

## **MINUTES OF CQTG MEETING 7**

**Held on Thursday 17 October 2024, 9:00am – 4.33pm**  
**Electricity Authority office – Wellington**

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<b>Members present:</b>	Sheila Matthews (Chair), Graeme Ancell, Matt Copland, Brent Duder-Findlay, Barbara Elliston, Stuart MacDonald, Mike Moeahu, Rob Orange, Jon Spiller.
<b>Apologies:</b>	Brad Henderson, Stuart Johnston, Gareth Williams.
<b>In attendance:</b>	Phillip Beardmore, Nyuk-Min Vong (Vong) (9:00am – 12:13pm, 12:31pm – end), Elzeth Grant-Fargie (9:00am – 4.20pm), Rob Mitchell.
<b>Guests:</b>	Professor Neville Watson (online, 9:00am–2:20pm), Connor McCarthy (3:00pm – end).
<b>Observer:</b>	Otis Boyle (online, 9:00am – 12:35pm), Victor Lo (online, 12:17pm – 2:20pm).

### **Introduction**

- 1.1 The Chair welcomed attendees to the seventh meeting of the Common Quality Technical Group (CQTG). A quorum was established, with nine of the twelve members present (including the Chair). Brad Henderson, Stuart Johnston, and Gareth Williams were apologies.
- 1.2 The Chair provided an overview of the meeting agenda and the meeting's objectives, which were to:
  - (a) provide feedback on the submissions from the June 2024 consultations related to issue 1 (frequency), issues 2 to 4 (voltage) and issue 5 (harmonics)
  - (b) provide feedback on the Authority's proposed options.
- 1.3 The group reviewed the status of the open actions from the previous meeting and approved the minutes of the fifth (subject to amending paragraph 2.3(a)) and sixth CQTG meetings.

<b>Action Item</b>	<b>7.1: CQTG chair to sign the minutes of the fifth (subject to amendment of paragraph 2.3(a)) and sixth CQTG meetings and publish the minutes on the Authority's website.</b>
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## 2. Voltage options paper

2.1 Elzeth presented the voltage section. Key points raised in the CQTG's discussion included:

- (a) The most effective way to manage voltage is at a local level rather than centrally, in order to limit the reactive power flow through the power system.
- (b) It would be useful to know how many existing generating stations would be subject to the voltage-related asset owner performance obligations in the Code under the different voltage options.
- (c) The new requirements for generation are seen as manageable for new plant but are likely to pose challenges for some existing smaller machine-based synchronous ones. The key identified voltage issues are not coming about because of these existing plant. Therefore, the CQTG supports a grandfathering approach for these existing plant, noting that grandfathering would not apply to these plant if they were to be altered / upgraded in the future. The Authority is open to grandfathering but will assess costs and benefits. An opt-in approach to being grandfathered would promote transparency, through the publication of a list of generation plant that have requested to be grandfathered.
- (d) Generators face costs when idle. If generators are providing reactive power while idle, they should be compensated because they could otherwise disconnect to avoid these costs. If they disconnect, the system operator can't rely on them for voltage support when needed.
- (e) Transpower can put in place non-transmission solutions for voltage support, for example with solar farms to provide voltage support at night.
- (f) The Code needs clearer wording on reactive power requirements for generators when they are idle (ie, connected but not dispatched / offered but not dispatched). The CQTG suggested wording like "electrically connected and dispatched" to deal with the idle issue.
- (g) Despite requests for data from submitters to support the Authority's cost-benefit analysis (CBA), very few submitters provided information.
- (h) A key concern for generators is the cost of demonstrating compliance, which may at times exceed the cost of equipment upgrades. The CQTG suggested reducing upfront compliance costs for smaller generating stations, through holding generators accountable for non-compliance via financial charges (similar to under-frequency causer payments). Under this approach, the owner of a generating station above the yet-to-be-determined threshold but below the current 30MW threshold would have to provide information to the system operator showing they have the capability to be compliant rather than undertaking modelling to prove compliance. If they were subsequently found to be non-compliant, they would face financial charges.

<b>Action Item</b>	<b>7.2: Authority to consider clarifying the terms "synchronised", and "available for dispatch" in clause 8.23 of the Code.</b>
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### *Option 1*

- 2.2 The CQTG's view was that the best place to specify the requirements is directly in the Code, rather than in guidelines.
- 2.3 The CQTG considered that lowering the 30MW threshold to 10MW is more appropriate than 5MW. All new generators will have the technical capability to comply, and the benefits will be similar, but generators below the 10MW threshold would face compliance costs that were higher in percentage terms relative to the capital cost of the project. A 10MW threshold also aligns with Part 13, which requires embedded generators over 10MW to provide offers and real-time information to the system operator.

