**To: Australian Energy Market Commission**
Via AEMC website

**Re: ZEN submission to *Retailer reliability obligation exemption for scheduled bi-directional units* Rule Change Request**

ZEN Energy (ZEN) is actively developing a gigawatt-scale pumped hydro project, the Western Sydney Pumped Hydro Project, targeted to come online in the early 2030s.

We welcome the opportunity to make a submission to the above rule change request.

## About ZEN Energy

ZEN is the first electricity retailer in Australia to have a near-term, science-based emissions reduction target in line with limiting global warming to 1.5°C.

ZEN has brought together a community of sustainability-driven customers (governments, businesses, industries, and residents), renewable energy suppliers, and capital partners. Some of our key customers include the South Australian Government, CSIRO's sites in NSW, Victoria, and the ACT, and the Southern Sydney Regional Organisation of Councils (SSROC), comprising 25 local councils.

ZEN has contracted renewable energy and environmental certificates from 25 solar and wind farms and is actively growing its firmed renewable energy supply. ZEN has just commenced construction on the 111MW/291 MWh Templers BESS in South Australia and is progressing a development pipeline of storage and generation assets across the mainland National Energy Market (NEM).

As an electricity retailer, ZEN provides long-term contracts to its customers, typically of 10 years. Its customers do not directly see wholesale electricity market conditions, they see a risk-managed product through ZEN's electricity portfolio. ZEN perceives the biggest price risk to customers (and consumers more broadly) as being prolonged wind droughts over winter and the high reliance on gas-market coupling that results during these periods. Suitable long duration storage (LDS) is the true mitigant to this risk for consumers, particularly longer duration pumped hydro, sized and designed to blunt both price volatility and its duration.

## Feedback on rule change request: pumped hydro assets should also be exempt from RRO

ZEN supports the rule change request and submits that pumped hydro assets should also be exempt from Retailer Reliability Obligation (RRO) liability.

The optimal development path in the 2024 Integrated System Plan (ISP) calls for investment that would "almost quadruple current firming capacity", using grid-scale batteries, pumped hydro and other hydro, coordinated consumer energy resources as VPPs, and gas-powered generation. This includes 49 GW/ 646 gigawatt hours (GWh) of dispatchable storage, as well as 15 GW of flexible gas.[1]

Pumped hydro projects are the most mature alternate storage technology to battery energy storage systems (BESS), and are particularly competitive for longer duration supply needs. While utility scale batteries typically have a maximum output duration of 2 hours (with some recent entrants having 4 hour duration[2], and one having 8 hour duration[3]), pumped hydro units have the potential to provide power for considerably longer periods than most current BESS.

Pumped hydro also has a greater ability to match the retiring inertia and system-strength contribution of synchronous thermal generators than asynchronous short-duration batteries. The other positives of pumped hydro projects are their high local content and substantially lower greenhouse gas emissions over a life cycle than battery storage technologies.

The value of pumped hydro projects is widely recognised. For example:

1. AEMO's 2024 ISP notes that: "forecasting both energy demand and weather can never be perfect. It is prudent to provide a buffer of deeper solutions to add resilience against known yet unpredictable risks. Market and policy settings will need to evolve to enable deep storage solutions with cost recovery mechanisms that are not limited to actual use."[4]
2. The Reliability Panel conducted a review of the reliability standard in April 2024, and found 75% VRE penetration in the NEM would increase the mean unserved energy event (USE) duration to seven hours. The current rule change request notes that "the expected RRO shortfall period in NSW commencing in December 2025 is for a period of 3 months for 7 hours a day" (p. 5). Pumped storage will have a valuable role to play in responding to such reliability gaps.
3. Simshauser et al[5] highlight the limitations of assuming gas-fired generation will be the backstop firming solution, noting the effects on adjacent gas markets and gas-supply infrastructure. There are prominent gas shortages in winter peak-demand events, with Simshauser modelling showing that including 18hr pumped hydro in the technology mix materially improved gas-supply shortfalls. (These shortfalls were reduced almost five-fold, from 29 PJ to 6 PJ annually.) Current issues relating to gas supply in Victoria illustrate the uncertainty.
4. The AEMC has increased the cumulative price threshold (CPT) to 8.5 hours at the market-price cap, and notes that the CPT is expected to continue to increase each year. The AEMC's

