SECURITY AND RELIABILITY COUNCIL

MINUTES

Meeting number: 35

Venue: Boardroom, The Electricity Authority, Level 7, 5 Hunter Street, Wellington Central

Time and date: 9.30 am until 3.30 pm, Thursday, 27 May 2021

Members Present

- Hon Heather Roy (Chair)
- Ben Gerritsen
- Gretta Stephens
- Guy Waipara
- Mike Underhill
- Nanette Moreau
- Nathan Strong
- Nigel Clark
- Phil Gibson

Apologies

- Barbara Elliston

In attendance

Name	Title	Agenda item # attended
	Electricity Authority (Authority):	
James Stevenson-Wallace	Chief Executive	#7-10 (from 10.32am-12.14pm)
Andy Doube	General Manager Market Design	#4-14 and #15-17 (from 9.48 am–1.56pm and from 2.37pm – 3.30pm)
Doug Watt	Manager Market Monitoring	#8 (from 10.51am-10.59am)
Grant Benvenuti	Manager Market Operations	#1-2 and #4-17 (from 9.30 am–9.35 am and 9.48 am–3.30pm)
Callum McLean	Senior Advisor Market Operations	#9-10 and #11-12 (from 11.13am-12.14pm and from 12.38pm-1.20pm)
Nicole Gagnon	Advisor Market Operations	# #4-17 from 9.48 am-3.30pm)
Barbara Eibl	Programme Coordinator, Wholesale Markets (Minute taker)	#1-2 and #4-17 (from 9.30 am–9.35 am and from 9.48 am-3.30pm)
James Blake-Palmer	Senior Advisor Market Operations (Secretariat)	#1-2 and #4-17 (from 9.30 am–9.35 am and from 9.48 am-3.30pm)
	Other:	
Stephen Jay	General Manager Operations, Transpower	#8-9 and #12 (from 10.35am-11.49am and from 12.38pm-1pm)

Name	Title	Agenda item # attended
David Katz	Market & Security of Supply Manager, Transpower	#8-9 (from 10.35am-11.48am)
Philip Beardmore	Director, Strata Energy Consulting Limited	#11-16 (from 12.38pm-2.41pm)
Clive Bull	Director, Strata Energy Consulting Limited	#11-14 (from 12.38pm-3.24pm)
Tim Hewitt	Chief Adviser, Performance Analysis, Commerce Commission	#14-15 (from 1.56pm-3.09pm)

The meeting opened at 9.30 am.
Grant Benvenuti, James Blake-Palmer and Barbara Eibl joined the meeting at 9.30am.

1. Attendance and apologies

1.1. The Chair welcomed members to the thirty-fifth meeting of the Security and Reliability Council (SRC). A quorum was established.

1.2. The Chair noted an apology received from Barbara Elliston.

1.3. A brief Health and Safety induction was held for members.

2. Changes to disclosure of interests

2.1. The Chair reviewed the interests register and noted two new members disclosed changes to the interests register after the papers had been sent out. These changes have been reviewed by the Chair and did not impact the topics discussed. There were no further changes disclosed.

2.2. The Chair approved members to act despite those declared interests.

Grant Benvenuti, James Blake-Palmer and Barbara Eibl left the meeting at 9.35am.

3. Members-only session

3.1. The members discussed their priorities for the meeting.

Nicole Gagnon, Barbara Eibl, Grant Benvenuti, James Blake-Palmer, Andy Doube, joined the meeting at 9.48 am.

3.2. As there were new members of the SRC, a brief round table of introductions occurred.

4. Minutes of previous meeting

4.1. The minutes of the 25 February 2021 meeting were accepted as a true and accurate record.

Nathan Strong moved and Gretta Stephens seconded. All members approved

4.2. Members were asked whether they would like to receive their papers by Diligent Boards. Interest by SRC members was high and the secretariat will investigate procuring Diligent Boards for SRC members.

1. Action: Secretariat to investigate providing Diligent Boards for SRC members.

5. Correspondence

5.1. The Chair gave an overview of the correspondence including the letters sent to the Authority and the Authority's replies.

6. Action list and updates

6.1. The secretariat provided an update on the action list:

a) Action item 3 *the Secretariat to provide an update about the Hutt Valley and Wairarapa region outage:* the update will be provided at the August meeting

b) Action item 5 *the Secretariat to organise a follow up cyber security survey to be sent to participants*: the cyber-security audit is scheduled to start in July

c) Action item 10 *the Secretariat to provide an update about the status of standards for inverter-based technology:* it was confirmed the Authority had written to WorkSafe to outline its concerns.

