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# Demand Estimation Sub Committee

4.1 Algorithm Performance Gas Year 2022/23  
Strand 1 – Weather Analysis

19 December 2023

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Strand 1 – Weather Analysis

# **BACKGROUND, OBJECTIVES, AND EXECUTIVE SUMMARY**

# Background – Strand 1: Weather Analysis

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

$$\begin{array}{c} \text{AQ / 365} \\ \text{(Average Daily} \\ \text{Consumption)} \end{array} * \begin{array}{c} \text{ALP}_t \\ \text{(Seasonal Normal} \\ \text{Consumption)} \end{array} * \begin{array}{c} \text{1 + WCF}_t * \text{DAF} \\ \text{(Weather Corrected} \\ \text{Consumption)} \end{array} = \begin{array}{c} \text{NDM Demand} \\ \text{(Class 3 \& 4)} \end{array}$$

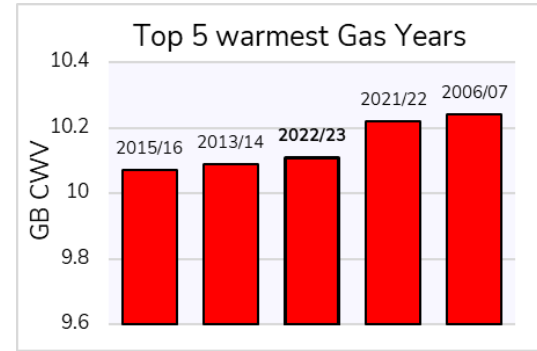
- Weather Correction Factor (WCF) represents the difference between the Actual Composite Weather Variable and Seasonal Normal CWV (CWV - SNCWV) on a given Gas Day
- Strand 1: Weather Analysis focusses on the WCF values observed in the Gas Year in order to:
  - Summarise the weather experienced in the 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 2022/23
- 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 in January, March, and notably December, the theme of Gas Year 2022/23 has been warmer than normal temperatures. February, June, and September 2023 stood out as particularly warm when compared to the Seasonal Normal for that time of year.



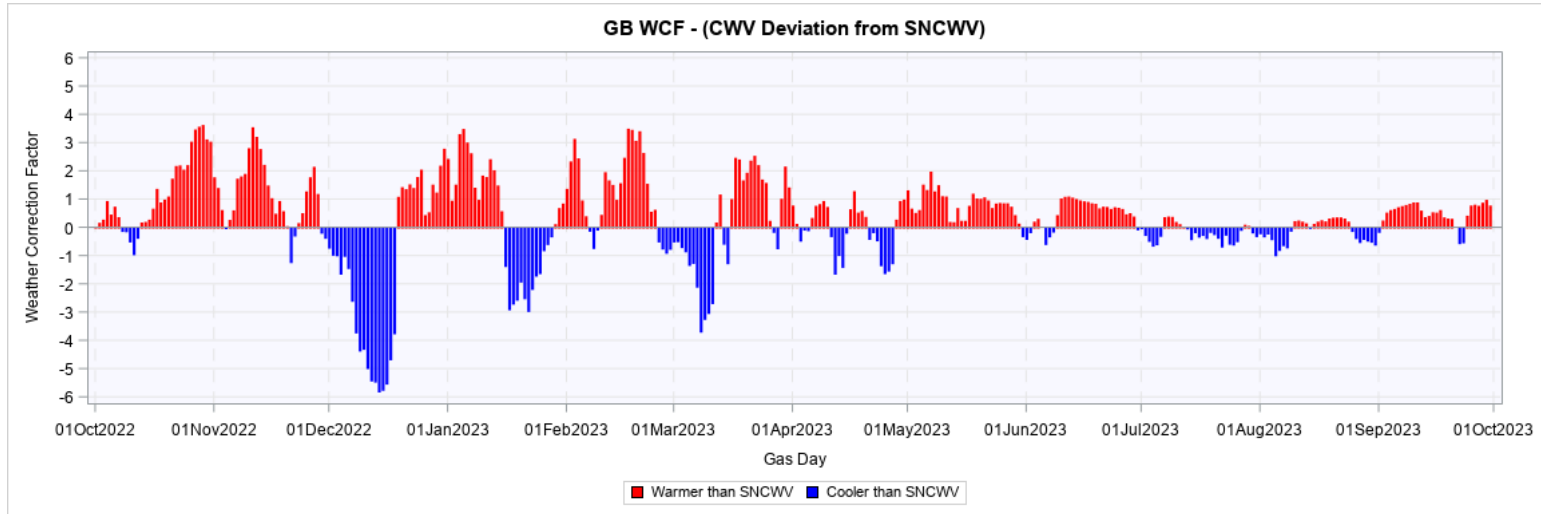
GB experienced its 3<sup>rd</sup> warmest Gas Year since gas industry records began, behind Gas Years 2021/22, and 2006/07.

