Downstream Allocation

Stakeholder Meeting

26 June 2012

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Study – scope and elements

- **Objective of study**
  - Investigate ways to improve 'D+4' initial end of month allocation process

- **3 step process**

  1. Residual gas calculation
  2. Split residual gas into Groups 4 and 6
  3. Use number of ICPs per retailer to split Group 6 demand between retailers.
     - Most influential step - twice as important as 4/6 split
     - Focus is on Group 6 - may not be as effective for group 4

- Solely focuses on large gates and large retailers.

Step I: Residual Gas Calculation

Residual Gas Calculation

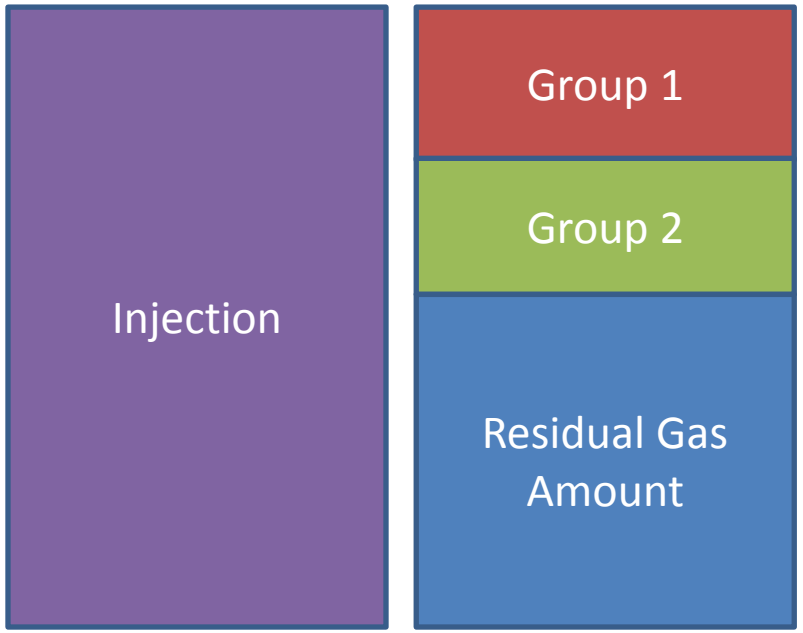
At the end of each month, the following information is available:

- The amount of gas injected at each gate (Injection)
- The amount of gas used by Groups 1 and 2 Time of Use customers (TOU)
- The AUFG factor for each gate.

