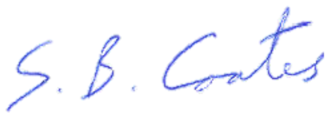
Technical Advice –Electricity Market Expert by Simon Coates

Date	28 March 2026
To	Trinity White, Environmental Manager – South Island Renewables, Genesis Energy
From	Simon Coates – Concept Consulting
Project advice provided for	Fast-track Application for Lake Pūkaki Hydro Storage and Dam Resilience Works
Documents referred to	The note I have prepared in relation to this fast-track application is "*Review of Meridian proposal to alter contingent storage access arrangements*", dated 19 March 2026 – filename *ReviewOfMeridianProposal_04.pdf* I also reference - the 20 September 2025 report prepared by JC[2] consulting for the Transpower System Operator entitled "*Contingent Storage Management: Understanding the trade-offs from restricting access to contingent hydro storage*" – filename *Contingent_storage_Final_Summary_Report_20Sep25_V2* - Meridian's 24 March 2025 submission to the System Operator on *"Security of Supply Forecasting and Information Policy Review: Issues Paper"* – filename *Meridian SOSFIP Review - Issues Paper Questions - March 2025.pdf* - Meridian's 4 November 2025 submission to the System Operator on "*Security of Supply Forecasting and Information Policy Review*" – filename *Meridian submission - SOSFIP Review 2025.pdf* - Sapere's 31 March 2025 report "*Modelling outcomes with and without access to contingent storage at Lake Pukaki – peer review*" – filename *Appendix-to-APPENDIX-B-Sapere-Peer-review-310325-_Redacted.pdf*
Qualifications and experience	First Class Honours degree in Physics from Bristol University, and a Masters degree in Environmental Technology (specialising in Energy Policy) from Imperial College. I am a director at Concept Consulting Group Ltd. In my eighteen years at Concept, I have regularly advised the government and the electricity regulator on matters of electricity market policy and design. I also advise extensively on gas and carbon market policy and design. I also lead Concept's market modelling and forecasting practice. In addition to providing regular electricity, gas, and carbon forecasts for market participants and public agencies, we are regularly used by market participants to undertake bespoke market modelling and

	forecasting in support of major projects. Our significant clients in this area include all four of the main generators.
Code of Conduct	As an expert witness I have read, and I am familiar with, the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. This memorandum has been prepared in compliance with that Code. In particular, unless I state otherwise, this response is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.
Signature	

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19 March 2026

Alicia Williams
Senior Legal Counsel
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By email: [redacted]

Dear Alicia,

Review of Meridian proposal to alter contingent storage access arrangements

You have asked for a review of Meridian Energy's proposal to remove regulatory constraints on accessing contingent hydro storage in Lake Pūkaki. For context, Meridian's current application imposes no enforceable consent conditions on the depth, frequency or duration of the lake below their current operational minimum of 518 meters above sea level (masl).

This note covers three aspects:

- A review of the analysis Meridian put forward supporting their proposed change.
- A review of whether Meridian's proposal is consistent with the underlying purpose of contingent storage.
- Consideration of the extent to which the New Zealand electricity system supply / demand balance has improved since Winter 2024.

Review of Meridian's benefits analysis

In their memo of 22 September 2025, Meridian assert that removing the restrictions on Lake Pūkaki contingent storage for the years 2026 to 2028 would likely reduce wholesale electricity prices by about 7% - something they say is equivalent to about $435m per annum load costs savings.

On this point it is worth noting that such load cost savings would only be realised by consumers if they purchased their electricity on the spot market. However, given that the vast majority of electricity purchased by consumers is based on electricity prices that are typically fixed a year in advance – and sometimes longer – the commercial benefit of a fall in wholesale prices would largely accrue to the main Gentailers (particularly those whose output would reduce the most in a dry year), albeit to a progressively and significantly reducing extent for the second and third years following any change which altered wholesale prices.

In assessing the likelihood of such benefits eventuating, I have compared Meridian's analysis with the September 2025 analysis undertaken by John Culy Consulting (JC^2) on behalf of the System Operator.[1] This too assessed the likely impact of removing the restrictions on accessing contingent storage.

