

## **Section 4 of Post 2025 Market Design Options – A paper for consultation Part A.**

### **INTRODUCTION**

Section 4 is for Distributed Energy Resources (DERs) with Associated Electric Power Systems Interfaces (aka IEEE 1547:2018 and IEEE 1547.1), not 10s MW or 100s MW renewable energy power plants where proponents can be expected to have engineering support to wade through connection processes.

Self-sufficient plain English (as in law verses legalese) is enabling to get all parties close enough, and particularly pulling supplier side towards middle and pulling customer side towards middle onto a common basis for flourishing Distributed Energy Resources.

Otherwise, it's disrespect for customers using insider jargon, acronyms, etc that does nothing to further usefulness of orchestrating customer resources in harmony with electricity grid assets and infrastructure.

Section 4 must also state principles and assumptions in self-sufficient plain English Charter (for non-technical, purchasers, regulators, etc) as follows or equivalent:-

Requirements in Certification are designed and applied with adherence to the following basic principles:

1. All electricity sources and electricity loads are considered resources.
2. All information flow between operator and resource is secured regardless of a resource's location on the electricity grid.
3. Operator access to individual resources is granted on a per-connection basis i.e. when you sign up to an electricity retailer, you agree (implicitly) to allow relevant operator access to information about your sources and load.
4. The operator's use of your resources is determined by a variety of situations including the ratio of source to load. Policy around this can change in accordance with the energy regulatory framework of each operator. Other information required by the operator may include measurements as seen by your NMI meter.
5. The operator monitors and measures the balance and reliability of all electricity assets, both sources and loads.
6. The flow of information between resources and the operator is established through an approved process of authentication.
7. The operator monitors and collects as much information as possible about the current state of electricity grid assets, infrastructure, and the information flow itself for the purposes of improving grid reliability.

There are some basic assumptions for electricity grid connection by any connection applicant that are developed along with the basic principles outlined above. They are:-

- A) No resource is automatically granted connection. Every resource in private AC grid shall have its Certification evaluated by approved process of authentication before an access request is granted to an operator.
- B) Operator assets and power-flows moving between electricity grid infrastructure and private AC grid connection should have a consistent technical integration and compliance with Certification requirements
- C) Some infrastructure used by the operator is not operator-owned. For example; from telecoms tower to a private AC grid premises, combined power-flows for all private AC grids on an operator's powerline.
- D) Operator personnel and electricity grid assets shall not rely totally on resources at a single electricity grid connection. This ensures, for example, a customer known to require life support equipment will not unexpectedly lose electricity supply.
- E) The entire private AC grid connection will not be considered an implicit Certification zone. For example; a visiting electric vehicle which is being charged at your premises, causes an extra source/load on the grid that hasn't been registered against your NMI meter.
- F) Resources (e.g. visiting electric vehicle) on a connection's private AC grid may not be owned or configurable by the connection applicant. For example, owner of a visiting electric vehicle might have placed 20% limit.

Additional Abbreviations:-

- Certification --> for example AS/NZS 4777.2 --> AS/NZS 4777.2:2020, Grid connection of energy systems via inverters, Part 2: Inverter requirements
- NMI --> National Metering Identifier is a unique 10 or 11 digit number used to identify every electricity network connection point in Australia
- Operator --> Electricity grid operator e.g. Distribution System Operator (DSO) at SA Power Networks, DSO at Ausgrid
- Resource --> Electricity source (e.g. solar PV) or Electricity Load (e.g. lighting) that is, a distributed energy resource or demand side participant

