Demand Forecast in the Electricity Risk Curves

Why does the demand forecast matter for the ERCs?

The Electricity Risk Curves (ERCs) model the future relationship between supply and demand. In other 101s, we have covered some of the assumptions that go into modelling the supply side, but equally as important are the assumptions that go into modelling the demand side. The ERC sequences are modelled up to 33 months into the future, so we require a forecast of demand for the next 3 years. Future electricity demand is a critical factor to consider when assessing security of supply, and this ERC 101 will explain what goes into the demand forecast.

What demand forecast do we use?

The demand forecast used in the ERCs is produced by Transpower's Grid Development division using a top-down model of national and island energy demand. The forecast uses an ensemble approach where 4 forecasts are combined to form a single base forecast, with additional discrete step changes added to the base where more detailed information is available. For example, there may be a known committed step change such as a major consumer increasing or decreasing consumption at some point in the future.

The ensemble uses the following input forecasts:

- Traditional econometric forecast
- Long term linear regression
- Short term linear regression
- MBIE Energy Demand and Generation Scenarios

The base forecast uses reconciliation data as its primary input and is calculated for each Grid Exit Point (GXP). Thus, the forecast inherently accounts for embedded generation and distribution losses but does not include transmission losses. We do some post-processing to ensure that supply and demand are modelled on the same basis in both the demand forecast and the ERC modelling. If the supply and demand side were not modelled on the same basis, we could accidentally double count some generation, and not count others. The flow chart in Figure 1 shows how the underlying energy forecast is determined.

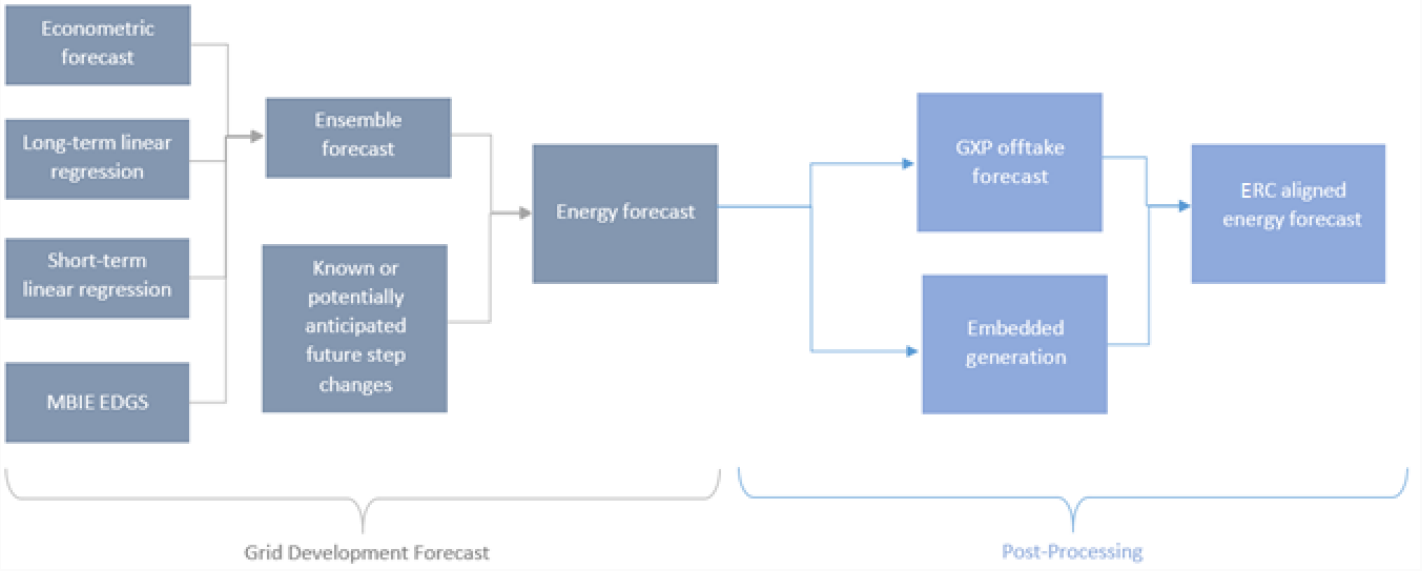

Figure 1: Schematic of how demand forecast is prepared

The forecast used in the ERC modelling is the expected forecast (i.e. P50) – in other words, our best estimate of what demand will be in the future. Once this demand forecast has been aligned with the ERC model, the annual values are shaped into weekly average demand per month, considering historic demand profiles throughout the year, and accounting for weekends and public holidays. These values are input into the ERC model, and can be seen in the ERC Assumptions Spreadsheet.

How does the demand forecast impact the ERCs?

We generally update our demand forecast once a year, however, in some situations (such as during 2020 when the closing of Tiwai was signalled for 2021) we update the forecast more often.

At the simplest level increasing forecast demand increases forecast risk levels and decreasing forecast demand drops the risk levels. However, the relation is not linear – i.e. X GWh of demand decrease in a month doesn't not drop the curves by X GWhs in that month. This is due to the curves been calculated over a 12-month period and finding the lowest point of storage. Therefore, the curves will change up or down by the sum of the demand change between the calculation month and the time of lowest storage. This will be different for each month of the year.

An example of demand change affecting risk is shown below. Due to the inclusion of a lower demand forecast in the ERC update in February 2019, there was a significant drop in the ERCs.