7 March 2019

Australian Energy Market Operator
GPO Box 2008
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Dear Sir/Madam

Energy Queensland submission to Distributed Energy Resources Register Information Guidelines Issues Paper

Energy Queensland Limited (Energy Queensland) welcomes the opportunity to provide comment to the Australian Energy Market Operator (AEMO) on its Distributed Energy Resources Register Information Guidelines Issues Paper (the Issues Paper).

Energy Queensland's Distribution Network Service Providers, Energex and Ergon Energy Network currently manage the highest penetration of solar photovoltaic generation in the country. As customers seek to integrate other distributed energy resources (DER), such as batteries and electric vehicles, greater visibility and understanding of these technologies will be important to manage the network of the future and deliver network services as reliably and cost-effectively as possible.

Energy Queensland's feedback on the Issues Paper is contained in the attached response table. In summary, Energy Queensland supports the scope and scale of the proposed DER Information Guidelines. However, we consider the DER register to be incomplete without the specific inclusion of electric vehicles and associated charging systems.

We would also welcome the opportunity to discuss with AEMO the technical aspects of the information to be collected for the DER Register in greater detail than is possible in this submission.

Should AEMO require additional information or wish to discuss any aspect of Energy Queensland's submission, please contact me on (07) 3851 6787 or Peter Wall on (07) 3664 4968.

Yours sincerely

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Encl: Energy Queensland submission to the Issues Paper

Energy Queensland Response - DER Register Information Guidelines Issues Paper

Questions		Energy Queensland comments
Section 3.1 – Information requirements		
1	Do you agree with the suggested format and method of data submission?	Energy Queensland supports the suggested format and method of data provision and considers that leveraging the existing Market Settlements and Transfer Solution (MSATS) web portal for data transfer is a logical solution. However, Energy Queensland would also support the investigation of alternative arrangements for the submission of Distributed Energy Resource (DER) information.
2	Are there adequate access arrangements for Installers and installation software providers to submit data on behalf of NSPs into the DER Register? If not, how might this be improved?	Energy Queensland is not aware of any existing access arrangements to allow third parties to submit data in future on behalf of Distribution Network Service Providers (DNSPs) to the DER Register. Installers currently interact directly with Energex's and Ergon Energy Network's systems via web portals or online forms to submit Connection Applications. DNSPs require information submitted by installers as part of their connection applications which is a subset of information the Australian Energy Market Operator (AEMO) is proposing for the DER register. We need that data prior to installation to ensure that we meet obligations under the National Electricity Rules (NER), especially related to timelines, regarding Connection Applications and Offers. DNSPs require this information in order to issue a contract to the customer. If external services are considered, the greatest benefit to Energy Queensland, and ultimately the data quality of the DER register, would be to validate installed equipment. We envisage that one option is that most of or all the additional fields of data be captured through an expanded version of the existing Clean Energy Regulator's (CER) process to create Small-scale Technology Certificates (STCs). By integrating with this system or format, DNSP portal and form additions, and significant costs duplicated across DNSPs, may be minimised or even avoided.

Questions		Energy Queensland comments
3	Are there any risks associated with the different submission frequency between the *DER generation information* and *DSP information*?	Energy Queensland understands that Demand Side Participation (DSP) information will continue to be submitted annually and DER generation information will be submitted to MSATS in near real time when our internal PEACE market interface systems are updated or in batches each weeknight. However, we will be striving to ensure both data sets originate from a single data source, minimising any risk of misalignment.
4	What is an alternate approach to the frequency of data submission? How would this be implemented?	Provided there are no barriers to the envisaged leveraging of the existing MSATS interfaces used by Ergon Energy Network and Energex, Energy Queensland does not foresee any need to consider alternative approaches to the frequency of submission.
5	Are there any other relevant issues that have not been considered?	Energy Queensland considers the following issues warrant consideration: **<u>Energy Source Capacity</u>** We note that the Information Guidelines (specifically Appendix B – Data Model) do not feature a field for 'Energy Source Capacity' or similar. However, it appears that the total array capacity will be calculated from the manufacturer's data and by the capture of data such as: • Number of devices • Manufacturer • Model Number • Device Type (e.g. Solar panel, Wind turbine, etc.) Energy Queensland recommends that 'Energy Source Capacity' be a defined field in any reporting from the DER register due to its value in reporting and modelling. **<u>Electric Vehicles</u>** Energy Queensland notes that the Australian Energy Market Commission (AEMC) has ruled that electric vehicles (EVs) and associated charging systems are excluded from the scope of the DER Register. However, we still consider that information on EVs and related charging equipment, including the location and nature of their use, is of significant importance to AEMO and DNSPs and should be captured in a data repository.