Using this information, a residual gas amount can be calculated for each gate

Residual Gas Amount =

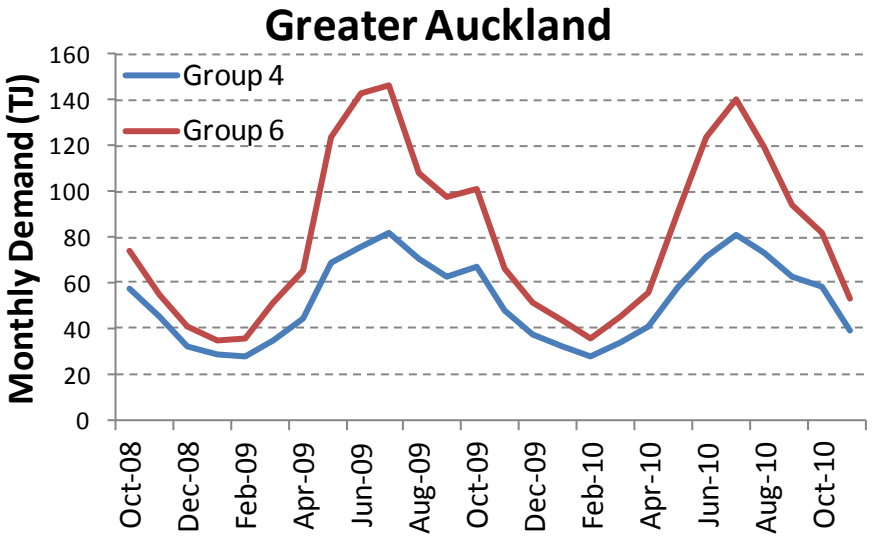
Injection - TOU*AUFG

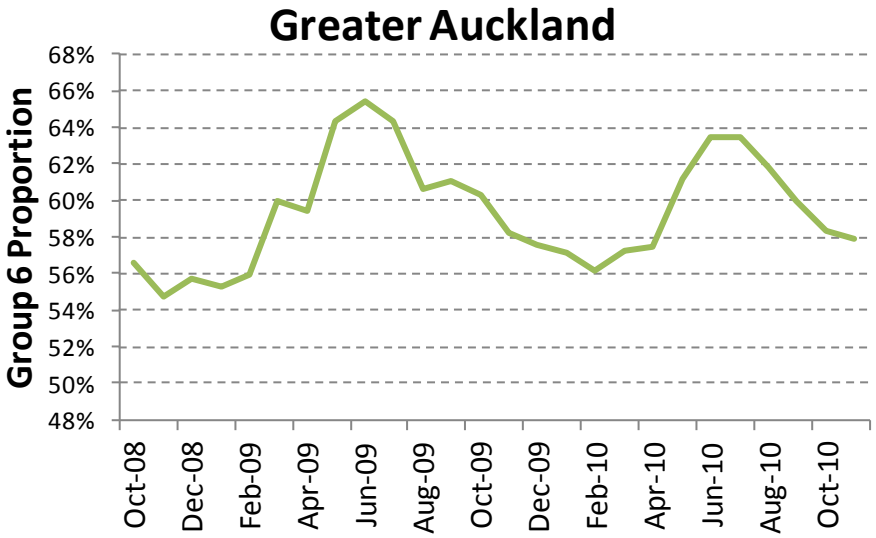


Step II: Group 4 / 6 Split

Splitting Residual Gas into Groups 4 and 6

- A number of different methods of splitting residual gas into Groups 4 and 6 were investigated.
- All methods were based on Group 6 demand being more temperature responsive / seasonal than Group 4





- Methods:
  1. Simple monthly allocation factors
  2. A model using external temperature to predict gas demand
  3. Using *total* residual gas to predict the *proportion* that is Group 6

Best Model?

The best model will use all points to model the relationship and have the minimum number of descriptive variables

- Especially important because of small historical record to base the model on.

- Monthly allocation factor
  - does not work well because it splits the record into 12 separate groups, so for some groupings there are only 2 observations

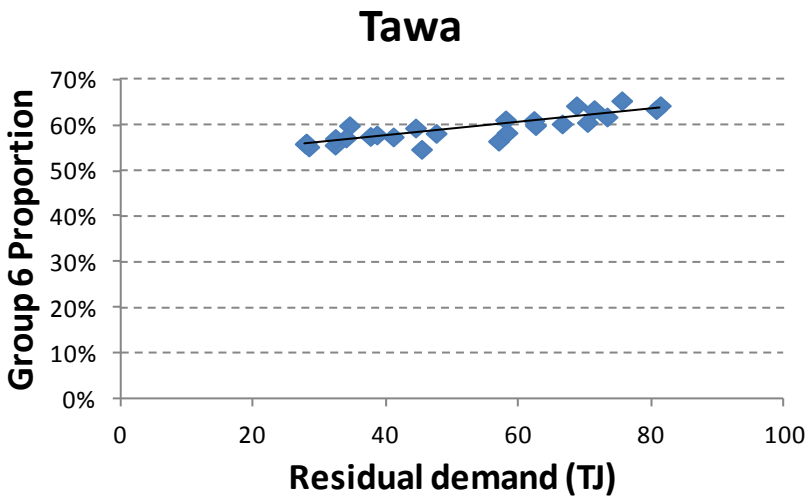
- External temperature model
  - a better option, but the relationship between temperature and demand is non-linear.
  - Requires external temperatures for each gate/region - more effort and more chance for something to go wrong

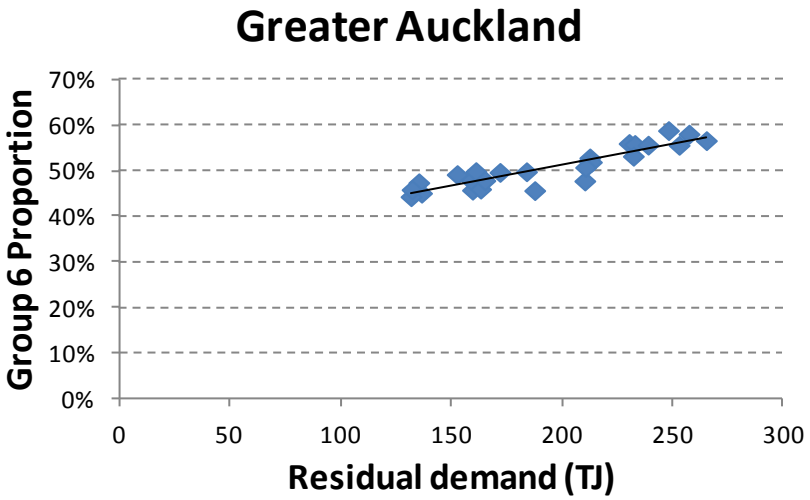
- Proportional Model
  - Best option

Proportional Model?