[1] Available for download here: https://static.transpower.co.nz/public/bulk-upload/documents/Contingent_storage_Final_Summary_Report_20Sep25_V2.pdf?VersionId=0N4nD5Vcu56YDa6ktn0yRA7SS3KDn4G7

Both analyses used the same fundamental approach to assessing the effect of removing restrictions on accessing contingent storage, in that both modelled the implementation of such a change through changing the water values that hydro operators use to manage their storage and release decisions.

Although there are many similarities between the two analyses, there are a number of differences that are relevant to assessing Meridian's projected benefits.

1. **The JC² analysis projected much smaller savings**: Approximately 1.3% in 2026 (with the caveat that this was provided there are no major unexpected supply outages, in which case the benefit would be even lower – see point 2 below) compared to the 7% projected by Meridian.

   It is not clear why Meridian's projected benefits are so much greater than JC²'s – particularly, as it appears that the JC² analysis considered eased access to all New Zealand contingent storage, whereas Meridian's only considered eased restrictions on the Pūkaki contingent storage. To establish why there is this difference would require a much more significant review of the methodologies and assumptions of the two modelling exercises – a significant undertaking that is beyond the scope of this engagement. In considering the magnitude of likely price effect, it is worth noting that

   - Concept's own modelling is indicating that eased access to contingent storage would result in an approximately 1.1% reduction in prices[2] – ie, similar in magnitude to the JC² analysis.
   - Sapere's review of Meridian's approach (undertaken on behalf of Meridian) identified that "*some of these factors [identified by Sapere] could reduce the [price] margin between the outcomes from the two scenarios [restricted vs eased access]*", but they did not attempt to quantify such effects. They also said that *"The restricted scenario does not adjust for when access to contingent storage is granted [by the System Operator when NZ lake levels drop below the trigger thresholds]".* It is not known whether this is indeed the case for Meridian's modelling, but if it were to be so it would tend to over-state the benefit Meridian calculated of easing access to contingent storage. Ie, their modelling of the restricted scenario would be applying unduly restrictive access to the contingent storage.

2. **The JC² analysis also considered the potential for stress events such as a major unexpected supply outage** (eg, the loss of a major thermal supply asset for a sustained period) – hence the caveat "provided there are no major unexpected supply outages" in the preceding point.

   The JC² analysis identified that removing restrictions on contingent storage would make the system far less resilient to these stress events. In simple terms, removing restrictions on contingent storage would result in lakes being held lower on average – something the Meridian analysis also identified – with the result that there would, on average, be less emergency reserve to be called upon in the event of a major unexpected supply outage. The JC² analysis identified that the lost resilience benefit from granting unfettered access to contingent storage could be significant – particularly in the next couple of years while the system is still relatively tight.

   When the JC² analysis also included the ability of the system to withstand unexpected supply outages, the overall benefit of removing restrictions on contingent storage fell materially such that *"taking all into account, [the] expected impact could be -ve or +ve within a small range"*.

[2] See Table 1 in the Concept note "Assessment of failure of the Tekapo tailrace", which shows mean prices in 2027 would fall from $177/MWh to $175/MWh if contingent storage access was eased and there was no failure of the tailrace.

In contrast, the Meridian analysis does not appear to consider the extent to which easing access to contingent storage will reduce the system's resilience to major unexpected supply outages.

It should also be noted that the significant additional costs in the JC^2 analysis associated with an unexpected stress event 'just' relate to placing a $ value on the load that was curtailed. It is not clear that this adequately reflects society's willingness to avoid situations of extreme scarcity, even if they occur infrequently. Past situations of extreme scarcity arising from unexpected events have almost always also resulted in significant political angst and subsequent inquiries, along with reputational damage to New Zealand as a place for energy intensive companies to invest – and actual exits of some industrial consumers in the case of the Winter 2024 scarcity event.

