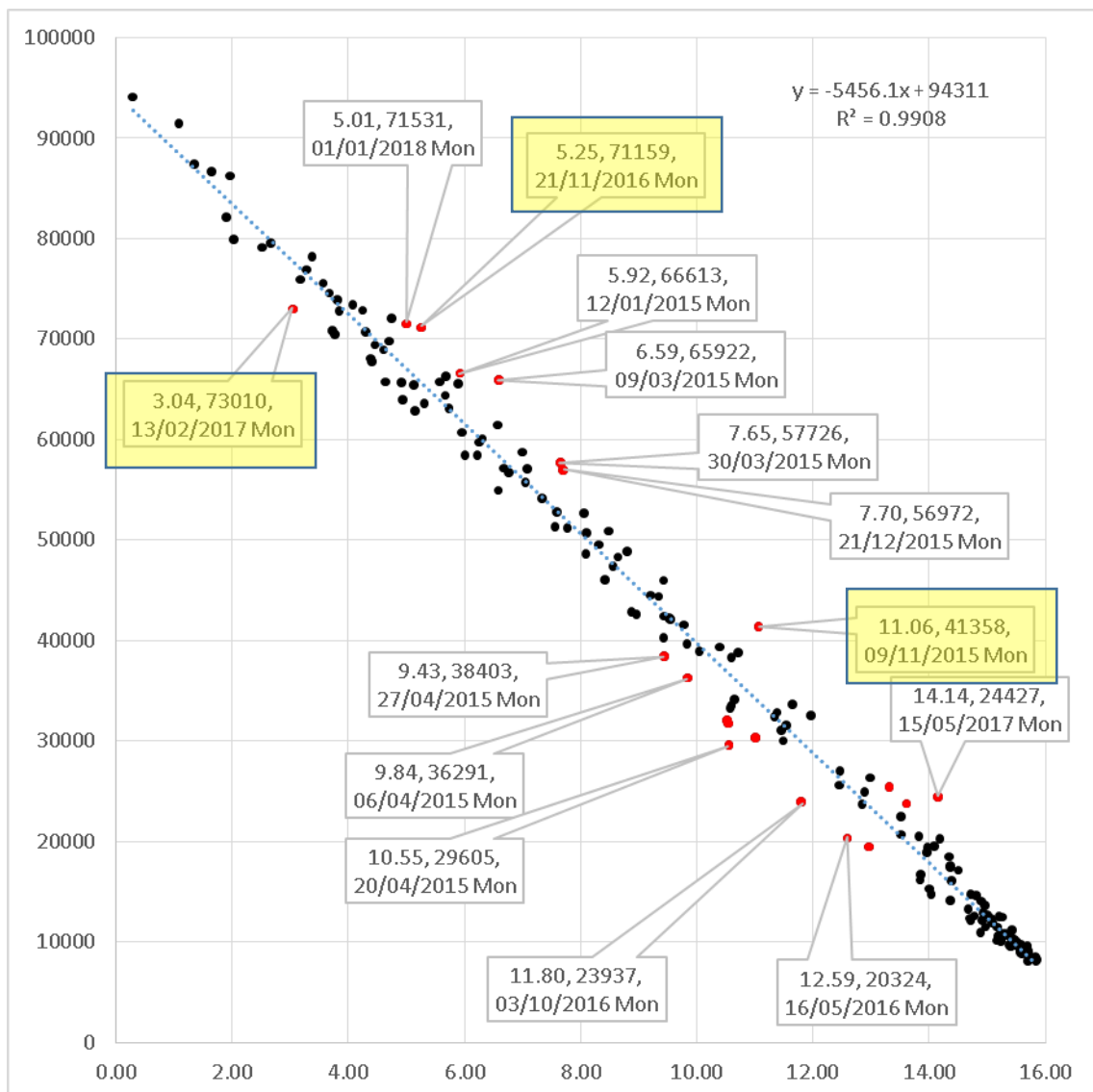


A simple gas demand model (demand = CWV) is shown in Chart 1: Monday. A forecast would be given on the regression line. The forecast would be over forecasting actual demands that are under the regression line and under forecasting actual demand that are over the regression line.

