Marinus Link

VEPC Submission – Independent Assessment and Analysis [FINAL] [PUBLIC]

23/04/2025

Endgame Analytics

24.01, 9 Castlereagh St

Sydney, NSW 2000

Australia

Executive Summary

Introduction

Endgame Analytics ("Endgame") has been engaged by Marinus Link to undertake an independent analysis and assessment of the Victorian Energy Policy Centre's ("VEPC") submission to the Tasmanian Legislative Council's Inquiry into Energy Matters in Tasmania[1].

VEPC's submission considered the merits of two proposed projects:

- Marinus Link, a proposed high-voltage direct current (HVDC) interconnector between Tasmania and Victoria.
- Cethana Pumped Hydro Energy Storage (PHES), a proposed 750 MW, 20-hour pumped-hydro energy storage in Tasmania.

We have reviewed the submission from VEPC and identified key claims made. Where appropriate, we have tested VEPC's analysis with updated data and calculations.

VEPC's submission and key claims

The major conclusion of VEPC's submission is that Marinus Link and Cethana would have limited benefit due to a lack of comparative advantage for Tasmania in:

- the generation of renewable energy (ie, wind generation in Tasmania)
- the development of long-duration storage (ie, through Cethana PHES)

VEPC assesses these conclusions using qualitative and statistical analysis of historical data and finds no meaningful comparative advantage for Tasmania in these areas. VEPC then concludes that given this lack of comparative advantage, Marinus Link development should not proceed.

Our findings

A summary of our key findings is presented below:

- **There is a strong comparative advantage for Tasmanian Wind**: Our levelised cost of electricity (LCOE) analysis shows that Tasmanian wind is ~18-20% cheaper than Victorian wind. Strong diversity between the two states and social license issues means that there is value in enabling development across both states rather than concentrating development risk in one or two REZs.
- **24-hour BESS will be more expensive than Cethana, even in 2035.** Our analysis of the levelised cost of storage (LCOS) for 24-hour Battery Energy Storage System (BESS) and Cethana shows that the LCOS of 24-hour BESS will be between $299.84 and $373.87/MWh in 2035. The lower bound on this range relies on CSIRO's most optimistic scenario, which sees unprecedented global and local learning. Even after this learning, our analysis shows that Cethana will be lower cost given current estimates, with a LCOS of $219.78/MWh up to 40% lower than 24-hour BESS.
- **The value of interconnection will change and strengthen over time:** VEPC's analysis largely uses historical analysis to inform the potential value of Marinus Link. Firstly, this overlooks the value of untapped Tasmanian hydro due to the limited period of analysis that conflates storage capacity with yearly energy availability. Secondly, the NEM is a system undergoing significant change. Our

[1] In November 2024, VEPC submitted to the Tasmanian Legislative Council's Inquiry into Energy Matters in Tasmania. This Joint Select Committee was appointed to inquire into energy prices and the energy system in Tasmania. Marinus Link Pty Ltd, Battery of the Nation and North West Transmission Development formed part of the terms of reference for the inquiry. VEPC's full submission can be found here: VEPC 2024, Submission to the Tasmanian Legislative Council's Inquiry into Energy Matters in Tasmania.

analysis points to future challenges in the Victorian system such that additional firming capacity and diversity of wind generation should be highly valued.

Our findings above point to the positive impact increased interconnection would have on the National Electricity Market (NEM) by enabling low-cost wind and PHES capacity.

From Endgame's perspective, strengthening interconnection and the transmission network are essential prerequisites to decarbonising the NEM. We have already seen delays to crucial transmission projects that will slow the pace of the transition and should not delay projects further[2].

[2] We refer to Nexa Advisory (2024), which showed that transmission projects in the NEM have been delayed by an average of 3 years compared to the original timing when identified. Endgame's modelling in a separate study with Nexa showed that a three-year delay to transmission projects (as planned in the ISP) would increase the total bill for the average New South Wales residential consumer by $1,100 over 20 years (equivalent to a 21 per cent annual average increase).

The full papers are available here:

- https://nexaadvisory.com.au/web/wp-content/uploads/2024/07/Nexa-Advisory-Consumer-Cost-of-Transmission-Delays-Report.pdf
- https://nexaadvisory.com.au/web/wp-content/uploads/2024/06/Nexa-Advisory-We-Plan-and-then-Dont-Build.pdf

Contents

1 Introduction

1.1 Context

Endgame Analytics ("Endgame") has been engaged by Marinus Link to undertake an independent review and analysis of the Victorian Energy Policy Centre's ("VEPC") submission to the Tasmanian Legislative Council's Inquiry into Energy Matters in Tasmania.

VEPC's submission considered the merits of two proposed projects:

- Marinus Link
- Cethana Pumped Hydro Energy Storage (PHES)

Our report provides an independent analysis and assessment of this submission. We have reviewed the submission from VEPC and identified key claims made. Where appropriate, we have tested VEPC's analysis with updated data and calculations.

We also note that VEPC makes several claims regarding AEMO's independence in its submission. We have focused explicitly on assessing VEPC's substantive quantitative analysis.

While we have been engaged by Marinus Link to prepare this report, all views contained within this report are Endgame's own.

1.2 Overview of Marinus Link and Cethana PHES

Marinus Link is a proposed high-voltage direct current (HVDC) interconnector between Tasmania and Victoria. The 1500MW project is split into two stages of 750MW each.