6.2. A Member noted the media article about Norske Skog (section 1.5) was not accurate and that Norske Skog was a well hedged participant.

7. Register of top security and reliability risks

7.1. The Chair facilitated comments from members and attendees.

7.2. Members' comments included:

a) Covid-19 interruptions to the supply chain are still a concern and there are increased prices for equipment and the list of stock delayed is continuing to grow. The recent outbreaks in Singapore and Melbourne were mentioned in relation to S2[1]

b) The shortage of thermal fuels, particularly coal is of concern. Members discussed *L2 gas supply running down* and noted it should be moved into the persistent risk column. There will be a need for a large amount of investment to meet the decarbonisation goals which will require private capital. Members also discussed the political comments on gas supply which have been detrimental to public perceptions of the risk of supply shortages

c) With regard to *P1 cyber-attack damages power system assets and/or cuts supply*, it will be crucial to ensure that industry participants take part in the next cyber-security survey. The recent attack on Waikato DHB is a reminder to those in the industry to review security settings

d) Members discussed *M2 Review of the 'Tree Regs' fails to capture potential to boost reliability* and noted this should be moved to the short

[1] S2 on the top security and reliability risk register is: *risk of lack of preparedness for a second wave of Covid-19 causing further economic hardship (with consequent impact on potential reduction in maintenance)*.

term. Members also discussed live line work and that while 40% of outages are planned, half of those can be completed on a live line.

e) The long-term impact of the 100% renewables target may encourage inefficient investment and lead to medium term market distortion. The industry needs to come together and consider the solutions. Members also noted the SRC has a duty to provide advice to the Authority even if it does not align with political outcomes

f) Members discussed their disappointment with media reports on dry year risk, particularly those which mentioned blackouts. Mis-information in the media has unnecessarily damaged the electricity industry's reputation. Members consider it is the Authority's role to provide corrected information in these circumstances.

7.3. Attendees comments included:

a) Consensus with the concerns raised by Members, including the cyber-security risks, and media mis-information reporting.

b) Other attendee comments included:

i. continuing to ensure the integrity of the electricity market

ii. preparedness of the distribution sector and pressure on networks for moving to the 100% renewables targets.

2. Action: Secretariat to make the following changes to the table 'Top security and reliability risks':

a) *L2 gas supply running down*: move to the 'Persistent risk column

b) S1(b) *Availability of imported goods/services*: add price increases in addition to the availability

c) *S3 Generator investor incentives weakened due to uncertainty arising from central government investigation of pumped hydro storge:* amend this to a dry year risk and include Tiwai and Pumped Hydro as examples

d) *P1 Cyber-attack damages power system assets and/or cuts power supply:* place more emphasis on P1, and include NZX (2020), Waikato DHB (2021) and Colonial Pipeline (US) (2021) as examples

e) Add a new risk M8*: Continued reluctance to use live line techniques for suitable work reduces reliability through increased planned outages*

f) Amend S8 Unreliable social media commentary to include '…or thermal fuel deliveries' in the example

g) Add a new risk L9: *market confidence could be affected by the pain from high prices and security of supply (dry year) impacting on investor's willingness to invest long in term assets for de-carbonisation*.

James Stevenson-Wallace, Stephen Jay, and David Katz joined the meeting at 10.32 am.

8. Purpose and scope of next meeting's substantive papers

8.1. The Chair welcomed the system operator representatives to the meeting and introduced the paper. The Members discussed the purpose and scope of each paper for the August meeting.

8.2. **Understanding consumer behaviour and expectations**: Members noted the list of speakers and directed the secretariat to add a speaker for vulnerable consumers and suggested FinCap. Members also noted the secretariat should ensure the consumer groups are considered as three separate categories (residential, SME's, major consumers). This paper should focus on how well the industry is engaging with consumers (more focus on section 1.2.1b)).

8.3. In general, Members noted each paper for the August meeting should include a view on climate change.

8.4. **Understanding consumer behaviour and expectations*:*** Members discussed:

a) Including information about consumer's potential confusion around Solar, EV

b) limiting papers to security of supply issues – a narrower focus

c) including overseas examples of consumer interaction or advisory panels

d) including a review of how well industry is consulting consumers on the price-reliability trade-off.

8.5. **Understanding the value of electricity to consumers**: Members noted:

a) switching sections 1.3.1a) and b) around so the focus is on providing assurance

b) the paper should be from the Grid Owner's perspective

c) including a section on how VoLL could be better used by industry

d) including a section on reviewing if VoLL is incentivising or inhibiting network alternatives.

