

Consumer advocates' verbal submission Draft 2024 Forecasting Assumptions Update

Purpose of this document

On 21 December 2023 AEMO published the Draft 2024 Forecasting Assumptions Update and CSIRO published their draft 2023/24 GenCost report¹ for consultation. AEMO held a verbal submission session with energy consumer advocates on 7 February 2023 to support their capacity to provide a formal consultation submission on the Draft 2024 Forecasting Assumptions Update. AEMO staff did respond to these comments in the session. AEMO produced this written record of the verbal submission, which has been agreed with attendees. AEMO will consider the submissions made in the session, along with all other written submissions to the Draft 2024 Forecasting Assumptions Update.

Submitters:

Name	Organisation	Name	Organisation
Craig Phasey	Energy Flex (EF)	Jennifer Brownie	Queensland Energy Users Network (QEUN)
David Prins	Etrog Consulting (EC)		

Submission topics

Consumer advocates provided comments on the following topics.

1. Clarity
2. Consumer focus
3. Flexible demand
4. Consumer Energy Resources (CER) and Electric Vehicle (EV) Uptake
5. EV charging
6. Technologies considered
7. The importance of forecast accuracy

1 Clarity

- **EC:** Each AEMO report should clearly explain and differentiate between its inputs and outputs. It is essential for the Integrated System Plan (ISP) to provide clarity regarding what are input assumptions as against modelled outcomes, as these are often confused in media reports and other publications.
- **EC:** While the ISP documents themselves set out what the ISP does and does not represent, this is often missed in AEMO's own media releases and in subsequent media and other publications. The ISP is not a blueprint for least cost energy transition in a vacuum. It is a modelled set of outcomes based on scenarios that may not eventuate, and based on taking as inputs committed policies, and committed investments that may not be least-cost.

¹ See <https://aemo.com.au/consultations/current-and-closed-consultations/2024-forecasting-assumptions-update-consultation>

2 Consumer focus

- **EC:** It is important for all aspects of the modelling to be considered from a consumer focus. In particular, new Consumer Energy Resources (CER) and Electric Vehicles (EV) will require consumer proactivity, as against much historic traditional applications of CER such as water heating and pool pumps have been operated on the basis of “set and forget”. New consumer activity must be evaluated from a consumer perspective rather than assumptions regarding what industry participants and market bodies would like consumers to do.

3 The benefits of flexible demand of CER and EVs

- **EF:** In the updated assumptions, most costs come from the assumption of reliability, that consumers want to keep their lights on all the time. However, up to 30% of demand can become load-following. Forecasts should explore the possibility of significant levels of flexible demand. Currently, customer batteries time-shift energy use to maintain current work assumptions. Energy Flex is trying to empower consumers to respond to grid prices and use their energy as an asset, time-shifting the way people work. Now that supply is variable, load should become variable too. It’s an education problem, not a load problem. One option is “process storage”, where jobs are done partially at different times, shifting the energy intense components to cheap energy times. Hot water is an example, where water is heated in the middle of the day and stored for later use.
 - **EF:** An option to explore the possible outcomes could include make a large percentage of load price sensitive and observing what behaviours consumers adopt.
- **QEUN:** Flexible demand is very low in Queensland, with many households shifting to flat tariffs. Even those on load control tariffs have batteries that are unavailable the grid. The coordinated - passive CER breakdown is important to get right in the forecast assumptions.

4 CER and EV uptake

- **QEUN:** The workbook indicates that very high EV uptake is needed. However, this is highly unlikely based on current trends. In June 2023 there were only 1000 new cars sold, so expecting 7,700 new EVs sold in 2030 is unlikely to occur. The current assumption requires Queensland to sell the same number of EVs in the next 5 years as what the entire NEM has now. Cost of living pressures reduces the ability to buy cars, as evidenced by car ownership length has increasing in Australia from 8 to 11 years. This is even more unlikely due to removal of the tax incentive for businesses to write off EV purchases.

5 EV charging

- **EF:** We need a distributed charging system. Parking spaces in cities need EV chargers, otherwise charging will only occur overnight, exacerbate grid problems. Vehicle to Grid (V2G) charging won’t fix these issue either.
- **QEUN:** Swappable batteries are available and need to be considered and modelled.
 - **EF:** Swappable batteries are efficient, as they can be tailored to trip length.
- **EF:** V2G and vehicle to home (V2H) charging is forecast after 2030, but their uptake is stymied by policy.
 - **QEUN:** If we don’t get V2G capability right, all behind the meter EV uptake will not be helpful to the grid.

6 Technologies considered

- **QEUN:** The ISP is using today's technology for a future grid. The ISP is seemingly not technology agnostic. By using the carbon budget in the NEO, the ISP is forcing in the wrong technology. We need to look into other technology, including other types on battery minerals, like sodium batteries, which can be used for solar and wind firming. Due to high insurance premiums, lithium batteries will not survive in the market due to constant fire and explosions. This applies for both home batteries and EVs.
- **QEUN:** Around the world, Toyota is investing in manufacturing Hybrids and they have been proven correct. This will be an especially important vehicle type if sodium batteries are delayed.