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		Energy Queensland looks forward to supporting AEMO in any parallel efforts to capture EV charging-related data as a means to prevent the need for significant network upgrades to accommodate difficult-to-forecast volumes of EV charging and associated impacts on electricity prices. **Panel direction** The direction that solar PV panels are facing (predominantly north, west, south or east) is a physical attribute of DERs that is not included in the proposed Data Model. However, this attribute has a significant impact on the relative output of the panels. It is recognised that while most arrays are positioned as close to north as feasible, some arrays, and even some panels within an array, are faced in other directions, making meaningful data collection problematic, for installers, DNSPs and AEMO. Despite these challenges, a consideration of inclusion of this attribute is recommended due to its impact on DER output at different times of day. Panel tilt angle is another physical attribute that affects output but Energy Queensland considers the variables to be too great to warrant collection. **Inverter demand response mode** As very few inverters have been installed with Demand Response Enabled Devices, and implementation of Demand Response Mode '0'(DRM0) is not specified in any connection standards, Energy Queensland recommends that a 'Null' option be added to the proposed multi-select options, and that 'Null' be set as the default value. **Non-inverter generators** Energy Queensland only specifies generator ramp rate and frequency response mode for registered generators so questions whether these parameters are in scope of the DER Register. **Device sub-types** Energy Queensland notes the value of device sub-type information, e.g. battery chemistry, for emergency services and considers that DNSPs are likely best placed to capture device sub-type information. However, we question the relevance of collecting data on panel type as the variation in generation output per kilowatt (kW) of rated capacity over the life of the panels in minimal.

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		<u>Other issues</u> Energy Queensland notes that the fields of 'Inverter device capacity' and 'Export limit' are stated kW. Energex and Ergon Energy Network currently record this information in kilovolt-amperes (kVA) (rather than kW) for values up to 30 kVA, an approach which aligns with the Clean Energy Council's publication of AS/NZS 4777-compliant inverters. We suggest that AEMO consider this alternative parameter for the DER Register.
Section 3.2 – DER register storage		
1	Are there any issues associated with the separate storage of *DSP information* and *DER generation information*?	Due to the overlapping nature of some DSP and DER generation information, there is some risk of data inconsistency. Energy Queensland is working to ensure we have a 'single source of truth' for both sets of data to reduce the potential for inconsistency. Energy Queensland notes the similarity between the NER reporting requirements for embedded generation (NER clauses 5.4.5 Register of completed embedded generation projects and 5A.D.1A Register of completed embedded generation projects) and those to be collected for the DER register. We note the potential for the duplication of this information and discrepancies in the database.
2	Are there any other relevant issues that have not been considered?	Energy Queensland is not aware of any other relevant issues.
Section 3.3 – DER register information access to NSPs		
1	What *regulatory obligations or requirement* do NSPs intend to use DER register data for?	Energy Queensland considers that DER information may help enable more accurate reporting for system eligibility for the Queensland Government's Solar Bonus Scheme. Future regulatory obligations would be enhanced by having more accurate DER information.
2	Do you have a preferred process for accessing *DER register information*?	Energy Queensland offers no response.
2a	Is existing NMI discovery (adding in DER) useful?	Yes
2b	Are existing C1, C4 and C7 reports (including DER) suitable? Is an additional	Energy Queensland offers no response.