8.6. **Understanding demand for electricity:** Members discussed:

a) the timing of this paper as the Government is responding to the Climate Change Commission report but it was agreed it should proceed for the next meeting

b) the paper should cover the present but also have a future focus, for example potential future changes to demand as NZ works towards the 2030 target

c) including a section on alternative scenarios to the base case, and how those alternatives are selected

8.7. **Various measures of reliability**: discussion included:

a) this paper will be similar to those provided previously, but will include a risk management review to provide lessons learned from big events

b) looking at end to end of reliability, so needs to include (if possible) down to the LV distribution networks information, potentially from the Commerce Commission's monitoring.

8.8. **Security of supply updates**: it was noted it will be important that SRC is involved in providing feedback to the last year on Transpower's performance.

8.9. **Risk and strategy environmental scan**: the Authority should engage external expertise, similar to that engaged for the 2019 scan.

Doug Watt joined the meeting at 10.51 am and left the meeting at 10.59 am.

9. Update on security of supply situation

9.1. An Authority attendee introduced the paper and provided an overview of the work undertaken by the Authority and the initial reasons for this work. The Authority attendee noted the SRC could provide strong advice to assist with the post event review.

9.2. The system operator representatives provided a presentation, covering an update on the current hydro storage situation and the assumptions that inform their risk assessments. Main points included an explanation around the Electricity Risk Curves (ERCs) and why daily reporting was put in place before the curves reached the 1% threshold. The system operator noted their assessment that there is a current 30TJ shortage for gas to operate at full capacity, but they assume the market will take appropriate actions to close this gap. In previous years the market has acted in this way, and so far, the market has reacted as they expected.

9.3. Members raised as the following questions:

a) has the system operator considered looking forwards when modelling the ERCs to take into account climate change and trends over the last five or so years as the current curves are based on a time series looking backwards 89 years? The system operator representative advised that they do have some forward-looking curves, but these are not published.

b) are the gas assumptions correct and reality-based and is there confidence around integrity of information from the industry? In response, the system operator representative advised:

i. they publish both flex and non-flex gas curves

ii. this year is an unusual year as the gas availability is not normal due to production field constraints

iii. they have completed analysis and are confident the curves are correct and the current methodology and assumptions reflect the current policy settings

iv. they have good relationships with both upstream and downstream participants and receive timely and relevant information, often confidentially

v. they are currently running a fortnightly industry webinar which the current situation, updates to the ERCs and SSTs, and any other information relevant to the current situation.

Callum McLean joined the meeting at 11.13am.

Stephen Jay and David Katz left the meeting 11.49 am.

10. Wrap up discussion on agenda # 9

10.1. The Chair welcomed questions and discussion on the security of supply information provided. Discussion included:

a) Whether media is part of the dry-year post-event review the Authority is planning on conducting (particularly the mis-information published recently). An Authority attendee provided assurance this would be included

b) Much of the discussion on the current security of supply situation is motivated by the current high wholesale price and forward hedging large industrial users undertake

c) Members are supportive of the dry year review planned and agree the Authority should receive more information on gas

d) Many houses have bottled gas and the cost in the future to move to another fuel supply when there is no gas will be large for many consumers

e) Members agreed there is a need for more transparency on the ERCs and that perhaps the methodology has simplistic assumptions (around the belief a deal will be struck)

f) The triggering of the early reporting was due to a Government who hasn't had experience with a dry year and the policies, systems and processes in place to manage one

g) The current dry year situation is giving policy makers an insight into some of the issues that will need to be dealt with in the transition to the 100% renewables target

3. Action: SRC encourages more insight into the supply lines for thermal fuel and encourages the Authority to mandate more information disclosure either directly or through other regulators

The meeting broke for lunch at 12.14 pm and reconvened at 12.35 pm.

12. Fit for purpose review: controlling the risk of supply emergencies using security of supply forecasting and official conservation campaigns

12.1. The Chair introduced the agenda item noting all fit for purpose papers were taken as read, and only high-level discussions on these should occur. Members agreed to provide advice to the Authority on the risks for each paper. The SRC's responses to each risk for the fit for purpose reviews are provided in individual tables in Appendix A.

12.2. The Strata Energy representative provided a high-level overview of the paper and led the SRC through the risk section. SRC responses are provided in Appendix A.

Clive Bull, Philip Beardmore, Stephen Jay and Callum McClean joined the meeting at 12.38 pm.

Stephen Jay left the meeting at 1.00 pm.

Callum McClean left the meeting at 1.20 pm.

16. Fit for purpose review: generation

Note: The Chair took this paper out of sequence

16.1. The Strata Energy representative provided a high-level overview of the paper and led the SRC through the risk section. SRC responses are provided in Appendix A.

