Update on the Future Security and Resilience work programme

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Future Security and Resilience (FSR)

- The Future Security and Resilience (FSR) programme
- 2023-24: Work underway
- 2024-25: Work being considered
- A bit about the Code



The Authority's statutory objective

To promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers

Section 15 of the Act also sets out an additional objective for us to protect the interests of domestic consumers and small business consumers in relation to the supply of electricity to those consumers.



Future Security and Resilience roadmap

Challenges & Opportunities	Activity	
Accommodating future changes within technical requirements	Review and update Part 8 of the Code	1
	Review and update Parts Parts 6, 7, 13, 14 of the Code to ensure they align to Part 8	
	Identify standard to support technical requirements in the Code	
	Update the Policy Statement to manage emerging risks	
	Update the System Operator's policies, procedures, guidelines and tools	
Coordination of increased connections	Update Grid Owner and System Operator commissioning processes and benchmark agreement	
	Review the approach to planning connection studies	
	Review operational study tools	
Operating with low system strength	Investigate system strength challenges and opportunities	
	Amend the Code to support performance criteria	
	Develop suitable market products and tools	
Enabling DER services for efficient power system operations	Enhance the Code and market system dispatch capability to accommodate DER offers	
	Improve real-time security modelling within operaitonal tools	
	Investigate new DER services to support efficient operation of the power system	
Visibility and observability of DER	Establish the impact of DER	
	Determine the credible event risk of DER	
	Update the Code to clarify DER obligations and operational requirements	
	Update procedures and tools to include DER asset information	
Balancing renewable generation	Improve market system and generation/demand forecast	
	Consider new or revised ancillary services to maintain balancing	
Managing reducing system inertia	Create a frequency reserve strategy to manage low inertia	
	Ensure that the Code and market system can accommodate new reserve types	
	Incorporate new reserve types into the Procurement Plan & testing methodology	
	Update operational procedures and tools	
Leveraging new technology to enhance ancillary services	Investigate changes to ancillary services	
	Ensure tools monitor the performance of the power system	
	Update the Code, market system and Procurement Plan to enable new technology to provide ancillary services	
Maintaining cyber security	Continually review and update cyber security measures	
Growing skills and capabilities of the workforce	Encourage and train the workforce's next generation	



FUTURE SECURITY & RESILIENCE PROGRAMME

Purpose: Ensuring New Zealand's power system remains secure and resilient as we transition to a low-emissions economy



Link to FSR indicators Link to Part 8 Issues paper Link to FSO consultation Link to FSO submissions



Review of Common Quality requirements in Part 8 of the Code

Part 8 review is addressing the 7 key common quality issues through a staged approach because issues are foundational to the safe and reliable supply of electricity to consumers

We have been actively working with stakeholders and seeking input from technical experts across the industry, including:

- System operator
- Common Quality Technical Group (CQTG)
- Other Authority teams, particularly Operations Policy
- MBIE, WorkSafe and EECA
- Electricity Engineers' Associations (EEA)
- Overseas regulators (Australia, UK)
- Professor Neville Watson of the University of Canterbury, a leading academic specialist in power system harmonics

Seven key common quality issues identified Issue 1: Frequency Issues 2, 3, 4: Voltage Issue 5: Harmonics Issue 6: Network information Issue 7: Code terminology



Review of Common Quality requirements in Part 8 of the Code: Issue 6 – Network information

Identified Problem	Proposed solution
Wind-powered generation units are currently excluded from having to comply with the routine testing requirements. Inverter-based resources are also not adequately captured by the periodic testing regime.	Amend the Code to remove the exclusion for wind-powered generating units from routine testing requirements. Update clauses to include appropriate routine testing requirements for inverter-based generation technologies, ensuring all generation technologies are subject to equivalent testing obligations.
Part 8 of the Code contains some clauses that specifically address 'wind' generation, that have the effect of reducing or excluding some obligations that other forms of intermittent generation should be subject to.	Amend the Code to either remove clauses that exempt wind generation from certain obligations or amend the clauses to apply to all forms of variable and intermittent generation.



