UNSW Collaboration on
Energy and Environmental Markets

# UNSW Submission to the AER's Consultation Notice (Sept 2026)

- **Essential Energy islandable microgrids sandbox trial waiver application**

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November 2026

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CRICOS Provider Code 00098G

# Introduction

The authors of this submission are currently engaged in the UNSW project "Community & Regulatory Perspectives on Microgrids", funded by RACE2030, and with Essential Energy is the industry partner. One section of this project focuses on the regulatory barriers faced by temporarily islanding sections of the interconnected grid – now referred to as T-SAPS (temporary stand-alone power systems)[1]. These barriers include the fact that a section of the grid that alternates between grid-connected and islanded operation does not fit neatly within the existing arrangements for either an interconnected network or a permanent stand-alone power system (SAPS).

Others include DNSP-owned assets providing generation into T-SAPS, settlement and network tariff anomalies that may occur if islanding occurs for extended periods, the need to maintain reliability of supply and power quality, how network reliability standards should be applied, and maintaining customer protections.

The Australian Energy Market Operator (AEMO) will soon be submitting a Rule Change proposal to the Australian Energy Market Commission (AEMC) that seeks to establish a formal framework within the NER for T-SAPS. Associated with the Rule Change proposal are the development of thresholds for when T-SAPS activation is expected to occur and detailed operational and procedural requirements for dealing with T-SAPS.

These latter two require input from real-life examples of trial T-SAPS. Essential Energy's proposed trials are the first in the NEM that would be islanded for a sufficient amount of time to provide useful data and experience.

We note that Essential Energy is currently in the process of developing the technical and control requirements for islanding and operating a T-SAPS themselves. These will also be required for any third-party T-SAPS but are unlikely to be developed if Essential Energy's waiver application is rejected.

Importantly, the successful deployment of T-SAPS could help develop the regulations, processes and technical requirements to island larger seconds of the grid. Local Energy Zones are now receiving a significant amount of attention – for example Ausgrid's Community Power Network and the Illawarra LEZ. Although they are not currently intended to island, this would be a logical next step. This would not only improve power quality and increase the resilience of power supply but would increase the deployment of distributed generation and reduce emissions.

NOTE: The primary author of this submission also works for the consultancy ITP Renewables (ITPR). ITPR has been engaged by the firm EDPR to provide advice on T-SAPS, with particular reference to their proposed T-SAPS at Braidwood (NSW), which has received ARENA funding. ITPR has made a separate submission to this consultation, which in some areas overlaps with this submission.

[1] Under the AEMC definitions, a microgrid is always islanded.

# Responses to Questions

**Question 1. What regulatory and industry learnings could this trial generate regarding islandable microgrids as a network solution?**

**Regulatory:**

The main regulatory learnings from Essential Energy's (EE's) trials are likely to occur through the provision of real-world data relevant to AEMO's Rule Change proposal. This Rule Change proposal seeks to establish a formal framework within the NER for T-SAPS within the National Electricity Market (NEM). It also states that, separately:

1. the Australian Energy Regulator (AER) would develop guidance outlining the circumstances in which formal T-SAPS activation is expected to occur (thresholds), and
2. detailed operational and procedural requirements associated with T-SAPS implementation would be developed through AEMO procedures and consultation processes.

Both of these will be developed based on the potential impacts that islanding could have on settlement anomalies, unaccounted-for-energy, network tariff anomalies, and the reliability of supply and power quality. Such impacts will be affected by a range of factors including the frequency and duration of islanding, the number of customers and the size and quality of the network infrastructure. AEMO has stated that these impacts must be determined empirically based on real-world examples of T-SAPS – such as those proposed by EE and by EDPR. They would enable measurement of the duration, energy volume and financial value of any settlement, unaccounted-for-energy, metering and tariff discrepancies. This would help inform the need for an enduring rule change, a threshold-based process, and an agreed operating and reconciliation procedure.

Of course, the trial should also contribute to a regulatory learnings regarding the pros and cons of allowing DNSPs to own and operate generation assets in a T-SAPS under strictly defined conditions.