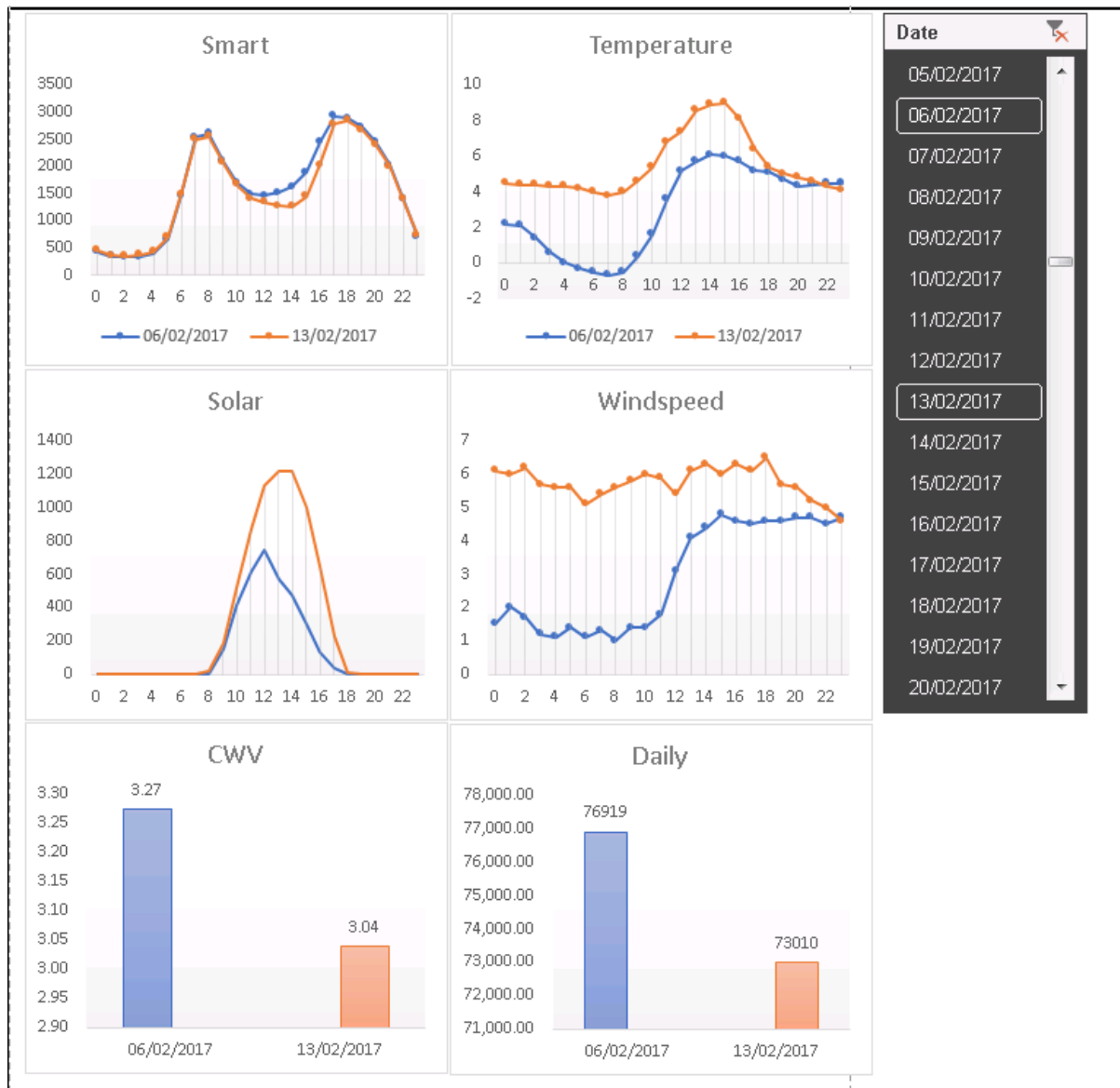
A significant difference or error in this Demand/CWV model could be due to the measurement in CWV. The data points in red show the P05, P95 percentiles of the residuals of the model to identify historic outliers where CWV isn't as good in explaining demand. Some of the outlier data points show the CWV, demand and date as a label for dates of interest and the yellow highlighted dates are shown in detail later.