Marinus Link is an actionable project under AEMO's 2024 ISP with optimal timings in the Step Change Optimal Development Path (ODP) for each stage of 2030-31 and 2037-38, respectively. The project is intended to enhance the interconnection between the two regions, supporting energy reliability, and allow improved access to Tasmania's wind and hydro resources.

Cethana is a proposed pumped-hydro energy storage and a key component of Tasmania's Battery of the Nation (BoTN) plan. The project is situated in Tasmania's Mersey-Forth scheme, utilising the existing Lake Cethana as the lower reservoir. A new upper reservoir will be constructed west of Lake Cethana, connected via underground tunnels to an underground power station.

The project is designed to provide a generating capacity of 750 megawatts (MW) with a storage duration of 20 hours. Marinus Link will be crucial in allowing existing untapped hydro capacity and Cethana to offer its firming capacity to the Victorian market, given the existing limits on Basslink.

1.3 Overview of VEPC's submission

In November 2024, VEPC submitted to the Tasmanian Legislative Council's Inquiry into Energy Matters in Tasmania. The major conclusion of the submission is that Marinus Link and Cethana would have limited benefit due to a lack of comparative advantage for Tasmania in:

- the generation of renewable energy (ie, wind generation in Tasmania)
- the development of long-duration storage (ie, through Cethana)

VEPC assesses these conclusions using a combination of qualitative and quantitative analysis of historical data and finds no meaningful comparative advantage for Tasmania in these two areas. VEPC's suggested option is for Tasmania to invest in rooftop solar[3] and for Victoria to develop local wind resources to replace Marinus Link and Cethana.

1.4 Structure of the report

Our report is structured as follows:

- **Section 2** assesses VEPC's claim that no meaningful comparative advantage exists for Tasmanian wind projects.
- **Section 3** examines whether 24-hour BESS is a more cost-effective form of storage compared to Cethana.
- **Section 4** considers whether future changes to the Victorian and Tasmanian energy systems point to a higher future value of interconnection that has not been captured by VEPC's analysis.

[3] We note that in general, we are supportive of increased rooftop solar deployment in Tasmania, which pairs well with existing hydro resources. We do not consider this a replacement for Marinus Link and Cethana.

2 The comparative advantage of Tasmanian wind

One of the primary claims made in the VEPC submission is that there is no significant comparative advantage for Tasmania in the development of wind generation compared to Victoria. We have quoted directly from the submission below:

> *Taken together, even before considering the cost of getting additional wind generation from Tasmania to Victoria, this evidence suggests that Tasmania does not have a meaningful comparative advantage in wind generation relative to Victoria...*[4]

This claim is repeated multiple times throughout the submission and is based on three considerations:

- That historical capacity factors for Tasmanian wind are 37% while Victorian wind farm capacity factors are in the order of 30%.
- That build costs are 5% higher in Tasmania than in Victoria, while connection costs are almost double.
- That there is spare transmission in Victoria that can be used without cost while Tasmanian wind requires significant transmission development.

We assess the relative costs and benefits of wind development in Tasmania in the section below.

We find that Tasmanian wind is significantly lower cost than wind in Victoria and that the NEM will require significant wind development in both states to achieve decarbonisation goals.

2.1 The cost of Tasmania wind

To test VEPC's claims around the cost of Tasmania wind, we have calculated a range of Tasmanian and Victoria Levelised Cost of Electricity[5] (LCOE) metrics based on inputs from the 2025 Draft IASR[6] for each Victorian and Tasmania REZ. We see a LCOE range of $62-74/MWh for Tasmania using IASR Step Change inputs for 2030, while Victoria sees a range of $76-$93[7]/MWh, showing a clear advantage for Tasmania.

It is also important to note that Tasmania has access to more high-quality wind sites than Victoria. In the ISP, AEMO splits physical wind limits into two categories Wind (High) and Wind (Medium), to reflect access to the highest-quality sites in each renewable energy zone (REZ). This split is shown in Figure 1 below, with LCOEs presented in Figure 2.

Our analysis shows a significant cost advantage for Tasmanian wind. Tasmania has access to a greater quantity of high-quality wind resources than Victoria at lower cost, even when accounting for higher build and connection costs.

[4] **Victoria Energy Policy Centre (VEPC).** *Submission to the Joint Select Committee on Energy Matters*, 27 November 2024, p. 21

[5] The Levelised Cost of Electricity (LCOE) represents the average net present cost per unit of electricity generated over the lifetime of a generation asset. It is a standard metric to compare the costs of different electricity generation technologies.

[6] **Australian Energy Market Operator (AEMO).** *Draft 2025 Inputs, Assumptions and Scenarios Report.* December 2024. Available at: https://aemo.com.au/-/media/files/major-publications/isp/2025/draft-2025-inputs-assumptions-and-scenarios-report-stage-1.pdf?la=en

[7] Using Wind (High) parameters for both Tasmanian and Victorian wind.