- The *total* residual demand is a good proxy for the temperature at a gate.
- The *proportion* of Group 6 demand is temperature dependent

- The relationship between the two appears to be linear, and is highly correlated
  - Uses all currently available information and no additional temperature data is required

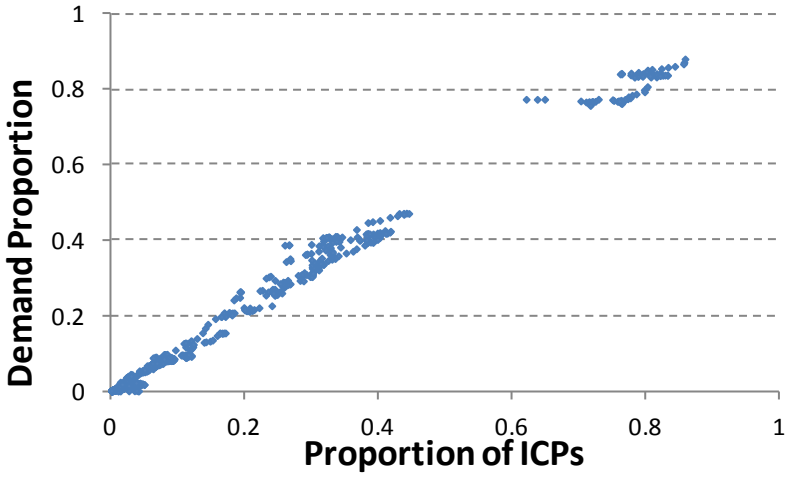


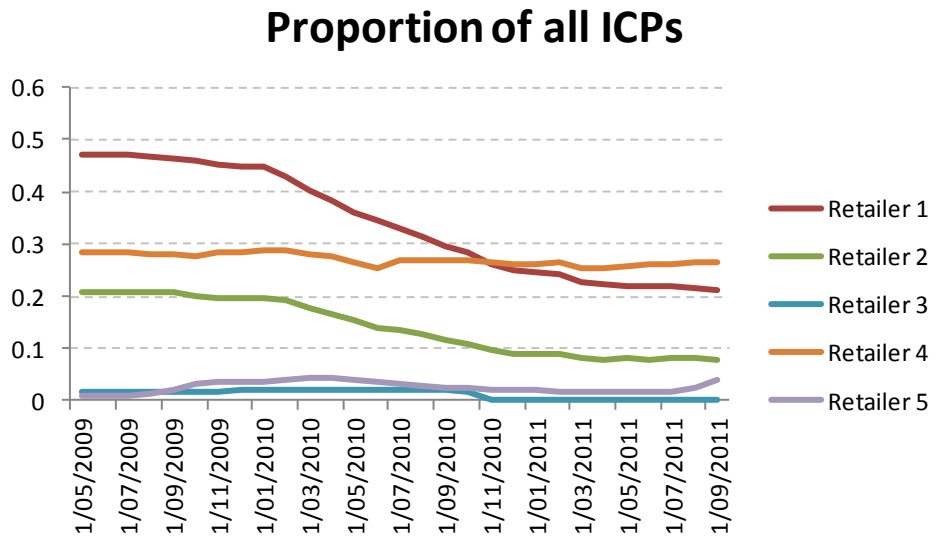


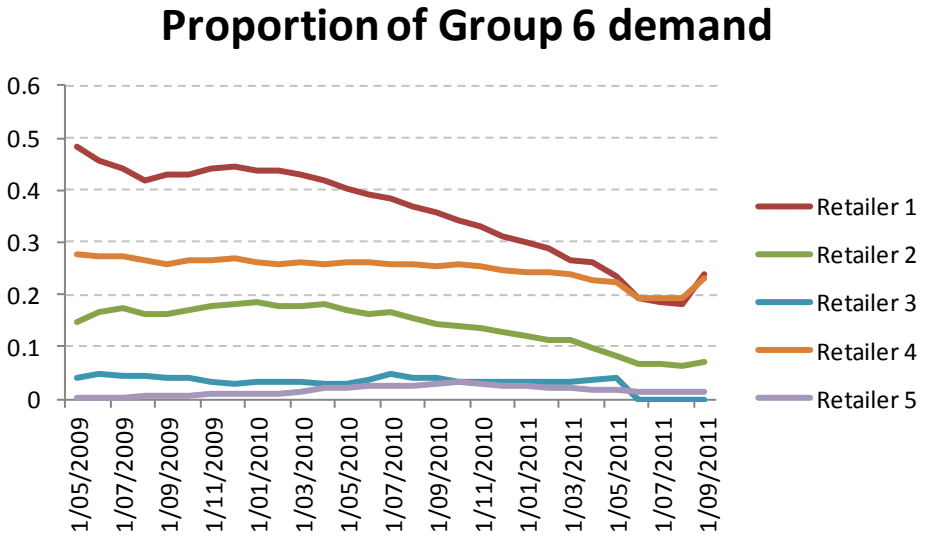
Step III: Split Group 6 using ICP Numbers

Why ICP data?

- Group 6 demand is very homogenous. Any one ICP is very similar to another.
  - Group 6 demand share for a retailer is largely determined by the share of Group 6 ICPs supplied by that retailer.