Questions		Energy Queensland comments
	report required? If a new report is required, what should it include?	
2c	What are your views on using an API to develop custom reports?	Energy Queensland considers this use of an API is appropriate and that it would provide useful functionality.
3	Do existing C1, C4 and C7 reports need to be provided if an API is provided?	Energy Queensland offers no response.
4	Are there any other relevant issues that have not been considered?	Energy Queensland is not aware of any other relevant issues.
Section 3.4 – AEMO reporting and publication		
1	Are there additional variables that should be published in the *DER register report* (see Appendix B for list of data)? Why?	As noted above in response to Section 3.1, Question 5, the following data fields are noted in Appendix B – Data Model, under Data Model Level 4 – DER Device: • Number of devices • Manufacturer • Model Number • Device Type While 'energy source capacity' can be derived from these pieces of data, Energy Queensland notes that this value is currently collected in the CER's process for claiming STCs and would not increase the reporting burden for the DER Register. As such, Energy Queensland recommends that total energy source capacity should be a defined field for DER Register reporting. Energy Queensland recommends that the term 'Region' be clarified.
2	Is aggregation at the post code level suitable? If not, what is an appropriate aggregation variable and why?	Energy Queensland considers that aggregation of DER information to the postcode level is appropriate for public reporting. However, for DER information to assist DNSPs, data must be visible to DNSPs at the NMI level.
3	Do you agree with monthly updating of the *DER register report*? Why/ why not?	Energy Queensland considers that reporting DER information by AEMO on a monthly basis is appropriate for public reporting. However, Energy Queensland notes that DNSPs will be updating MSATS at least daily and would expect to access DER Register information that has been updated more regularly than monthly. For example, our DNSPs Energex and Ergon Energy Network anticipate the need to refer to DER Register information that has been updated at least weekly to support timely and accurate technical assessments and other tasks.

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4	Are there any other relevant issues that have not been considered?	Energy Queensland notes that if DER is being filtered by fuel type, but then aggregated by postcode and shown as 'Null' if no more than 10 in that postcode region, many unique projects may not show on the register reporting at all e.g. Hydro, biomass, geothermal.
Section 4.0 – Proposed Data		
1a	What are the costs and impacts of AEMO's proposed data requirements? Please break down and describe the costs based on: Upfront once-only costs vs ongoing costs	Energy Queensland considers that significant investment will be required to enhance data capture in our DNSPs' systems to meet AEMO data requirements. At this stage it is difficult to specify the amount of this investment due to the lack of clarity on the final information requirements and collections channels. However, we anticipate this will include: Upfront • significant changes to existing Customer and Market systems for both Ergon Energy Network and Energex, including migration of relevant existing and new fields to both internal and external customer-facing platforms. • development of integrated MSATS solution and, • if the CER data collection process cannot be leveraged, establishment of a post-installation data collection process. Ongoing • maintenance of new system, • inclusion of potential future AEMO data requirements, and • replication of data solution in Energy Queensland's new digital transformation platform. In addition, Energy Queensland anticipates additional changes/systems will be required for: • identifying decommissioning of systems (upfront plus ongoing costs), and • monitoring installer compliance (upfront plus ongoing). Energy Queensland expects that AEMO will develop a solution with minimal cost