[1] AEMO, 2024 Integrated System Plan for the National Electricity Market, 26 June 2024, Executive Summary

[2] Why 2024 will be the year of the big battery (Ben Potter and Angela Macdonald-Smith, AFR, 2 January 2024)

[3] RWE to build Australia's first eight-hour battery (Sinje Vogelsang, 28 May 2024).

[4] AEMO, 2024 Integrated System Plan for the National Electricity Market, 26 June 2024, p69.

[5] Solving for '*yy*': demand shocks from Australia's gas turbine fleet (Paul Simshauser and Joel Gilmore, March 2024; Griffith University)

> modelling consultant IES noted that long-duration events (10+ hours) make up a material share of the expected unserved energy volumes – up to 25% in NSW.

The current RRO rules do not facilitate optimal investment in pumped storage at the scale and in the timeframes required to support an efficient energy transition. In particular, the inclusion of pumped hydro assets as RRO liable entities creates risk that is likely to both:

1. slow down the scale and rate of investment in new pumped hydro projects, and
2. impact the way that such assets operate during reliability gap periods.

This will increase costs to consumers while reducing reliability and security. It may also delay the exit of thermal generators and increase carbon emissions, again increasing costs to consumers and damage costs to the environment.

We support the request to change the NER to exempt pumped hydro from RRO liabilities in addition to large-scale batteries, and notes this would make the RRO rules more consistent with its original intent. As the consultation papers notes, the RRO is

> a mechanism designed to support reliability across the National Electricity Market (NEM) by preventing predicted future generation shortfall ('reliability gaps')... The framework is designed to provide incentives to market participants to invest in 'firm' generation or demand-response capacity in order to future-proof consumers against unreliable electricity supply. [6]

Investment in new pumped hydro is precisely the sort of investment that the RRO is seeking to stimulate. Imposing RRO liability on pumped hydro assets runs counter to this fundamental objective. Slowing down such investment, making it more costly, or hindering its optimal use during a reliability gap period is unnecessary and inefficient. As a result, the current rules do not optimally achieve the National Energy Objective (NEO).

ZEN appreciates the AEMC's consideration of our responses to the consultation paper questions, set out below.

Our responses to the consultation paper questions are set out below.

## Question 1: Does the RRO threaten the security of the power system by posing obligations on batteries?

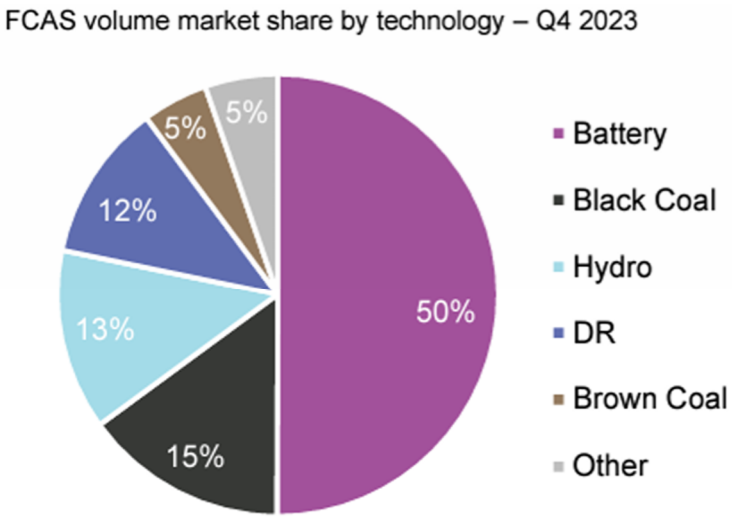
> • Do you agree with the proponents' assessment of other NEM-wide risks as a result of batteries being liable entities to the RRO?