- Also importantly, ICP information is available in time for D+4 allocation

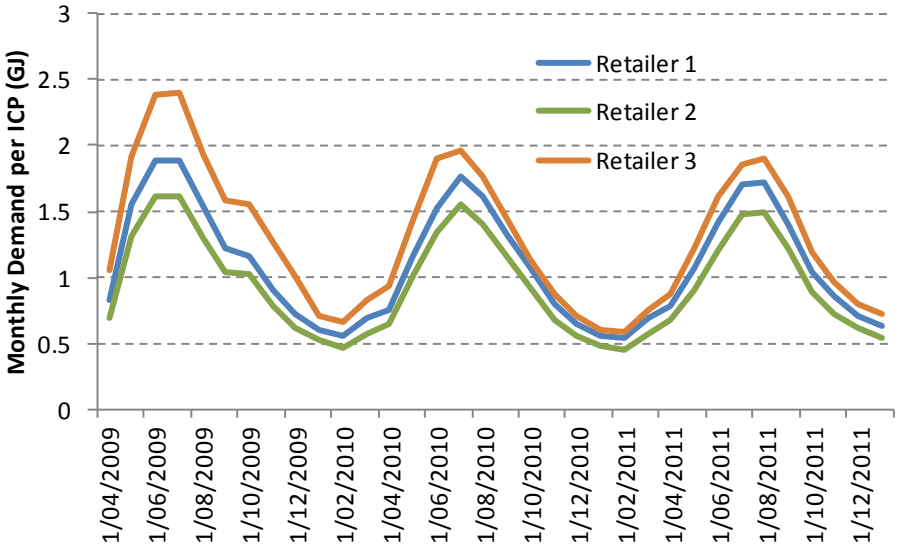






Correcting for 'Intensity Factor'

- The makeup of each retailer's customer base is slightly different.
  - Different value low/high user plans?



- Although Group 6 demand is mostly homogenous, there are observable differences between different retailers.
  - Calculate an 'intensity factor' for each retailer at each gate, based on the demand per ICP from the past two years.
  - Adjust the allocation to each retailer based on the intensity factor.