Questions		Energy Queensland comments
		impacts to DNSPs and installers.
1b	What are the costs and impacts of AEMO's proposed data requirements? Please break down and describe the costs based on: Separation of internal labour costs, contracted labour, system improvement	Energy Queensland considers that significant investment will be required to engage external providers to supply data to Energy Queensland, and/or to AEMO on behalf of Energy Queensland. At this stage it is difficult to specify the amount of this investment.
2	Do you agree with the proposed data requirements? Why/ why not?	Energy Queensland considers that the number and nature of proposed fields for the DER Register creates an onerous administrative burden on DNSPs and installers in particular. Specifically, Energy Queensland advocates for reconsideration of the following fields: **<u>Removal of "Inactive" requirements in "Status" at DER Device level, and ideally "AC Connection" and "DER Device" levels</u>** Energy Queensland notes that there are many reasons why a generating system or one or more of its components may be inactive, and for greatly varying lengths of time. Interval meter data could potentially be used to reveal when export has ceased for consecutive days, weeks or months, but this could be due to many reasons, e.g. a small proportion of PV systems do not export, due to onsite consumption or inverter settings. Energy Queensland advises that attempting to record and report "Inactive" status at the DER Installation level is problematic and unlikely to be recorded consistently enough to be valid. This is even more problematic at the AC Connection and DER Device levels. As such, Energy Queensland suggests that the 'inactive' element of the status field be removed at the AC Connection and DER Device levels, and also at the DER Installation level. **<u>Inclusion of "Decommissioned systems"</u>** Although Ergon Energy Network and Energex do not currently have a notification process for decommissioned systems, we support the inclusion of this status field at the DER Installation for the value it will add to DER data. This would ensure we were aware in most cases when a DER installation is removed or has failed with no owner intention to recommission. However, attempting to manage, and monitor compliance of, decommissioning notifications at the AC Connection level is problematic and not recommended. Requiring decommissioning notifications at

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		the DER Device level is particularly not supported.
3	Do you agree with the proposed data structure (see appendix B, figure 3)? If not, please explain why it would not work and propose an alternative.	Energy Queensland generally agrees with the proposed data structure. However, Energy Queensland considers there to be very limited benefit to its DNSPs in having access to data defining configurations below the DER Installation level, but recognises there may be enough benefits to AEMO and Emergency Services to justify the inclusion. The potential value of this level of data needs to be considered in the context of the significant impost on installers, DNSPs and potentially other relevant entities.
4	Should data variables that have default values prescribed by the AS4777 standards (e.g. Under-frequency protection, Over-frequency protection, Under-voltage protection, Over-voltage protection, etc) be requested as discrete inputs? Why/ why not?	Energy Queensland notes that AS 4777 (a 2005 Standard) has been superseded by AS/NZS 4777. The relevant voltage and protection settings are in AS/NZS 4777.2. Energy Queensland considers that these data variables should be set to default values where possible, with the facility for values to be overridden by installers when relevant. However, we would like to note the challenges with prescribing AS/NZS 4777 discrete inputs for the DER register. Firstly, Australian Standards are generally not legislated, and while AS/NZS 3000 (which itself refers to AS/NZS 4777 series) is called up in legislation in most states and territories in Australia, careful analysis is required to verify that the references to AS/NZS 3000 in legislation would capture the cross references to AS/NZS 4777 series. Secondly, a number of values in AS/NZS 4777 are merely suggested values and different regions may have valid (e.g. historical) reasons for using alternative settings. Further, Energy Queensland considers that AEMO may have misinterpreted the application of central protection values under AS/NZS 4777.1:2016 in the DER Register Information Guidelines. Centralised protection does not apply to the majority of inverter connections less than 30MW. These only apply to connections sized between 30 kVA and 200 kVA (see Table 1 of AS/NZS 4777.1), and some between 200 kW and 30 MW where individual Inverter Energy System (IES) installations are between 30 kVA and 200 kVA. These central protection settings will be programmed into a separate protection device discrete from the inverter. Further, AS/NZS 4777.2 applies to all LV grid connected inverters, whereas AS/NZS 4777.1 only applies to installations of IES up to 200 kVA.