Yes, we agree that the current rules threaten the security of the power system. We also consider that the same issues arise in relation to pumped hydro (though clearly not in relation to very fast frequency

[6] AEMC, Retailer reliability obligation exemption for scheduled bi-directional units, Consultation paper, *30 May 2024*, p. 1.

response). The additional cost and risk created by the RRO framework could both slow down investment in new pumped hydro projects and impact the way such assets run during reliability gap periods. For example, a pumped hydro plant could decide not to pump during a reliability gap period, even if its output is needed later in the period to address forecast shortfalls. (As the rule change proponents and the consultation paper note, AEMO would dispatch pumped hydro load in the NEM Dispatch Engine only when that is a least-cost dispatch decision.)

A hydro plant could also decide not to offer FCAS lower services in order to avoid RRO liabilities, with resulting implications for system security. The figure below shows that hydro contributed 13% of FCAS in Q4 2023 and this share may increase as more thermal plant leaves the market.




Source: AEMO, Quarterly Energy Dynamics, Q4 2023, p. 47.

If AEMO needed to direct pumped storage plant into service in order to address reliability or security concerns, the costs to consumers would likely be high since a directed participant is entitled to be compensated for its costs, potentially including penalties for breaching RRO obligations (see clause 3.15.7B of the NER), and such compensation costs are recovered from consumers. A much simpler approach, as suggested by the rule change proponents, would be to exempt pumped hydro plants from RRO liability. As well as lowering costs to consumers, this would avoid imposing unnecessary risks (and control room complexity) during reliability gap periods when the system is already under strain.

### Question 2: Will excluding batteries from RRO contribute to a secure power system during reliability-gap periods?

- Apart from RRO compliance, do you see any other barriers to batteries providing system security services?
- Are there compelling reasons to keep batteries liable to the RRO? In other words, do you see merits in keeping the RRO technology-neutral?

Excluding batteries from the RRO will contribute to a secure power system during reliability gap periods. Exempting pumped storage plants will have the same effect as it will remove a disincentive to offering security services during reliability gap periods. In relation to the last point above, we do not consider that the RRO is currently technology neutral, an issue which we discuss further below.

### Question 3: Should we also consider exempting pumped-hydro assets from the Retailer Reliability Obligation?

Yes. We consider that pumped hydro assets should be exempt from the RRO. We consider that this approach aligns with

- the principle of technology neutrality (see further below),
- cost and risk minimisation, and
- the fundamental objective of the RRO - being to stimulate investment to avoid reliability shortfalls.

The consultation paper suggests that "pumped-hydro storage assets are much less responsive than batteries to market signals due to the different technologies and do not provide the full spectrum of system-security services that batteries do".[7]

We note that a range of different technologies will be needed as the market transitions, and readily acknowledge that pumped hydro does not provide the exact same services that batteries do - particularly in relation to very fast frequency response. However, pumped storage assets can provide some services that batteries do not as yet provide - including the ability to boost reliability over long duration periods.

The rule change request notes that "the expected RRO shortfall period in NSW commencing in December 2025 is for a period of 3 months for 7 hours a day". No battery currently in the market can boost reliability over such a long duration. Pumped storage will have a valuable role to play in responding to longer duration reliability gaps, particularly as more and more thermal plants retire and winter lulls - not just summer evening peaks - pose increasing reliability challenges.

Synchronous hydro units also make a valuable contribution to system security by providing inertia and system strength. While batteries are able to provide very fast frequency response, thereby reducing the required level of inertia in the system, synthetic inertia is not a perfect substitute and a minimum level of inertia from synchronous machines will continue to be required. In addition, the performance of batteries during major grid disturbances is less well understood and the availability of synchronous hydro units will boost system security during reliability gap periods.