**Industry/technical:**

There are likely to also be significant industry/technical learnings from the proposed projects. In particular, they will result in the development of a switching protocol and operational protocol that can be applied to different locations. The switching protocol is the process by which a defined section of the interconnected grid switches to being islanded and back again. The operational protocol ensures that the microgrid is operated in such a way that reliability of supply and power quality are maintained.

The use of a number of different locations will allow comparisons of the impacts of different types of control of generation, storage, protection and switching under network-owned, third-party and hybrid arrangements. They would also provide opportunities to determine who is best placed to take responsibility for supply quality, reliability and reconnection in both modes, including what happened during planned separation, unplanned loss of grid supply, restart, sustained islanding and reconnection as well as any failed transition.

Ultimately, the proposed trials would enable a comparison of each site's solution with the arrangements for regulated SAPS.

**Question 2. What are stakeholders' views as to the proposed benefits of this trial?**

There are many likely benefits of the proposed trial. Building on the response to the previous question, the proposed trials will allow the AER to:

1. Assess the impact of settlement anomalies and unaccounted-for-energy on the wholesale market.
2. Determine the feasibility of retaining ordinary tariffs, which would help avoid disproportionate billing complexity, versus the need for T-SAPS-specific tariffs if longer or repeated islanding creates material costs or unequal outcomes.
3. Measure interruptions and interruption minutes avoided, including performance during extended outages and any failures of the microgrid itself.
4. Distinguish the impacts of planned upstream work from an unplanned loss of supply to customers within an islanded area and develop operational requirements for both scenarios.
5. Identify faults that occur as a result of separation, black start, load restoration and reconnection.
6. Compare the full cost and reliability outcome with maintaining, replacing or upgrading a feeder, and with options such as automation, local generation or batteries. This could be used to develop per-customer metrics.
7. Calculate the operating, fuel, maintenance, replacement and eventual transition costs, as well as the share paid by government, investors and network customers.
8. Test proposed environmental and customer benefits using measured generation, fuel consumption, curtailment and operating data.
9. Clarify how a failed islanding event is counted in reliability measures, including SAIDI, SAIFI, applicable service standards and incentive reporting. A planned upstream outage during which the microgrid maintains supply should be distinguishable from an unplanned interruption caused by the microgrid.
10. Assess customers' experience of reliability, supply quality and bill impacts, as well as develop appropriate customer communication requirements and test their effectiveness.

**Question 3. Do stakeholders consider that the trial may impact the operation of the national electricity system and market, including AEMO's role as the system and market operator? If so, how?**

One of the main aims of the proposed trials is the minimisation of such impacts when a section of the interconnected grid transitions to a SAPS and back again. They will allow AEMO and affected market parties to identify the start and end of an islanding event, the resources supplying the island and the electricity recorded at relevant connection points. This can then be applied to the relevant spot prices and network tariffs to assess the significance of islanding events at different locations. This will provide experience regarding

how discrepancies will be measured and reconciled as well as help the AER to determine the thresholds when additional measures, such as specific tariffs, are required. Such thresholds would be based on factors such as duration, energy volume and financial value for notifying retailers, investigating settlement or unaccounted-for-energy differences and correcting material errors.

**Question 4**. **What are stakeholders' views on potential risks of the trial? How might such risks be mitigated with conditions? Which conditions do stakeholders think will be appropriate to manage these risks?**

The four main potential risks are: i) reduced quality of supply and power quality, ii) reduced customer control, iii) lack of appropriate processes to assess the trial impacts, and iv) issues with third-party accountability.

**Quality of supply and power quality**

There will be a need for site-specific evidence that generation and storage can establish and sustain the island under credible conditions, including restart after an unplanned outage, increased demand when customers are re-energised, equipment failure and declining battery charge. This will require site-specific procedures for separation, protection, local frequency and voltage control, load management and safe reconnection. These procedures should account for existing CER. Conditions should name the decision-maker, fallback response and circumstances that require islanding to cease. Ideally these should be in place before any trial commences.

