29 September 2020

Ms Audrey Zibelman
Chief Executive Officer
Australian Energy Market Operator
GPO Box 2008
MELBOURNE VIC 3001

DERProgram@aemo.com.au

Dear Ms Zibelman

Consultation – Initial Distributed Energy Resource Minimum Technical Standard

Energy Queensland Limited (Energy Queensland) welcomes the opportunity to provide comment to the Australian Energy Market Operator in response to its first stage of consultation on an initial minimum distributed energy resource technical standard.

This submission is provided by Energy Queensland, on behalf of its related entities, including:

- Distribution network service providers, Energex Limited and Ergon Energy Corporation Limited;
- Retailer, Ergon Energy Queensland Pty Ltd (Ergon Energy Retail); and
- Affiliated contestable business, Yurika Pty Ltd including its subsidiary, Metering Dynamics Pty Ltd.

Should AEMO require additional information or wish to discuss any aspect of this submission, please contact me on 0467 782 350 or Alena Chrismas on 0429 394 855.

Yours sincerely

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Encl: *Energy Queensland comments to AEMO on its first stage of consultation*

Energy Queensland

Submission to the Australian Energy Market Operator

Consultation Paper- Initial Distributed Energy Resource Minimum Technical Standard

Energy Queensland Limited

29 September 2020

About Energy Queensland

Energy Queensland Limited (Energy Queensland) is a Queensland Government Owned Corporation that operates businesses providing energy services across Queensland, including:

- Distribution Network Service Providers, Energex Limited (Energex) and Ergon Energy Corporation Limited (Ergon Energy Network);
- a regional service delivery retailer, Ergon Energy Queensland Pty Ltd (Ergon Energy Retail); and
- affiliated contestable business, Yurika Pty Ltd (Yurika), which includes Metering Dynamics Pty Ltd (Metering Dynamics).

Energy Queensland's purpose is to 'safely deliver secure, affordable and sustainable energy solutions with our communities and customers' and is focused on working across its portfolio of activities to deliver customers lower, more predictable power bills while maintaining a safe and reliable supply and a great customer experience.

Our distribution businesses, Energex and Ergon Energy Network, cover 1.7 million km^2 and supply 34,000GWh of energy to 2.25 million homes and businesses each year.

Ergon Energy Retail sells electricity to 738,000 customers in regional Queensland.

Energy Queensland also includes Yurika, an energy services business creating innovative solutions to deliver customers greater choice and control over their energy needs and access to new solutions and technologies. Metering Dynamics, which is a part of Yurika, is a registered Metering Coordinator, Metering Provider, Metering Data Provider and Embedded Network Manager. Yurika is a key pillar to ensuring that Energy Queensland is able to meet and adapt to changes and developments in the rapidly evolving energy market.

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1 Introduction

Energy Queensland Limited (Energy Queensland) welcomes the opportunity to provide comment to the Australian Energy Market Operator (AEMO) on its first stage of consultation related to the development of an initial distributed energy resource (DER) technical standard. This submission is provided by Energy Queensland, on behalf of its related entities Energex Limited (Energex), Ergon Energy Corporation Limited (Ergon Energy Network), Ergon Energy Queensland Limited (Ergon Energy Retail) and Yurika Pty Ltd (Yurika).

This consultation follows on from the rule change request that proposes to develop a DER minimum technical standard. Energy Queensland understands that the DER technical standards developed as part of this consultation process are subject to the rule change coming into effect. It is also noted that as this consultation is running concurrently with the Energy Security Board's (ESB) consultation on the DER technical standards governance framework, the comments that Energy Queensland raised in response to that consultation should be considered in parallel with its comments related to this consultation.

While Energy Queensland is supportive of the work AEMO has undertaken in relation to the development a DER minimum technical standard, our preferred approach is to move forward with an earlier implementation of AS/NZS 4777.2, which we understand will be finalised in early 2021. Notwithstanding our preference, it is crucial that there is a clear and established governance framework within which the DER minimum technical standard operates, that allows for jurisdictional differences and comprises members who represent a range of participants in the national electricity market (NEM). There is considerable and wide support for a national approach to power system security and reliability. However, it's important to strike the right balance between system issues and jurisdictional obligations, safety requirements and network performance.

Energy Queensland has concerns with implementing AEMO's proposed standard prior to the finalisation of related reviews, including but not limited to the ESB's governance review. This will ensure that the parameters are set by establishing who has accountability, authority and decision-making in relation to DER technical standards.