3. **The JC^2 analysis also considered the extent to which allowing unfettered access to contingent storage may alter the economics of thermal stations to a degree that would impact on their economic viability.** The JC^2 analysis indicated that:

   - the returns for such thermal generators would be reduced if contingent storage became part of hydro schemes' normal operating range, and
   - this may result in Genesis closing the third Huntly Rankine unit earlier than it would otherwise do or result in a reduction in fuel stocks held by thermal generators to save fuel holding costs.

   Although no analysis was undertaken of the likelihood of such outcomes, this analysis does illustrate that making the water that is currently contingent storage part of hydro generators' normal operating range would, all other things being equal, reduce the incentive on parties to invest in other measures to provide dry year reserve.

Lastly, it should be noted that neither analysis considers that Meridian's application to enable easier access to contingent storage at Lake Pūkaki would require operational reliance on the Tekapo B temporary tailrace and weir. This structure was originally constructed as a temporary facility during commissioning of the upper Waitaki scheme, prior to Lake Pūkaki being raised to its current operating range. It is presently submerged and not relied on for the operational security of the Tekapo Power Scheme.

If lake levels were to fall below 518 masl, the tailrace weir and discharge chute become progressively exposed. This would return the structure to operational service to control tailwater levels at the Tekapo B power station. This would require Genesis to rely on a temporary tailrace structure that was never designed for routine operation and which, if re-exposed and reactivated, carries a materially elevated risk of failure.

If the temporary tailrace and weir were to fail, all generation from the Tekapo Power Scheme (Tekapo A & Tekapo B) would cease until the tailrace was repaired. In addition, water that would normally flow through the Tekapo canal system would not reach the downstream Ōhau stations, resulting in a significant loss of generation across the upper Waitaki scheme. While some water ordinarily used for generation through the Tekapo Power scheme and Ohau A, B and C stations could still reach Lake Benmore via the Tekapo River, this would occur only following Lake Takapō reaching its maximum control level, and would be in a less controlled manner and with reduced operational flexibility across the scheme. The resulting loss of generation during periods of system stress would likely increase wholesale electricity prices, increase reliance on thermal generation, raise emissions, and create additional risks to security of supply.

This would almost certainly increase electricity prices at a time of underlying system stress. Any decision whether to ease access to contingent storage should first assess whether the increased accessing of lower lake levels should appropriately allocate the materially elevated risk of failure of the structure.

The temporary tailrace and weir has always presented some baseline risk. However, the Meridian proposal materially increases exposure by increasing the frequency and duration of operation at low lake levels: converting emergency-only exposure into planned discretionary exposure, and creating unpredictable operational reliance on a temporary structure of unknown structural integrity.

Review of conceptual framework for contingent storage

One of the key reasons why the lake levels associated with contingent storage are not part of hydro operators' normal operating ranges is because such low lake levels can result in higher environmental costs than when lake levels are within the normal operating range.

Accordingly, the environmental consenting authorities have restricted access to such lake levels during normal operations.

However, it has also been recognised that such environmental costs are likely to be worth incurring in exceptional circumstances of electricity system stress if accessing the lower lake levels would help 'keep the lights on'. This trade-off has been operationalised through resource consents which grant access to contingent storage if national hydro storage levels drop below levels where the likelihood of needing to call an Official Conservation Campaign or implementing rolling cuts rises above certain thresholds.

In other words, the contingent storage is a fuel-of-last resort before needing to call upon these potentially higher cost demand curtailment options during supply emergencies.

Therefore, at the heart of considering when contingent storage can be accessed is the question of what constitutes an emergency worthy of accessing contingent storage?

Meridian's proposal appears to suggest that an extremely dry year consistent with some of the driest in historical record would constitute such an emergency, even if there were no other thermal supply outages. This is because the supporting analysis considers outcomes across a range of hydrologies – including extremely dry years – but without assessing the potential for other contingencies such as the unexpected loss of a major supply asset.

Meridian go on to state that access to resources such as the water currently considered contingent storage would be best achieved through *"cost-reflective market signals complemented by regulatory incentive to ensure supply security, including provision for Official Conservation Campaigns (OCC), customer compensation schemes (CCS), and scarcity pricing."* They further argue that the regulatory discretion currently granted the System Operator regarding easing access to contingent storage during supply emergencies should be removed and replaced with firm (raised) national storage thresholds when contingent storage could be accessed.