Compare Results

Results

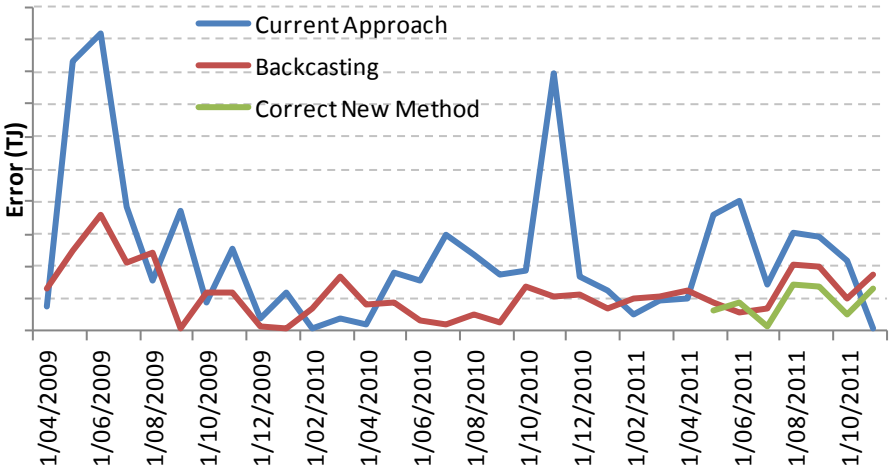
- To assess the accuracy of the new method in predicting gas demand, it was applied to the 5 largest gates and a selection of 5 smaller gates across all available historical data.

- Due to the limited historical data available, it is not possible to correctly apply the method to the older data. However, it is possible to 'backcast', by assuming that certain relationships don't change materially over time. These relationships are:
  - The relationship between total residual gas demand and group 6 proportion
  - The intensity factor, to correct for small differences in customer base between retailers.

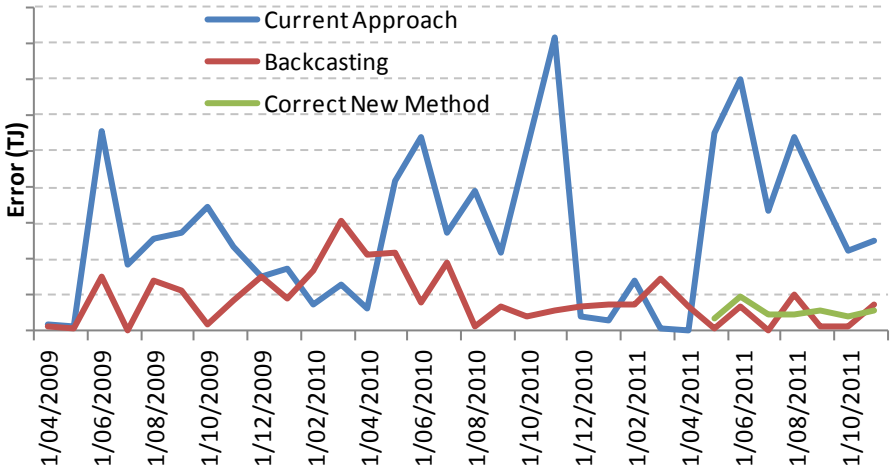
- As a check on the validity of the assumption, the method previously described was applied correctly to the final few months of data.
  - The accuracy was similar for these months