## **BACKGROUND**

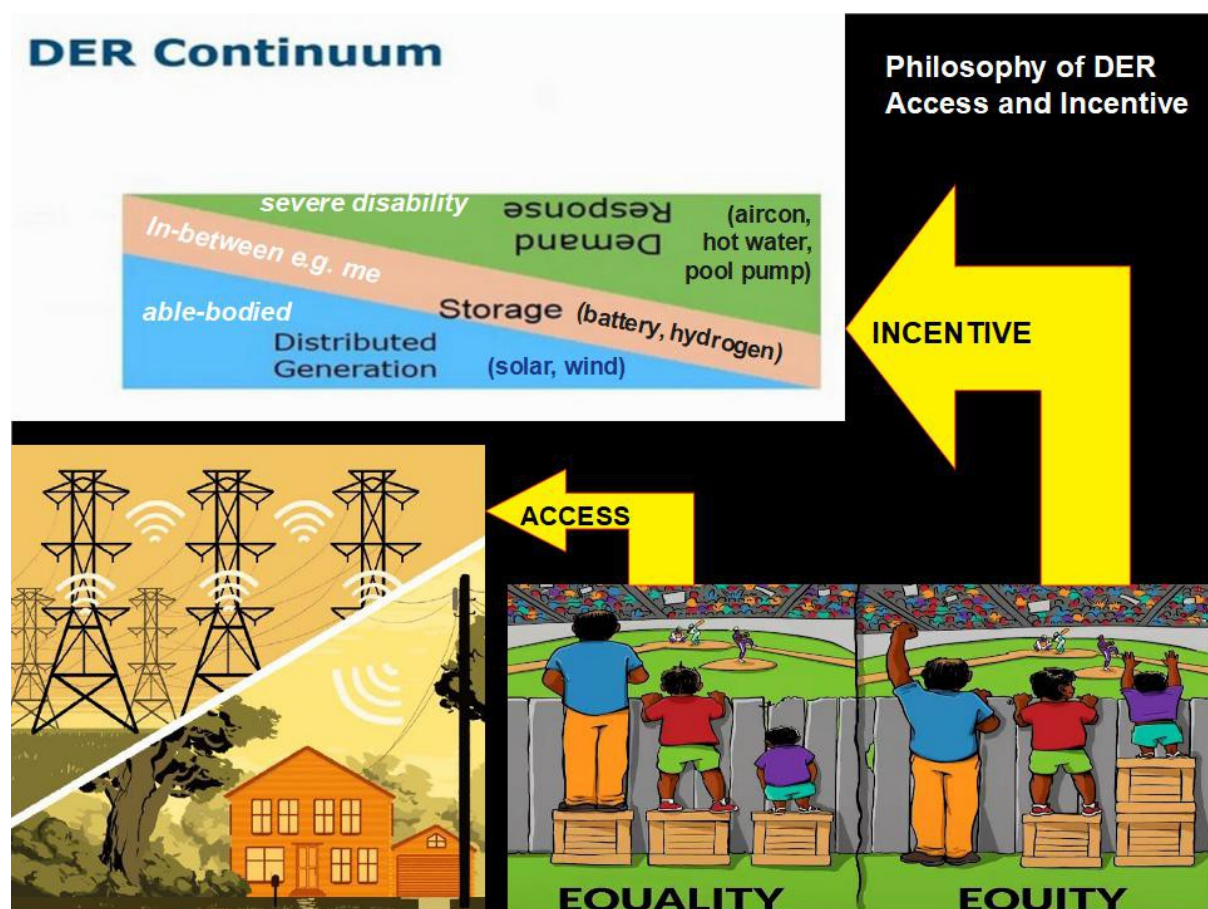
Under the National Electricity Rules (and before that National Electricity Code), the Australian Energy Market Operator (AEMO and before that NEMMCO) has for two decades been monopoly high-grade licensed corporation (ship's captain) holding ultimate command and responsibility of energy market. No impediment to steady progress existed to evolutionary steps forward through a combination of Capability Maturity Model and Business Process Improvement within calm waters (sea) in terms of threats to security or sources of vulnerability ... until 2021 looking forward.

Yet instead of unusual power system events within the NEM trending to zero; 2021 thus far has seen three reviewable operating incidents:-

- i. Total loss of SCADA Systems Data on 24 January 2021
- ii. Trip of Torrens Island A and B West 275 kV busbars on 12 March 2021
- iii. Trip of multiple generators and lines in Queensland and associated under-frequency load shedding on 25 May 2021

*"Standards that are too high may constitute a barrier to entry, which increase new entrants' costs and jeopardise reliability if those barriers deter or delay new entrants. They could also exclude certain technologies if the Rules are not technology neutral. On the other hand, consumers and participants rely upon the power system meeting various standards for security, stability and power quality. The Rules must strike a balance between ensuring sufficient new entry and the ongoing security of the power system and quality of supply." - NEMMCO (forerunner to AEMO) 10 February, 2006*

To date, resources (DERs) treatment is philosophically equivalent to disability sector for which a Royal Commission is in-progress so below is a Philosophical Continuum of DER Access and Incentive untainted by Australian Energy Market Operator (AEMO) preoccupation with Integrated System Plans and "Costa Concordia" episodes i., ii., iii.



## Question 30 of Post 2025 Market Design Options – Part A.

"Are there constraints on switching providers with DERs today?"

Response: This question does not attempt to address the issue analogous to multiple transmission lines tripping at the "outer end" away from Callide C, and should not assume "retailer" is epicenter of customer experience to exclusion of other parties.