In principle, it is hard to argue with an approach which seeks to achieve the provision of supply security through cost-reflective market signals within a regulatory framework that incentivises an appropriate level of supply security.

However, in practice, there are likely to be good reasons for holding some out-of-market reserves that can only be accessed through some form of regulatory discretion.

The most significant reason is that, while markets are generally the best approach for addressing known risks, they are poorly suited for what are often referred to as 'black swan' events: Events that were unforeseen but have a major impact.

Because black swan events are, by definition, unexpected, they render traditional risk management tools largely ineffective. Instead, a better approach is to try and build resilient systems that can withstand unexpected, high impact shocks.

In the case of the New Zealand electricity system, one of the principal risk management tools are the water value curves that hydro generators use to guide their storage and release decisions. These are generated on a stochastic basis, using historical hydro flows as the basis for deriving the probability space.

Additionally, particularly when considering longer-term decisions relating to plant investment and retirement, generators will typically also consider the potential for other factors that could affect New Zealand's supply-demand balance, including plant outages, changes in fuel price, and changes in demand. These factors will be taken into account through running electricity market models using a range of scenarios that vary key input assumptions, and then using the results to identify the decisions that are most robust against the plausible range of future outcomes.

While this approach helps decision makers identify the best set of investment and operational decisions in the face of known uncertainties, they are inherently poorly suited to address risks which are not well understood (ie, there is limited data on which to assign probabilities of occurrence) or which there is no real appreciation that such a risk could eventuate.[3]

New Zealand's energy sector has experienced a number of events which caused major disruption but which were not anticipated ahead of time:

- The oil shock of the 1970s, occurring at a time when New Zealand relied on some oil-fired generation. (In this respect it is worth noting that New Zealand's electricity system is now largely isolated from such international fossil fuel shocks but, if New Zealand goes down the path of investing in an LNG terminal, we would once again be exposed to the kind of shock that is currently being experienced due to the Iran war.)
- Two concurrent years of low inflows (1991 & 1992) coupled with a material miscalculation of thermal fuel supplies
- The unexpected drop in gas supply in 2024, coinciding with a dry period and a system that was significantly under-built due to uncertainty over whether the Tiwai smelter would exit.

Additionally, New Zealand likely faces risks associated with an unexpected and prolonged outage of a major supply asset (eg, the Huntly 5 CCGT, or a pole of the HVDC) coinciding with a relatively dry period, or even a natural disaster (eg, earthquake or cyclone) taking out key supply assets (generation or transmission) for a prolonged period. Although these are all plausible events, there is poor information to assess the likelihood of their occurrence.

The JC^2 analysis illustrated how eased access to contingent storage reduced the system's resilience to a black swan event and illustrated how this substantially negated – more than completely so in some scenarios – the benefits of improved access to contingent storage during years which didn't experience such supply shocks.

The key challenge in developing arrangements which help build resilience to black swan events is doing so in a way that does not undermine incentives for parties to invest in measures to manage those risks where markets are best able to manage the risk. As set out in point 3 on page 3 above, this is something that the JC^2 analysis illustrated was a likely outcome if hydro generators were to be given unfettered access to contingent storage to manage their dry year risks. In contrast, the current contingent storage arrangements appear to be better able to provide this emergency backstop in a way that doesn't undermine market incentives to invest in dry-year management resources.

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[3] It should be noted that this is an inherent challenge for all decision makers – whether they be entities operating within a market framework, or a central agency tasked with making the investment and operational decisions.

Lastly, even if it were possible to predict the likelihood of all major supply interruptions or fuel price shocks, it is not clear that the current arrangements are adequate to enable access to contingent storage to be driven by market price signals:

- It is not clear that the level of payments in the Customer Compensation Scheme are set at a high enough level to reflect society's willingness to pay to avoid conservation campaigns. If payments in the CCS are too low, the likelihood of running out of water to an extent that triggers a conservation campaign will be much higher.
- There is no mechanism to take account of the environmental externality costs associated with accessing low lake levels. Again, without such a mechanism, low lake levels will be accessed more often than would be justified by such costs.
- It is not clear the extent to which the probability of failure of the Tekapo B temporary tailrace and weir increases with the depth of the lake level falling or the duration at such low levels. Without such probability information, markets are poorly suited to assess whether accessing the low lake levels due to dry year events is worth the risk.