Figure 1: ISP resource limits by REZ (High, Medium)

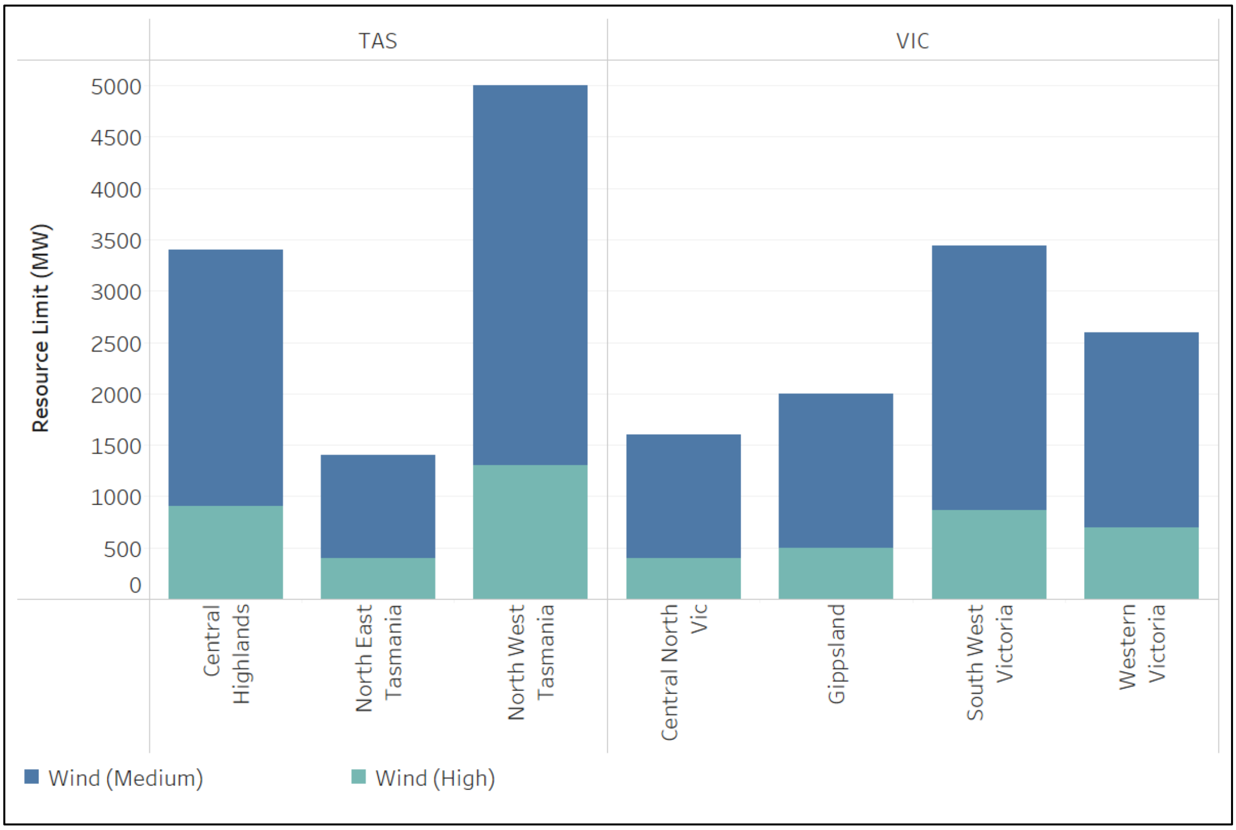
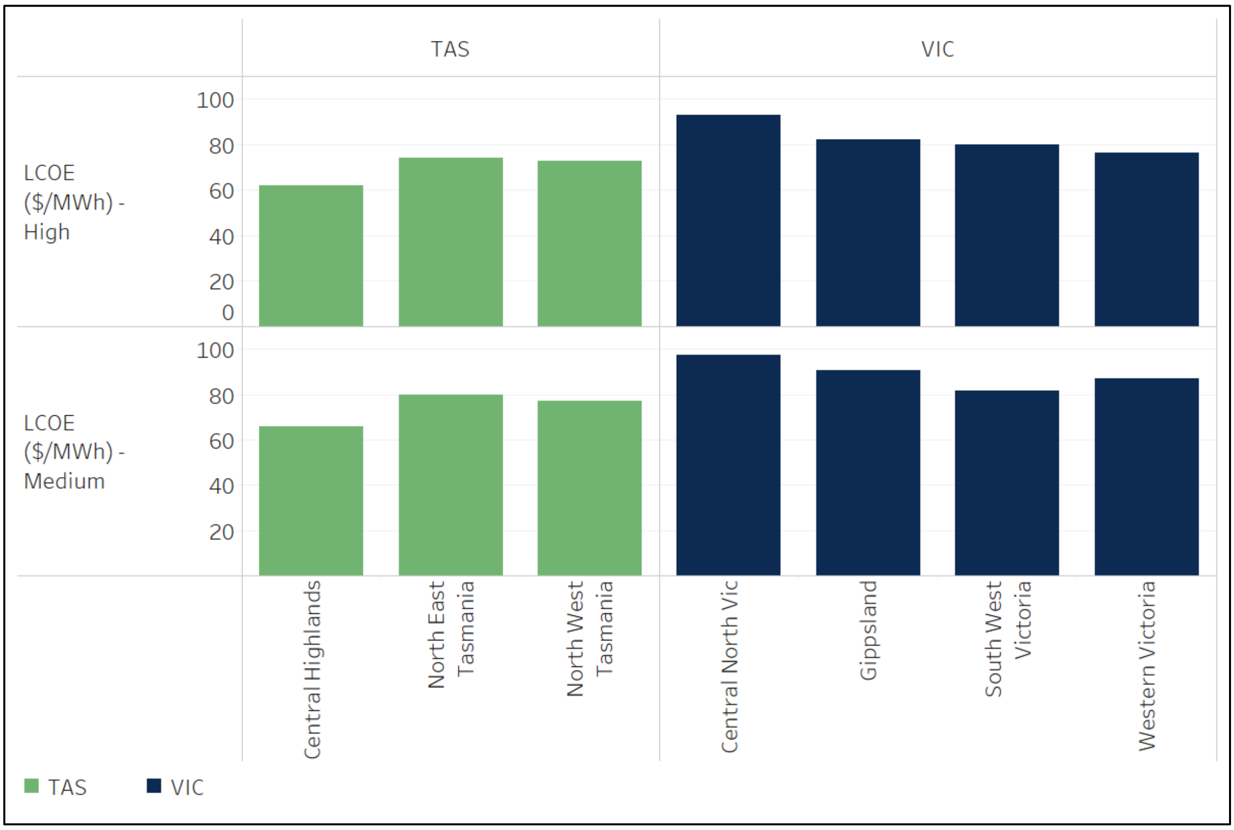