**Customer control**

Although EE says that community consultation will be completed beforehand for every site location, once the trial is in place, there will be no options for customers to opt-out. Although it is highly unlikely that customers would opt out of having their electricity supply maintained, this inability to opt out should be well communicated, along with information on anticipated supply reliability.

**Appropriate assessment processes**

Although it is unlikely that the trials will result in material impacts through market and tariff anomalies (because the islanding times will be relatively short), it is still possible. Therefore, there should be a pre-agreed process to observe, quantify and correct such anomalies if they are material. This is needed to protect retailers, financially responsible market participants and customers.

**Third-party accountability**

Where a third party provides and/or operates generation, there should be clear contractual and regulatory accountability. Material safety, supply or market incidents should be reported promptly, with a mechanism to pause affected operation while the cause is addressed.

**Question 5. Is a program-level waiver framework appropriate for this trial? What deployment-specific information should be available before the waiver can be relied on (e.g. should individual deployments require AER approval or notification; to what extent should sites be able to be added or substituted over time; and what should constitute a material change requiring further assessment?)**

A program-level waiver avoids the need to go through an extended waiver application process for each site. It would need to set a clear boundary for network purpose, eligible activities and available waivers. Each site could require a go/no-go assessment before waiver-enabled operation, which would require a summary covering the network need, alternatives considered, affected customers, community consultation activities and outcomes, technical design, ownership, funding and exact waiver provisions needed. It should also define the expected pattern and permitted reasons for islanding, site-specific operating limits, switching and reconnection procedures, market-data treatment, customer engagement and exit arrangements.

Repeated designs could receive a proportionate review, but a new ownership/operational model, materially different capacity or market activity, or substantially larger customer exposure, could receive closer scrutiny. As long as the appropriate procedures are followed, substitution of one site for another should be allowed.

**Question 6. Does this trial raise any other regulatory or operational barriers that need to be considered? Are there any further waivers required in addition to the ones identified by Essential Energy?**

Essential Energy proposes that the power system security obligations for a T-SAPS should be the same as for a SAPS, which are slightly different to those for the interconnected grid. This would affect aspects of Chapter 4 (Power System Security) of the Rules related to "operating distribution systems according to power system stability guidelines, reporting around circumstances that impact power system security, complying with performance standards to reduce power system security effects etc" (p46 of EE's Sandboxing Application). Therefore, although AEMO's Rule Change request does not consider changes to Chapter 4 of the NER, it is possible that some may be required. These changes are not required for EE's trials but may be required for the long-term development and operation of T-SAPS.

**Question 7. What are stakeholders' views as to Essential Energy using a mix of self-owned and third-party owned and operated microgrid assets? What further information should the AER take into account when deciding whether to grant the trial waivers?**

Given that the proposed T-SAPS developments are trials, and will be subject to particular scrutiny, we believe that EE should be allowed to mix network and third-party assets. This will allow a comparison of the cost, reliability and accountability of different models of network ownership and operation, where network assets are supported by third-party generation, third-party operation and hybrid models.

The use of third-party assets would require an authority matrix naming who may instruct the generator or battery, operate network switches, approve island formation, manage load, respond to faults and authorise reconnection. Contractual obligations should support, rather than obscure, the distributor's responsibilities to its customers.

Of course, it is important that EE seeks genuine contestable offers from 3rd party providers, as well as contracted participation in the T-SAPS. These providers should receive sufficiently clear network-need and technical information to propose an alternative, without gaining inappropriate access to customer or sensitive network data.

**Question 8. What are stakeholders' views as to the operational arrangements outlined in Essential Energy's application that would need to be in place before a site is allowed to island? What should be the parameters around islanding?**

In addition to obtaining the required regulatory approvals, these arrangements can be divided into community and technical.

**Community**

The affected community must be fully aware of the T-SAPS and what it means for them (as stated above, the current proposal is that customers can't opt out). The boundary of the T-SAPS should be well defined, as should the ability of the T-SAPS generation to maintain power, and for how long, during different seasons and under different weather conditions.

