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23 May 2023

RE: Issues Paper - Future Security and Resilience -
Review of common quality requirements in Part 8 of the Code

New Zealand's Electricity Authority is reviewing the technical requirements for distributed energy resources (DER), which it refers to as the common quality requirements in Part 8 of the Code. This is to help prepare for New Zealand's expected uptake of inverter-based energy resources in future. SwitchDin urges consideration of the following reforms:

1. ***Mandate AS/NZS 4777.2:2020***

The Authority should introduce a national mandate requiring that all inverters connecting to distribution networks must demonstrate compliance with AS/NZS 4777.2:2020.

2. ***Establish the foundations for a digital compliance framework***

Verification and compliance of inverters with technical standards is fundamental to ensuring that inverter-based energy resources perform as required. Manual inspection and verification is prohibitively expensive. Future costs will be significantly lessened if the Authority puts in place the foundations for a digital compliance framework.

3. ***Develop an interoperability policy and regulatory framework***

It is likely that within the next year or two, most inverters installed in New Zealand will have a communication channel that is compliant to IEEE 2030.5 CSIP-Aus. The interoperability capability of inverters will be unusable unless distribution networks can match the capability with their servers. The Authority should support the development of interoperability capability by distribution networks.

4. ***Establish a register of distributed energy resources***

Distribution networks will require visibility of distributed energy resources (DER). The Authority should consider establishing a central DER Register, based on information collected by electricity distribution businesses.

5. ***Empower customers by enabling access to local, real time metering data***

Customers (and their authorised agents) will require access to local, real time data from the meter to enable optimisation of assets at the site level and for conformance with network requirements such as flexible export limits.

6. ***Establish a regulatory framework for voltage management on the low voltage distribution network***

Voltage management is a critical factor influencing the capability to host large amounts of DER on the distribution network. Regulation of voltage management will become increasingly important as DER penetration increases.

7. Review and update the voltage standard

The Authority should consider aligning with the European voltage standard (IEC 60038) which is 230V±10% and is centered on 230V.

Background to Key Recommendations

1. ***Mandate AS/NZS 4777.2:2020 for all inverters connecting to distribution networks***

Australia and New Zealand are a common market for inverters and most, if not all, inverters sold in New Zealand would already comply with AS/NZS 4777.2:2020. While we have no evidence to suggest that New Zealand has been used as a 'dumping ground' for older inverters, mandating the latest standard would help to ensure that is not the case.

Inverters compliant with AS/NZS 4777.2:2020 provide reactive power to the network to assist with voltage management. This would help to address the Authority's concerns regarding future challenges with respect to voltage management on the low voltage distribution network. The requirements of the latest inverter standard mean that customers are required to provide voltage management services free of charge as a condition of grid connection approval. This is embedded within AS/NZS 4777.2:2020 in the form of Volt-Watt and Volt-var responses.

As noted in the Issues paper, the 'sympathetic' tripping of inverter-based resources during transmission faults can exacerbate the problem of loss of generation. The most recent update to the product standard for inverters (AS/NZS 4777.2:2020) includes short duration under voltage ride through requirements. Mandating that all newly installed inverters must comply with AS/NZS 4777.2:2020 would therefore be a very cost effective response.

The Authority should implement the AS/NZS 4777.2:2020 mandate nationally, rather than leaving it to electricity distribution businesses. Information as to which inverters comply with AS/NZS 4777.2:2020 is available free of charge from the Clean Energy Council (CEC) web site[1].

2. ***Establish the foundations for a digital compliance framework***

Verification and compliance of inverters with technical standards is fundamental to ensuring that inverter-based energy resources perform as required. Experience has shown that inverters on the Australian market comply with the AS/NZS 4777.2:2020 product standard, however compliance by installers leaves much to be desired and a disturbingly large proportion of inverters are incorrectly set at the time of installation. Manual on-site inspection and verification is prohibitively expensive, hence the need for a digital compliance framework. Australia is expected to move toward a digital compliance framework in the short to medium term future, and New Zealand should aim to be a 'fast follower'.

3. ***Develop an interoperability policy and regulatory framework***

From 1 July 2023, new connections to the South Australia (SA) distribution network will be required to demonstrate that the inverter is interoperable with the SA Power Networks utility server, and is capable of dynamic export limitation. This interoperability capability will enable the introduction of a digital compliance regime in the medium term. Australia's Energy Security Board (ESB) is also considering a national interoperability mandate to ensure that all new inverter installations are, in future, capable of communication with the distribution network's server.