An analysis has been done for Monday, Tuesday and Sunday separately, to reduce the impact from any calendar impacts.

Chart 1: Monday



13/02/2017

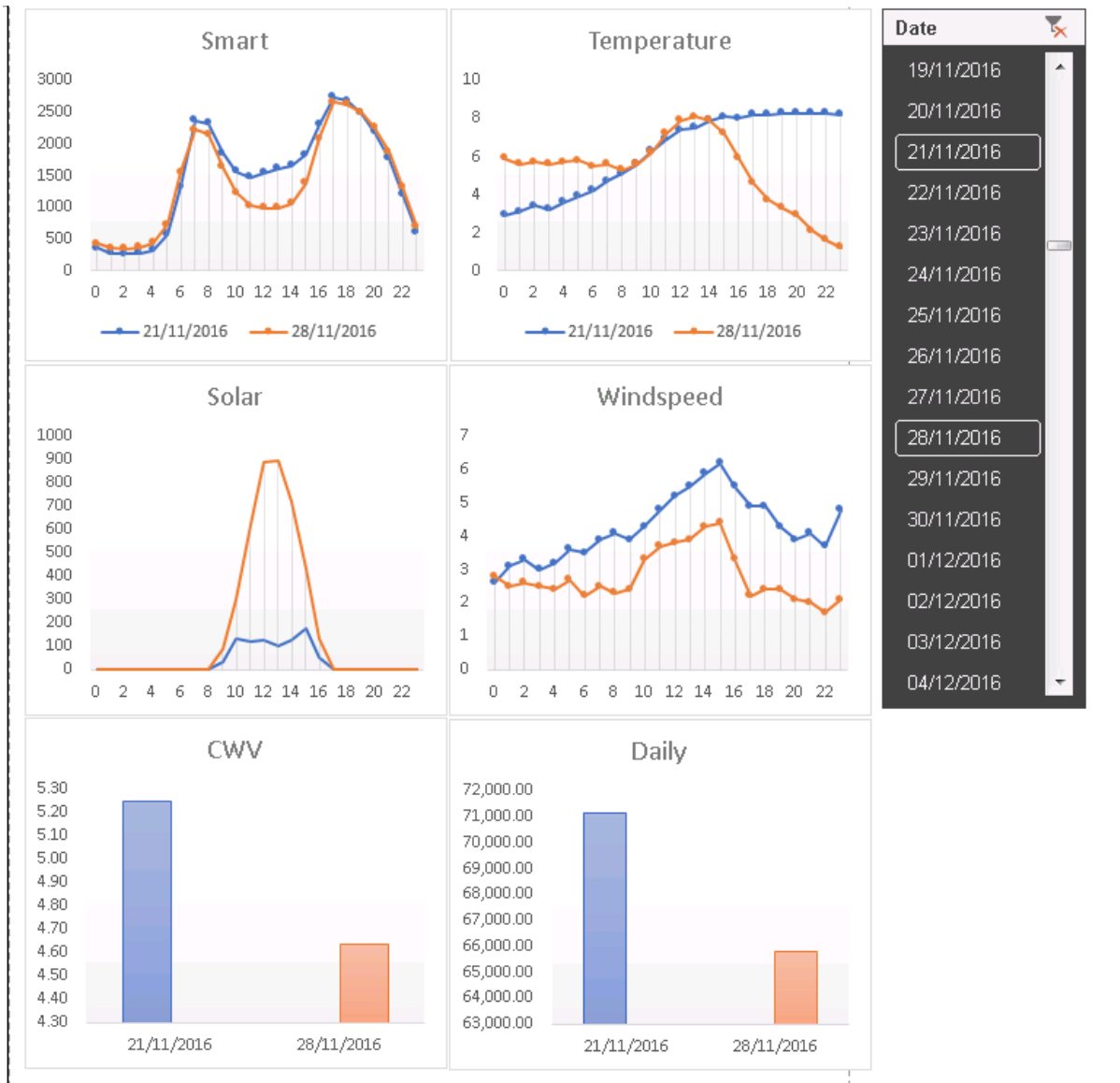


Demand is lower compared to the comparison day (06/02/2017), but CWV is colder, 3.04 v 3.27. Demand is lower from mid afternoon. Although the temperature profiles for both days are very different the levels of demand at the start of the day are the same, until mid afternoon.