14. Fit for purpose review: transmission and distribution

14.1 The Strata Energy representative provided a high-level overview of the paper and led the SRC through the risk section. SRC responses are provided in Appendix A.

Tim Hewitt joined the meeting at 1.56 pm.

Andrew Doube left the meeting at 1.56 pm and re-joined at 2.37 pm.

Mike Underhill left the meeting at 2.25 pm.

15. Fit for purpose review: transmission and distribution

15.1 The Strata Energy representative provided a high-level overview of the paper and led the SRC through the risk section. SRC responses are provided in Appendix A.

Philip Beardmore left the meeting at 2.41 pm.

Tim Hewitt left the meeting at 3.09 pm.

13. Fit for purpose review: consumer-premises equipment

13.1 The Strata Energy representative provided a high-level overview of the paper and led the SRC through the risk section. SRC responses are provided in Appendix A.

Clive Bull left the meeting at 3.24 pm.

17. The SRC's forward work programme

17.1. The Chair noted the August meeting included a visit with the Authority Board the day before the SRC meeting. The Secretariat advised the SRC would meet with the Authority Board as the last agenda item and then join the Board for informal discussion afterwards. The Chair also noted the August SRC meeting would include the annual strategy session.

17.2. Discussion was held around renaming G2 in order to progress with some of the sub projects. This will be discussed further at the August meeting.

17.3. Members requested if papers were ready early for the future meetings, the Secretariat send more detailed papers to members earlier.

4. Action: Secretariat to make the following changes to forward work programme:

a) bring the 'Gas industry reliability and resilience' theme papers forward to Q4 of 2021

b) move the emergency preparedness paper to Q1 of 2022

c) move the cyber-security survey report to Q1 of 2022

d) move the themes for Q1, Q2 and Q3 2022 to Q2, Q3 and Q4 respectively.

5. Action: Secretariat to invite MBIE to August meeting in order to discuss the NZ Battery project

The meeting ended at 3.30 pm.

Appendix A Tables summarising initial evaluations of current regulatory arrangements and SRC response

Table 1: Summary of initial evaluation of whether regulatory arrangements for security of supply forecasting and OCCs are effective in managing the risk of supply emergencies (SRC12)

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
1	The energy and capacity security of supply standards may be materially incorrect.	The security of supply standards may be materially too low. This could result in the under-build of generation, should the annual Security of Supply Annual Assessment (SoSAA) be used as a key information input to generation investment decisions. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements may be improved** The 2017–2018 review of security of supply standards identified one likely regulatory change: The South Island winter energy margin was found to be analytically worthless due to improvements in HVDC link capacity. Therefore, it should be removed. The 2017–2018 review also mooted shifting responsibility for calculation of winter security margins from the Authority to the system operator and having these standards recalculated regularly in a more dynamic way. Given the transition to a low-carbon economy, reviewing the security of supply standards would seem desirable. Therefore, the secretariat suggests the SRC advise the Authority to commit to a timeframe for completing the next review of the standards.[2]	The SRC notes this evaluation, but did not consider the SRC needed to provide a recommendation to the Authority.
2	Information on gas supply arrangements may be incomplete.	The system operator's information on gas supply arrangements is not as fulsome as it could be, which adversely affects the accuracy of the system operator's security of supply information and short- to medium-term forecasting.	**Effectiveness of regulatory arrangements could be improved** The secretariat understands the system operator considers the informal approach to exchanging information on gas supply arrangements provides valuable opportunities for exchanging	The SRC agrees with the evaluation and also recommends coordination with the gas industry.