Figure 2: LCOEs by REZ



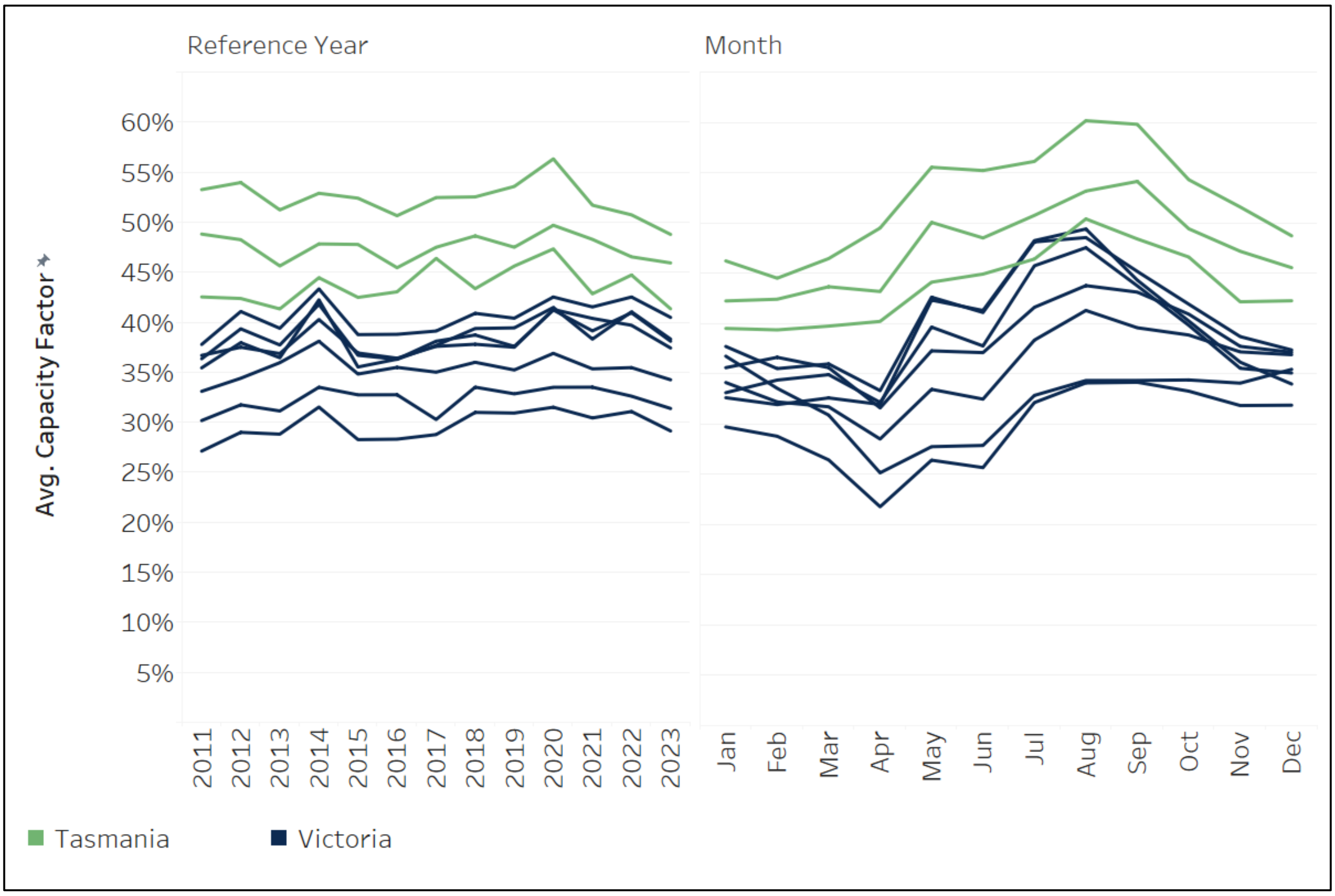
2.2 Contribution of Tasmanian wind during periods of system stress

While we consider that LCOE is an important metric for assessing the relative advantage of Tasmanian wind, it is also important to consider the value of wind resources in terms of contribution to periods of system stress and high prices. In a highly decarbonised NEM, wind droughts[8] will constitute the single most challenging period for the system.

Wind resources that are less correlated with Victoria wind will significantly limit the requirement for the grid to rely on gas, diesel or other forms of firming.

The lower correlation of Tasmanian wind with Victorian wind compared to NSW and SA is well understood and forms a key part of the rationale for Marinus Link[9]. Figure 3 demonstrates this lower correlation between Victoria and Tasmania by showing the average capacity factors (using AEMO ISP traces[10]) for all Tasmanian and Victorian Renewable Energy Zones (REZ) by month and across AEMO weather reference years (2011-2023).

