UIG Task Force

13.2.2 Accuracy of NDM Algorithm - Use of Weather Data - Sensitivity of Components of the Composite Weather Variable (Including 13.2.3 & 13.2.4)

Summary of Findings

Area & Ref #	13.2.2 Accuracy of NDM Algorithm - Use of Weather Data - Sensitivity of Components of the Composite Weather Variable
UIG Hypothesis	Weather is a key input in to the NDM Allocation calculation. If the output of the algorithm is particularly sensitive to certain inputs, and the relationship with demand of a the inputs fluctuates or the algorithm does not use the inputs as effectively as possible, then the NDM allocation could be inaccurate which would contribute to UIG.
Data Tree References	CWV, SNCWV, Child Items

Findings Status	**[Closed]**
UIG Impact Peak Volatility %	**Up to 20%**
UIG Impact Annual Average %	**Up to 5%**
Confidence in Percentages	**N/A**

Findings	Approach to analysis
1°C change in temperature can cause a max absolute change of 12% in UIG, and 1°C change in the Weather Correction Factor can cause a max absolute change of 20% in UIG. NDM Allocation / UIG is highly sensitive to temperature, but not very sensitive to wind speed. The Effective Temperature used to calculate the CWV uses 50% of the previous day's Effective Temperature. Removing the 'memory' in the CWV calculation can cause a 4°C change in the CWV. Using 25% of the previous day's Effective Temperature can cause a 19% max absolute change in UIG. NDM Allocation / UIG is sensitive to parameters involved in calculating the effective temperature and components of the CWV involving the effective temperature. The CWV calculation uses 12 temperature measurements and 6 wind speed measurements each day. These measurements are weighted based on the premise that the temperature at different times of day can have different levels of influence on demand. Within day weightings are more important in shoulder seasons and might be contributing up to 5% to UIG. The amount of change in UIG is dependent on the amount that we vary the input / parameter: ***This exercise illustrates that the NDM algorithm is particularly sensitive to changes in temperature and emphasises the importance of making sure the relationship between weather and demand in the NDM Algorithm is robust.*** *Confidence is N/A as this is an exercise showing the potential impact on UIG; it does not mean there parameters are actual responsible for this much UIG.*	Recalculate the Composite Weather Variable but adjust the input variables and parameters individually to determine how much impact movements in weather and the weightings of the CWV calculation have on NDM Allocation and therefore UIG.

Supporting Evidence (1/7) – Summary of Variable Sensitivity Assessments.

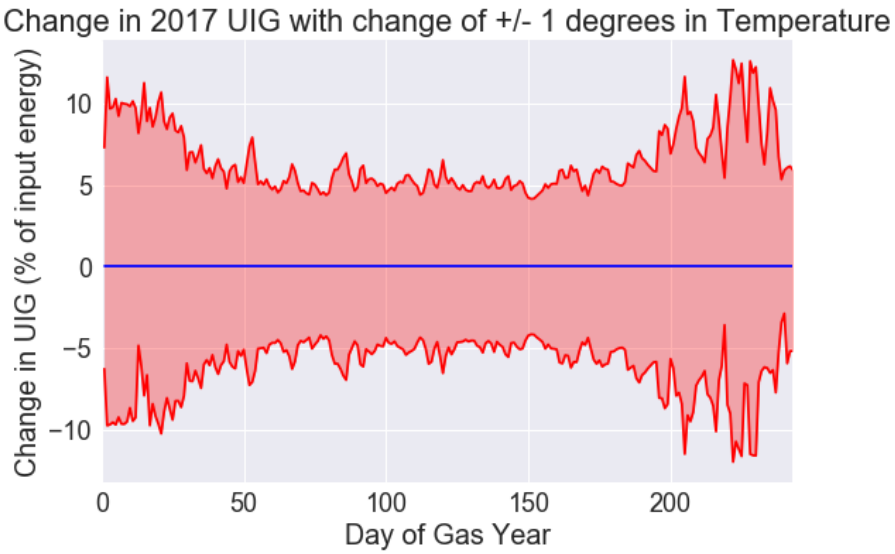
Parameter or Input	Impact on UIG Baseline	Impact on UIG volatility
Weather Correction Factor	High	High
Seasonal Normal Composite Weather Variable	High	High
Cold weather coefficient	Low	Low
Wind chill coefficient	High	Medium
Effective temperature coefficient	Medium	Medium
Cut off coefficient	Medium	Low
Cold weather start temperature	Low	Low
Transition start temperature	High	Medium
Transition end temperature	Medium	Low
Temperature	High	Medium
Wind Speed	Low	Low
Seasonal Normal Effective Temperature	Medium	Medium
Wind chill factor limit temperature	Low	Low
Wind limit speed	Low	Low
Effective temperature weight	High	High