[2] Refer to https://www.ea.govt.nz/development/work-programme/risk-management/winter-energy-and-capacity-margins-review-20172018/development/.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
		This could result in industry participants making demand/supply decisions (eg, scheduling of plant maintenance) that contribute to or exacerbate supply emergencies. **Initial evaluation:** **Likelihood: Medium likelihood of risk becoming an issue**	information that a more formal process may inhibit. However, it would appear prudent for the Authority to review whether there are potential options to improve on the current informal approach. The secretariat suggests the SRC advise the Authority to include this review in its current work on wholesale market information disclosure.	
3	The ability of the power system to operate with low and uneven hydro lake levels is not well understood.	The ERC approach effectively treats the controlled hydro lakes (Tekapo, Pukaki, Hawea, Te Anau, Manapouri, and Taupo for national analysis) as a single large reservoir. “Shortage” is interpreted as the point where the super-reservoir runs out of water (or would run out of water, if not for rolling outages). In practice, a severe supply emergency would likely result in some hydro lakes running low on water before others. The possible consequences are not well understood. For instance, there could be capacity shortages before total hydro lake storage was exhausted. Therefore, the ERCs may overstate the ability of the power system to operate using water from key hydro lakes with reasonable storage when one or more other key hydro	**Regulatory arrangements appear effective** The risk is more with the inputs and assumptions used in determining the ERCs, rather than the regulatory arrangements within which the ERCs sit. The best way to resolve the issue may be for Transpower to carry out analysis to better understand how the power system may operate with low and uneven hydro lake levels, and to communicate the results to interested parties. The Authority may have some role in instigating this work.	The SRC notes the evaluation and agreed to take up the offer from system operator to look into this and provide a paper to the Authority.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
		lakes are drawn down to a very low level. If so, appropriate mitigating steps, such as an OCC, may not occur early enough. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**		
4	An OCC may end too soon because the trigger for ending an OCC is inappropriate.	From September to December the triggers for starting and ending OCCs are very close together. An OCC during this period could end shortly after it began if hydro storage quickly rebounded from the 10% ERC to the 8% ERC. But another OCC could start soon thereafter (ie, after less than a week), if hydro storage fell to the 10% ERC again. Such 'flip-flopping' behaviour would undermine conservation efforts. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Regulatory arrangements appear effective** The Authority looked at this issue in 2018–2019 and made a minor change to the regulatory arrangements. Submitters on the Authority's Code amendment proposal suggested alternatives to both the Authority's proposal and the Authority's final decision. It may be prudent to revisit this risk within five years, as part of a periodic general review of the regulatory arrangements for using OCCs to manage supply emergencies. The system operator and Authority can agree alternative dates to start and stop OCCs, so could intervene to mitigate the impact of this risk.	The SRC agrees with the evaluation.
5	The Code provisions for sub-national OCCs may not be appropriate.	Negative consumer perception of a South Island-only OCC could undermine its perceived legitimacy, weaken its	**Effectiveness of regulatory arrangements may be improved**	The SRC agrees with the evaluation.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
		effectiveness, damage long-term confidence in the electricity industry and affect the durability of the OCC and CCS arrangements. Running a South Island-only campaign could also undermine energy conservation efforts by creating additional complexity, particularly if it segued into a national campaign or vice versa. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	When clause 9.23 of the Code was drafted in 2011, relatively limited southward transfer capacity existed on the HVDC link. Changes in the physical power system since 2011 have improved the ability to transfer energy from the North Island to the South Island. In 2018–2019 the Authority sought feedback on removing South Island-only OCCs—first, as part of a consultation on other changes to the regulatory arrangements for OCCs, and then via a survey. While most survey respondents supported the removal of South Island-only OCCs, the Authority was not satisfied they were adequately representative of the parties affected by the proposed change. The Authority therefore could not be satisfied there was widespread support to amend the Code using section 39(3)(b) of the Act. The Authority's preliminary analysis suggests the overall net benefit from removing South Island-only OCCs is unlikely to be very significant, given the infrequency of these. There may be an opportunity to include this change as part of one of the Authority's omnibus Code amendment proposals. The system operator and Authority can agree alternative dates to start and stop OCCs, so could intervene to mitigate the impact of this risk.	

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
6	Retailers may not have a sufficiently strong incentive to avoid rolling outages.	The CCS creates a strong incentive for retailers to act to avoid OCCs. However, there is no compensation requirement on retailers in the event of rolling outages due to an energy shortage. Retailers may therefore have an incentive to hasten rolling outages if an OCC has already begun. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Regulatory arrangements appear effective** The system operator decides on the length of an OCC independent of retailers' commercial interests. It may be prudent to revisit this risk within five years, as part of a periodic general review of the regulatory arrangements for using OCCs to manage supply emergencies.	The SRC agrees with the evaluation.
7	Inaccurate inputs and assumptions may cause material inaccuracies in the ERCs.	The system operator must use various inputs and assumptions when determining the ERCs. There is always the risk of inaccuracies in these inputs (eg, inaccurate data provided to the system operator by participants) and assumptions (eg, that short-term market behaviour seeks to minimise use of hydro storage during periods of low inflows). Material inaccuracies in these inputs and assumptions would be likely to cause material inaccuracies in the ERCs. This could result in hydro lakes being drawn down faster or slower than is optimal. If they are mistakenly drawn down too quickly, this increases the risk of an OCC being needed and possibly rolling outages.	**Regulatory arrangements appear effective** The system operator reviews the inputs and assumptions used in the ERCs in a timely manner. The system operator also publishes the inputs and assumptions used in determining the ERCs, subject to restrictions on confidential information. This provides an opportunity for interested parties to provide the system operator with updated information where those parties consider the ERCs' inputs and assumptions to be inaccurate. The willingness of interested parties to provide the system operator with information appears to be good, although there is no regulatory compulsion underpinning this. Given the expected changes to the electricity industry over the coming years (eg, the uptake	The SRC agrees with the evaluation, and notes the desirable end state is for consistent and fully transparent information available for all fuels, not just hydro.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
		Initial evaluation: **Likelihood: Low likelihood of risk becoming an issue**	of distributed energy resources), it may be prudent to revisit this risk within five years, as part of a periodic general review of the regulatory arrangements for using OCCs to manage supply emergencies.	