**Action Item 7.3: Authority to consider a threshold of 5MW or 10MW, working with the system operator, and considering compliance costs, and considering grandfathering for some or all existing generating stations that are under the 30MW threshold (including what clauses/subclauses would be subject to grandfathering).**

- 2.4 The +50%/-33% range is common globally. This range currently applies to transmission-connected generators in New Zealand, and the CQTG's view was that it should be retained for generators connected to the transmission network.
- 2.5 The CQTG recommended introducing a  $\pm 33\%$  range for generating stations connected to distribution networks. The CQTG suggested the Authority get feedback from distributors on this range, explaining to distributors the reasons for this range when doing so.

**Action Item 7.4: Authority to consult distributors (likely via Electricity Networks Aotearoa (ENA)) on a  $\pm 33\%$  net reactive power range for generators connected to distribution networks, explaining the reasons for this range when doing so.**

### *Option 2*

- 2.6 The CQTG noted that some distributors and embedded generators have the inter-control centre communications protocol (ICCP).
- 2.7 The CQTG agreed the system operator and distributors should be responsible for working together to manage voltage across the grid exit point.

**Action Item 7.5: System operator to carry out further voltage-related studies to determine whether the GXP power factor requirements in the Code should be revised.**

**Action Item 7.6: System operator to share the high-level scope of the voltage-related studies with the CQTG's voltage sub-group for feedback.**

**Action Item 7.7: Authority to consider submitters' concerns about the potential costs of Option 2 as part of evaluating the option's benefits and costs.**

### Option 3

2.8 Previous comments and actions are also applicable to option 3 (eg, grandfathering).

#### *Alternative options raised by submitters*

2.9 Discussion from the CQTG on the alternative options raised by submitters:

- (a) **Grid-forming (GFM) technology:** Modern GFM technology assists with recovering from islanding, helps to eliminate oscillations (particularly good for weak networks), and could improve regional resilience. GFM technology manufacturers appear to be hesitant to push GFM technology for wind generation due to concerns about its effect on wind turbine torsional stress.

<b>Action Item</b>	<b>7.8: Authority to obtain from Professor Neville Watson relevant GFM papers (eg, a 2023 PhD thesis, CIGRE papers).</b>
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<b>Action Item</b>	<b>7.9: Authority to add GFM as a topic to the system strength work in the FSR roadmap (item 6) in the next financial year.</b>
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- (b) **Market-based solutions:** It takes many years to establish a market, but the most efficient approach would be to put the necessary requirements in place now to ensure that a minimum level of capability and equipment is already in place to potentially build a future market around. The CQTG also noted that creating a market can result in participants not taking responsibility unless they are sufficiently incentivised.
- (c) **Transmission-based assets to manage voltage:** As discussed under options 1 and 2, voltage is best managed locally. So, voltage issues at GXP's that are caused by distribution-connected assets are best managed on the distribution network.
- (d) **Appropriate standards:** Noted that additional standards may need to be considered for increasing amounts of solar, battery and electric vehicle chargers.

### 3. Harmonics discussion paper

3.1 Phillip presented the harmonics section. Key points raised in the CQTG's discussion included:

- (a) There is a risk of misalignment if the Code references external standards that may be later updated. The Authority needs to manage this risk.
- (b) Immunity levels are important when considering harmonics. AS/NZS 61000 covers compatibility and immunity levels.
- (c) The allocation methodology in the Electricity Engineers' Association (EEA) power quality guidelines was designed for distribution systems and the absence of a system study. A Transgrid paper at CIGRE highlighted the impact that inaccurate vendor data can have on system studies.
- (d) A harmonics database might be expected to help industry participants plan better and defer investments in harmonics equipment until needed. Transpower has this data for the transmission network. Although the data

isn't published, Transpower makes it available to parties looking to connect to the transmission network.

- (e) In the UK, only C-type filters are installed, which may also help in New Zealand.
- (f) There is already a charge-based regime that applies for harmonics. The Code requires the system operator to investigate complaints (clause 7.2D) and recover costs from the causer (clause 8.3). An approach suggested by the CQTG was requiring asset owners to contribute to a wider study when the network harmonic limits start to be approached – for example, a threshold of 80% of the planning limit.
- (g) Encouraging diversity from the start of projects could be incentivised. Orion is currently doing this by altering transformer windings at different sites.
- (h) Both installation standards and device standards need to be considered. It was noted that device standards would fall under the remit of the Ministry of Business, Innovation and Employment (MBIE).
- (i) Submissions were in favour of removing the requirement to comply with NZECP 36:1993, which is outdated. The CQTG supported this view.