**Technical**

The conditions under which a section of the main grid can be islanded should be well defined, as should the thresholds under which, for example, particular market adjustments and special tariffs are invoked. If the available generation cannot serve every load, the procedure for prioritising or interrupting customers should be clearly communicated in advance.

Prior to islanding, the protection, generation and storage controls, communications, black-start capability where relevant, and reconnection under credible failures should have been tested – resulting in the development of a switching protocol and an operating protocol for each site. This should include the operation of any CER under islanding conditions.

Procedures should be in place to record switching decisions, island duration, customers interrupted, power-quality problems and equipment failures.

**Question 9. Do stakeholders have concerns with the possibility to exceed 10 deployments? What possible conditions could be imposed to ensure trial deployments are appropriately identified and managed?**

If the trial is initially limited to 10 sites, there should be a transparent and well-developed procedure through which EE can apply to the AER to add additional sites. This would include an assessment of the success of and learnings from previous sites, as well as clear justification why any additional sites are needed (for example that the new site(s) have novel characteristics that could provide additional information). These could include feeder length and internal fault exposure, the size of the islanded load, embedded generation, switching capability and ownership arrangements.

**Question 10. We are interested in stakeholders' views on the boundaries between contestability and competition. What constraints or other conditions could be placed on Essential Energy's ownership and operation of the microgrids to support efficient outcomes for customers regarding affordability and reliability of their electricity supply?**

As stated in our response to Question 7, EE should seek genuine contestable offers from 3rd party providers, and provide contracted participation in the T-SAPS. These providers should receive sufficiently clear network-need and technical information to propose an alternative to DNSP assets, without gaining inappropriate access to customer or sensitive network data.

This would require fair documented procurement processes for contestable components and services, where offers for assets and network-support services are compared to a network-owned solution, including integration, control and operating costs – all on a whole-of-life basis.

Clear accounting and information boundaries should be maintained. The AER should be able to test whether customer-funded assets or privileged network information confer an unfair advantage, while allowing practical contracts with third-party providers.

Third party assets should be operated under a bilateral contract that clearly states both party's responsibilities (including mandated prioritisation of network services when required) and the chain of command during switching and operation.

Regulated network investment, connection or integration work, grant funding and third-party expenditure should be treated separately in any cost assessment. Customers should fund only an efficient network service, with any permitted revenues and network-support payments transparently reported.

**Question 11. What are stakeholders' views as to the appropriate RAB and revenue treatment of the microgrids and their assets?**

Under Chapter 6 of the NER, DNSPs cannot own market-facing generation assets on the interconnected grid unless they have a ring-fencing waiver from the AER, although temporary generation is allowed to meet reliability constraints (but this generation is not considered market-facing because the electricity is not sold). DNSPs can include generation/battery assets that are not market-facing in their RAB, but only to the extent that they provide network support.

Under the new SAPS Rules, SAPS are now included in the NEM. Under Chapter 6 of the NER, DNSP-led SAPS have been classified as standard control services, and so all the assets (including poles and wires, and any generation owned by the DNSP) form part of their regulated asset base (RAB). These generation assets can only be owned by a DNSP under an exemption framework provided by the AER. DNSPs can only include the efficient capital cost of any generation assets as long as the total capital/operating expenditure is cheaper than maintaining or replacing the traditional grid poles and wires.

Where an asset in the RAB can provide two services, one of which is not a distribution service, the Shared Asset Guidelines (SAG) apply. In 2025 these guidelines were modified so that a percentage of the net positive revenue received from the generation of electricity, or from the provision of a service, is subtracted from the annual revenue allowance under their RAB. In addition, under the ring-fencing guidelines, a cap of 0.02% to 0.2% of the DNSP's annual revenue allowance has been introduced, which limits the annual revenue a DNSP can

earn from providing a generation service in a SAPS. This is intended to act as a guard rail to enable access by third party generation providers. If the revenue cap is breached the DNSP has to apply for a waiver from the AER.

