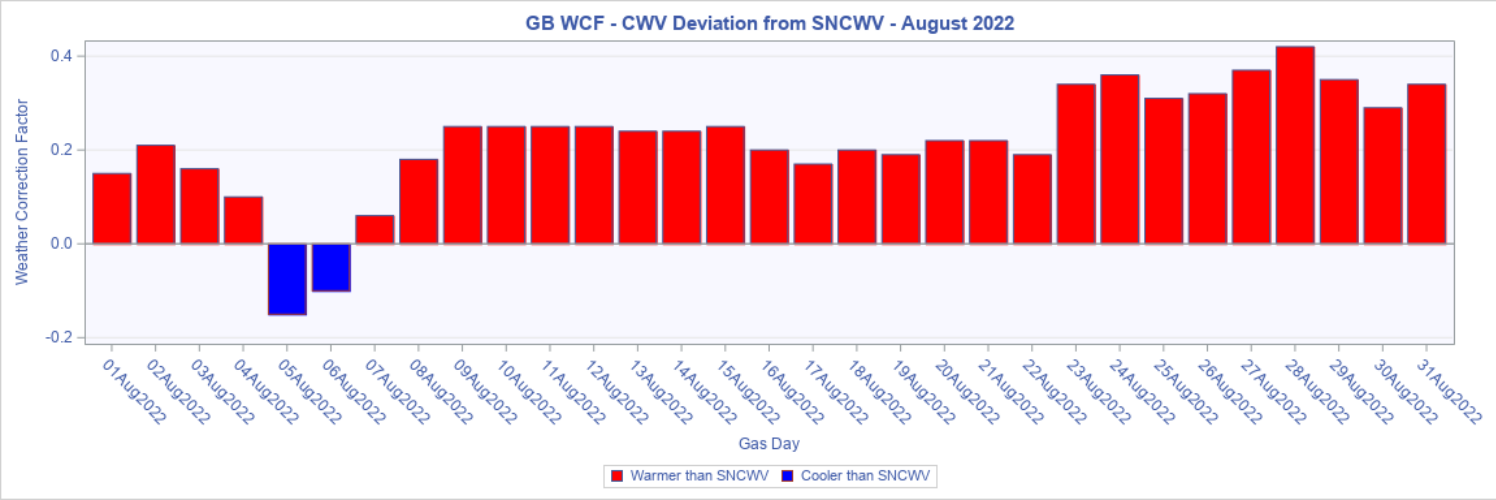
- Chart shows daily comparisons of CWV vs SNCWV throughout May 2022
- A stretch of warmer than normal weather lasted from 01st May up to and including 28th May 2022.
- Only the final 3 days of May experienced colder than seasonal normal weather