Figure 3: Average REZ profile by month and reference year



Tasmania has much higher capacity factors than Victoria in general and has a different set of 'high' reference years than Victoria (2020 for Tasmania, 2014 for Victoria). Importantly, in July to September, when Victorian wind output begins to drop off, Tasmanian wind reaches its peak. If Victoria were to rely on

[8] A "renewable drought" refers to refers to prolonged periods when solar and wind energy production simultaneously drop to very low level. These are typically over multi-day periods.

[9] **Hydro Tasmania.** *Battery of the Nation: Analysis of the Future National Electricity Market – Executive Summary.* 2018. Available at: https://www.hydro.com.au/docs/default-source/clean-energy/battery-of-the-nation/future-state-nem-analysis-executive-summary.pdf

[10] Available here: https://aemo.com.au/-/media/files/major-publications/isp/2024/supporting-materials/2024-isp-wind-traces.zip?la=en

only its local output during these months, the state would see higher prices and costs for consumers. Tasmanian wind complements Victoria's profile and can improve outcomes for both states.

2.3 The difficulties of developing wind in a social license constrained system

VEPC has previously stated that there is significant available renewable hosting capacity in Victoria that should be used instead of developing Tasmanian wind resources.

> *Victoria, by comparison, has ample scope to increase wind generation in the Gippsland region with very little or no incremental shared grid transmission expansion[11].*

This is not discussed in detail in the Energy Matters submission but has been a point of contention in other reports produced by VEPC[12]. Jacobs has previously been engaged by the Victorian Government to assess this claim. We refer readers to that report[13].

In the context of the Energy Matters submission - VEPC compares the cost of Tasmanian wind with the cost of enabling transmission development to Victorian wind, while assuming wind development in Victoria will be unconstrained and possible with little transmission expenditure. We consider that this will understate the costs of Victorian wind development.

We note that local opposition to wind and transmission projects in Australia is strong and Victoria is not an exception to this trend. VEPC's preferred development pathway would concentrate social license risk in one state and one or two REZs.

From our perspective, given that social license issues are increasingly binding constraints on the development of wind resources in Australia, interconnection will play a crucial role in strengthening access to a diverse range of renewable resources across a range of REZs.

[11] **Victoria Energy Policy Centre (VEPC).** *Submission to the Joint Select Committee on Energy Matters*, 27 November 2024, p. 21.

[12] **Mountain, B., Bartlett, S., & Edwards, D.** (2023). *No longer lost in transmission*. Victoria Energy Policy Centre.

[13] **Jacobs Group (Australia) Pty Ltd.** *Plan B Review – Jacobs' Report – Volume 1.* March 2024, p. 20. Available at: https://www.energy.vic.gov.au/__data/assets/pdf_file/0024/700863/Plan-B-review.pdf

3 The comparative advantage of Cethana PHES

In its submission, VEPC analyses the cost-effectiveness of Cethana PHES vis-à-vis 24-hour BESS. In particular, it claims that given comparable $/kWh costs between 24-hour BESS and Cethana in 2035, that 24-hour BESS would be more cost-effective. This is highlighted in the quote from VEPC below:

> *Taking account of much lower round-trip losses in batteries (circa 12%) versus pumped hydro (circa 25%) the conclusion is that 24-hour electro chemical storage will be much cheaper than Cethana.*[14]

The reasoning behind this apparent lack of comparative advantage for Cethana given by VEPC is:

1. A 24-hour BESS in Victoria would be closer to load centres and could make use of local generation without transmission losses
2. 24-hour BESS costs, per the 2023-24 CSIRO GenCost report[15], are expected to decline significantly and are more comparable to estimates for Cethana on a per $/kWh basis with lower round-trip-efficiency losses.
3. Hydro Tasmania is likely to be over-optimistic in its estimated costs of Cethana, while CSIRO is unlikely to be optimistic for batteries.

This section focuses on the cost-effectiveness of Cethana PHES vs 24-hour BESS. We have used an equivalent methodology to Section 2 to analyse the levelised cost of the two storage options. Additionally, we address certain challenges in the bankability and financing of long-duration storage that may impact the development of alternative long-duration storage projects in Victoria.

3.1 Levelised cost of storage – PHES vs BESS

The VEPC compares the $/kWh to $/kWh capital costs of PHES and 24-hour battery in its submission. This comparison does not consider project lifespan, efficiency, operational costs or degradation. Importantly, 24-hour BESS generally has a technical lifetime of 10-20 years based on warranty, while PHES is a longer-lived asset (40-50 years). This means that a 24-hour BESS will have to be rebuilt over the operational lifetime of PHES, and at the same $/kWh cost is less value-for-money than PHES.