Table 2: Summary of initial evaluation of whether regulatory arrangements for consumer premises equipment are effective in managing the risk of major supply reliability events (SRC13)

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
1	Under-frequency events impacting the entire grid are exacerbated by substandard or incorrectly set inverters at consumer premises	Solar PV and BESS indirectly connected to distribution networks through DC/AC power inverters may not 'ride through' (i.e. remain connected and operating) a major generation failure, thereby exacerbating grid-wide under-frequency events, and potentially triggering automatic under-frequency load shedding (AUFLS). Note: this is similar to an equivalent risk discussed in the transmission paper; in this case, the inverter is consumer premises equipment. **Low likelihood of risk becoming an issue in the short term**	**Effectiveness of regulatory arrangements needs to be improved** The system operator has recognised this identified risk and has undertaken relevant investigative work. In cooperation with the system operator, the Authority is scoping a work programme to review the performance aspects of the inverter standards for distributed generation. At the transmission level, the Authority is well underway with a review of Parts 8 and 13 of the Code that has as its objective the enablement of grid-scale (battery) energy storage systems (BESS) to provide instantaneous reserve. WorkSafe regulates electrical safety but that does not cover inverter performance as it impacts networks. The ESRs cite a very out of date standard (AS 4777.1:2005) in respect of electrical equipment safety and this is a known issue.	The SRC notes this evaluation
2	LV and distribution network under and over-voltage events exacerbated by substandard or incorrectly set inverters at consumer premises	Solar PV and BESS indirectly connected to distribution networks through DC/AC power inverters may exacerbate local network	**Effectiveness of regulatory arrangements needs to be improved** The system operator has recognised this identified risk and has undertaken	The SRC notes this evaluation

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		over-voltage conditions, potentially triggering inverter shutdown or local high voltages adversely impacting the power quality received by network neighbours. **Low likelihood of risk becoming an issue in the short term**	relevant investigative work. In cooperation with the system operator, the Authority is scoping a work programme to review the performance aspects of the inverter standards for distributed generation. At the transmission level, the Authority is well underway with a review of Parts 8 and 13 of the Code that has as its objective the enablement of grid-scale (battery) energy storage systems (BESS) to provide instantaneous reserves.	
3	Large capacity appliance consumption at times of peak network usage	Charging EVs coincident with a winter evening peak leads to severe network overloading and voltage collapse **Low likelihood of risk becoming an issue in the short term**	**Effectiveness of regulatory arrangements needs to be improved** EV charging (like all domestic power use) is currently unregulated. It is left to distributors to monitor uptake and load profiles and inform consumers about potential issues. Some distributors have introduced time of use network pricing, including through tailored EV tariffs. Nationally consistent approaches including standardisation through regulatory arrangements should be considered. See also section 4.3 below.	The SRC notes this evaluation
4	Inverters do not comply with standards or are set incorrectly	Inverters that do not conform with the appropriate standard or have settings tampered with may perform poorly in	**Effectiveness of regulatory arrangements needs to be improved** The inverter standard AS/NZS 4777.2 is not currently regulated but is included in	The SRC notes there needs to be more focus on enforcement of Standards, especially the