7 The importance of forecasting CER accurately for the ISP

- **QEUN:** The EV uptake forecast is being used in the ISP to optimise the future grid. If EV forecasts are overstated, coal plants will have to stay open for longer, reducing the impact of ISP projects.
- **QEUN:** The ISP uses CER as a balancing act to reduce overbuilding the system, but it is overstating how much consumers will fill that gap.
- **EC:** The way the ISP doesn't include CER costing means that the true cost isn't estimated. This is another topic that can be misquoted in the media regarding the ISP.
- **EF:** CER can fill the gap if consumers are in control. If the supply side of the electricity market has control over CER, consumers will not adopt it. The uptake is a control issue, not a technology issue.

Additional comments from Energy Flex:

- The forecasts are based on the assumption that demand is inflexible/inelastic. We suggest that this is not the case.
- Demand inflexibility is the key driver of cost associated with a reliable renewable energy grid. If a significant portion of demand can be made to follow supply, coordinated by appropriate price signals, the total cost of energy for the whole community drops.
- Individual users can be incentivised to flex their demand in response to price signals because of the economic benefit they gain: more energy at reduced prices. This also underpins the business case for overbuild in renewable energy.
 - See PNNL research claiming 17% cost reduction to participants and 10% cost reduction to non-participants through access to real time electricity pricing.
<https://www.pnnl.gov/projects/transactive-systems-program/dsot-study>
- The potential for load flexibility is high if load is properly prioritised. The Clean Coalition <https://clean-coalition.org/disaster-resilience/> have created 100% reliable cost effective solar micro-grids with minimal battery storage. The key to their process is in inverting the current proportions of critical and discretionary load. Clean Coalition workings demonstrate that for most organisations, critical load comprises perhaps 10%, high priority load another 15% and discretionary load the remaining 75%. This breakdown can be extrapolated to much wider communities.
- Load can be made flexible without sacrificing production (for industrial and commercial users) or utility (for residential users) by enabling “Process Storage”.
- Process Storage is where excess energy is stored as partially completed product rather than as a potential (chemical, gravity, kinetic or electric potential) for later re-conversion to electricity. The basic idea is to achieve the same production output by time shifting work in response to available energy rather than utilising a lossy energy conversion and storage mechanism so that work can be maintained at constant speed.
- Process storage is available from heavy industry through to residential users.
 - a. Heavy Industry:
 - i. Aluminium smelting. See Enpot, a technology that maintains thermal equilibrium within aluminium smelter pots enabling up to +/- 30% energy flexibility
<https://enpot.com/>
 - ii. Hard Rock Mining: See OZ Minerals Scalable and Adaptable Mining whitepaper. SAG mills, which traditionally use 40% of a mine’s energy, can be replaced with a new technology mill that uses 20% of the energy and is completely flexible – product dwell time <5 seconds and fully electrically operated. A trial of this mill is underway at a major Australian mine. <https://unearthed.solutions/u/competitions/scalable-and-adaptable-mining>
 - b. Residential:

- i. Hot water is an easy example of process storage and one that has been used under off-peak/controlled load systems for some time. Delay-start mechanisms for major appliances such as dishwashers, washing machines and dryers are another example of easy methods to shift work from peak periods to renewable generation periods.
- Our estimate is that up to 30% of all load can become flexible, often through nothing more than a decision and/or a control system change. We are actively pursuing evidence to prove or disprove this estimate.
- Dynamic pricing based on the spot price offers a broadscale coordinating mechanism to stimulate self-organisation across the grid leading to a level of natural balance with no external control. The residual control challenge including FCAS should be well within the capabilities of AEMO to manage, especially as the dispatchable levers to manage the balance are eroded by renewable penetration. Further, the balance is achieved by individual users optimising their own financial position, therefore cross subsidies inherent in traditional demand response mechanisms will not be required. In short, the system becomes self-reinforcing.
- We do not expect this submission to precipitate an immediate change to the modelling that has been successful thus far. What we do request is an experiment where load does become flexible and follows price. Run the model at 10%, 20% and 30% flexible load to see what impact this has on price, renewables penetration and storage/firming requirements. We suspect that the results will be surprising.
- The next step is to educate the community on the new energy reality and particularly, the value of flexibility.

Additional comments from QEUN:

QEUN seriously believe the carbon budget is forcing the ISP to build yesterday's grid today.

For example, assuming sodium-ion batteries do overtake lithium ion for both utility-scale and home battery storage plus EVs in the near future. Then those with lithium batteries will find they have expensive batteries with a high fire risk and high insurance premiums (or maybe in some cases uninsurable homes and businesses).

Sodium ion batteries could be a gamechanger in that more solar and wind farms could be incentivised to colocate battery storage rather than spilling i.e. more in front of meter storage rather than relying on behind the meter CER investment.

But for an investor only interested in energy storage then building a 300 MW utility-scale lithium battery today will find it difficult to compete with a 300 MW utility-scale sodium ion battery built down the road in the next couple years (assuming a level playing field of no commercial offtake agreements or grants).

We need to move with technology ie not overbuild the grid with yesterday's technology just to meet the ISP's carbon budget..... Australia's trade exposed industries can't compete on labour costs but they should be able to compete on energy costs if AEMO do not build a dinosaur grid.

As per below, sodium ion batteries have been around for a while and cannot be regarded as experimental new battery technology ie it is already commercial.

As consumers we are very excited to know there is a way to remove the fire and explosion risk of lithium batteries but we are equally excited that removing the risk is cost effective ie a sodium ion battery is cheaper!

The fire risk is immense as per this video by Professor Paul Christensen ([link](#)) - avoid the first 1 minute as its advertising for the International Tall Buildings Fire Safety Conference. I agree with the Professor the dog is smart - until I watched this video I would have done what the person did and not what the dog did.