- There are very large improvements for some retailer/gate combinations

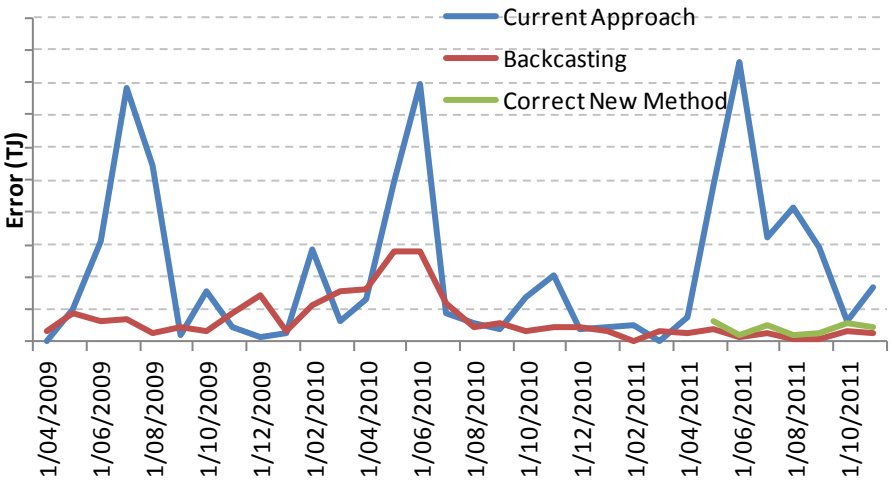
Auckland - Large Retailer 1



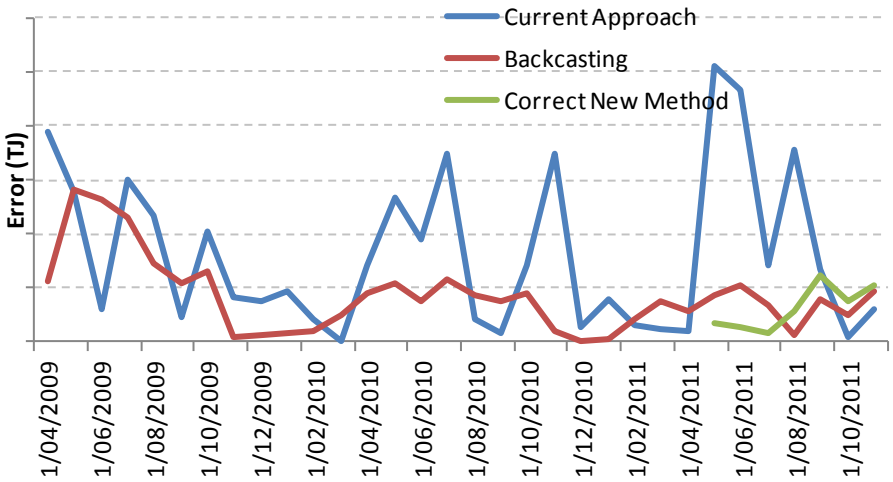
Hamilton - Large Retailer 2



Hamilton - Large Retailer 3

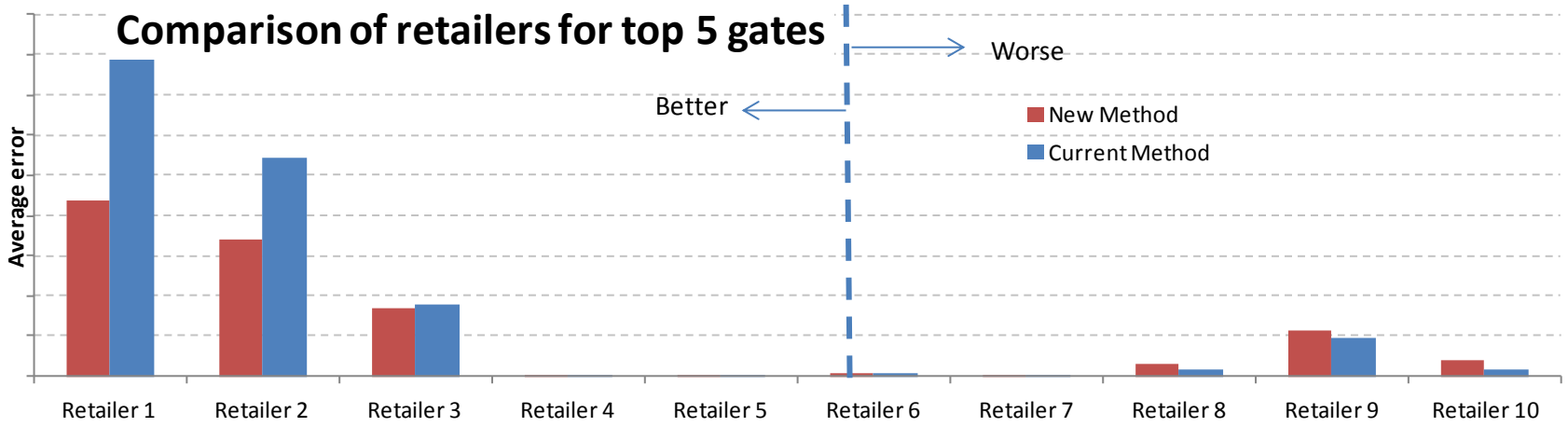


Belmont - Large Retailer 3

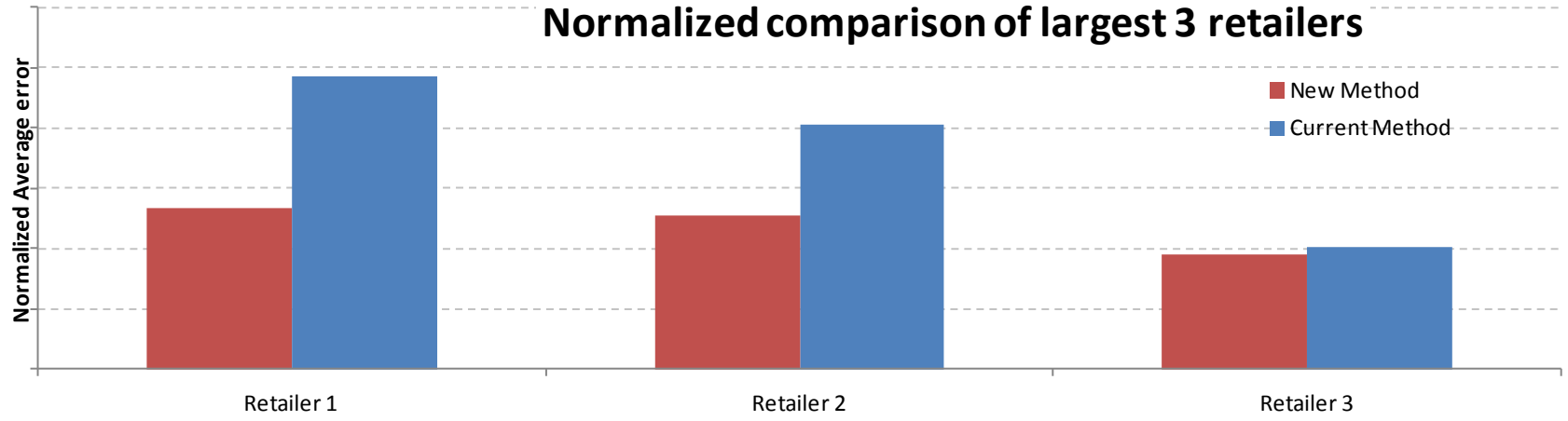


Results

- Overall, the method improves performance for large retailers for large gates.