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		terms of frequency, voltage, protection, harmonic distortion and system event 'ride through', leading to local voltage outside statutory limits and/or exacerbating grid-wide under-frequency events, and potentially triggering automatic under-frequency load shedding (AUFLS). **Low likelihood of risk becoming an issue in the short term**	good industry guide developed by the EEA, including with appropriate settings for the advanced power quality modes provided by modern inverters. Through their connection and operation standards, distributors have the ability to require compliance with AS/NZS 4777.2. The standard is cited in Part 6 of the Code but its function in that part of the Code is as an eligibility criterion governing access to a faster track DER connection approvals process. See also section 4.3 below.	technical performance (non-safety) aspects as Worksafe does not cover this. There is potential for regulations, although there are jurisdictional issues as the Authority cannot regulate non-participants, so would need to be done through another agency which may not have the performance of the electricity system as a priority.
5	Cyber risk	Inadequate cyber security of consumer premises equipment leads to material harm to those systems, impacting supply reliability. A bad actor gains access to and control of critical IP-addressable network-connected consumer premises equipment, such as smart control systems and uses this access to disrupt consumer premises equipment.	**Regulatory arrangements may not be effective** Information disclosure requires publication of asset management plans. However, making mitigation strategies and defensive measures public would be counter-productive if it provides information that bad actors may use against the distributor. *Confidential presentations and surveys related to this risk have been commissioned and given to the SRC.* *Needs further assessment by specialists.*	The SRC will investigate incorporating questions about minimum standards for cyber-security into the cyber-security survey. The SRC considers this is an area which should be considered by the regulator.

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		AMI is subject to cyber risk because it is networked. **A reasonably likely possibility of a risk becoming an issue in the short term**		
6	Inadequate market arrangements for participation of new technology consumer premises equipment.	Aggregations of small scale DER is enabled in energy and ancillary services markets by Code amendments and changes to MOSP service terms. However, if dispatched resources fail to perform this could lead to AUFLS activation during an under-frequency event. **Low likelihood of risk becoming an issue in the short term**	**Regulatory arrangements appear effective** The Authority regulates the electricity market via the Code. Numerous complex improvements have been developed over many years and are fully operational. Performance is monitored over time and major system events are monitored and, in some cases, subject to further investigation.	The SRC notes the Authority's continuing work in this area. The SRC also notes the Code has some barriers to new technologies and needs to be more technology neutral, or where technology specific regulation is required, that this does not present a barrier to other technologies.

Table 3: Summary of initial evaluation of whether regulatory arrangements provide effective controls on the risk of unplanned transmission outages (SRC14)

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
1	Inaccurate longer-term demand forecasts result in insufficient transmission being built to ensure that demand never exceeds transmission capacity.	If demand were to exceed transmission capacity, then demand response / load shedding would be needed. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**The effectiveness of regulatory arrangements needs to be improved** The Transpower capital expenditure input methodology provides for Transpower to propose major capital expenditure transmission investments to accommodate expected demand growth. Demand-driven investment proposals are overlaid on the grid reliability standards in the Code. However, these use an out-of-date definition of the core grid. (Refer to the next identified risk area.)	The SRC notes this evaluation.
2	The defined core grid used in the grid reliability standards is out-of-date.	The definition of the core grid excludes changes to the grid, changes in grid demand, and generation investments over the past 15 years. If the outdated core grid defined in the Code were to result in the under-build of transmission or delays in the replacement of aging assets, then this could lead to a transmission capacity shortfall. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements needs to be improved** Currently, when assessing whether the grid satisfies the grid reliability standards, Transpower and other industry stakeholders are meant to ignore the various changes to the grid and its usage over the past 15 years. At a minimum, the current regulatory arrangements need updating to ensure the second (deterministic) limb of the grid reliability standards refers to all relevant grid assets. The Authority may wish to place back onto its work programme a review of the grid reliability standards. This review could encompass:	The SRC notes the grid reliability standards are due for a review and recommend the Authority, as a minimum, review the ‘core grid’ definition.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
			• a review of the second limb of the grid reliability standards and the core grid definition • a review of the consistency of the grid reliability standards and investment triggers attached to the grid reliability standards with the Transpower capital expenditure input methodology determination, and the system operator's operational standards • a review of the effect of emerging technologies on the grid reliability standards.	
3	The benefits and costs of proposed transmission investments are estimated inaccurately.	If a proposed transmission investment's net benefit were underestimated,[3] resulting in the investment not being made, this could mean an under-build of transmission or delays in the replacement of aging assets. This could lead to a transmission capacity shortfall. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements could be improved** Although the value of expected unserved energy in Schedule 12.2 of the Code has not been reviewed for several years, the Transpower capital expenditure input methodology provides for Transpower to use another appropriate value per MWh instead of the value in the Code.[4] However, the value of expected unserved energy is used as a default value for other initiatives that affect reliability of supply (eg, when Transpower applies the net benefits test specified in the outage protocol to assess proposed planned outages, connection asset variations, and interconnection asset variations).	The SRC encourages the Authority to review the expected value of unserved energy in the Code]

[3] The Commerce Commission has advised the secretariat that an under-estimation of a proposed transmission investment's net benefit due to an over-estimation of project costs is a reasonable risk.