The table shows which weather components of the NDM Algorithm are particularly sensitive to variability and may therefore be contributing to UIG.

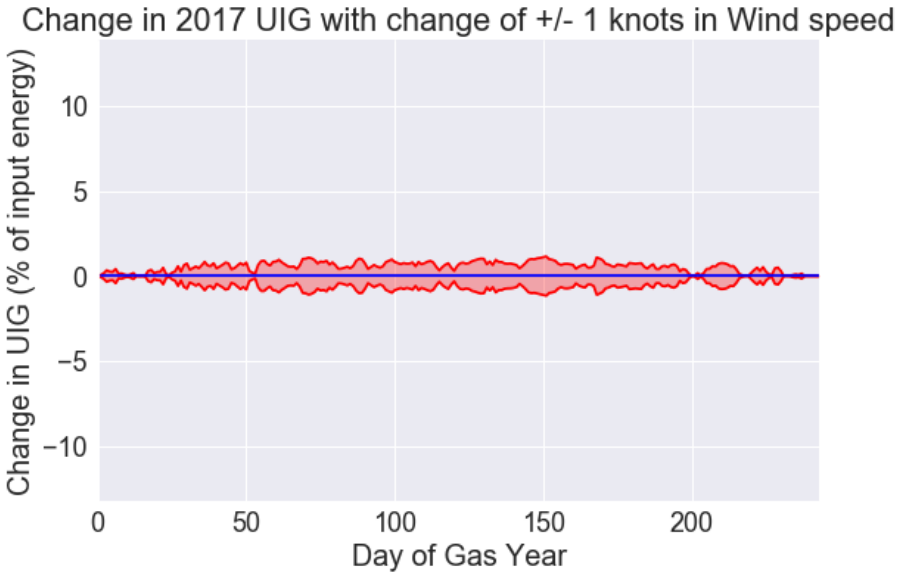
This does not mean that there is an issue with the way the NDM algorithm uses these Parameters or Inputs, but that the higher the impact on UIG the more important it is that the algorithm correctly models the relationship between the parameter and actual demand.