Discussions around interoperability should be led by industry rather than AEMO. There is a risk that the entire value chain will not be considered, including manufacturers of inverters, installers, retailers, networks, aggregators and consumers. It's important that the whole chain is engaged to realise the value that interoperability can bring in realising the benefits of DER.

Energy Queensland also considers that a staged approach, targeting the highest risk states, such as South Australia, will enable a smoother transition for the industry and reduce testing burden.

It will be important to ensure that the DER minimum technical standard complies with the relevant jurisdictional framework. For example, in Queensland, under the *Professional Engineers Act 2002* (QLD), only a Registered Professional Engineer of Queensland (RPEQ) or a person under direct supervision of an RPEQ can carry out a professional engineering service. Due to the definition of engineering services, the development or adoption of the DER minimum technical standard is an engineering service and as such, must be carried out by a RPEQ.

Energy Queensland's comments in response to the questions raised in the consultation paper, together with any alternative proposals Energy Queensland has that address the objectives outlined in the rule change are included in the following section.

Energy Queensland is available to discuss this submission or provide further detail regarding the issues raised, should AEMO require.

2 Table of detailed comments

Initial DER Minimum Technical Standard

	Consultation Paper Feedback Question	Energy Queensland Comment
Issue 1: Mass scale disconnection of DPV (inverter energy systems)		
1	What are the costs and benefits of implementing enhanced testing for short duration undervoltage disturbance ride-through in the initial standard? (Noting that these would likely be superseded upon the publication of the AS/NZS 4777.2?	Energy Queensland considers that the benefits are captured well within the consultation paper. However, there is an additional cost for manufacturers to test if the proposal is preceding the AS/NZS 4777.2 certification testing which may also be required in 2021. In Energy Queensland's opinion, it would be more beneficial to fast-track the adoption of AS/NZS 4777.2 where the benefits may be realised quickly. This could be a six-month timeframe compared to the standard 1-year transitional period. Waiting for the release of the updated standard would not burden test facilities, given we understand testing is still being undertaken overseas and in markets where COVID-19 is impacting on resourcing.
2	What are the implications of mandating in the initial standard for additional testing to confirm that inverters can meet the short duration voltage ride-through test procedure, including in relation to DNSP obligations to manage their network safety, power quality and reliability?	AEMO's proposal suggests that it will improve power quality and reliability. However, Energy Queensland's understanding is that it will not result in any measurable benefits in the short-term. Typically, over a six-month period, Energy Queensland's distributors would connect approximately 150-200 MW of Inverter Energy System (IES) DER, which we consider could adopt the new undervoltage ride-through standard. Waiting until the implementation of updated AS/NZS 4777.2 would decrease the benefit of early implementation of the low-voltage ride-through for Queensland and the NEM more generally. The time period between when the minimum technical standard can be realistically mandated compared to AS/NZS 4777.2 needs to be considered.
3	To operate the power system securely, a level of certainty is required to ensure new installs can satisfactorily withstand a transmission level fault of this nature. Are there other cost-efficient solutions available that provide a high level of certainty in achieving this objective? What considerations need to be made for small DER businesses, manufacturers and consumers?	Power system security can be achieved by ensuring compliant installations. Energy Queensland primarily allows customers or their agents to apply selecting their IES from a filtered list of compliant AS/NZS 4777.2 inverters, that further adhere to Energy Queensland's standards (volt-var, volt-watt and IEC 62116). This listing is verified through the Clean Energy Council. The new AS/NZS 4777.2 will allow for improved performance with new requirements and improved compliance with the introduction of "Region A" settings. Energy Queensland additionally requires RPEQ design and commissioning certification for installations larger than 30 kVA.

