Generation Assumptions in the Electricity Risk Curves

What are the supply assumptions we use for generation?

The behaviour of thermal generators modelled in the ERCs is defined by the SOSFIP clause 6.1(b) *"[The electricity risk curves must] assume market behaviour that seeks to minimise the use of hydro storage"*. This clause is incorporated into the model as an assumption that generation from thermal resources will always be prioritised over hydro generation. While this assumption does not reflect normal market operation, it reflects the capability of the generation fleet to reduce controlled hydro generation and thus avoid a hydro shortage situation, which is the core purpose of the ERCs.

Generation behaviour for sources such as geothermal, wind and hydro must also be modelled to account for their generation capability throughout the year. These behaviours are included in the ERC model as generation profiles, either "profiled output" or "based on historical inflow sequences", which are shown in the Electricity Risk Curve Assumptions Spreadsheet. This table also includes additional information on future plant that will be commissioned in the next 2-3 years, and any de-ratings of plants due to notified restrictions in their generation capacity.

Profiled output

Generators that are identified as using a "profiled output" are modelled using predefined generation patterns based on historic output. The profiles change over the year due to historic patterns in operation, for example some geothermal generators have months where they typically generate more or less, and therefore their generation profiles vary from month to month. These profiles are comprised of 4 values: week-day; week-night; weekend-day; weekend-night. Historic output is typically averaged over the last 5 years, but we apply discretion in our modelling in some cases to account for irregularities such as major outages. Typically, geothermal and some run-of-river hydro generators are profiled as they follow predictable patterns in their annual generation. In the case of some hydro generators, we have insufficient plant and inflow information to model based on historical inflow sequences. For wind generation, we currently use a flat annual profile, but we are investigating ways of improving this.

Based on historical inflow sequences

Unlike the somewhat predictable generators (Geothermal generation for example), the generation patterns for hydro generators can vary each year depending on their levels of storage and inflow patterns. Larger hydro generators that have sufficiently reliable historical inflow datasets are modelled "based on historical inflow sequences" using historical inflows sequences as a basis for generation output. Weekly inflow datasets are created for Clutha, Manapouri, Waitaki, Tekapo and Waikato, Cobb, Coleridge and Waikaremoana, based on 89 inflow sequences since 1931. Generally, each of the modelled generators supply energy based on these historical inflow datasets, in addition to the amount of storage (if they have controlled storage) they have available. This is a complex calculation as generators store or use water to ensure a balance between avoiding spill and avoiding shortage. The generation quantities are determined using proprietary software provided by Energy Link. The average monthly generation profiles that were calculated using this method for the March 2019 ERC update are shown below:

	Hydro Generation (GWh)						
	Waitaki	Clutha	Manapouri	Waikato	Cobb	Coleridge	Waikaremoana
Mar-19	598	338	425	379	18	21	39
Apr-19	506	368	460	386	20	21	42
May-19	534	331	490	364	23	25	48
Jun-19	545	310	496	477	25	28	60
Jul-19	529	310	525	514	26	27	70
Aug-19	500	261	556	483	26	28	69
Sep-19	473	212	550	437	25	29	55
Oct-19	466	200	544	341	24	29	45
Nov-19	519	162	556	302	23	30	35
Dec-19	489	134	494	275	20	29	28
Jan-20	568	111	477	259	19	27	28
Feb-20	624	136	435	287	17	25	33