Analysis – Monthly Assessment: May 2022



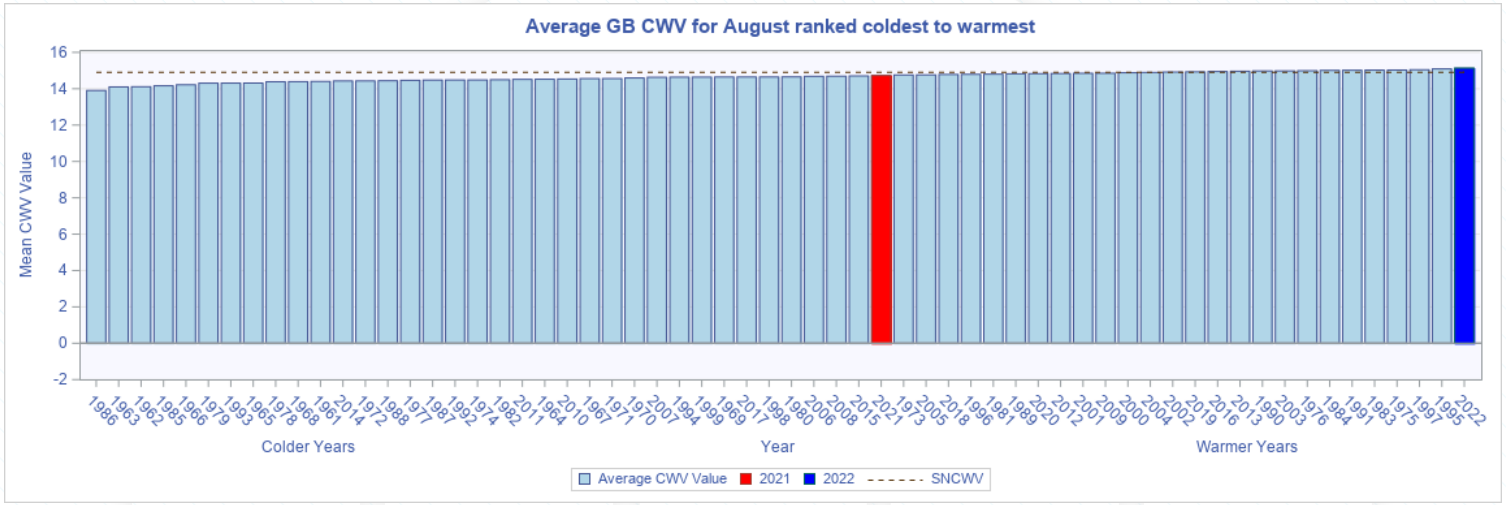
- Chart shows national monthly CWV average for each May since Gas Year 1960/61 (May 1961)
- May 2022 ranked as the 2nd warmest May observed in CWV history
- May 2021 was much colder than Seasonal Normal, the difference in weather was a contributing factor to a roughly 32% decrease in NDM Allocation for the month of May (31.5 TWh to 21.4 TWh)

Analysis – Monthly Assessment: Aug 2022



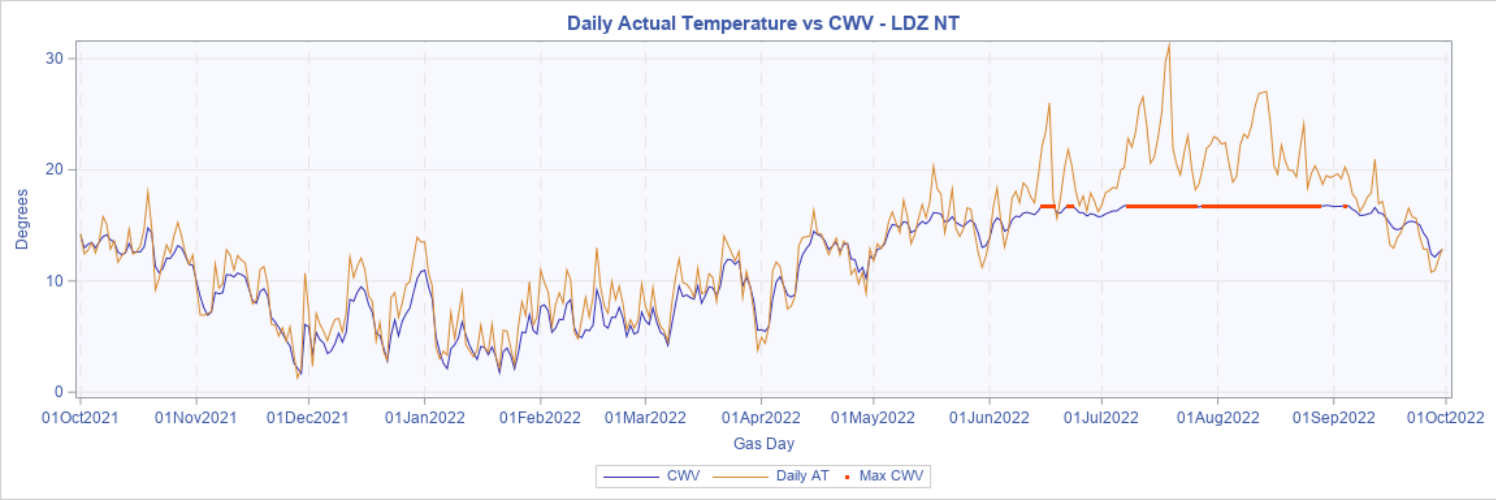
- The second half of July 2022 saw record breaking temperatures in the UK, reaching 40 degrees in some areas. Following on from the heatwaves in July, August 2022 saw a sustained period of temperatures much warmer than the seasonal normal, including a heatwave between 8th – 14th August
- WCF values are capped at a maximum value due to the maximum value of the CWV in each LDZ, in August 2022 this maximum was frequently hit by most LDZs
- Only 2 days, 05th and 06th August showed a deviation from the warm weather and were both colder than the seasonal normal.