	Consideration that in the future, visibility and identification through interoperability could recognise compliant devices and non-compliant devices instantaneously through a reporting functionality will assist in maintaining power system security. This could be formalised through customer contracts, or, alternatively included in the National Electricity Rules (NER).
4 Should this or a future version of the DER minimum technical standard incorporate AS/NZS 4777.2 and/or the revised version, following its publication (expected to be in early 2021)? What are the benefits and risks in doing this?	Yes. Energy Queensland supports the minimum standard including AS/NZS 4777.2 and the future version of AS/NZS 4777.2 due for release in 2021. Noting the stated scope of DER, it should be made clear that the standard applies to IES technology only, not active loads or rotating machines. Additionally, there may be gaps for IESs for which AS/NZS4777.2 does not apply, for example, large-scale central inverters and LV inverters that are not designed for 230 V. As such, the DER minimum technical standard may need to provide flexibility in managing these circumstances, for example, connecting LV IESs to DNSP's HV networks. Energy Queensland also reinforces the importance of the ESB's review into the governance of DER technical standards, which is currently underway. Having two standards, namely this DER minimum technical standard, and the new AS/NZS 4777.2 being managed by different industry bodies may create challenges, ambiguity and lead to a lack of alignment if updates or changes are made without the appropriate governance framework.
Issue 2: Integrating high levels of DER	
5 What are the technical challenges faced by each industry sector in integrating DER?	Energy Queensland is supportive of ARENA's initiative to maximise the value of DER through the Distribution Energy Integration Program (DEIP) and has provided input to AEMO's Renewable Integration Study and is supportive of the findings in that report. Both initiatives are critical, as they highlight the challenges facing the industry as whole and reflect the day-to-day experiences in ensuring power system security in the NEM. Increasingly, reverse power flow is becoming a significant challenge for Energy Queensland's DNSPs, as is highlighted in this consultation paper. There is some evidence that suggests islanding events occur within the distribution networks and this will be an emerging risk with higher penetration of DER and increased ride-through capability. More broadly, balancing the customers desire to maximise their generation, whilst ensuring connection limits are set, such that the network is always operated safely present the greatest technical challenges where: • DNSPs currently have to make conservative assumptions to safely and cost effectively manage the high volume of DER connection applications.

		• DNSPs often do not have the monitoring or visibility at lower levels of the network to make more informed decisions in relation to connection applications. • As distribution networks are highly dynamic, assessments made in relation to connection applications are likely to become redundant given changing load and generation patterns. • Connection agreements are determinate, in that they are difficult to adjust or change at a DNSPs discretion where circumstances change. Managing fault currents on networks will be increasingly challenging with the aggregated operation of DER connections. Large amounts of rotating machines will increase fault currents which can impact on plant ratings. Conversely large amounts of IES can reduce the available fault current which can impact on the design and operation of protection schemes particularly in microgrids. Whilst rooftop solar photovoltaic will continue to pose challenges as penetration increases, newer technologies such as battery energy storage systems and electric vehicles, will add an additional layer of complexity not yet seen. Despite these challenges, Energy Queensland considers that interoperability between DER devices and networks, should enable the implementation of dynamic customer standards and connection agreements, thereby allowing increased export of some DER devices when network conditions allow, and the ability to curtail when required. This will maximise customer benefits while meeting system reliability and security obligations. It is likely to allow for flexibility in other settings broader than just export, opening markets and opportunities for customers.
6	What interoperability functions are needed to help address the challenges and realise the value of DER?	In Energy Queensland's view, the ability to publish dynamic operating envelopes, rather than impose static connection limits, would provide the greatest opportunity to realise the value of DER. Dynamic operating envelopes ensures that the network can be operated safely at peak times, whilst allowing customers to maximise the potential of their DER device at other times. We envisage functions to enable the capabilities include the following: • Remote viewing and updating of DER configuration settings. • Remote scheduling of maximum active power, power quality response modes, limits for generators including charge or discharge modes, and limits for storage at the connection point. • Remote disconnection when a safety issue arises. • Demand response functionality to enable granular balancing of generation and load on Energy Queensland's distribution LV networks.

	Furthermore, reporting of near real time local metering data and the DER device operating state to networks will assist in realising the value of DER. This level of metering data is integral in: • calculating local network constraints • providing measurement and verification of actions taken • improving outage management, and • notification of unsafe conditions at the customer premises.
7 What interoperability capabilities are available now for consideration in DER minimum technical standards? What capabilities will be required in the future?	For top tier inverter brands, critical functionality (such as generation output control) is already available via local low-level protocols (i.e. Modbus). Enforcement of this minimum functionality allows future wide area interoperability to be achieved with the addition of an external gateway device. Capabilities in the future should be as simple as connecting a DER device to the internet and configuring which DNSP or aggregator the customer wishes to connect to with an authentication provided by that authority. Energy Queensland is currently investigating the use of IEEE 2030.5 to determine whether it meets the interoperability capabilities required.