- The difference in weather between Gas Year 2021/22 to Gas Year 2022/23 was a contributing factor, alongside changing AQs driven by consumer behaviour, to a 6.1% reduction in overall NDM Energy allocated from one Gas Year to the next. AQ trends will be explored further in later strands.

Strand 1 – Weather Analysis

# WEATHER ANALYSIS

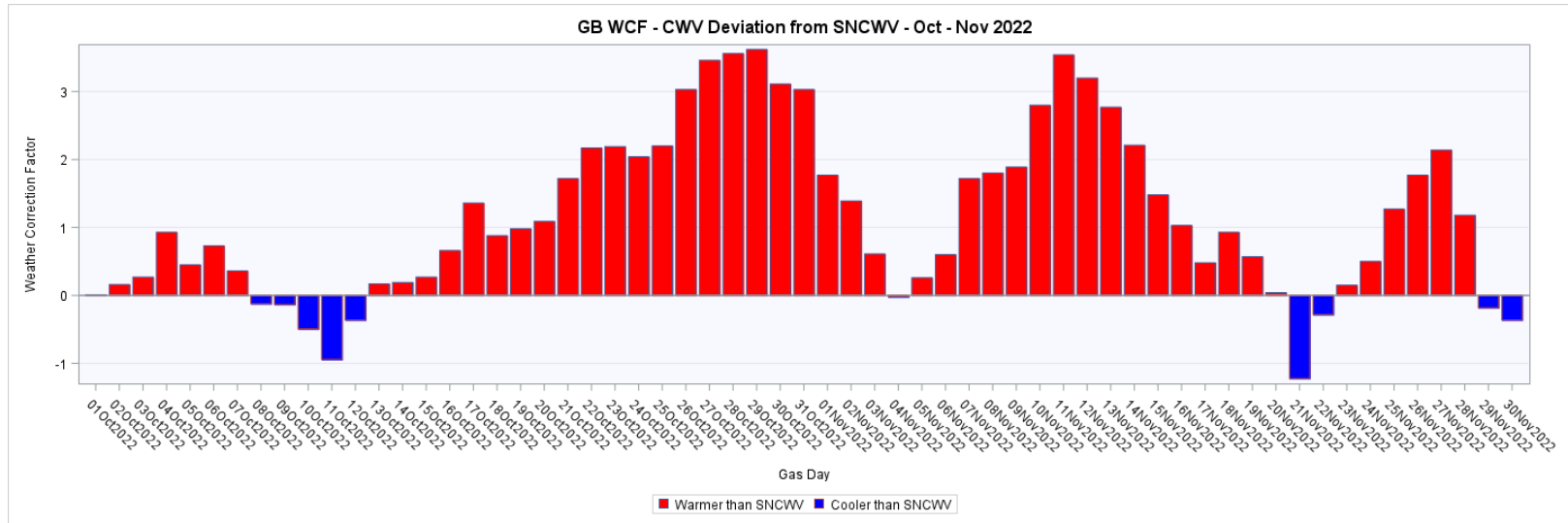
# Analysis – Daily Observations



- Chart above shows the Weather Correction Factor (WCF) i.e. Composite Weather Variable (CWV) – Seasonal Normal CWV (SNCWV) throughout Gas Year 2022/23
- A spell of extremely cold weather was observed during the first two weeks of December 2022, much to the contrast of general weather trends across calendar year 2022 ([Met office link for further reading](#))
- Gas Year 2022/23 has generally been another warm year, following on from Gas Year 2021/22 which was the Second warmest Gas Year on record in CWV terms since records began



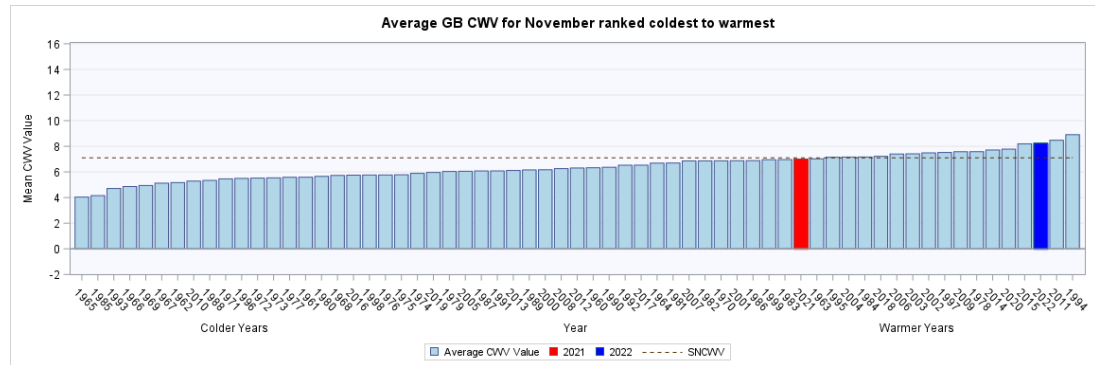
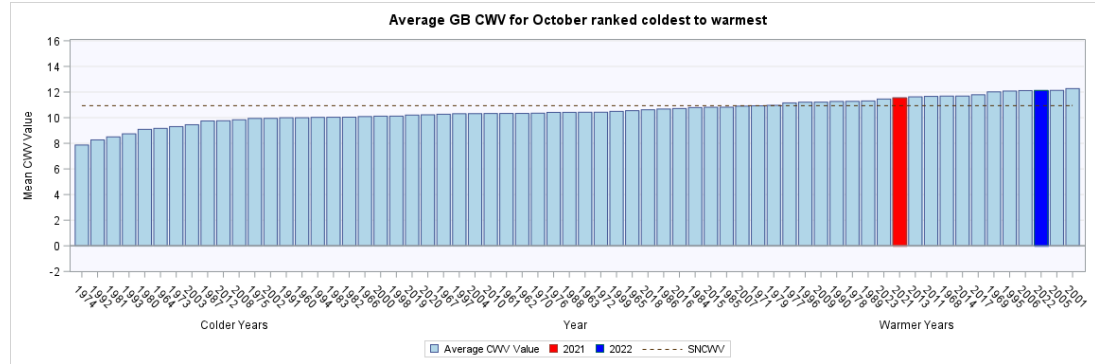
# Analysis – Monthly Assessment: Oct - Nov 2022