Given that the NER currently contains no dedicated framework governing T-SAPS, clarification is required regarding the treatment of DNSP-owned generation assets when transitioning from the interconnected grid to a T-SAPS. However, it is likely that a combination of the above, applied on a pro rata basis, would be most appropriate, i.e.:

1. DNSPs can include non-market-facing generation/battery assets in their RAB, but only to the extent that they provide network support, and
2. the full value of all DNSP-owned assets can be included proportional to the time when that section of the grid is islanded, and the SAG would apply.

In addition, some general rules should apply:

1. Assess the efficient network-service share of each investment against alternatives before proposing recovery from regulated customers. Distinguish that share from grant-funded, investor-funded or commercial capacity, including shared equipment.
2. Set an auditable site-level method for allocating capital and operating costs, metered revenue, deductions and customer benefit. Report how any return from the use of customer-funded CER is reflected in regulated outcomes.
3. Specify any network-support payment potentially provided to third-party generators in terms of the contracted service and verifiable performance.

**Question 12. What impacts could there be on third parties? How could these be managed appropriately? What conditions might need to be imposed to help manage any impacts on third parties?**

As stated in our response to Question 3, one of the main aims of the proposed trials is the minimisation of impacts on the national electricity system and market, including on AEMO's role as the system and market operator. However, once an event crosses a T-SAPS threshold, AEMO would still be responsible for implementing the appropriate procedures. When this occurs, AEMO, retailers, financially responsible market participants and metering parties should be provided with event data and an established process to resolve material settlement effects.

To the extent that retailers service customers on the section of the grid that is islanded, changes to tariffs to address market and network tariff anomalies could increase complexity. This highlights the importance of appropriate thresholds for when these changes should be implemented. Retailers should be notified if any of their customers may be affected by islanding so that they can develop appropriate billing procedures. They should also be notified when an event crosses specified operational or financial thresholds, and have access to a defined process to correct any material errors.

Third-party asset providers need contractually-based operating responsibilities related to dispatch priority, reserved capacity, maintenance, switching authority and response to failure. This should also specify how any third-party shortfall affects reliability reporting (eg. STPIS) and how resulting costs are allocated.

Connected generators and consumer energy resources may be affected by protection settings or operating controls. Those effects should be assessed for each design, and a

process provided for raising and resolving any material access or performance problems. The AER should receive timely notice of significant third-party impacts.

**Question 13. What do stakeholders think about this exit strategy?**

There are essentially three exit strategy options: i) where the site simply reverts to permanently remaining part of the interconnected grid, ii) where the site is moved to a permanent SAPS, or iii) where AEMO's proposed T-SAPS Rule changes are incorporated in some form into the NER and are deemed appropriate for the site in question. If the proposed T-SAPS Rule changes have not yet been implemented by the end of EE's trial period, the site could revert to being part of the interconnected grid until the proposed T-SAPS Rule changes are resolved.

The exit pathways for each site should be determined well before expiry of the trial period. These should be defined separately, including metering, retail, asset ownership, service standards and customer engagement. They should include milestones for deciding the approach, securing necessary approvals, changing contracts and informing customers.

Any ownership and operating contracts with third-party operators should incorporate, and be consistent with, the rules and procedures around any exit strategy.

**Question 14. Do stakeholders have concerns around decommissioning, transition costs or impacts on customers' energy supply arrangements?**

Although the details of each site are unknown at this stage, we expect that these costs will not be significant compared to the overall project cost. It is likely that assets used in a decommissioned T-SAPS can subsequently be used to provide network support (as occurs for example at the Bawley Point and Kioloa microgrid).

Still, there should be a process to allocate the costs of removing, transferring or modifying generation, storage, protection and control equipment depending on the type of exit. The plan should cover network, grant-funded and third-party components and prevent an unexamined transfer of stranded costs to customers. End-of-contract, decommissioning and asset handover responsibilities should be included in contractual agreements from the start, including who retains operating records, technical knowledge and responsibility for safe switching.

It is also important to define how retail, metering, connection, tariff, life-support and complaint arrangements would transition under different types of exit.

**Question 15. Do stakeholders have any other comments about the trial?**

No other comments.