Submission
To
The Electricity Authority

Subject: Consultation paper – frequency – related Code amendment proposals

Executive summary: Prepared by the Electricity Authority.

The Electricity Authority Te Mana Hiko (Authority) is committed to promoting the future security and resilience of New Zealand's power system in a highly electrified future, ensuring it is set up to deliver the best possible outcomes for consumers. To help achieve this, we are proactively refining industry rules to support greater electrification while maintaining a stable and reliable power system for decades to come. As the sector evolves, it is critical that we, as a regulator, anticipate challenges and enable a smooth transition to a more electrified economy.

Through our multi-year Future Security and Resilience (FSR) programme, we are taking a forward-looking approach by enabling new technologies, addressing security and resilience risks and building a power system that is reliable, flexible and future focused.

A critical part of this programme is a review of the common quality requirements in Part 8 of the Electricity Industry Participation Code 2010 (Code). These requirements are foundational to the safe and reliable supply of electricity to consumers.

We are consulting on proposed Code amendments to help address the first of seven key issues identified in the review:

Issue 1: An increasing amount of variable and intermittent resources, primarily in the form of wind and solar photovoltaic generation, is likely to cause more variability in frequency within the 'normal band' of 49.8–50.2 Hertz (Hz), which is likely to be exacerbated over time by decreasing system inertia.

This paper follows on from our consultation paper Addressing more frequency variability in New Zealand's power system, published on 25 June 2024, which set out short-listed options to address the frequency issue. After considering submitter feedback on that paper and undertaking further investigation and analysis, the Authority proposes to amend the Code to:

• Lower the 30 megawatt (MW) threshold for generating stations to be excluded by default from complying with the frequency-related asset owner performance obligations and technical codes in Part 8 of the Code.

• Set a permitted maximum dead band beyond which a generating station must contribute to frequency management and frequency support.

The proposed changes will promote the reliability of electricity supply and the efficient operation of the electricity industry, for the long-term benefit of consumers. These changes will enhance the reliability of electricity supply by improving frequency stability and reducing the risk of inadvertently tripping an automatic under-frequency load shedding block. The changes will promote the efficient operation of the electricity industry by minimising the need for additional reserves and frequency keeping to be procured. This will help to keep power bills lower for consumers.

Submission response as follows:

There should be no changes made to the existing Electricity Industry Participation Code 2010.

There should be no widening of the normal frequency band.

To widen the normal frequency band would be considered reckless and irresponsible.

The Electricity Authority (EA) claim to be committed to promoting the future security and resilience of the NZ power system in a highly electrified future is a play on words. We had one in the past and we have one now.
The EA go on to say they are proactively refining industry rules while maintaining a stable and reliable system – wrong. Changing the Code will degrade the system. Refining or fine tuning the industry rules is one thing, to change them is another.

The electricity grid is privately monitored and total harmonic distortion (THD) readings in excess of 95% are being obtained when the Act states THD shall not exceed 5%. Which effectively means the grid is unstable now and has been for some time.

Why is the Electricity Authority not enforcing the current Electricity Industry Participation Code 2010 (EIPC 2010) now?

Connecting electric vehicles to the grid to cook the evening meal is barmy.

General Motors is currently investing $1 billion in developing a new V8 ICE engine plant and a further $3 billion on vehicles. What do they know?

Electric vehicles are not a thing of the future.

See the EIPC 2010, Schedule 8.3. Technical Code A – page 56; or

The Electricity Authority consultation paper 7.41. on page 49
The Authority proposes to amend clause 5 of Technical Code A of Schedule 8.3 as follows:
5 Specific requirements for generators
(1) Each generator must ensure that—
(a) each of its generating units, and its associated control systems,—
(i) supports the system operator to plan to comply, and to comply, with the principal performance obligations; and
(ii) is able to synchronise at a stable frequency within the frequency range stated in the asset capability statement for that asset; and
(b) the rate of change in the output of any of its generating units does not adversely affect the system operator's ability to plan to comply, and to comply, with the principal performance obligations. The rate of change must be adjustable to allow for changes in grid conditions; and
(c) each of its generating units has a speed governor and/or frequency control system that—
(i) provides stable performance with adequate damping; and
(ii) has an adjustable droop over the range of 1% to 7%; and
(iii) does not adversely affect the operation of the grid because of any of its non-linear characteristics; and
(iv) operates with a dead band not exceeding ±0.1Hz; and

The stand out points are,
5 (1) (a) (i) supports the system operator ….
(ii) is able to synchronise at a stable frequency ….

In brief the EIPC 2010 states requirements for generation.
1. Produce a 50 hertz sinusoidal waveform energy.
2. Synchronise the 50 hertz energy to the grid.
3. Maintain a synchronous mode of operation.
4. Must not alter the characteristics of the grid.

A THD of 95% is a grid with altered characteristics and the THD can only be produced in bulk by non-compliant generation.

Transpower have a THD of 1% at their 220,000 volt level. The problem therefore is at the 33.000 volt level. There is non-compliant generation in the Taupo area supplying into the Unison 33,000 volt network. A thorough audit is required.

Northland also has high THD and has solar farms and non-compliant binary geothermal at Ngawha Springs. Another audit required.

There is non-compliant generation connected to the grid else where. All generation ought to be made to prove their compliance and those which fail ought be be shut down and investigations carried out.

A three phase motor is not a generator.

Non-compliant generation includes.
5. Wind turbines which do not produce 50 hertz and cannot synchronise to the grid.
6. Binary geothermal, excluding the main Wairakei plant, which do not produce 50 hertz and cannot synchronise to the grid.
7. Several hydro stations of the Bryan Leyland type which do not produce 50 hertz and cannot synchronise to the grid.
8. PV solar and especially roof top PV solar may not have sufficient inertia to enter the grid. Suitable for off grid situations.

Now is the time to investigate the grid and generation connected to the grid. The rules should not be rewritten to accommodate bogus generation.

The Electricity Authority refers to audit types such as.
* All industry participants – can be randomly audited.
* Dispatchable load purchasers -
*Distributors (local and embedded networks) -
* Generators.
* Metering equipment providers -
* Reconciliaton participants -

If everything and everyone is compliant and meeting the requirements of all audits there would be no concern leading to a common quality enquiry.

The Electricity Authority makes mention of keeping power bills lower for consumers. Having smart meters fitted with 50 hertz band pass filters would prevent the non-compliant waveforms being added to consumers power bills. A considerable saving to be achieved.

Brian Johnston
Registered Electrician