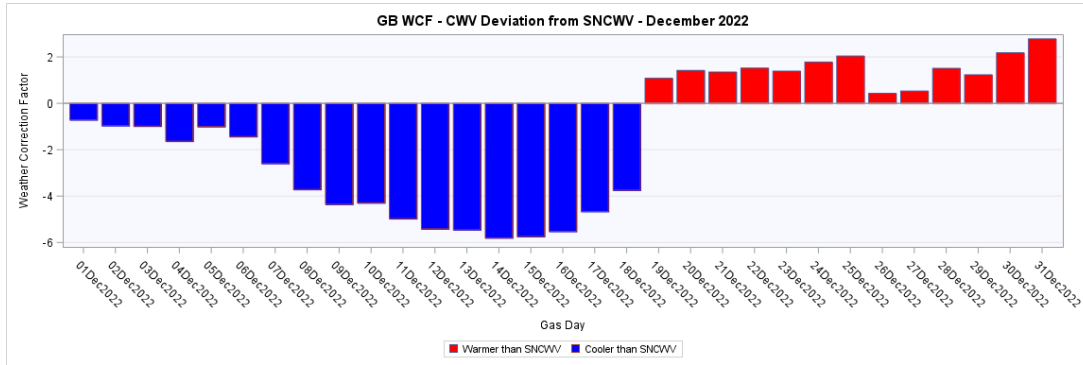
- Gas Year 2022/23 began with a period of warm weather stretching across October and November 2022, as can be seen from the chart above.
- Only a handful of Gas Days in October and November 2022 were recorded as having a CWV below the Seasonal normal for that time of year. A period of much warmer than normal weather persisted from mid-October to mid-November

# Analysis – Monthly Assessment: Oct - Nov 2022

- Charts to the right shows each October and November since Gas Year 1960/61 ranked in order of average GB CWV, with 2022 highlighted in blue
- The warmer than normal weather persisting throughout the two months led to October 2022 and November 2022 being the 3<sup>rd</sup> warmest October and November respectively since CWV records began
- These two months followed the warmer trends observed in [Gas Year 2021/22](#) with 2022 being one of the warmest calendar years on record in the UK ([See further details](#))