Supporting Evidence (2/7) – Changes to input Temperature

Temperature



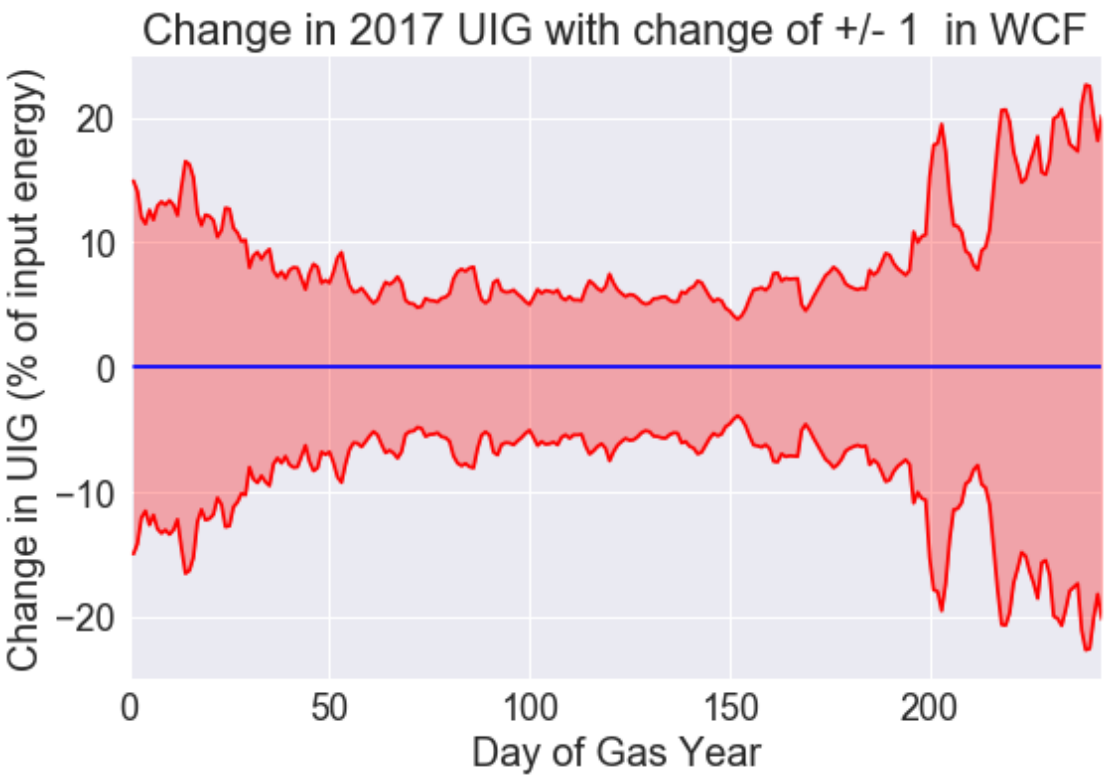
Wind Speed



1°C change in temperature can cause a max absolute change of 12% in UIG: very low resolution temperature data (data which is not sufficiently detailed to represent the weather experienced by the majority of the gas users in and LDZ) input at the LDZ level can contribute to UIG and volatility. The effect is more pronounced in the shoulder months.

Changes to Wind speed have very limited impacts on UIG by comparison, less than 2% on average.

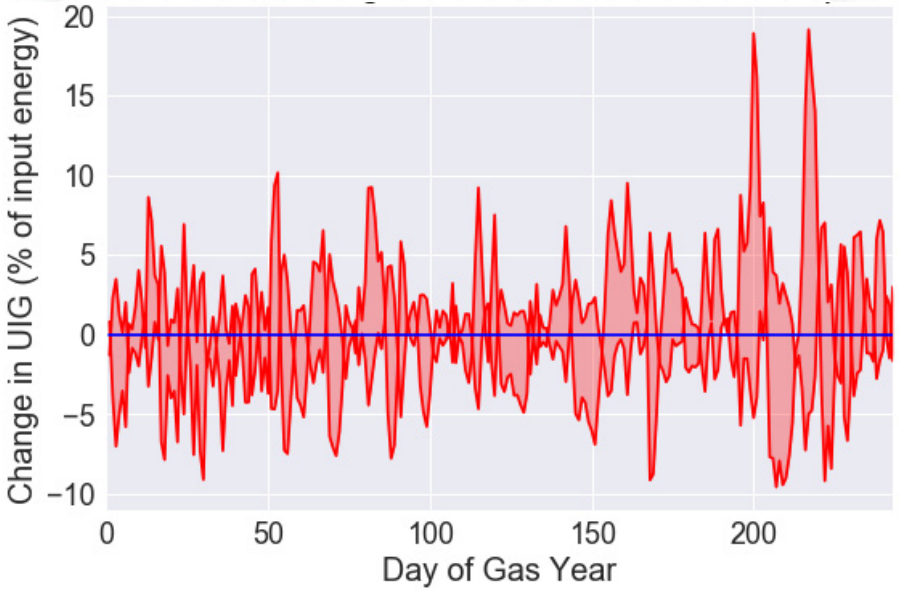
Supporting Evidence (3/7) – Effective Temperature Weightings