Perhaps the wind and temperature effects until mid afternoon offset each other, while Solar is higher for the 13/02/2017 therefore this could be overall reducing demand. The inclusion of solar into CWV would result in a warmer CWV, or perhaps the wind effect on this date is too high resulting too cold CWV.

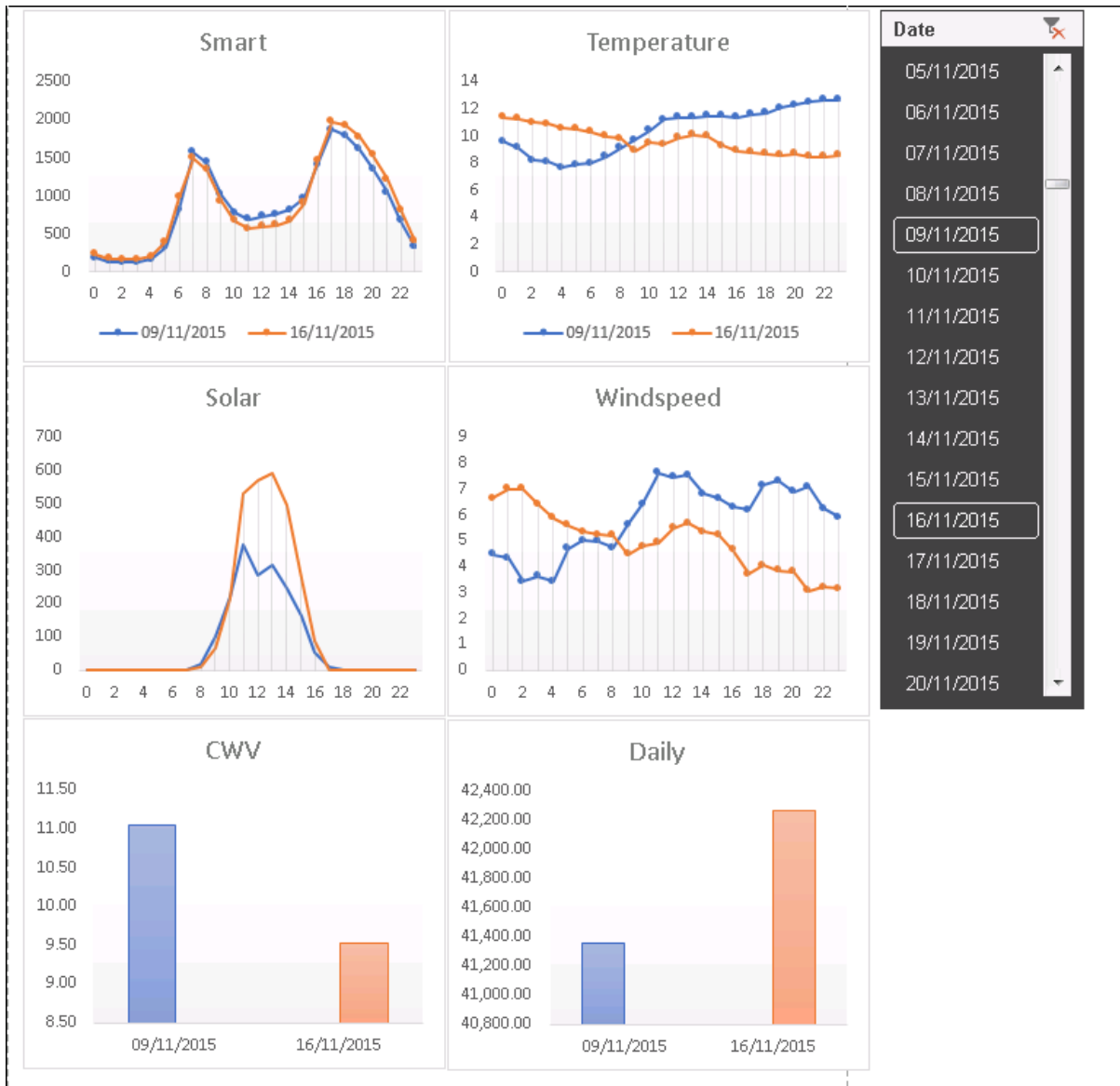
From the simple demand model 13/02/2017 over forecasting demand given CWV – so perhaps CWV is too low and therefore a warmer CWV from the inclusion of a solar impact/or less wind effect, would have the effect of moving the actual data point towards the regression line.