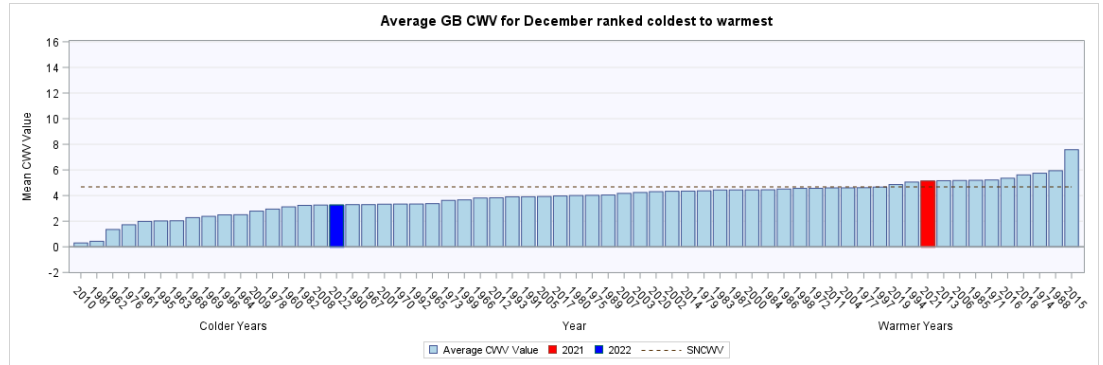


# Analysis – Monthly Assessment: Dec 2022

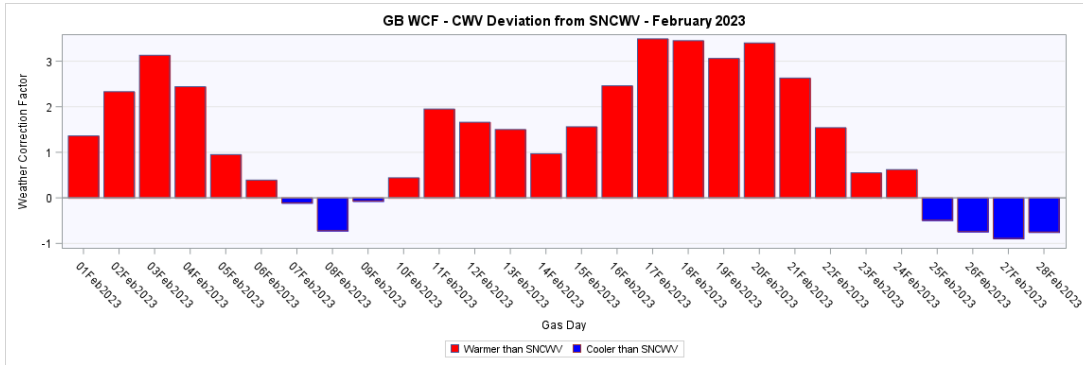


- As mentioned, a spell of extremely cold weather was observed during December 2022, with GB CWV much colder than normal up to and including Gas Day 18<sup>th</sup> December
- From Gas Day 19<sup>th</sup> December onwards, temperatures rose to slightly above Seasonal Normal average for the remainder of the month

- As can be seen on the graph to the right, December 2023 was, on average, much colder than the Seasonal Normal