<b>Action Item</b>	<b>7.10: Authority to raise the device standard issue with MBIE and propose removing NZECP 36:1993.</b>
<b>Action Item</b>	<b>7.11: Authority to invite Professor Neville Watson to the Authority/MBIE/WorkSafe monthly meetings on the harmonics issue.</b>
<b>Action Item</b>	<b>7.12: Authority to develop harmonics options 1 and 2, discuss with the harmonics sub-group, and present a draft options consultation paper to the CQTG in Q1 2025.</b>

#### **4. Frequency options paper**

- 4.1 Rob M presented the frequency section. Many of the CQTG's comments in the voltage section also apply to the frequency section. Key points from the CQTG's discussion included:

##### *Option 1*

- 4.2 For existing generation that cannot reasonably comply with the requirements, the CQTG supported a grandfathering approach. The Authority would need to consider the costs and benefits of a grandfathering approach against the alternative of the dispensation process. Grandfathering could also be applied in different ways, for example it could be everything under 30MW or only generating stations under 10MW.
- 4.3 If the 30MW threshold is lowered, the CQTG supports excluding existing generation under 30MW from both the frequency support requirement and the requirement to ride through an under-frequency event.
- 4.4 A 10MW threshold is preferred over 5MW for the same reasons as in the voltage section (lower costs, similar benefits and a consistent threshold to Part 13 of the Code).

**Action Item 7.13: Authority to consider a threshold of 5MW or 10MW, working with the system operator, and considering compliance costs and grandfathering (including what clauses/subclauses would be subject to grandfathering).**

- 4.5 There were mixed views in the submissions on aligning AS/NZS 4777.2:2020 with the Code. Some submitters support the alignment, but others wanted more information before providing a view. There appeared to be confusion on whether the intent is to update the Code to align with the standard, or vice versa.

**Action Item 7.14: Authority to clarify whether the proposal is to align the Code with AS/NZS 4777.2 by amending the Code or the standard.**

#### *Option 2*

- 4.6 For those generators that apply a wide deadband to avoid the costs of wear and tear, other generators need to compensate and are therefore subject to increased wear and tear to their own equipment.
- 4.7 Based on Australia's experience of implementing a uniform  $\pm 0.015\text{Hz}$  deadband across all generation technologies, the CQTG recommended a uniform deadband should apply to all generation types in New Zealand. In Australia, this deadband has led to generating plant uniformly moving less because the frequency is so well managed. The CQTG recommended the Authority explore how Australia implemented its  $\pm 0.015\text{Hz}$  deadband and dealt with implementation issues, including differing inherent deadbands across generation technologies.
- 4.8 A lead-in period would be necessary if a deadband were mandated. The additional costs of model validation and testing also need to be considered.
- 4.9 The CQTG and most submitters supported retaining the current normal band.

**Action Item 7.15: Authority to further investigate option 2, with a particular focus on learnings from Australia's implementation of a uniform small deadband.**

#### *Option 3*

- 4.10 No Code change is required, as the system operator can already procure more reserves. Therefore, the CQTG agreed no further action on this option is required from a Code amendment standpoint, including no further system studies.
- 4.11 It was noted that increasing the frequency keeping band would require another round of tests, which may add approximately \$50,000 of costs to asset owners providing frequency keeping support. Perhaps this could be done in stages.

## **5. Any Other Business**

- 5.1 Connor presented the draft scope for a study on BESS frequency, voltage, and FRT requirements. Key points from the CQTG's discussion included:
- (a) **Voltage obligations:** the benefits need to be quantified.
  - (b) **Frequency obligations:** we should consider a uniform deadband, consistent with the earlier discussion in the frequency section.

**Action Item    Action 7.16: System operator to conduct a literature review on BESS performance obligations and share a proposed high-level scope for system studies with the CQTG.**

5.2    The meeting closed at 4:33pm.

### Summary of outstanding action points

No.	Action	Who	When
1.7	<ul style="list-style-type: none"> <li>Authority to engage with MBIE, urging MBIE to prioritise proposing an amendment to the Electricity (Safety) Regulations 2010, to permit the supply of electricity to installations operating at 230 volts AC to be within 10% of 230 volts AC.</li> </ul> <p><i>Noted the consultation is due to the Minister soon.</i></p>	Authority	Closed
5.1	<ul style="list-style-type: none"> <li>CQTG chair to sign the minutes of the third and fourth CQTG meetings and publish the minutes on the Authority's website.</li> </ul>	Authority	Closed
5.2	<ul style="list-style-type: none"> <li>Proceed with the current Code amendment proposal.</li> </ul>	Authority	Closed
5.3	<ul style="list-style-type: none"> <li>Look at broadening the term 'control system' in the Code in a way that can apply to all technologies – for example, a control system is a system that dynamically adjusts control output signals in a programmed response to continuously changing input signals.</li> </ul>	Authority	Closed
5.4	<ul style="list-style-type: none"> <li>Authority to consider reviewing the periodic testing requirements, so that Part 8 of the Code contains high-level output-focussed obligations and specific testing requirements are placed in a separate document incorporated by reference into the Code.</li> </ul>	Authority	In progress
5.5	<ul style="list-style-type: none"> <li>Authority to exclude FSR-002 and FSR-003 from the Code amendment proposal paper and</li> </ul>	Authority	Closed

