Proposed algorithm and associated issues

DESC were asked to undertake analysis to investigate an algorithm to replace the current algorithm to support the Nexus requirements for new meter point categories.

There were three options considered:

1. Option A – average demand from a sample of smart meters scaled up/down to other sites in the same "class" (EUC or similar grouping)
2. Option C – regression formula based on relationship of gas demand for a "class" to up to [six] weather data items and other non-weather parameters such as day of week, time of year; use of actual weather data each day to predict demand for that "class" based on the formula
3. Option E – amendment to current allocation formula, to use actual weather data in deriving the weather correction factor and to remove the Scaling Factor from the formula

In brief the methodology for the options was:

1. For the sample of smart meters take the days consumption and increase by the ratio of AQ from the sample to the AQ of the population. This method did not function as well when large scaling was required and would have necessitated a different methodology for nominations but was the only mechanism to allow full scale migration of SMART into the allocation.

2. Regression analysis would use historical weather and demand information to produce multipliers for each variable. For example:

$$Demand_{T_{LDZ}} = \left[\left(\sum_{EUC_1}^{EUC_n} \frac{AQ_{EU}}{365} \times (\alpha A^a + \beta B^b + \gamma C^c + \delta D^d + \cdots) + K\right) + Demand_1 + Demand_2\right] \times AF$$

   A typical formula may be
   AQ/365 * (22314.6JAN + 22984.2FEB + 22464.8MAR + …. - 1442.6CWV + 162.6SLOT4Temp - 0.11SLOT2GlobalRadiation - 563.8MonThu - 367.4MeanTemp + 143.9MeanWindspeedlag1 + 102.1MeanTempLag2 – 1331.8PreNYPeriod – 2980.3Xmas + 239.8Slot2Temp …)

   In essence the individual items would have a multiplier – set each year – that allowed a simple calculation of the demand.

3. The amendment to the current method uses AQ and ALP as currently, then adjusts DAF to represent the weather reaction of each class and calculates a weather correction from the CWV movement away from expected normals.

In undertaking the analysis it was recognised that there were issues with the scaling methodology. The DESC preferred methodology is to use pure regression – this is clearer and more easily replicable by industry participants.

There were some issues in data availability for undertaking the regression analysis effectively. The best method is to use a number of consecutive historical years to derive the coefficients. While we were undertaking the analysis there was limited data due to the seasonal normal rebase and this meant that the main results were run using a single year to derive the coefficients.

In the comparisons the option E tweak performed slightly better overall – although not significantly and importantly not in the key E01b EUC which would be deriving the majority of the volume. Regression methodology was also equal in accuacry at the larger EUCs (6-8).

If two years data were used to derive the parameters the regression method would have performed even better and DESC believes that with another two year of historical data the regression method would be the optimal mechanism to use.

Optimising allocation is important to minimise the risk Shippers have between on the day purchase and balancing and final reconciled position. There is a cost differential that Shippers are exposed to which can be significant.

DESC clearly minutes that time constraints have dictated the current choice of option, but there was a consensus that the option being put forward was not ideal and DESC are of the opinion that it will require replacement as soon as there is sufficient history to derive the regression parameters effectively.

Concerns were raised regarding hardcoding of the UNC text. Flexibility rather than restriction should be incorporated. It was believed that prescription (ie specifically tying to Option E) should be avoided in order to more easily facilitate/not preclude any future changes (such as the eventual use of Option C). Any associated formula should be provided in a supporting document rather than in the UNC. It was concluded that Option E (with caveats) would form the recommendation to DESC.

The option proposed in Mod453 is seen as an interim option – there are large errors which could mean instability in the allocation – this is an unknown quantity until it goes live, and another reason to support improvements. We are concerned that providing the text as it currently stands does not make it clear that DESC see this solution as temporary.

It is important for the code to indicate the transient nature of the proposal and to ensure that the system is built to future proof the change to a regression mechanism in a few years time.

Development of the regression will be able to validate results using the mechanism we have used to assess over the past twelve months and will be able to show significant benefits in terms of accuracy, clarity and robustness, providing assurance when moving to the this method.

Our suggestion is to end date the algorithm for no more than 3 years post Nexus implementation (earlier if the regression is ready) and to indicate the replacement mechanism to ensure the move from this interim to a more robust solution is as trouble free as possible.