- Although December 2023 was not one of the coldest months in CWV history, it was the coldest December since 2010

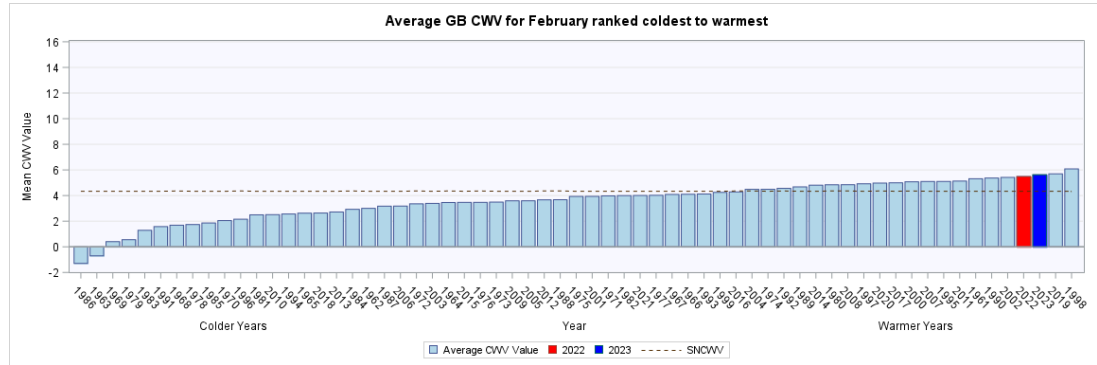


# Analysis – Monthly Assessment: Feb 2023

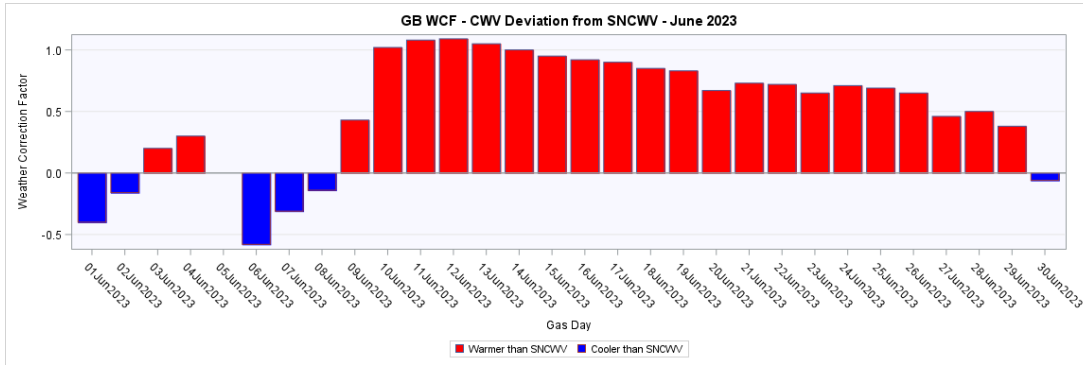


- The majority of Gas Days during February 2023 were warmer than normal, with a spell of much warmer weather during the middle of the month
- Only 7 of the 28 Gas Days in February were slightly colder than the average for that time of year