As such, following the same approach used in Section 2, we have analysed the levelized cost of storage (LCOS) for Cethana and a hypothetical 24-hour BESS using AEMO IASR[16] and the latest CSIRO GenCost[17] assumptions. The assumptions we have used are summarised in Table 1 below:

[14] **Victoria Energy Policy Centre (VEPC).** *Submission to the Joint Select Committee on Energy Matters*, 27 November 2024, p. 30

[15] **CSIRO.** *GenCost 2023-24: Final Report.* May 2024. Available at: https://www.csiro.au/-/media/Energy/GenCost/GenCost2023-24Final_20240522.pdf

[16] **Australian Energy Market Operator (AEMO).** *Draft 2025 Inputs, Assumptions and Scenarios Report.* December 2024

[17] **CSIRO.** *GenCost 2024-25: Consultation Draft Report.* December 2024. Available at: https://www.csiro.au/-/media/Energy/GenCost/GenCost2024-25ConsultDraft_20241205.pdf

Table 1: Assumptions for LCOS analysis[18]

Assumption	24-Hour BESS	Cethana	Source
WACC	7%	7%	2025 Draft IASR
Economic lifetime	20	40	2025 Draft IASR
Duration	24	20	Endgame assumption
Round-trip efficiency (RTE)	85%	75%	2025 Draft IASR
Assumed Cycles Per Year	60	60	Endgame assumption

VEPC assumes a cost of $132/kWh for 24-hour BESS in its analysis, which is taken from the CSIRO's Global NZE by 2050 scenario[19]. This is by far the most optimistic scenario for VRE and batteries in the CSIRO report and assumes costs in 2035 come down nearly 70% from 2023 levels. CSIRO acknowledges that this is an extreme scenario in its report:

> *Under the Global NZE by 2050 scenario there is a strong climate policy consistent with maintaining temperature increases of 1.5 degrees of warming and achieving net zero emissions by 2050 worldwide. The achievement of these abatement outcomes is supported by the strongest technology learning rates and the least constrained (physically and socially) access to variable renewable energy resources*

We have calculated a range of LCOS across the three scenarios presented by CSIRO, as shown in Table 2 below. We consider it appropriate to use all three CSIRO scenarios for this analysis to provide a range of outcomes.

Table 2: LCOS Results for 24-hour BESS and Cethana

Assumption	24-Hour BESS	Cethana
$/kWh - Install Cost	Current Policies - $202 Net Zero Post 2050 - $174 Net Zero 2050 - $162	$132 (Based on AEMO estimate of $2,636.99/kW)
LCOS - $/kW	$367.00 - $457.62	$197.80
LCOS - $/MWh	$299.84 - $373.87	$219.78

[18] Note, our comparison does not include fixed operating and maintenance costs (FOM), CSIRO does not give an assumption for 24-hour BESS in its report. Given the FOM costs for 8-hour BESS are $37.30/kW in the Draft IASR and nearly double that of a 4-hour BESS, we could expect 24hr BESS costs to be similar to Cethana ($84/kW).

[19] Note also that this figure has been updated to $162/kWh in the 2024-25 GenCost Draft report. VEPC has used the 2023 GenCost report in its analysis while we have used CSIRO's most updated figures.

Our analysis shows a LCOS for Cethana of $219.78/MWh using 2024-25 assumptions with no learning[20]. This is compared to a range of $299.84 - $373.87/MWh for 24-hour battery storage in 2035, after significant learning.

While we agree that PHES projects have been subject to cost overruns, our analysis implies that there is a significant buffer in Cethana costs before 24-hour BESS becomes a more cost-effective option. 2024-25 costs for Cethana would have to increase by 40-70% to become uncompetitive with BESS using CSIRO's numbers.

3.2 Challenges in LDES development

Importantly even if 24-hour BESS comes down in costs, there will remain significant challenges to its deployment. LDES is fundamentally hard to commercialise in energy-only markets. While the trend globally has moved towards batteries in the 4-8 hour range, examples of long-duration storage being built without government support or underwriting are rare.

Unless there are significant changes to the market to unlock LDES, this is likely to remain the case into the 2030s. Given Cethana (as we have shown) is lower cost on a LCOS basis and is strongly supported by its proponent, we consider that pinning hope on the development of commercially unproven 24-hour BESS as an alternative is not reasonable.

When viewed in conjunction with the cost challenges discussed in Section 3.1, we consider that the replacement for Cethana would likely be reliance on gas-powered-generation (GPG) instead of 24-hour BESS. Given ongoing challenges in the Victoria gas market, additional reliance on GPG would compound emerging issues in the system. We discuss these issues in more detail in Section 4.2.

[20] Learning refers to significant cost reductions from further global and local deployment of the respective technology. Metrics such as learning rates are quantified in the CSIRO 2023-24 GenCost report appendix.

4 How the value of interconnection will change over time

As highlighted in Section 1 of this report, VEPC's submission primarily uses historical analysis to inform its assessment of the value of Marinus Link and Cethana, as opposed to market modelling or other forward-looking analyses.

We note that as the energy system transitions to high penetrations of renewables, Victoria and Tasmania will face materially different challenges and operational constraints in the future when compared to today. The role of energy system modelling is to identify these challenges and determine the least-cost pathways to address them.

Endgame maintains in-house modelling that covers the NEM and East Coast Gas System over the next 25 years across a range of scenarios. Our modelling shows that Victoria, in particular, will face significant challenges in the future, such that additional interconnection may be warranted. As Victoria has not faced these challenges over VEPC's study period, its analysis will understate the need for and potential future value of Marinus Link.

This section highlights some of these challenges and how they may increase the value of interconnection beyond VEPC's study period. We conclude that given the strong need for long-duration dispatchable capacity in Victoria throughout the 2030s and ongoing challenges in the gas sector, Marinus Link, the untapped hydro storage capacity and Cethana will provide additional value not well captured by historical analysis.