1°C change in the Weather Correction Factor can cause a max absolute change of 20% in UIG

Supporting Evidence (4/7) – Effective Temperature Weightings

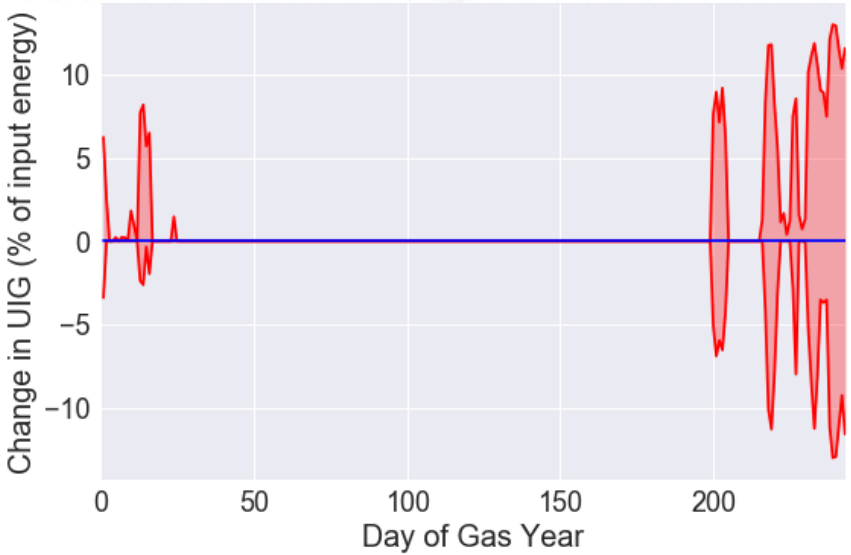
Change in 2017 UIG with change of +/-0.25 in effective temperature weighting



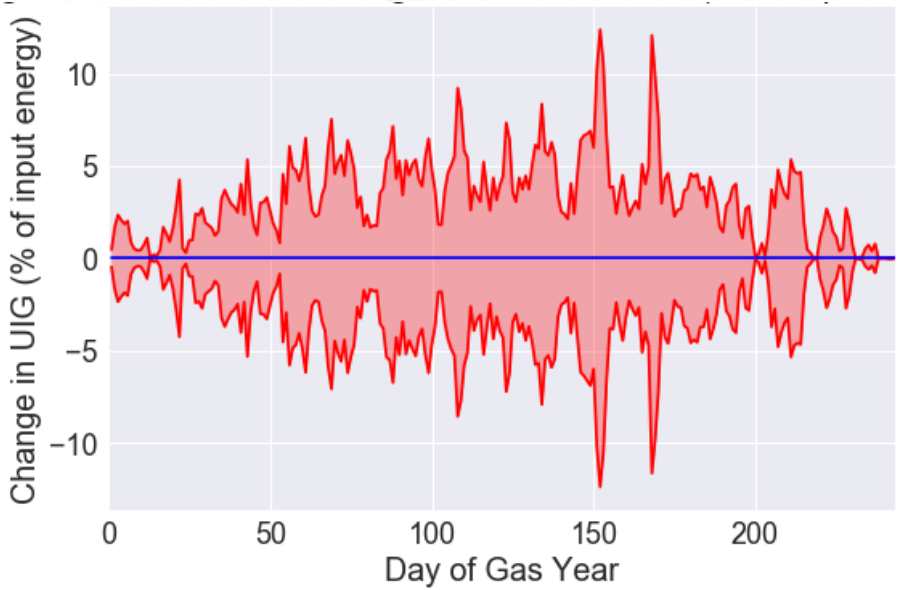
Changing the CWV calculation to use 25% of the previous day effective temperature rather than 50% can cause a 19% max absolute change in UIG.