- Chart to the right shows all Februaries ranked in order from coldest to warmest when compared against Seasonal Normal
- The warmer weather observed led to February 2023 being recorded as the third warmest February since CWV records began, slightly warmer than February 2022

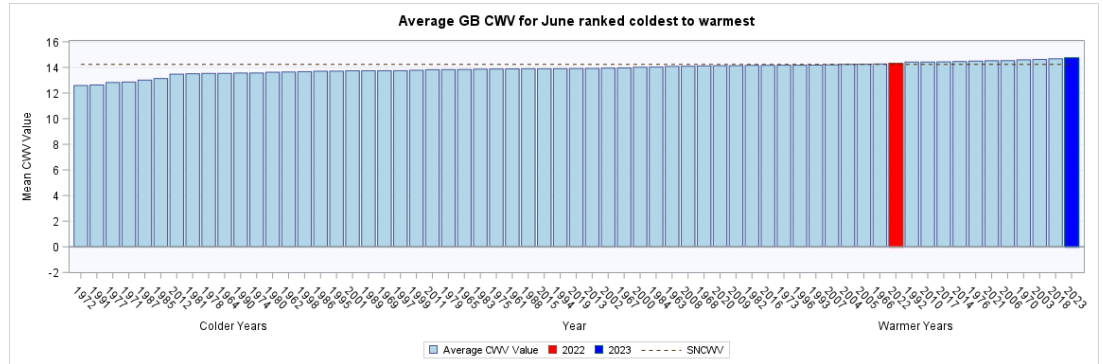


# Analysis – Monthly Assessment: Jun 2023

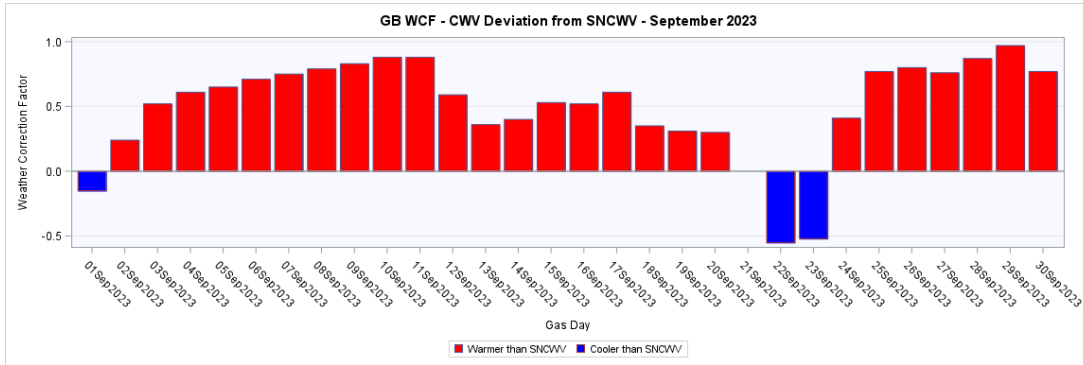


- The first week in June was a mixture of slightly colder and warmer than Seasonal Normal weather
- A consistent period of warmer than normal weather was observed from 9<sup>th</sup> to 29<sup>th</sup> June 2023
- Positive WCF values are limited during summer months due to the cap of Max CWV

- The warmer than normal weather observed during June 2023 led to it being recorded as the warmest June in CWV records
- Further reading from the Met Office confirms that average temperatures in June 2023 “eclipsed the previous record by 0.9°C”. [Climate change impacts June temperature records - Met Office](#)