8 What are the priority interoperability capabilities to be taken forward in minimum standards over the next 2 years?	Energy Queensland considers that the following priority interoperability capabilities are required:
	• Remote scheduling of maximum active power and export, power quality response modes, limits for generators including charge or discharge modes, and limits for storage at the connection point.
	• reporting of near real time local metering data and the DER device operating state to networks will assist in realising the value of DER. This level of metering data is integral in:
	  ○ calculating local network constraints
	  ○ providing measurement and verification of actions taken
	  ○ improving outage management, and
	  ○ notification of unsafe conditions at the customer premises.
	• Remote disconnection capability for system security and islanding detection purposes.

9 Should the DER Visibility and Monitoring Best Practice Guide developed by a sector of industry participants be	Energy Queensland is supportive of this Guide, and welcomes a market trial, with particular focus on addressing coverage capability in remote areas.

	utilised as a basis for review and inclusion in future minimum DER technical standards, and if not what other options should be considered?	While, this Guide can be used as a basis for informing minimum standards, and future revisions, it is important that a consistent approach as to what constitutes DER data is formed. The AEMO should consider this as part of this review.
10	What developments exist in communications, data and interoperability systems, for consideration in future DER minimum technical standards?	Interoperability will require a communications medium between the networks and customer owned DER equipment. At scale, this is unfeasible, or at best prohibitively expensive for DNSPs to extend their operational communication networks to the customer premises, even without cybersecurity considerations. Energy Queensland considers that utilising the customers own internet connection is instead the most economic approach. However, there will be challenges in ensuring an ongoing internet presence and how this coexists with the connection agreement related to the DER device. There are scenarios where the internet is not available, such as, farms or remote pumping stations, and unplanned/planned internet outages. DER devices must be able to operate in a safe state, for example, where no internet is detected or communication to the DER Management System (DERMS) is lost or stale. Energy Queensland considers that IEEE 2030.5, OpenADR and IEC 61850 (TR 61850-80-3 proposal) are viable options for DER interoperability over the public internet. There would be benefit to all market participants if access was provided to existing Internet of Things (IoT) devices and smart meter capability. For example, smart revenue meters have low level power quality data, Demand Enabled Response Device (DRED) capability that makes the retrospective visibility and monitoring application of old embedded generation installations more feasible.
11	Should the Australian Implementation Guide for IEEE 2030.5 currently under development by a sector of industry participants be utilised as a basis for review and inclusion in future minimum DER technical standards, and if not what other options should be considered?	Energy Queensland supports the use of IEEE 2030.5 as a lower cost option for customers and industry to achieve an interoperability solution that will enable a viable dynamic customer standard for Queensland customers. Alignment with existing standards has economic benefits for customers through competition and lack of re-work for vendors. Energy Queensland already has a number of dynamic customer connection trials allowing operating envelopes with dynamic export and initiatives in progress based off the concepts of IEEE 2030.5 including being part of Energy Networks Association (ENA) evolve project.
Issue 3: Implementation of the initial standard		
12	If an implementation date were to be set in the initial standard, what is an appropriate implementation date	Energy Queensland suggests that DNSPs in Queensland, South Australia and Victoria are required to implement short duration voltage disturbance ride through requirement once the DER minimum technical standard has been implemented in the NER or a subordinate instrument. This should only

	for the short duration voltage disturbance ride through requirements?	be required if AEMO can demonstrate that an adequate range and supply of inverter products, solar and battery and in a variety of sizes, can be supplied for these markets. DNSPs in remaining states and territories should be delayed by one year or until the implementation of the new AS/NZS 4777.2, whichever comes first.
13	What are the benefits and risks/costs of staging implementation of the initial standard across jurisdictions?	Energy Queensland considers that a staged implementation targeting higher priority regions, such as South Australia, will ensure that inverter stocks are managed appropriately. This should also allow for faster implementation.
Issue 4: Conformance		
14	Do you suggest any changes to the proposed test procedure? What and why?	The type and impedance of the source of the test grid may need to be more defined and prescribed to simulate from a "strong" grid to a "very weak" grid scenario. The consultation paper suggests that the power quality response mode settings should be set according to the ENA's recommended default power quality response modes in Tables 4a, 4b and 4c. Energy Queensland does not agree and instead recommends that the settings contained in Tables 3a, 3b and 3c, which are already adopted in Queensland, Tasmania and parts of NSW. Additionally, these settings are very similar to Victoria's settings and is what is proposed for AS/NZS 4777.2 "Region A" setting.