Analysis – Monthly Assessment: Aug 2022



- Chart shows national monthly CWV average for each August since Gas Year 1960/61 (August 1961)
- Although there is a smaller deviation that some other months, August 2022 ranked as the warmest August on record

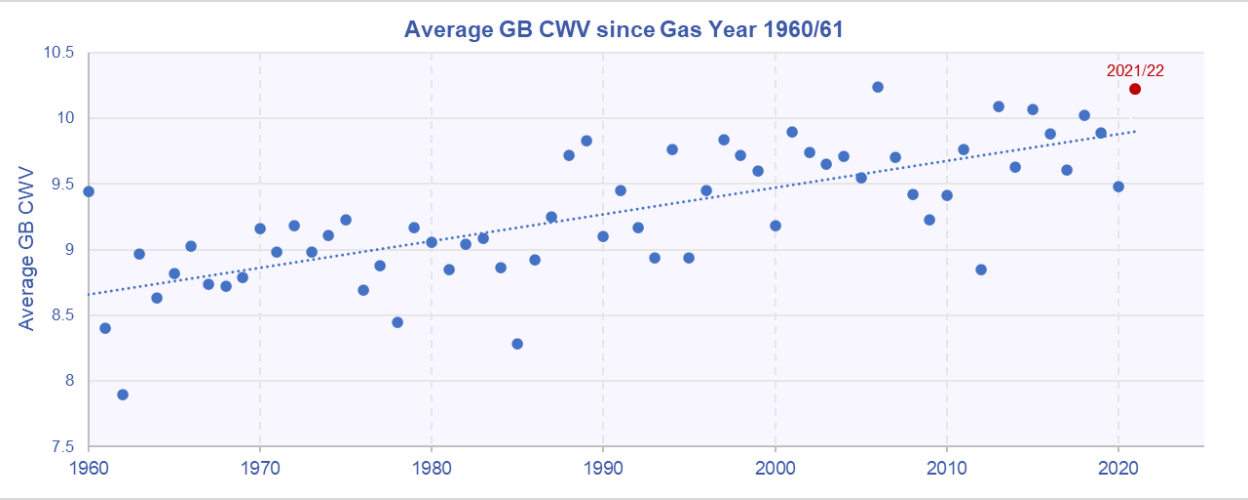
Temperature vs CWV – Gas Year 2021/22



- The above graph shows the Daily observed Actual Temperature (At) against the Calculated CWV for LDZ NT in Gas Year 2021/22

- The Max CWV is commonly hit during summer months, exceptionally long periods of very warm weather resulted in the CWV being at its maximum value for long spells in July and August

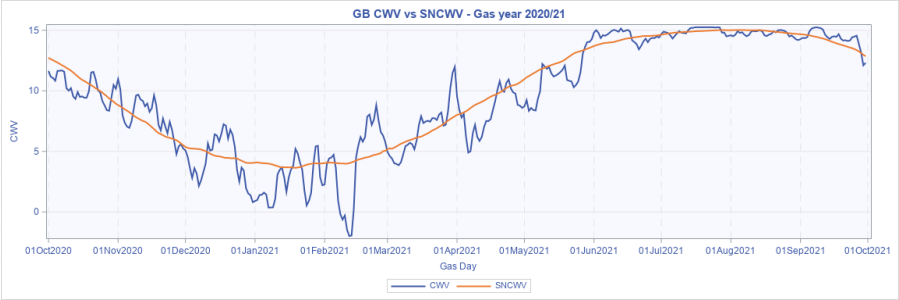
Gas Year 2021/22 vs Gas Industry History