- There are observable differences between the performances of different retailers

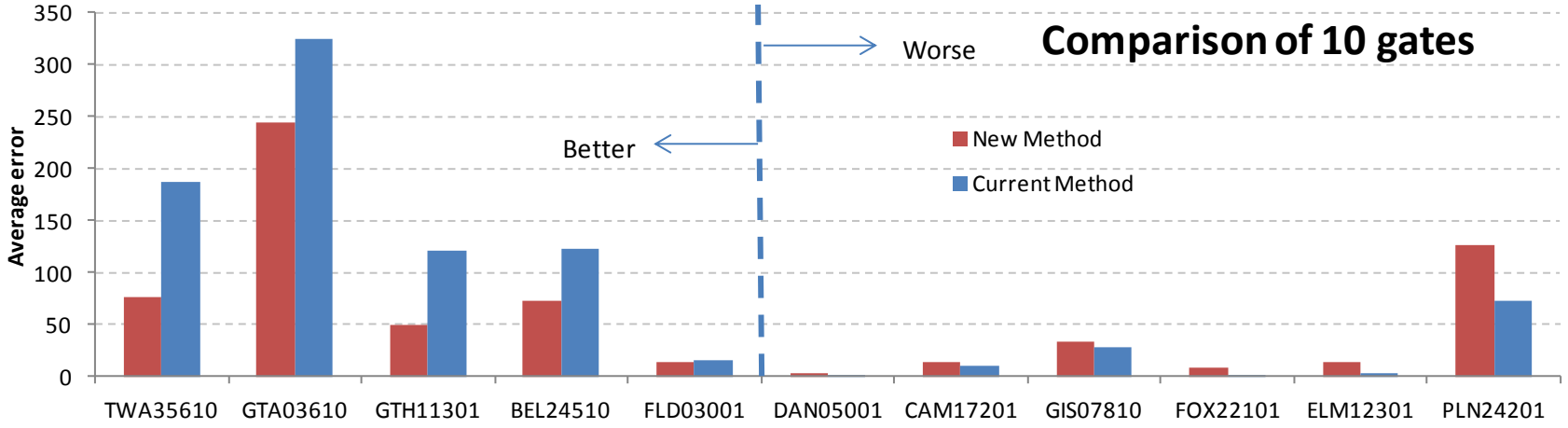


- Even when correcting for different size customer base



Results

- The method works better for large gates
  - Residential demand



Summary

- There are significant improvements for certain retailer and gate combinations.
  - The method is an improvement for some gates and not others.
- This method works best for large retailers at large gates.
  - This is where most allocation error occurs.