Supporting Evidence (5/7) – Model Parameters

Transition Start Temperature

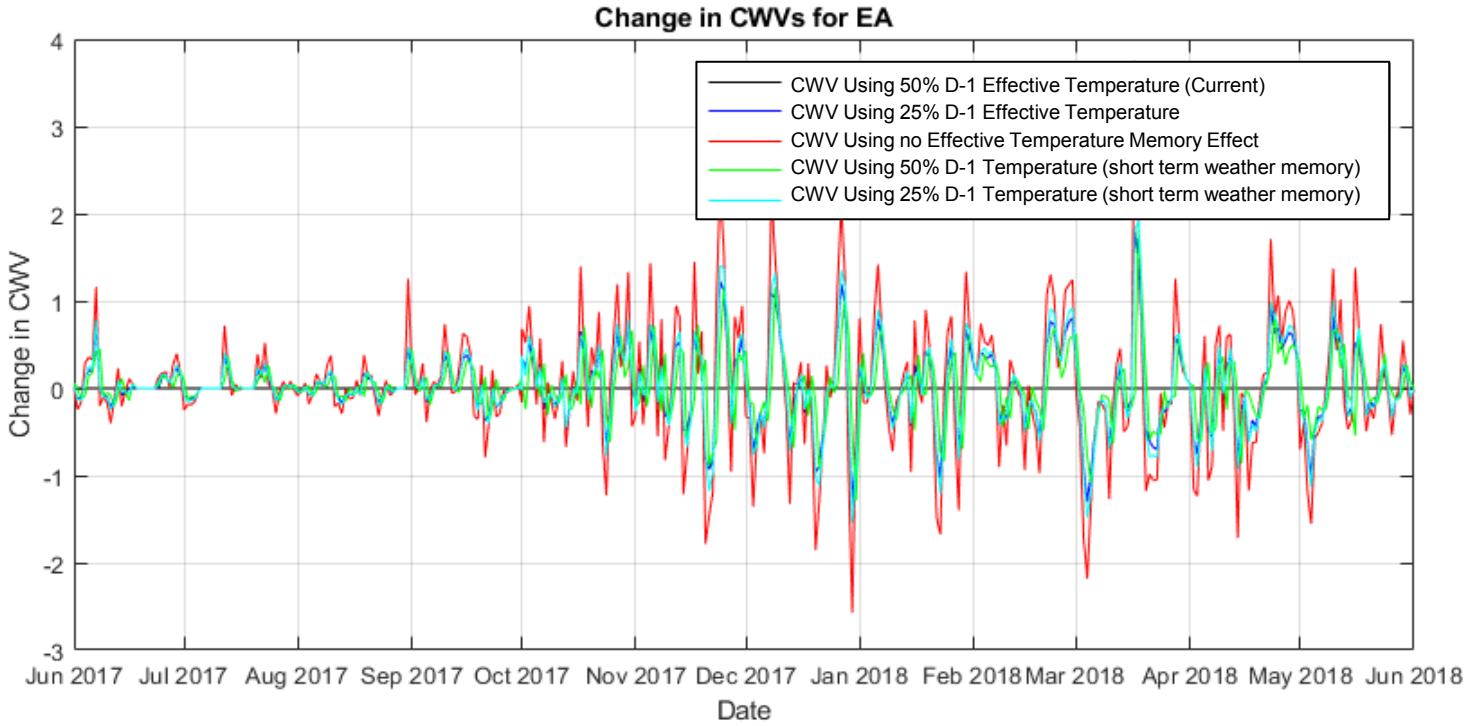


Wind Chill Coefficient



NDM Allocation / UIG is sensitive to parameters involved in calculating the effective temperature and components of the CWV involving the effective temperature