System restart services are not mentioned in the paper. However, it also worth considering pumped storage units can provide such services (along with some batteries), important particularly as the NEM experiences a growing number of high impact low probability events.

[7] AEMC, Retailer reliability obligation exemption for scheduled bi-directional units, Consultation paper, 30 May 2024, p 8.

Technology neutrality

Technology neutrality was an important consideration for the Commission in determining that batteries and pumped hydro should be subject to RRO liability. The Final Determination for the Integrating Energy Storage Systems (IESS) rule change includes the following statements regarding technology neutrality:

> The final rule, which is a more preferable final rule, introduces a new participant category, the Integrated Resource Provider (IRP), that will facilitate the efficient entry and operation of storage and hybrid facilities in a flexible and technology-neutral way.[8]
>
> The Commission's final decision is for a technology-neutral approach for any new definitions in the NER to accommodate storage and hybrid facilities. This involves establishing a new term, bidirectional unit, for a unit that has both load and generation that does not refer to energy storage specifically. Energy storage is not defined as a service separate from generation and load. Instead of defining a new service, a bidirectional unit generates and consumes electricity.[9]

We agree with the decision not to define energy storage as a service in itself. In the case of batteries and pumped storage, energy (or water) is pumped/stored not as an end in itself but for the subsequent generation of energy and/or provision of system security services. Despite this, the IESS rule has resulted in an unlevel playing field when it comes to RRO liability - an outcome that is inconsistent with the principle of technology neutrality.

This is in part a function of the approach adopted to auxiliary load. The IESS rule change included a new definition of "auxiliary load" which means that energy used for pumping water is excluded from auxiliary load. This is critically important because of the way auxiliary load is referenced in the new definition of "bi-directional unit" which was added to the NER by the IESS Rule. In particular, bi-directional units are defined as "a production unit that also consumes electricity". The definition, in chapter 10 of the NER, then goes on to say that, in relation to the consumption of electricity, auxiliary load is to be disregarded.

Snowy Hydro's submission to the IESS Draft Determination commented:

> The draft decision proposes a definition of "auxiliary load" which specifically excludes electricity consumption used to pump water for a pumped hydro production unit. This is remarkable and contradicts the basic logic of pumped storage. Pumped hydro facilities are typically considered the textbook example of auxiliary load.[10]

The Commission's approach to defining auxiliary load differs to that adopted in other regulatory contexts, including within Australia. For example, the regulations governing the creation of large scale generation certificates (LGC) treat auxiliary load used in power stations in the same way as energy used to pump water for hydro electricity generation (as distinct from other purposes such as water or sewage treatment).[11]

The LGC approach to auxiliary load differs from the approach adopted in the IESS Rule change. The approach now given effect by the NER means that - in relation to RRO liability - pumped hydro plants are

[8] AEMC, Integrating energy storage systems into the NEM, Rule determination, 2 December 2021, p. i.
[9] Ibid, p. 17.
[10] Snowy Hydro, Submission to IESS Draft Determination, 16 September 2021, p. 3.
[11] See Regulation 3B(2) of the Renewable Energy (Electricity) Regulations 2001 (the Regulations) discussed here. .

treated differently to other electricity generators, some of which also have significant auxiliary loads. For example, AEMO modelling for the ISP assumes that brown coal power stations have an auxiliary load of 8.21% - which is significant given the size of most brown coal units, and the fact that such loads can be present when the plant is starting and prior to any net generation output.[12] Such units have no RRO liabilities as they are categorised as neither market customers nor integrated resource providers - they are simply treated as generators. We submit that, where a pumped hydro plant consumes energy to pump water, solely for the purpose of generating electricity at a later time, it should not attract RRO liability.