1. TECHNICAL information flow is \*customer --> distribution network\* which DERs CANNOT SWITCH irrespective of the "outer end" of FINANCIAL information flow e.g. "retailer".
2. Requirements for TECHNICAL information flow (i.e. 5 minute updates) are expressed in terms that cannot future proof according Alexandra Von Meier (i.e. 0.1 second updates required per references 3, 4, 5, 6) and, as a result, overall network capability will be reduced in order to maintain a standard of TECHNICAL information flow optimised per reference 7.
3. [https://arpa-e.energy.gov/sites/default/files/9\\_CIEE\\_GD\\_OP-12\\_von%20Meier\\_public.pdf](https://arpa-e.energy.gov/sites/default/files/9_CIEE_GD_OP-12_von%20Meier_public.pdf)
4. [https://www.naspi.org/sites/default/files/reference\\_documents/naspi\\_dist\\_synchrophasor\\_monitoring\\_distribution\\_20180109.pdf](https://www.naspi.org/sites/default/files/reference_documents/naspi_dist_synchrophasor_monitoring_distribution_20180109.pdf)
5. <https://arxiv.org/pdf/1605.02813.pdf>
6. [https://www.academia.edu/33935513/Phase\\_identification\\_in\\_distribution\\_networks\\_with\\_micro\\_synchrophasors](https://www.academia.edu/33935513/Phase_identification_in_distribution_networks_with_micro_synchrophasors)
7. <https://arena.gov.au/knowledge-bank/technical-description-of-api-implementation/>
8. Diversity within superannuation portfolio is recommended by ACCC et al to spread risk then WHY NOT diversity of "outer end" of FINANCIAL information flow i.e. "retailer"?
9. Isn't competition best when DER owner (individual NMI customer) subscribes DER capability (or portion/s) to more than one "outer end" of FINANCIAL information flow i.e. "retailer"?
10. Freedom of choice spectrum is from community (e.g. aggregation of low-income customers) \*OR NOT\* an individual NMI customer (e.g. your wealthy ancestors settled in early 1860s)?

"Are constraints on switching likely to occur through standards being introduced now or expected, such as IEEE 2030.5?"

Response: This question does not attempt to address the issue analogous to Total loss of NEM SCADA System Data on 24 January 2021, and should not assume "B2B and B2M processes don't fail" is epicenter of customer experience to exclusion of other parties.

- a) TECHNICAL information flow per Alexandra Von Meier (i.e. 0.1 second updates) needs proven-in-use standard that is, IEEE Std C37.117.2-2011 over VPN, with plug-n-play parameters at customer-end.
- b) IEEE Std C37.244-2013 refers IEEE Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring AND note IEC 61850-90-5 isn't plug-n-play protocol.
- c) A symmetrical internet connection does NOT have equal download/upload speeds as is reverse TECHNICAL information flow (i.e. 1 second update) thus also IEEE Std C37.117.2-2011 over VPN.
- d) Total loss of NEM SCADA System Data on 24 January 2021 directly caused notable pricing and dispatch issues, thus each distribution network substation needs scaleable cluster architecture computing.
- e) <https://arena.gov.au/knowledge-bank/technical-description-of-api-implementation/> <-- Data layer.
- f) Basic Data layer of model needs freedom of choice of protocol for FINANCIAL information flow within defined subset of approved full stack protocols such that mapping exists in more than two protocols.
- g) In recognition of the fact that MQTT is data-centric whereas HTTP (IEEE 2030.5) is document-centric, and that MQTT is an open OASIS standard and ISO recommendation (ISO/IEC 20922), MQTT must be an approved full stack protocol within defined subset of protocols for FINANCIAL information flow.
- h) <https://core.ac.uk/download/pdf/160743474.pdf>
- i) <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7123563>  
<https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=4050&context=thesesdissertations>
- j) Protocols expire (e.g. TLS versions before 1.2) therefore curating defined subset of approved full stack protocols every five years (say) will result in durability and vitality of FINANCIAL information flow.
- k) TLS 1.3 (and its DTLS equivalent) need to receive due consideration based on curating cycle time.

## Question 31 of Post 2025 Market Design Options – Part A.

“What are stakeholder views on approaches outlined? What might be the advantages and disadvantages associated with each?”