How does the NZ electricity system for 2026 to 2028 compare to Winter 2024?

The trigger for Meridian's contingent storage proposals is the energy crisis of Winter 2024, where the combination of low hydro inflows and a major unexpected drop in gas production pushed the system into a situation of acute scarcity.

However, as we enter 2026, the New Zealand electricity system is in much better shape than was the case in 2024 and is projected to continue to improve further over the coming years:

- The underlying electricity supply / demand situation has improved as renewable build continues to outpace demand growth. Thus, on a mean-hydrology-corrected basis, the % renewable electricity for Winter 2025 is estimated to be approximately 91%, compared to ~88% for Winter 2024. This represents a fall in the need for thermal generation of over a quarter. The projected continuation of renewable build outpacing demand growth over the next three years will reduce this need for thermal generation even further.
- New Zealand has started 2026 with a much better fuel storage situation than in the start of 2024:
  - Hydro storage was one-third higher
  - Gas storage was one-quarter higher
  - There is over 50% more coal stockpiled at the Huntly station. Furthermore, following its recent agreement with the other main generators, Genesis has made commitments to ensure three Rankine units are generally available – rather than the prior situation of committing to two units, and making best endeavours to make the third unit available if required.
- Contractual arrangements have been made to enable gas that is contracted by Methanex to be on-sold to meet electricity needs in a dry year situation. This contrasts with Winter '24 where arrangements were being negotiated as the crisis developed, significantly delaying the time when the gas was able to be diverted to meet the electricity generation need.

This significantly improved, and further improving, situation will make the electricity system far better able to deal with dry year events.

In this, it is notable that, even in the exceptional situation of system stress in Winter 2024, there was no eventual need to call upon either contingent storage or an Official Conservation Campaign. This suggests that there is no pressing need to grant unfettered access to contingent storage for 2026 to 2028 given that the underlying supply-demand situation is greatly improved, and continuing to improve, compared to Winter 2024.

Further to this, ambiguities over the extent to which contingent storage could be accessed in the event of a supply emergency, and which were raised by stakeholders as a concern during and after the Winter 2024 crisis, have now been resolved. Thus, material amendments to the Security of Supply Forecasting and Information Policy have been finalised, which include an update to contingent storage buffer settings,. These settings will be effective 1 May 2026 (i.e., ahead of Winter 2026). These changes, together with Genesis's replacement resource consents, (which addresses the Lake Takapō 'shadow constraint') will enhance certainty over the ability to access contingent storage when required – a view also held by the Electricity Authority who stated that the changes "*materially improve the contingent storage release boundary buffer*".[4] It is also noteworthy that in this same statement the Authority said they want "*to ensure that contingent storage is not used too early because if this happens there may be insufficient storage available when it is needed most.*"

Summary

While Meridian's proposal would likely reduce prices across most 'normal' years – albeit with the benefit of such lower prices for the first year or so predominantly going to the gentailers who have sold forward their electricity to consumers at agreed prices – it would reduce the resilience of the electricity system to deal with unanticipated supply shocks – the overall net effect of which has a material likelihood of being detrimental to New Zealand's electricity consumers.

Furthermore, New Zealand is in a substantially better position than it was during Winter 2024, with

- renewable build greatly reducing the need for thermals
- greater coal stockpiles and a more reliable Huntly Rankine station
- ex-ante arrangements in place for diverting Methanex gas in the event of a supply scarcity event
- resolved ambiguities over the ability to access contingent storage when needed.

As such there does not appear to be a strong 'emergency' rationale for easing access to contingent storage, and if access was eased it would *reduce* the system's resilience to any potential future unforeseen supply interruption.

Yours sincerely

S. B. Coates

Simon Coates

Director

[4] Policy changes to strengthen dry year risk management | Electricity Authority