This approach was the one adopted by AEMO in its IESS rule change request. It stated:

> AEMO has considered how Bi-directional Resource Providers should be accommodated in the Retailer Reliability Obligation (RRO) framework that came into effect on 1 July 2019. Currently, Part D of Chapter 4A identifies RRO 'liable entities' as Market Customers with an aggregate annual load in a relevant region of more than 10GWh.
>
> Under existing arrangements, ESS (batteries and pumped hydro) will be RRO liable entities (subject to the energy threshold) where they are registered as Market Customers for the load component of their facility. *However, because an ESS is likely to consume and store electricity when demand is low, and to produce electricity in periods of high demand, an ESS should be regarded as improving system reliability.* The position for 'hybrid' facilities with ESS, generation and load is more complex, as it will not be clear whether they are contributing to improving reliability.
>
> AEMO considers that a Bi-directional Resource Provider should not be a liable entity under the RRO unless its facility includes a load. This approach means that *end user loads* remain within the RRO framework, as intended, without creating incentives to install ESS with a load to avoid the RRO obligation.[13]

Two points are worth emphasising: AEMO considered energy storage systems would improve system reliability and hence should not be subject to RRO liability. To use a colloquialism, storage is part of the solution, not part of the problem. AEMO also referred to "end user loads" remaining within the RRO. By contrast, pumped storage load (like battery charging load) is not an end user load - it is simply a means to generate energy later - and hence it should not remain within the RRO.

In its draft determination on the IESS rule change request, the Commission noted:

> Feedback on this issue in submissions to the consultation paper was limited; the issue was only addressed by six stakeholder submissions. All agreed with AEMO's proposal to exempt storage assets as liable entities under the RRO.[14]

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[12] AEMO, 2023 IASR Assumptions Workbook, Existing Gen Data Summary sheet

[13] AEMO, Integrating Energy Storage System Rule change request, 23 August 2019, pp 23-24.

[14] AEMC, Integrating energy storage systems into the NEM, Draft rule determination, 15 July 2021, p122. The Final Determination similarly noted that "six stakeholders did not support the draft decision for storage participants to be liable entities under the RRO". Two stakeholders did support the approach adopted by the Commission. See: AEMC, *Integrating energy storage systems into the NEM, Rule determination, 2 December 2021,* p. 67.

Despite this, the Commission determined (in both its draft and final determinations) not to adopt AEMO's proposed approach, instead making integrated resource providers subject to the RRO. The Commission expressed the view that "it is not appropriate to introduce technology-specific exemptions; obligations under the NER should be based on the services provided rather than an entity's technology or its participant category." [15] The Commission also considered that such entities were unlikely to exceed the threshold for RRO liability (10GWh).[16] However, as the rule change proposal notes, storage assets consuming over 10GWh per year "equates to every battery system approximately 20MWh or larger – i.e. the majority of grid-scale batteries connected in the NEM today, as well as almost all projects currently planned".[17]

We agree that obligations should be based on services, not technology or participant category. We consider that it is not appropriate to introduce technology-specific exemptions *or obligations*. Pumped hydro units provide energy and security services, just as thermal units do. Consistent with this, we consider that pumped hydro units should be exempt from RRO liability, just as thermal generators are.

Such an approach would

- be consistent with the principle of technology neutrality,
- support the original intent of the RRO,
- align with AEMO's proposed approach in its rule change proposal, and stakeholder support for that approach.

It would also reduce costs and risk to consumers, consistent with the NEO.

### Question 4: What are your views on the costs and benefits of the proposed exemption?

- What do you consider the proposed exemption's benefits and costs? Please articulate how the costs/benefits for battery assets may flow through to market costs and system-management costs.
- If there are implementation costs for the exemption, will they be one-off or ongoing?
- Is there anything the Commission could do in designing the rule that would help to minimise the costs and maximise the benefits?

ZEN agrees with the information provided by the rule change proponents regarding the benefits that could be expected to result from this proposed rule change - both for batteries and pumped storage units.

