(ACN 154 893 857)

SwitchDin Pty Ltd
Level 1, Building B, 91 Parry Street,
Newcastle NSW 2302

23 May 2023

Dr Nicola Crauford
Chair
Electricity Authority Te Mana Hike
By email: fsr@ea.govt.nz

Dear Dr Crauford,

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

SwitchDin welcomes the opportunity to provide feedback to the Electricity Authority s review of common quality requirements in Part 8 of the Code.

SwitchDin is an energy software company that bridges the gap between energy companies, equipment manufacturers and energy end users to integrate and manage energy resources on the grid. SwitchDin s technology enables our clients to build and operate vendor-agnostic virtual power plants (VPPs) and microgrids, and to optimize site performance across fleets of diverse assets. Founded in 2014 in Australia, SwitchDin is currently in the process of expanding its presence in Aotearoa by building on existing and new partnerships with energy retailers, electricity distribution businesses, solar retailers and system integrators, so that we can leverage our experience to support the imminent New Zealand energy transformation.

SwitchDin welcomes the work of the Authority to prepare for the likely uptake of inverter-based energy resources. Our area of specialisation is inverter-based resources connected to the low voltage distribution network and we have limited our comments to that area. We are recommending several initiatives which are low hanging fruit and would deliver long-term benefits for minimal short term costs.

We urge the Authority to consider the expeditious introduction of the following reforms:

- Mandate compliance with AS/NZS 4777.2:2020 by all inverters connecting to distribution networks,
- Establish the foundations for a future digital compliance framework for distributed energy resources (DER), such as inverters, battery energy storage systems (BESS), electric vehicle (EV) chargers and flexible load,
- Develop a policy and regulatory framework for the interoperability of distributors and sites with inverter-based energy resources,
- Establish a register of distributed energy resources,
- Empower customers by enabling access to local, real time metering data,
- Establish a regulatory framework for voltage management on the low voltage distribution network, and
- Review and update the voltage standard to align with the IEC 60038 voltage standard which is

230V 10%.

These issues are elaborated upon in our submission. Thank you for the opportunity to respond to these important issues. I remain available for further discussions and inputs.

SwitchDin would be keen to participate in the workshops foreshadowed in the Issues Paper. Please add Josh McLaren (josh.mclaren@switchdin.com) and me (darren.gladman@switchdin.com) to the invitation list for the Authority s consultative processes regarding regulation of electricity, data and distribution networks.

Best regards,

Darren Gladman
Head of Policy and Regulatory Affairs

Key Recommendations

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 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

[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

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.