	consider a revised approach to moving these options forward.		
5.6	<ul style="list-style-type: none"> <li>Authority to progress this item and specify an appropriate (eg, 1MW) threshold at the point of connection that applies to both generation and load.</li> </ul>	Authority	Closed
5.7	<ul style="list-style-type: none"> <li>Authority to amend the wording and progress this item.</li> </ul>	Authority	Closed
5.8	<ul style="list-style-type: none"> <li>Authority to exclude the FSR-006 Code amendment proposal from the paper and consider whether droop settings are appropriately included in Part 8 of the Code or elsewhere (eg, a document incorporated by reference in the Code or in a system operator technical document).</li> </ul>	Authority	Closed
5.9	<ul style="list-style-type: none"> <li>Authority to proceed with the proposal.</li> </ul>	Authority	Closed
5.10	<ul style="list-style-type: none"> <li>Authority to proceed with the proposal</li> </ul>	Authority	Closed
5.11	<ul style="list-style-type: none"> <li>Authority to consider revising the reference to 'voltage control mode' in clause 5(2)(a) of Technical Code A of Schedule 8.3 of the Code, as part of addressing the three key voltage-related issues.</li> </ul>	Authority	Closed
5.12	<ul style="list-style-type: none"> <li>Authority to proceed with the proposal, subject to changing the term to "dynamic reactive power compensation devices".</li> </ul>	Authority	Closed
5.13	<ul style="list-style-type: none"> <li>Authority to add a Code amendment proposal to treat BESS as generation for the purposes of Part 8.</li> </ul>	Authority	Closed
5.14	<ul style="list-style-type: none"> <li>Authority to add a Code amendment proposal to amend the definition of 'generating unit' and share it with the CQTG for review.</li> </ul>	Authority	Closed
5.15	<ul style="list-style-type: none"> <li>Authority to consider the appropriateness of including in the</li> </ul>	Authority	Not started



	Code a new definition 'generating system'.		
5.16	<ul style="list-style-type: none"> <li>Authority to add a Code amendment proposal in relation to the FRT requirements.</li> </ul>	Authority	Closed
5.17	<ul style="list-style-type: none"> <li>Authority to send these updates in written form, along with the meeting slides, to the CQTG.</li> </ul>	Authority	Closed
7.1	<ul style="list-style-type: none"> <li>CQTG chair to sign the minutes of the fifth (subject to amendment of paragraph 2.3(a)) and sixth CQTG meetings and publish the minutes on the Authority's website.</li> </ul>	Authority	
7.2	<ul style="list-style-type: none"> <li>Voltage issue: Authority to consider clarifying the terms "synchronised", and "available for dispatch" in clause 8.23 of the Code.</li> </ul>	Authority	
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7.7	<ul style="list-style-type: none"> <li>Voltage issue: Authority to consider submitters' concerns about the potential costs of Option 2 as part of evaluating the option's benefits and costs.</li> </ul>	Authority	
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7.10	<ul style="list-style-type: none"> <li>Harmonic issue: Authority to raise the device standard issue with MBIE and propose removing NZECP 36:1993.</li> </ul>	Authority	
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7.13	<ul style="list-style-type: none"> <li>Frequency issue: Authority to consider a threshold of 5MW or 10MW, working with the system operator, and considering compliance costs and grandfathering (including what clauses/subclauses would be subject to grandfathering).</li> </ul>	Authority	
7.14	<ul style="list-style-type: none"> <li>Frequency issue: Authority to clarify whether the proposal is to align the Code with AS/NZS 4777.2 by amending the Code or the standard.</li> </ul>	Authority	
7.15	<ul style="list-style-type: none"> <li>Frequency issue: Authority to further investigate option 2, with a particular focus on learnings from Australia's implementation of a uniform small deadband.</li> </ul>	Authority	

7.16	<ul style="list-style-type: none"> <li>System operator to conduct a literature review on BESS performance obligations and share a proposed high-level scope for system studies with the CQTG.</li> </ul>	System operator	
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Confirming the CQTG has approved these meeting minutes are a true and correct record.

Dated this 11<sup>th</sup> day of April 2025.




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Sheila Matthews

**Chair**