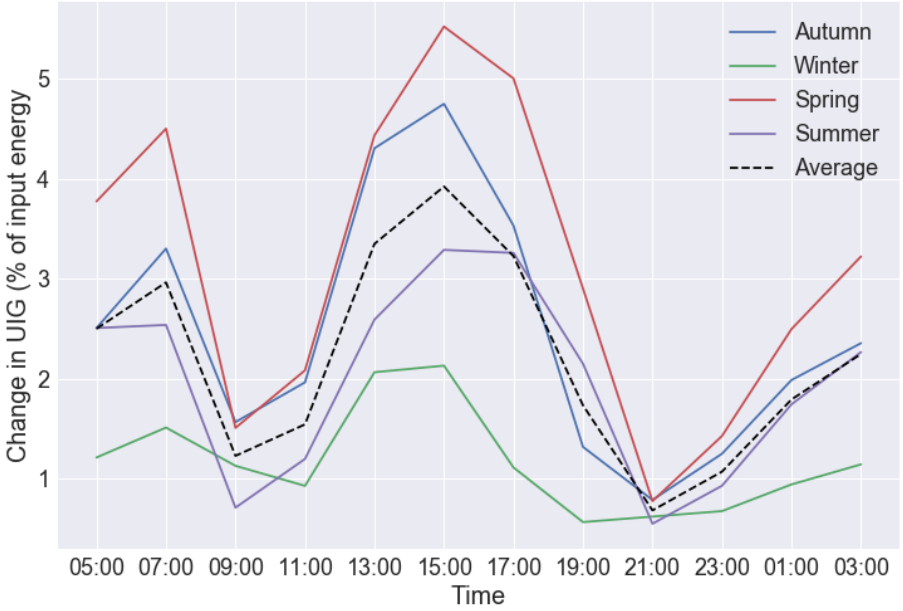
Supporting Evidence (6/7) – Effective Temperature Weightings



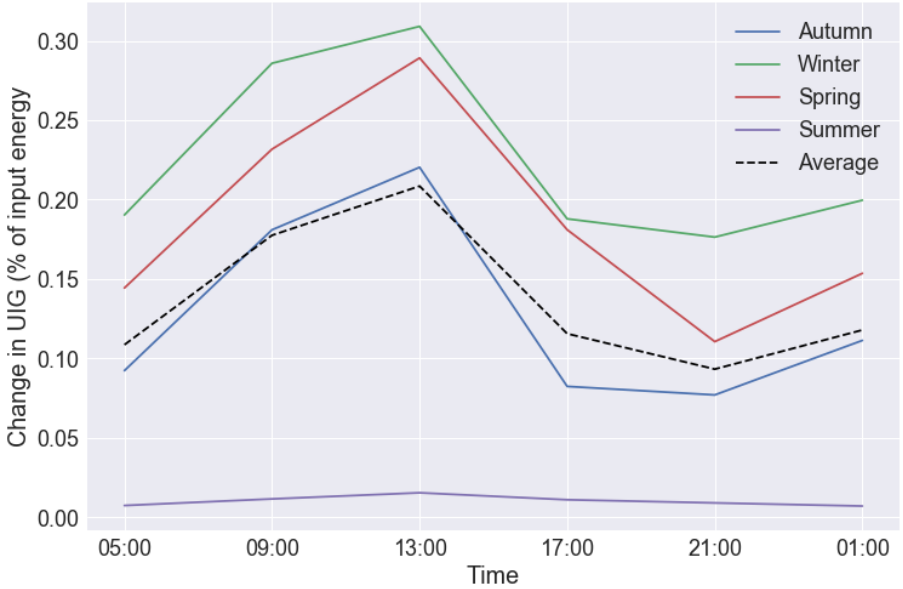
Removing the previous day Effective Temperature (ET) from the CWV calculation, so the CWV is calculated using current day weather only, can cause a 4°C change in the CWV.

Supporting Evidence (7/7) – Within Day Temperature Weightings

Temperature



Wind Speed



Within day weightings are more important in shoulder seasons (Spring and Autumn) and might be contributing up to 5% to UIG. There is much more sensitivity to demand in the early morning and mid afternoon, peaking at around 7:00 AM and 15:00 PM respectively.