The CEC list of Inverters with Software Communication Clients[2] includes information about which inverters have a communication channel that is compliant to IEEE 2030.5 CSIP-Aus, either hosted locally on the inverter or a gateway device, or via a certified cloud connection to the network operator utility server. This list is based on testing conducted by SA Power Networks. This is in addition to the other capabilities included in the CEC inverter list, such as compliance with AS/NZS 4777.2:2020.

Australia and New Zealand are a common market for inverters and once interoperability becomes a mandatory requirement for inverters installed in Australia it will just be a matter of time before all

[1] See https://www.cleanenergycouncil.org.au/industry/products/inverters/approved-inverters for details
[2] See https://assets.cleanenergycouncil.org.au/documents/products/Inverters-with-SCC-230412.pdf for details

inverters installed in New Zealand will also have that capability. However, the capability in inverters will be unusable unless distribution networks can match the capability with their servers. The Authority should support the development of interoperability capability by distribution networks. This will necessitate some investment in utility servers.

4. Establish a register of distributed energy resources

Distributors' visibility of the location, size and functionality of DER should be improved. The Authority should consider establishing a central DER Register and require distribution networks to report the data they have collected to date on the location, size and functionality of DER. The DER Register should include electric vehicle (EV) chargers. Reporting processes should be standardised in future. In Australia, the Australian Energy Market Operator (AEMO) maintains a DER Register based on information provided by distribution businesses. Lessons learned from the operation of Australia's DER Register should be considered.

5. Empower customers by enabling access to local, real time metering data

In future, customers (and their authorised agents) will require access to local, real time data from the meter to enable optimisation of assets (such as flexible load, electricity generation, and energy storage) at the site level and for conformance with network requirements such as flexible export limits. If the real-time data is not available from the meter, the alternative is to install multiple meters. This places an unnecessary cost burden on consumers. Data access is becoming an increasingly urgent issue in the Australian market, with the introduction (or planned introduction) of reforms to enable a two-way electricity market, such as Dynamic Operating Envelopes and cost-reflective tariffs.

Given the long time involved in replacement of metering assets, the development of policy on metering data should commence soon. Although these might not yet be pressing issues for New Zealand, there is an opportunity to pre-emptively address future problems by ensuring technical specifications for meters, inverters and EV chargers enable the kinds of data exchanges that will be needed in future.

The Authority should review the minimum technical specifications for meters with a view to enabling local, real-time data access for optimisation of assets behind the meter.

6. Establish a regulatory framework for voltage management on the low voltage distribution network

Regulation of voltage management will become increasingly important as DER penetration increases because voltage management is a critical factor influencing the capability to host large amounts of DER on the distribution network. Better voltage management will reduce electricity bills and greenhouse gases, improve equipment performance, and reduce damage to appliances. Overvoltage increases the incidence of solar curtailment, wastes energy and can unnecessarily increase customers' electricity bills.

In Australia, the Victorian Government has commenced the development of a regulatory framework for voltage management, and has started by quantifying the costs and causes of overvoltage in distribution networks.

There is a common cultural view within the electricity industry that high voltages on distribution networks constitute better voltage management than lower voltages. There were grounds for this view when electricity only flowed one way. The view needs to change in the context of two-way electricity flow. Distribution businesses need to be able to deliver within the standard and there needs to be a change in opinions to recognise that managing a feeder at an average voltage of 220V (for example) is not inherently better or worse than managing it at 240V.

7. Review and update the voltage standard

The Authority should consider aligning with the European voltage standard (IEC 60038) which is 230V±10% (ie. 207V to 253V) in place of New Zealand's current 230V±6% requirement.

Managing high penetration of solar PV on distribution networks will be simpler and cheaper if New Zealand adopts the European standard. Aligning with the European voltage standard of 230V±10% would assist networks with their voltage management obligations and increase solar hosting capacity, while reducing network expenses. It is very likely to be the 'lowest hanging fruit' for solar enablement policies.

There is a proposal with Standards Australia for adoption of IEC 60038 as an Australian standard to help manage power flows in both directions. Note that if IEC 60038 were adopted as an Australian standard there would be no need to update AS/NZS 4777.2:2020 because it was written in the expectation of adoption of IEC 60038 as an Australian standard.