21/11/2016



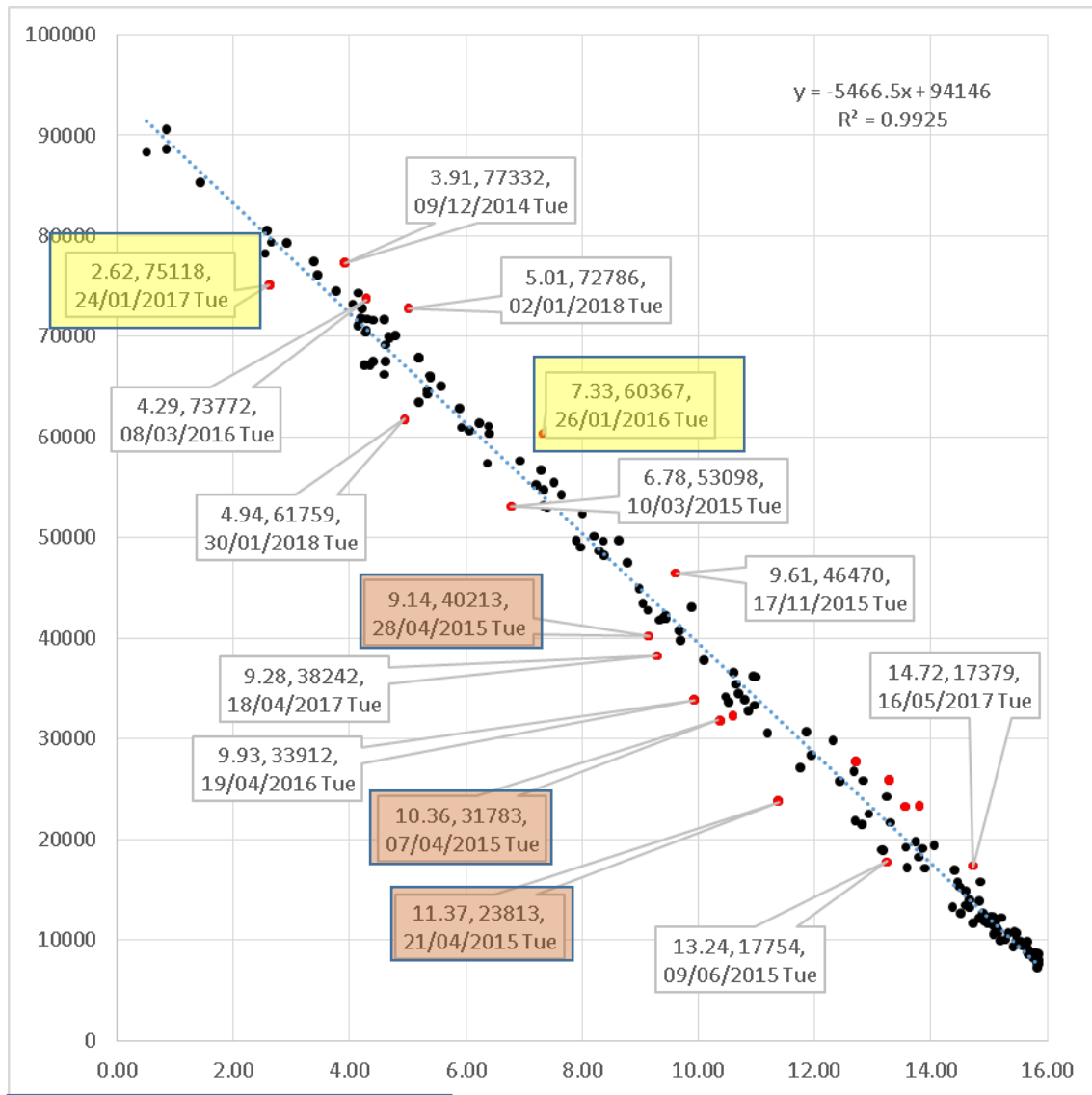
Levels of demand during the day are higher, spot temperatures midday are similar, wind is higher. Again demand is higher on the warmer CWV day. It was a very dull day and CWV is under forecasting these higher levels of demand. A colder CWV from solar effect could help, or perhaps the CWV for the 28/11/2016 is too low due to the impact from the trend of colder temperatures into the day, which didn't show straight away a large impact on demand. Perhaps the temperatures weights in the overnight hours are too high, the variability of overnight demands compared day time look less than 50% as implied by the weights.