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		We also note that for each example provided the protection and voltage 'example data' were incorrect (with the exception of what AEMO refer to as "Overvoltage Protection 1 (V>>)" which should actually be "Overvoltage Protection 2 (V>>)" which is an internal factory setting for the inverter aligned to AS/NZS 4777.2. We also note that for the first four examples cited in Appendix C, all of the aggregate inverter sizes were too small to require the installer to install central protection. By way of a practical example, in Queensland, the installation of a 1MW rotating machine is required to include a grid protection relay with protection and voltage settings which can be found in Energex and Ergon Energy Network's joint Standard for Connection of Embedded Generating Systems to a Distributor's LV Network (STNW1174).
5	For the AC connection table (Appendix B), is it relevant to include protection modes for non-inverter DER? If so, what is the relevant information that should be captured?	Energy Queensland notes that there are no national standards for these types of modes for non-inverter based technologies. Further, Queensland does not specify these parameters for rotating machines. It is far more likely due to the inertia of rotating machines that they will assist in maintaining frequency in an event instead of disconnecting due to instability. Queensland's primary grid protection settings for a rotating machine and associated time delays can be found in Energex/Ergon Energy Network's joint Standard for Connection of Embedded Generating Systems to a Distributor's HV Network (STNW1175). We note that there are challenges for including protection settings for inverter based technologies due to the lack of legislative requirements for compliance to these settings. The Energy Networks Australia (ENA) National DER Connection Guidelines are intended to bring greater alignment in this space. However, the ENA guidelines do not mention the frequency limits beyond which inverters will stop operating (Fstop) or stop charging (Fstop-CH). Energy Queensland considers that there may be benefit in AEMO consulting further with the ENA to foster national alignment on this as a requirement.
6	Do you agree with the data source/ providers for the physical collection, listed in Appendix B? If not, explain why and who else or what other data sources should be involved.	Energy Queensland believes that greater clarity is needed around 'data source/providers' in the table, potentially via two columns: one headed 'Data source' and another headed 'Data provider to Register', as these are often different entities. We also propose for consideration that the DERID have a DNSP

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		prefix and be numerically assigned by the DNSP in its source system. Overall, the DNSP application process is limited in its effectiveness in accurately capturing data that is often only determined on the day of installation. Post-installation data collection, by parties yet to be determined, will provide the most accurate data. Energy Queensland welcomes the opportunity to discuss these matters with AEMO in greater detail than is possible in this submission.
7	Are there any other requirements that have not been considered? Why are these important? Which table are they relevant to?	We note that dynamic network export limits are being considered for future standards, although not for the DER register. We also note that the register is phase-agnostic. However, as many of the devices on the register are going to be at single- or two-phase residences there would be some interest in knowing whether the NMI associated with the premises is a single- or two-phase NMI or if the DER is connected to one or two phases but is at a three-phase premises. This detail would be valuable for DNSPs to determine network loading/efficiency at a MV/substation level, especially with high levels of aggregated DER. In relation to the examples provided, we believe that some of the examples were not practical. It is important for DNSPs and AEMO to manage the expectations of industry as to the type of installations that may be expected at a premises. All of the examples noted above were given central protection values even though none were required under standards. Energy Queensland supports appropriate alignment with the AS/NZS 4777 series to remove the challenges with emerging inverter based DER that does not comply with the standard and, as such, does not meet settings such as Vnom-max and Fstop. This will prevent the connection of non-compliant devices as well as devices which interfere with the ability of inverters to operate in a compliant manner.
8	In terms of the examples given, are their other DER installation configurations that AEMO should consider?	Energy Queensland notes that it may be appropriate to consider future DER configurations at the premises level and allowance should be made to extend the data model in the future to accommodate unforeseen configurations. We also consider that it may be useful to provide an example of a large connection

Questions		Energy Queensland comments
		(such as a 1MW solar) installed on multiple sub boards, as well as a bulk metered connection such as a gated community.
9	Are there any other relevant issues that have not been considered?	Energy Queensland is not aware of any other relevant issues.
General Comments		
1	Do you have any other comments?	Energy Queensland notes the importance of the publication of the final data requirements to enable delivery of system solutions by the commencement date. We also consider that particular attention must be given to the transmission-distribution interface. Whereas traditionally power flow has been from the transmission to the distribution systems, it is possible for active power to flow from the distribution system to the transmission system under certain conditions with the increasing deployment of DERs on the distribution system. This shift in the active power flow direction and level, due to the operation of the DERs, is critical to DNSPs.