



Memorandum

TO: Ellie Watson
CC: Richard Matthews (Mitchell Daysh)
FROM: Oliver Mooney and Gareth Gray
DATE: 1 September 2025
RE: High-level generation implications with enabling continuous flow down the Takapō River

Renewable generation, system cost and greenhouse gas emissions

The imposition of a minimum flow and / or flushing flows would reduce renewable electricity generation, drive system and consumer costs upwards, and result in short to medium term greenhouse gas emissions to make up any shortfall.

Currently it is reasonable to assume that the resulting shortfall in hydro generation would be offset by increased thermal generation.

A 26 m³/s minimum flow would significantly reduce electricity generation at the Tekapo Power Scheme, with further reductions at Meridian's Ōhau A, B, and C stations due to diverted flow bypassing Lake Pūkaki.

Table 1 below considers replacing the shortfall in hydro generation with coal-fired generation from Rankine units, which we consider a fair assumption in the short-term given the uncertain future of gas supply and coal's frequent role as the marginal fuel.

Table 1: 26 m³/s minimum flow as lost GWh and corresponding CO2 emission.

Scheme	GWh of lost hydro generation per annum (GWh)	Additional Coal Burn per annum (tonnes)	Resulting Emissions per annum (tCO2)
Tekapo	345	190,022	343,863
Ōhau A, B & C	304	167,087	302,360
Total Waitaki	649	357,108	646,223

To contextualize these figures, 357,000 tonnes of coal equates to approximately ten coal shipments and represents roughly 37 percent of the current coal stockpile at Huntly Power Station. These numbers do not consider the additional emissions associated with shipping and transport to and from Huntly.

Replacing the lost energy with coal is feasible but poses greater risks to security of supply than hydro, due to reliance on imported fuel and the higher maintenance requirements of Huntly's

Rankine units. Additionally, an increase in thermal generation in the market results in greater wholesale electricity prices.

Operational limitations

The introduction of minimum flows would make managing the lake storage more complex due to the loss of control over all the outflows. Minimum flows would likely drive more conservative water use and set higher targets for pre-winter storage, both of which could raise the likelihood of spill and further lost generation.

An effective reduction in Lake Takapō storage means that at low lake levels the scheme would need to be shut down daily for longer durations to avoid the Tekapo B turbines operating in the rough running range (less than 43 cumecs), potentially impacting on the daily peak electricity demand periods. Currently the scheme can be shutdown overnight to accommodate times when storage is low to preserve the lake level and allow the scheme to be run to meet demand periods during the day. With a loss of inflow these occasions would be extended bringing associated security of supply issues.

At present, if Takapō A Power Station trips offline the storage in Lake George Scott (LGS) can be used to supplement the canal volume, ensuring Takapō B Power Station can continue to run and supply the grid. Without that option available the entire Takapō Scheme would have to be shut down until the water arrives from Gate 16 meaning a total loss of up to 190 MW rather than a loss of up to 30 MW for Takapō A Power Station alone. This would have a significant impact on the grid, especially at times when generation is scarce and increases the likelihood of grid instability or blackouts.

When Lake Takapō is low or nearing the minimum the need to conserve storage would start happening during winter, much earlier than usual, impacting on the market for extended durations until the storage recovers in the following spring/summer period. A minimum flow would jeopardise the available contingent storage that is used effectively as an insurance policy to keep the grid stable in national crises.

Signed – Gareth Gray (Control Centre Manager / Hydrologist)



Signed – Oliver Mooney (Senior Analyst – Wholesale Analytics)