4.1 The value of untapped storage capacity in Tasmania

In its submission, VEPC asserts Tasmania has no storage capacity that will be unlocked by Marinus Link, citing historical Basslink flows which have seen a historical capacity factor of 44%. This is based on VEPC's analysis of Basslink flows from Tasmania to Victoria during the period 1 January 2023 to 31 October 2024. However, the VEPC analysis does not consider:

- Historic drought suffered by Tasmania over the study period, evidenced by Basslink importing at max capacity in some periods.
- The presence of negative prices in Victoria in some periods in the dataset, likely indicating renewable curtailment in Victoria.
- The possibility of renewable generation being low at the same time of low demand periods such that there is limited value in exports (i.e., high residual demand).

The VEPC analysis conflates storage capacity (the size of Tasmanian hydro dams) with yearly energy availability (dependent on rainfall and hydro risk curves). In fact, Tasmanian has significant spare storage capacity except in drought years.

A more rigorous analysis would be to analyse residual demand, prices, and flows in both states – i.e., the fundamental drivers of Basslink export, while considering the changing needs of the system over time. Without such, VEPC's analysis is limited in evaluating the future value of Marinus Link.

4.2 The need for dispatchable capacity in Victoria

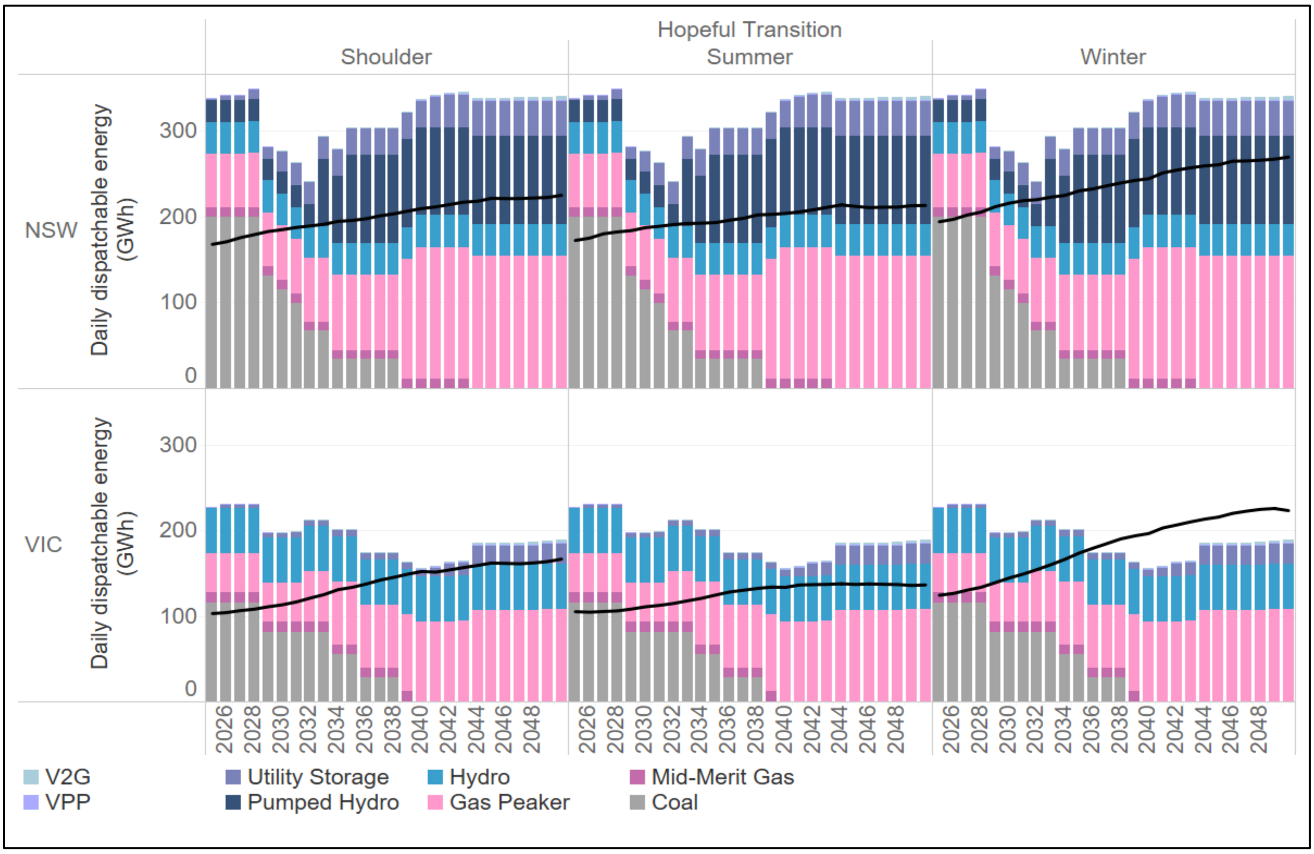
As Victoria's coal fleet retires and new renewable capacity comes online, there is a need for dispatchable capacity to meet energy needs during renewable droughts (ie, long periods of high residual demand and low renewable output).

As shown by our previous analysis in Section 3, 24-hour BESS is not a cost-effective way of providing this firming compared to Cethana PHES. Moreover, the limited availability of suitable sites for pumped hydro and other emerging long-duration energy storage means that the state will need to depend more heavily on GPG to meet its energy needs during renewable droughts if Cethana does not proceed.

This provides a prima facie justification for increased interconnection with other states with diverse renewable profiles to minimise the frequency and magnitude of those droughts. It also implies that there will be benefits from sharing firming assets with states with greater potential for LDES development, such as Tasmania.