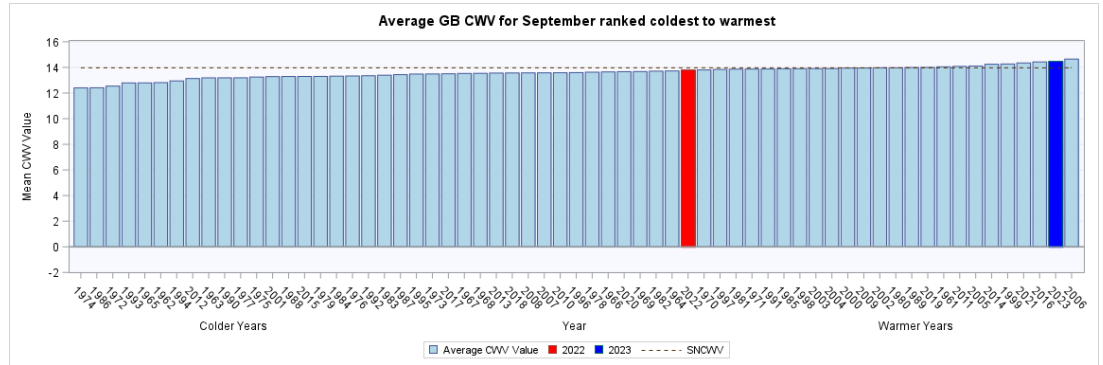


# Analysis – Monthly Assessment: Sep 2023

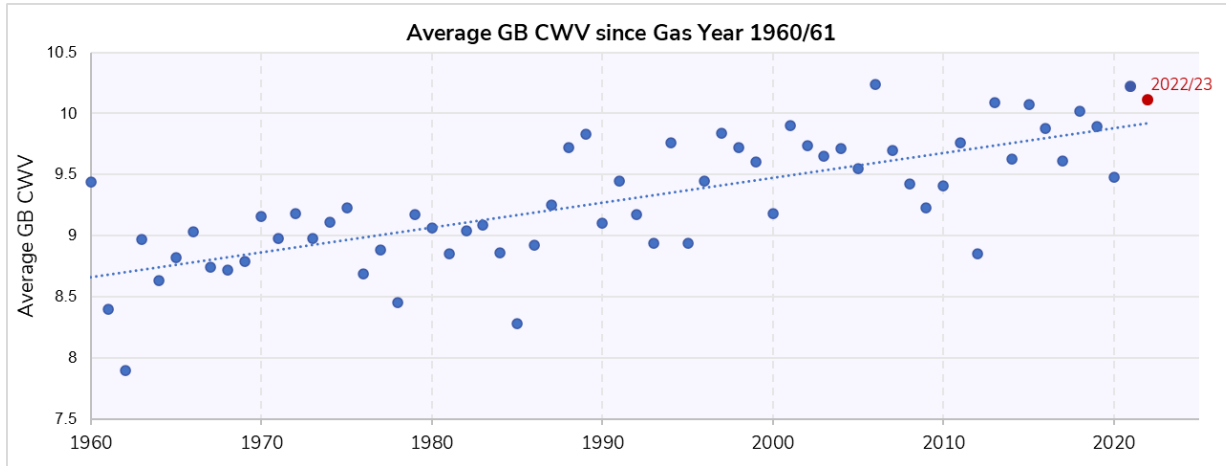


- Other than a small number of colder than normal days, the majority of September 2023 saw warmer weather than expected for that time of year
- A continuous spell of warm weather was observed from 02<sup>nd</sup> to 20<sup>th</sup> September

- Chart to the right shows each September since 1960 ranked in order of average CWV value for GB, September 2022 was marginally below Seasonal normal
- The continued warm weather led to September 2023 being ranked as the 2<sup>nd</sup> warmest September in CWV history