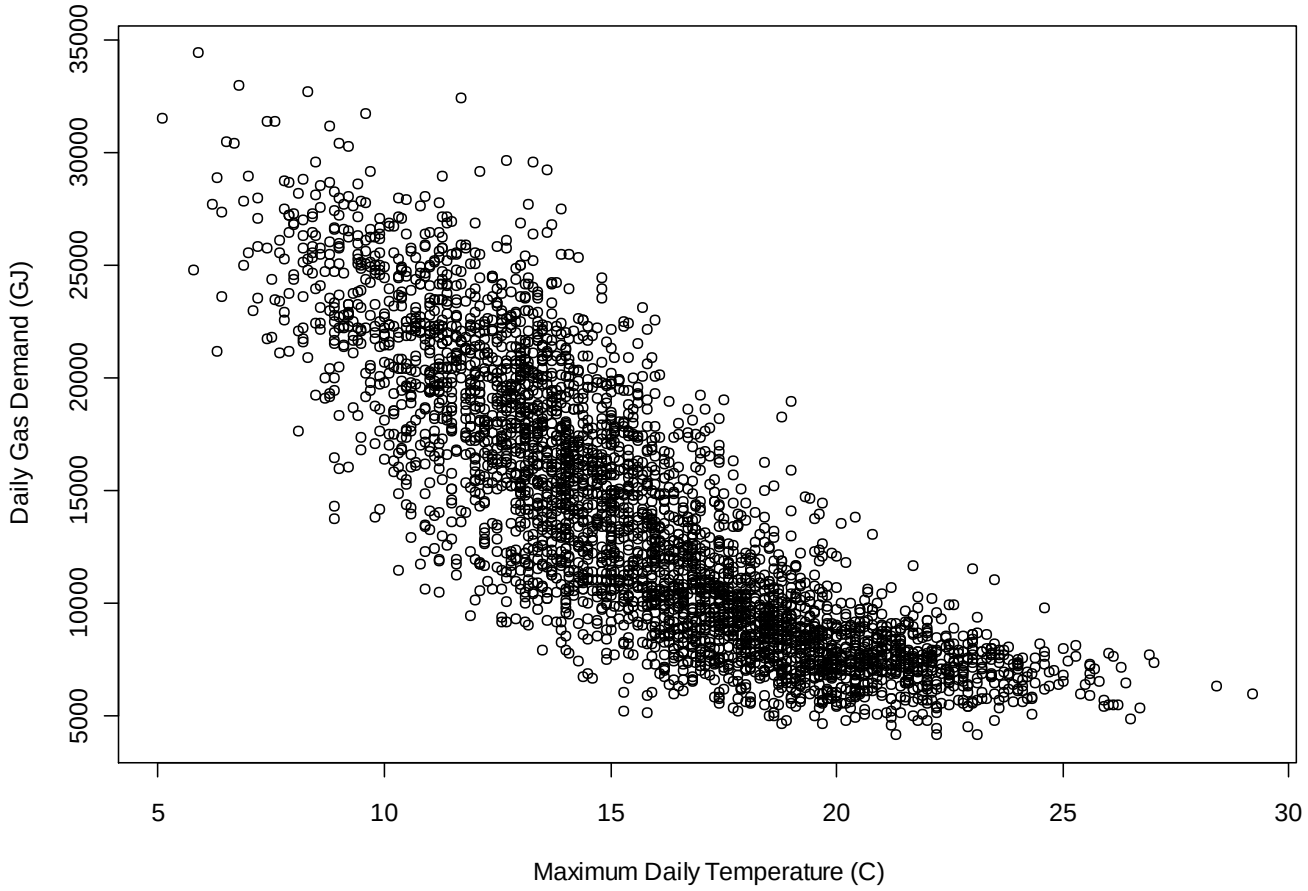
Next Steps

Repeat using ICP data split into allocation groups

- Current analysis was performed using the number of total ICPs.
  - This is acceptable for Group 6 at large gates because 98%-99% of ICPs are in Group 6
- Investigate the appropriateness of this approach for Group 4
  - It is not expected to be as accurate due to 'blockiness' of Group 4 load
- For smaller gates and retailers, using Group 6 only data may improve the effectiveness of this approach
  - When group 6 data is available, the method can be applied to all gates

Appendix 1 - Additional Material

Gas demand temperature dependence



Palmerston North

Palmerston North had systemic underreporting of Group 4 demand during winter 2009. This disrupts the modelling of group 4 / 6 split, and cause the method to predict erroneous allocations