Figure 4 below shows the average available dispatchable energy (GWh) in VIC and NSW against average daily demand (GWh), from our in-house modelling. Where daily dispatchable capacity is below load, the system is short on average of dispatchable capacity and there is a high risk of unserved energy (USE) in a VRE drought. We show that Victoria has an average shortfall of dispatchable capacity post-2034 that could be alleviated by Cethana and increased interconnection.

Figure 4: Daily available dispatchable capacity and operational demand NSW, Victoria (2024-2050)



4.3 Challenges in the Victorian gas sector

Importantly, this shortfall of long-duration dispatchable capacity will come at a time when supplying gas to Victorian GPG becomes increasingly challenging.

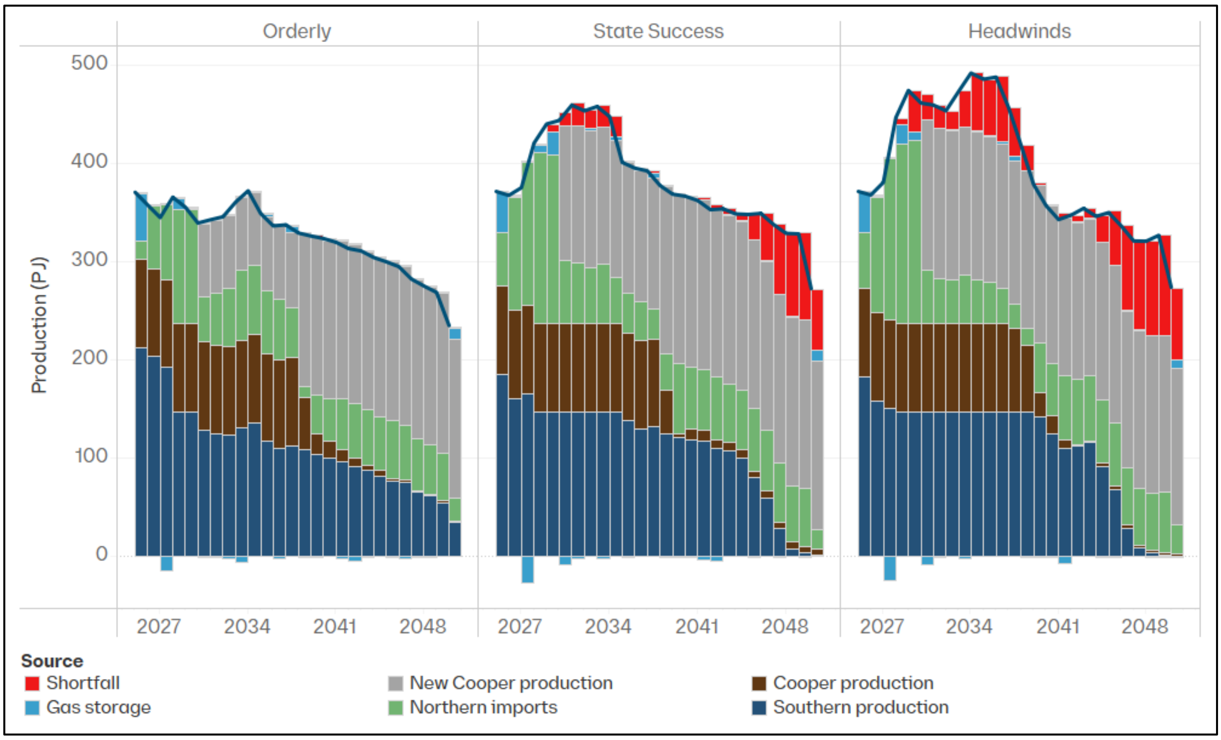
These challenges that exist in the Victorian gas sector over the medium term are well understood. AEMO's 2025 Gas Statement of Opportunities[21] (GSOO) shows a risk of peak day shortfalls in Southern States from 2028 onwards and annual supply gaps from 2029.

Endgame maintains an in-house gas subscription service which models the East Coast Gas System over 25 years and investigates new sources of production, pricing and the potential risk of shortfalls. Our modelling

[21] AEMO. 2025 Gas Statement of Opportunities. March 2025. Available at: https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2025/2025-gas-statement-of-opportunities.pdf

reinforces the existence of significant challenges in the 2030s in Victoria. The 2030s are a wedge year for the gas sector in a range of credible scenarios[22], as shown by our projections of gas supply and potential shortfalls in Figure 5 below:

Figure 5: Southern production and shortfalls by scenario, Endgame gas projections



We see a range of shortfalls and high prices occurring in our State Success and Headwinds scenarios from 2030 onwards. In both scenarios, Marinus Link is delayed by three years compared to the Orderly scenario, worsening the reliance on GPG over the period.

In a future system, lower diversity in wind generation and a lack of firming capacity will increase Victoria's reliance on gas-powered generation through a period where the East Coast Gas System is under significant stress. This will not be captured in historical analysis, as Victoria has traditionally had significant gas reserves and an abundance of dispatchable capacity.

This highlights the importance of considering the full benefits of interconnection into the future, which would include reduced generator capital, fuel costs, lower renewable energy zone augmentation costs and reliability benefits. We consider that the most appropriate place to assess these future benefits is through market modelling.

[22] Our in-house modelling consists of three scenarios which are briefly described below:

- Orderly Transition: aligned with the ISP, renewable development and transmission proceeds as planned.
- State Success: states meet local renewable targets, but Australia falls short of its overall decarbonisation goals
- Headwinds: delays to transmission and renewable development lead to delayed coal retirements and increased reliance on GPG.