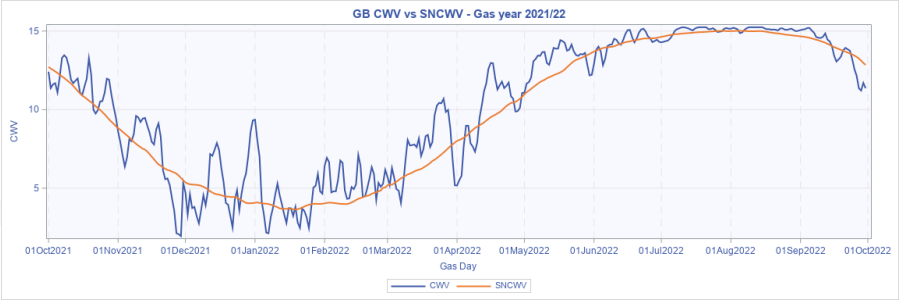


- Overall, Gas Year 2021/22 was much warmer than normal, and ranked as the second warmest Gas Year on record when comparing actual CWV values

- 2021/22 had an average GB CWV value of 10.22 which was only marginally below Gas Year 2006/07, which had an average GB CWV value of 10.24

Analysis - Comparison of CWV vs SNCWV





- The above charts show the GB CWV against the GB SNCWV since the new CWV formula including Solar Radiation, and corresponding SNCWV basis, was introduced in October 2020.

- They indicate that the SNCWV provides a good fit for the observed CWV values across the 2 complete Gas Years

Gas Year	Season	Degree Day Comparison
2020/21	Autumn (2020/21)	1.5% Cooler
	Winter (2020/21)	3.5% Cooler
	Spring (2020/21)	11.9% Cooler
	Summer (2020/21)	3.1% Warmer
2021/22	Autumn (2021/22)	3.4% Warmer
	Winter (2021/22)	7.5% Warmer
	Spring (2021/22)	10.1% Warmer
	Summer (2021/22)	2.1% Warmer

- A degree day comparison shows that Autumn, Winter and, Spring of Gas Year 2020/21 were cooler than the Seasonal Normal

- Summer of Gas Year 2020/21 and all seasons in Gas Year 2021/22 were warmer than Seasonal Normal

- The largest seasonal shift since the previous gas year was observed during Spring, moving from approx. 11.9% Cooler to 10.1% Warmer than Seasonal Normal

Conclusions

- Overall, the observed weather during Gas Year 2021/22 when compared to current seasonal normal (using Degree Day analysis) is as follows:
  - Q1, Autumn (Oct'21 to Dec '21) was approximately 3.4% warmer than Seasonal Normal
  - Q2, Winter (Jan'22 to Mar '22) was approximately 7.5% warmer than Seasonal Normal
  - Q3, Spring (Apr'22 to Jun '22) was approximately 10.1% warmer than Seasonal Normal
  - Q4, Summer (Jul'22 to Sep '22) was approximately 2.1% warmer than Seasonal Normal

- Top 5 warmer and colder than Seasonal Normal Gas Days (Highest and Lowest WCF respectively) are listed in table below

Rank	Warmer than SN		Colder than SN	
	Gas Day	GB WCF	Gas Day	GB WCF
1	1st Jan 2022	5.29	27th Nov 2021	-3.97
2	31st Dec 2021	5.26	28th Nov 2021	-3.73
3	30th Dec 2021	4.52	29th Nov 2021	-3.70
4	2nd Jan 2022	3.99	1st Apr 2022	-2.84
5	16th Apr 2022	3.45	21st Mar 2022	-2.72

- The standout periods of unusual weather were:
  - New Year, February 2022, March 2022, May 2022, Mid-Late July 2022, and August 2022

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