1 Energy Forecasting Methodology Overview

1.1 Summary

In summary, energy forecasts are prepared at the tariff level by analysing metered consumption data and customer numbers and seeking to undertand the trends which are influencing these two key components of the forecasts. AusNet Services compiles the relevant information into an energy forecasting model which produces outputs of energy (and demand where applicable) for every billable tariff category.

This section sets out an overview of the energy forecasting methodology. The fundamental steps in the current forecasting process are:

- Extract historical customer numbers by tariff;
- Apportion forecast customer growth to individual tariff codes;
- Correlate historical energy consumption with weather conditions;
- Estimate the impact on energy consumption of:
    - solar PV;
    - retail electricity price changes;
    - energy efficiency
    - other likely drivers of energy consumption, e.g. electric vehicles, batteries.
- Enter any step changes (up or down) in expected load from large customers
- Validate energy forecasts by undertaking a top-down analysis of energy at the tariff level and comparing it to the forecasts derived from the bottom-up process
- Where needed, apply post-model adjustments to reflect any differences between top-down and bottom-up results.

1.1.1 Extract historical customer numbers by tariff

The number of customers assigned to each of AusNet Services' electricity distribution tariffs are extracted from the monthly revenue accruals model, which in turn is based on billing data. This allows the energy forecasting model to be calibrated to the current number of customers per tariff.

1.1.2 Apportion forecast customer growth to individual tariff codes

AusNet Services prepares customer growth forecasts as a key input to its annual maximum demand forecasts.

Those customer forecasts are compiled by having reference to both the historical trend in customer growth and the Victorian government's projections of structured private dwellings (SPD) in the Victoria in Future (VIF) planning publication.[1] Where there is evidence that the VIF forecast growth rates are not reflective of actual growth, more weight may be given to historical trends.

Based on the observed trends in customer growth rates within certain tariffs, the customer growth forecasts from the above process are then allocated to individual tariffs. For example, tariffs which are closed to new entrants receive a zero allocation, the demand forecast's growth in solar connections are allocated to solar tariffs, and so on.

1.1.3 Correlate historical energy data with weather conditions

Monthly billing data is extracted for each of the timeblocks (e.g. peak, off-peak, shoulder, etc.) for every tariff.

[1] https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future (accessed 9 Sep 2019)

Temperature, wind and sunlight hours data is extracted from OSIpi and historic BOM data. This data is used to calculate Cooling Degree Days (CDDs) and Effective Degree Days (EDDs).

Energy consumption within the timeblocks is then correlated with CDDs and EDDs via multivariate regression analysis in order to understand the relationship between weather and energy usage at the tariff and time block level.

1.1.4 Estimate the impact on energy consumption of various drivers

The preceding step provides a baseline consumption per customer which can be multiplied by the number of customers over the forecast period to produce a base energy consumption forecast. However, it does not at this stage take into account future changes in consumption caused by drivers that are not in, or will be different to, the baseline.

There are multiple drivers of future energy consumption, including:

- solar PV;
- retail electricity price changes;
- changes in energy efficiency;
- electric vehicles;
- batteries.

Some of these drivers are longer term (electric vechicles, batteries) and some are shorter term (solar, energy efficiency, price). For annual pricing submissions, which only require a one-year ahead forecast, the impact of longer term technologies such as electric vehicles and (to a lesser extent) batteries, is not especially relevant.

1.1.5 Estimate the impact on energy consumption from COVID-19 impacts

For the updated HY2021 and FY2022 forecasts, it was necessary to adjust expected energy consumption to take account of the likely impacts of COVID-19.

With businesses and offices re-opening and many employees returning to their workplaces on an at least part-time basis, the ongoing impacts of COVID-19 on energy consumption are uncertain. However, daily interval meter data over the period Mar-Apr 2021 is suggestive of a ~4% increase in residential and ~2.5% decrease in non-residential consumption,

These increments and decrements have been applied to each tariff starting from the first month of the forecast (April 2021) and remain in place until Dec 2021, after which the impact is reduced by 50% (until June 2022).

It is important to note that the above increments and decrements relate to energy per customer. The impact of COVID-19 is also realised through an expected reduction in the number of connections in FY22, in line with the EDPR forecasts.

1.1.6 Enter any step changes in large customers

To the extent that AusNet Services has been made aware of any planned changes in consumption for large (>160 MWh per annum) customers, these will be reflected in the modelling. This information can be sourced directly from the customers (for example, via meetings), or publicly announced closures/expansions.

1.1.7 Validate energy forecasts

The above steps result in a bottom-up energy forecast for all tariffs (and timeblocks) for which AusNet Services has active customers. To ensure that these forecasts have not resulted in an over-statement or under-statement of energy consumed for each tariff, the results are compared to actual monthly energy delivered for a period of at least the previous 12 months.

To the extent that there are differences between the forecast energy and actual energy delivered, the model inputs and assumptions are reviewed to understand why these differences may exist. Post-model adjustments may be included in instances where the bottom-up drivers are not adequately capturing expected demand.