# Gas Year 2022/23 Vs Gas Year History

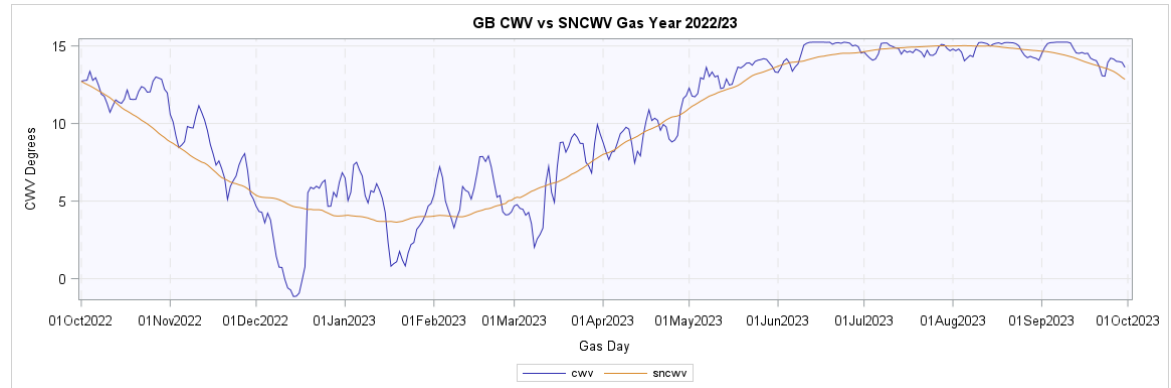


- The above chart shows the average GB CWV for each Gas Year in chronological order
- As can be seen, Gas Year 2022/23 was another warmer than normal year, and ranked as the third warmest Gas Year on record when comparing the actual CWV values
- In Gas Year 2022/23, GB had an average CWV value of 10.11 which was slightly lower than Gas Year 2021/22, which had an average CWV value of 10.22.

# Analysis – Comparison of CWV vs SNCWV

Season	Month	Degree Day * Comparison
Autumn	October	22% Warmer
	November	12% Warmer
	December	10% Cooler
Winter	January	2% Warmer
	February	11% Warmer
	March	1% Warmer
Spring	April	1% Cooler
	May	19% Warmer
	June	19% Warmer
Summer	July	7% Cooler
	August	5% Cooler
	September	17% Warmer

\*Degree Day - a variable used for analysing weather levels. It is calculated using an LDZ Threshold minus the CWV



- Chart above shows the CWV for Gas Year 2022/23 plotted against the current SNCWV basis, table to the left shows a 'Degree Day' calculation for each month of the Gas Year

- Despite experiencing one of the warmest Gas Years on record, SNCWV continues to produce a reasonable relationship to observed CWV values, with no clear detachment between the two profiles.
- Current SNCWV 'levels' and 'shape' will be reviewed in more detail, across all years since October 2020, as part of next year's Seasonal Normal Review analysis



# Conclusions

- Overall, the observed weather during Gas Year 2022/23 when compared to current Seasonal Normal (Using Degree Day analysis) is as follows:
  - Q1, Autumn (Oct'22 to Dec'22) was approximately 3.1% warmer than Seasonal Normal
  - Q2, Winter (Jan'23 to Mar'23) was approximately 4.3% warmer than Seasonal Normal
  - Q3, Spring (Apr'23 to Jun'23) was approximately 8.6% warmer than Seasonal Normal
  - Q4, Summer (Jul'23 to Sep'23) was approximately 2.0% 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	29 Oct 2022	3.62	14 Dec 2022	-5.80
2	28 Oct 2022	3.56	15 Dec 2022	-5.74
3	11 Nov 2022	3.54	16 Dec 2022	-5.52
4	17 Feb 2023	3.49	13 Dec 2022	-5.45
5	05 Jan 2023	3.48	12 Dec 2022	-5.41

- The standout periods of unusual weather were:
  - Cold weather: December 2022
  - Warm Weather: November 2022, February 2023, June 2023, September 2023
- When interpreting the various strands of Algorithm Performance, it is relevant to recall the weather conditions that prevailed during the Gas Year being analysed