Review of Common Quality requirements in Part 8 of the Code:

Issue 7 – Code terminology

Identified Problem	Proposed solution
Inverter-based generation does not have a speed governor. Hence, dispensations or equivalence arrangements have to be relied on to avoid non- compliance with the Code.	Amend the Code to replace the requirement for 'speed governor' with a requirement to have a 'frequency control system', and consequential changes to several other clauses.
The current definition of "generating unit" in the Code lacks clarity and may be interpreted inconsistently.	Amend the definition of "generating unit" in the Code to clarify that it refers to the smallest technically and operationally independent collection of equipment that functions as a single entity to produce electricity, including individual wind turbines in a wind farm and strings of solar panels connected to a single inverter at a solar farm.



Review of Common Quality requirements in Part 8 of the Code

Published a consultation on issues in April 2023

Next steps:

- June 2024: Publish consultations for:
 - Options to address the frequency issue (Issue 1)
 - Options to address the voltage issues (Issues 2, 3 and 4)
 - A discussion on the harmonics issue (Issue 5)
- Second half of 2024: Proposed Code amendments to address Issues 6 and 7



Future system operation

- Published a consultation on 15 February 2024 which closed 19 April 2024.
- Received 53 submissions from a range of stakeholders (generators, Transpower, EDB's, Consultants, Consumer groups, retailers, metering companies and other organisations such as Fonterra, New Zealand Steel, National Road Carriers Assn, Foresta, New Zealand Green Building Council, Measurements Standard Laboratory).
- Submissions have been published on our website.
- Review of the submissions is underway.

Next steps:

• Review the submissions which will inform next steps



FSR: Work streams likely to be investigated in 2024-25

- Further studies *if required* to inform options for the Part 8 issues
- Operating the power system with reduced system strength
- Future system operation next steps
- Improving the FSR indicators



A bit about the Code

- Code process
- The "omnibus"
- A case study



What is the process to make the necessary Code changes?



The "omnibus" process for regular updates to the Code

- Up to 3 times a year, the Authority will run an Omnibus process to make changes to the Code
- This allows the Authority to make several Code changes through a single consultation and amendment process

 rather than individual papers
- Code changes suitable for the omnibus:
 - Unlikely to be controversial or generate material media interest
 - Not be time critical
 - Have a strong preferred option
- A cost benefit analysis is required



Why is the Code amendment process so long? Case study - Hawaii



Hawaii

notable features

- One of the most
 isolated
 archipelagos in the world
- Evolution of unique ecosystems found nowhere else on earth
- Particularly
 vulnerable to outside predators



HAWAIIAN ECONOMY - OVERVIEW

- Reliance on agriculture: Hawaii's economy was heavily reliant on agricultural exports, especially sugar canes
- **Invasive species:** rats were causing significant crop damage, resulting is huge financial losses
- Crop protection was vital: managing pests was crucial for Hawaii's economic stability and prosperity



Desperate farmers came up with a solution to the rat problem





THE MONGOOSE

- Natural predator of rats
- Noted success in the Caribbean at controlling rat populations
- Requires no upkeep or maintenance
- Safe and harmless to locals



THE MONGOOSE WAS IMPORTED

BUT FAILED FOR 3 MAIN REASONS:



The mongoose and rats never actually encountered each other



Mongooses ate native wildlife and protected endangered species



Brought the bubonic plague to Hawaii, along with other diseases.

KEY POINTS

- **Importance of thorough evaluation:** it doesn't matter how obvious the solution appears, the mongoose is an example of the need to carefully analyse proposed solutions and potential consequences before changes are implemented.
- **Changes can be difficult to reverse:** This needs to be considered, and alternative approaches need to be investigated.
- Input from stakeholders can identify issues with overseas approaches and tailor to local conditions.



Information the Authority needs for a Code amendment proposal

- Existing arrangements
- Problem definition
- Proposal (incl. suggested Code wording)
- Assessment against the Authority's statutory objectives
- Cost-benefit analysis
- Alternative options