We consider that implementation costs would be low and one-off rather than ongoing. By contrast, compliance with the rules as they currently stand would impose significant ongoing costs for batteries and pumped storage units, in addition to the wider market (consumers and market bodies).

We note that a benefit of the proposed rule change would be to avoid potentially significant costs associated with AEMO having to issue directions (i.e. if RRO liable entities opt to withdraw energy or security services from the market in order to mitigate the risk of incurring RRO penalties, and AEMO has

[15] AEMC, IESS Draft Determination, p. 123.
[16] Ibid, p. 124.
[17] Tesla, Neoen, Iberdrola, *Retailer Reliability Obligation exemption for Scheduled Bidirectional Units Rule change request,* 8 April 2024, p.2.

to resort to directions to maintain reliability and/or security). Directions can be costly and these costs are passed through to consumers who have no capacity to hedge such risks.

In addition, there may be insufficient time to issue directions if low probability but high impact events occur. These can have major implications for the system (e.g. extended black system events) and the cost of these is very difficult to quantify.

Zen considers that the proposed change would be relatively simple to implement and would deliver an important benefit by removing an obligation which can be expected to

- stymie investment in batteries and pumped storage, and
- result in increasingly important sectors of the market withdrawing security services during reliability gaps.

We expect that any implementation costs would be far outweighed by the resulting benefits - even if it is not possible to quantify the benefits with a great deal of precision.

### Question 5: What are the key implementation issues and considerations?

- Do you foresee barriers to implementing the exemption?
- What arrangements can we consider with the 'Integrating Energy Storage Systems into the NEM' rule change starting in June 2024?

We do not see any major barriers to implementation and support the proposal to make the proposed amendment before December 2024.

### Question 6: Are there alternative solutions to an exemption of the RRO that would be preferable?

- Do you believe that battery operators can manage risks from RRO compliance with solutions available today? If so, what are these solutions?
- Would an alternative solution be more aligned with the intent of the RRO and the long-term interests of consumers?

We disagree with the premise of this section of the consultation paper - i.e. that there may be a reason to "keep the RRO technology neutral" by keeping batteries liable under the RRO.[18] As discussed, we do not consider the current approach to be technology neutral.

We also do not believe that battery operators can manage risks from RRO compliance with solutions available today, or at least cannot do so efficiently and in a manner that is consistent with the NEO. Purchasing caps often involves purchasing from hydro units - which would not be an option when the cap is needed to manage risks that are also faced by hydro units. The alternative - purchasing caps from thermal plant - would add potentially significant costs without discernible benefits, and potentially delay the exit of thermal plants. This would increase carbon emissions and push up costs associated with meeting emission reduction targets, all contrary to the NEO. [**NOTE:** this is not my area of expertise. Others may have a different view re this, or more information to add re caps etc.]

[18] AEMC, Consultation paper, p. 9.

In relation to alternative solutions, if the proposed approach is considered problematic, consideration could be given to amending the definition of auxiliary load so that it includes energy used for pumping water. Such load could then be excluded from the calculation of RRO liability.

**Question 7 - Assessment framework**

- Do you agree with the proposed assessment criteria?
- Are there additional criteria that the Commission should consider or criteria included here that are not relevant?

We support the assessment framework subject to one addition. In the section discussing "principles of market efficiency", the consultation paper refers to the current approach "adding risks that batteries cannot effectively manage or hedge against".[19]

We suggest that this section should refer not just to efficacy (i.e. whether or not batteries can *effectively* manage or hedge risks) but also to questions of *efficiency.* That is, even if batteries can effectively manage or hedge RRO related risks, it is important to consider the cost of doing so and whether this is the most efficient approach.

## Conclusion

ZEN would welcome the opportunity to discuss our submission further. Please don't hesitate to contact fin.adamson@zenenergy.com.au or via phone as noted within my email signature.

Yours Sincerely,

Fin Adamson
Development Manager

4/7/2024

[19] Ibid p. 12.