09/11/2015



The demand model is under forecast actual demands for CWV 11.06.

Chart 2: Tuesday



07/04/2015, 21/04/2015, 28/04/2015, all over forecasting lower levels of demand. This is consistent with it being a sunny shoulder month.

26/01/2016



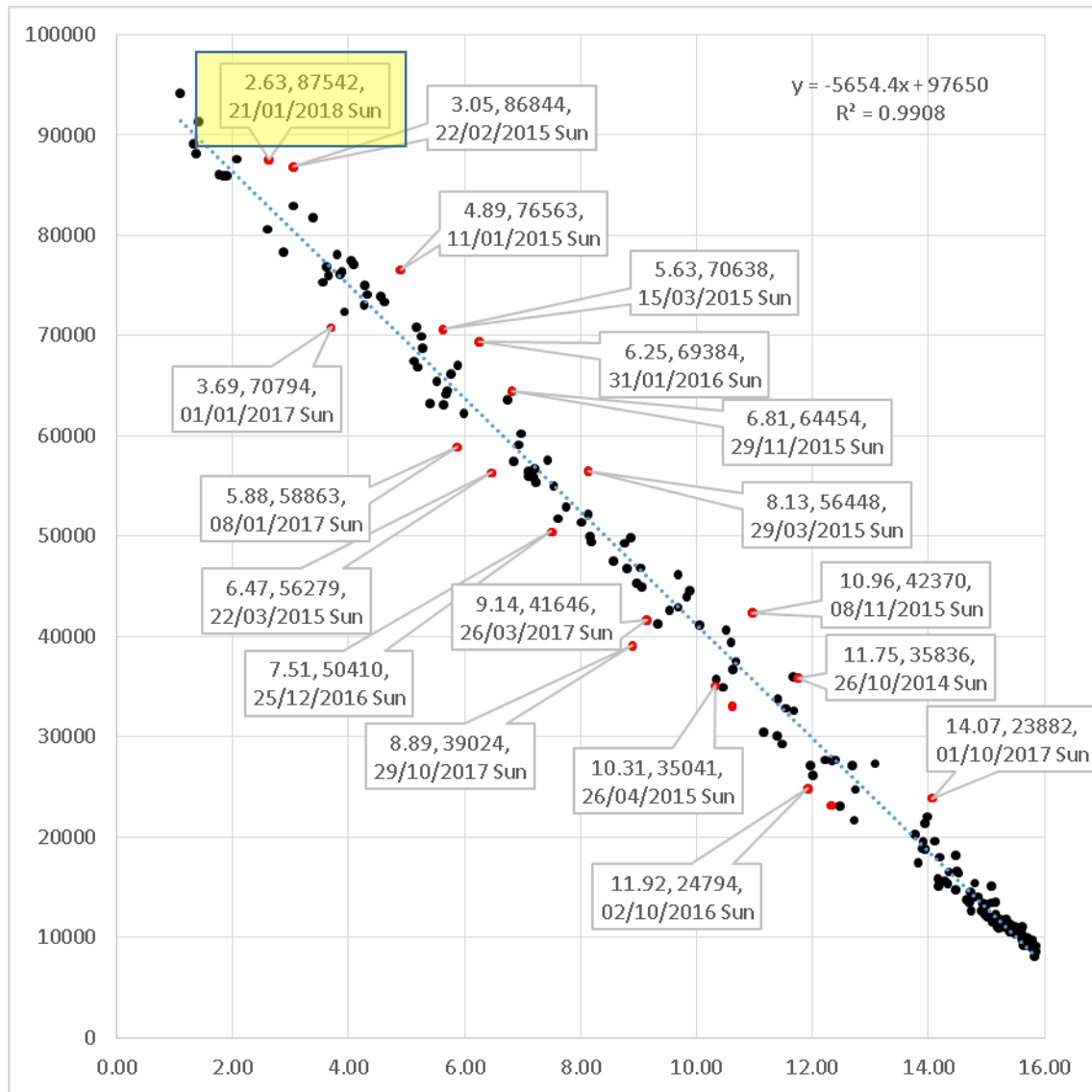
CWV is under forecasting demand, perhaps due to low solar levels. The demand increase from the 25/01/2016 to 26/01/2016 seems greater than CWV alone 7.55 to 7.33 and the slight Monday to Tuesday calendar effect.

24/01/2017



Very different temperature profiles, and CWV, while demand between the two Tuesdays differs less than expected. There is over forecasting actual demand on the 24/01/2017 – which was a bright day for a January.

Chart 3: Sunday



21/01/2018



Well known recent example of a day with high forecasting error. Shows very clearly the very different levels of daytime demand that can occur for a Sunday. The demand model is under forecasting this day - rain on a Sunday all day long.

General other known Issues with CWV

Issue	Detail	Likely Improvement 1 greatest, 5 least
CWV parameters	Review temperature, wind speed weights. Optimise parameters SNET	1 – optimisation is expected to offer the greatest improvement
Model Misspecification	Missing impacts on demand due to solar, rainfall, snow and fog.	2 – Would help seasonality of profiles, e.g. April and occasional days so helping DAFs
Regional Weather	LDZs share weather station for different regions	? – Are LDZ using the best weather stations for model accuracy and forecast? E.g. shared use of Heathrow for several LDZs.
Excluding outlier days from modelling	Year '18'19 ALPS DAFS includes outlier consumptions days affecting seasonality of profiles	3 – Impacted this year's business profile.
LDZ NE	Wind Chill weights is too low – showing visually less peak NDM demands compared to LDZ total and thus spiky UIG.	5