Response: These questions do not attempt to address the issue that diversity is inviting actual customers' opinion (\*not\* customer lobbyist organizations) on ESB Part A ... inclusion is being asked to dance (integrate customer opinion) when customers reply to ESB Part A. Attributes of higher-level of community involvement which differ from the traditional ESB/ AER/ AEMC (AEMO in effect doesn't engage) approach to community engagement include:

- a) Engaging community early in the Post 2025 Market Design Options (Anderson, 2013; Bell et al. 2005; Corscadden et al. 2012; Fast et al. 2016; Groth and Vogt 2014a; Hall et al., 2013, 2015; Hindmarsh, 2010; Hindmarsh and Matthews, 2008; Jami and Walsh, 2014);
- b) Genuinely incorporating community input into plans and design for integration of each community's customer resources (Hindmarsh, 2010; Hindmarsh and Matthews, 2008; Jami and Walsh, 2014);
- c) Building and maintaining trust between ESB and each community (Alberts, 2007; Hall et al. 2015);
- d) ESB exceeding minimum (mandated or legislated) requirements (Anderson, 2013; Fast et al., 2016; Hall and Jeanneret, 2015; Howard, 2015; Soma and Haggett, 2015);
- e) ESB establishing consultative committees with each community (Fast et al., 2016; Howard, 2015);
- f) ESB forming a long-term commitment to and relationship with each community (Anderson, 2013; Fast et al., 2016; Hindmarsh and Matthews, 2008; Jami and Walsh, 2014; McLaren Loring, 2007);
- g) ESB embedding staff locally to develop long-term relationships (Hall et al. 2015; McLaren Loring, 2007), and;
- h) ESB avoiding incendiary settings, such as (virtual) town-hall meetings which can descend into a “shouting match” (Hall et al. 2015, p. 306).

ESB is on-course to make integration of each community's customer resources into a four-letter word, where term “community” means cohort of type of customers e.g. low-income.

### References:

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## Question 32 of Post 2025 Market Design Options – Part A.

"Are there other potential approaches that could be considered?"

Response: This questions do not attempt to address the issue addressed by Emily Noether's first theorem: that every differential symmetry of the action of a physical system (and Post 2025 Market Design results in a physical system, rather than dark matter) with conservation forces has a corresponding conservation law. The "differential symmetry of the action" is funding of stakeholder views (i.e. good news for AEMO, distribution networks, transmission networks, via AER Innovation Allowances and Incentive Schemes or ARENA and so on) double-dipping on customers e.g. funding good news for other stakeholders and their own.

We consider the funding of stakeholder views for AEMO, distribution networks, transmission networks to be an important step towards clarifying negligence of those stakeholders or that of their professional engineers which has already adversely affected ESB proceedings in questions 30, 31, 32. The NSW government's main task in 2002 was to convert what until then had been a common law concept of professional negligence, developed by the courts, to a statutory definition. In 2003 and according to lawyers in Sydney, the new test for negligence had six elements:

1. For the law to apply a person must be practicing a profession.
2. A professional will not be liable for professional negligence if he or she acted in a manner that was "widely accepted". This is no so broad as universal acceptance, but obviously excludes minority opinions or approaches.
3. The wide acceptance is limited to practices in Australia. An Australian engineer will not necessarily be judged against the differing standards that might apply in other countries, where circumstances are different.
4. The professional will be judged against the standards of his or her peers.
5. The "widely accepted" practice is limited to "competent professional practice", to avoid a lowest common denominator approach. It will not be a defence to say that a particular activity, although deficient, was widely accepted.
6. A court may impose its own view notwithstanding widely accepted, competent, professional peer opinion if it considers that the widely accepted, competent, professional opinion is "irrational".

There are two sorts of professional negligence claims for engineers, and other professions. The first is where an engineer makes a technical error (not typographical error). The second is where the engineer may fail to properly inform his or her client of a potential range of outcomes before a decision is made to proceed with a particular project.

Superficially, the NSW model did not attempt to change the standard of care in terms of duty to warn of risk. However, there are some provisions which deal with concept such as "obvious" risks and "inherent risks. But professionals should not take to much comfort in the possibility of defending a claim by suggesting that a risk was obvious.

There are also some changes relating to apologies. Many professionals feel some hesitation in apologizing if they recognize an error has been made, for fear that the apology may be interpreted by a court as an admission of liability to compensate their client for the financial losses arising. However, the NSW legislation in 2002 provided that an apology does not constitute an express or implied admission of fault.

We are sorry but we cannot help ESB on an ad hoc basis. We provide fee for service engineering expertise primarily (but not exclusively) for Australian businesses. We are not funded for general public good information. (Though we do believe technologies outlined in our responses to questions 30 and 31 will contribute to de-carbonising our world). If ESB is interested in engaging us as a consultant please get in touch with Marcus Steel, as per covering letter of this submission.