[4] Refer to the definition of 'value of expected unserved energy' in Part 1 of the Transpower capital expenditure input methodology, p. 21.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
			Therefore, it would seem prudent to review the value of expected unserved energy in the Code.	
4	Unplanned network interruptions.	The transmission network may have unplanned outages, despite network redundancy. Reasons might include: • asset failure • environmental causes (eg, seismic activity, flooding) • third party activity (eg, helicopter contacts). **Initial evaluation:** **Likelihood: High likelihood of risk becoming an issue**	**Regulatory arrangements appear effective** The outage protocol requires Transpower to deal with an unplanned outage as quickly as reasonably possible and in accordance with good electricity industry practice. The IPP determination for Transpower sets quality standards for Transpower to meet in combination with financial incentives, which provide Transpower with an incentive to maintain or improve quality of supply.	The SRC agrees with this recommendation.
5	Inadequate security for information and internet-connected network and non-network systems.	A 'bad actor' disrupts network operation and/or destroys network equipment by accessing: • transmission network information physically or electronically (cyber attack), • transmission network infrastructure electronically (cyber attack).	**Effectiveness of regulatory arrangements could be improved** Information security and cyber security for grid owners are not regulated in a prescriptive manner. Legislation or regulation that prescribes in detail how information must be protected, or sets outcome-based performance standards will quickly become outdated.[5]	The SRC will investigate incorporating questions about minimum standards for cyber-security into the cyber-security survey. The SRC considers this is an

[5] Refer to the SRC paper 'Industry arrangements for information security: An overview of arrangements relating to cyber and physical security of information', 22 October 2015, p. 11.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
		Successful cyber attacks on non-network IT systems may afford access to critical network business systems. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	However, it may be worth exploring the benefits and costs of requiring grid owners to adopt an internationally recognised cyber security maturity framework, such as the Electricity Subsector Cybersecurity Capability Maturity Model (C2M2)[6].	area which should be considered by the regulator
6	A lack of transparency of reduced grid security.	If consumers and generators are unaware of reduced grid security, they cannot take actions to reduce the adverse effects on themselves of any grid outage that occurs during the period of reduced grid security. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements could be improved** The outage protocol specifies policies and procedures to ensure Transpower involves its customers in decision-making and coordination around planned outages. However, the outage protocol has not been reviewed since it came into effect in January 2008. It would appear timely for a review of the outage protocol to occur, so that learnings from outages over the past 13 years can be incorporated in it (eg, re-planning of outages at short notice). This review could explore benefits and drawbacks of arrangements for larger distribution-connected consumers and generators to be made aware of a forthcoming reduction in grid security in a timely manner (eg, thereby providing time for consumers	The SRC recommends the Authority request the system operator undertake a review of the outage protocol

[6] EMCa, May 2019. Transpower Regulatory Control Period 3 Proposal: Review of aspects of the proposed ICT expenditure, Report to New Zealand Commerce Commission.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
			to hire back-up generators or schedule plant maintenance). It is worth noting that the Commerce Commission requires disclosure on the extent that Transpower has placed customers on N-security, including: • when it has occurred • how much notice Transpower provided to customers • the point of service affected by a reduction to N-security.[7]	
7	Underfrequency events exacerbated by inverters.	Distributed energy resources (DER) connected to distribution networks through DC/AC power inverters (inverters) may not 'ride through' a major generation failure, thereby exacerbating under-frequency events, and potentially triggering automatic under-frequency load shedding (AUFLS). **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements needs to be improved** The system operator has recognised this identified risk and has undertaken relevant investigative work. In cooperation with the system operator, the Authority is scoping a work programme to review the performance aspects of the inverter standards for distributed generation.[8] At the transmission level, the Authority is well underway with a review of Parts 8 and 13 of the Code that has as its objective the enablement of grid-scale (battery) energy storage systems (BESS) to provide instantaneous reserves. The Authority is also formally requesting WorkSafe update the Electricity (Safety)	The SRC notes this evaluation

7 Commerce Commission, 29 August 2019, Transpower's individual price-quality path from 1 April 2020, Decisions and reasons paper, p. 193.

8 Although WorkSafe is the safety regulator for inverter standards, the Authority can make regulations relating to the performance of network-connected equipment.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
			Regulations 2010, so they refer to the correct inverter standard.[9]	

9 AS/NZS 4777.2:2015.

Table 4: Summary of initial evaluation of whether regulatory arrangements for distribution are effective in managing the risk of widespread supply reliability events (SRC15)

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
1	New technology	Distribution congestion – consumer demand from the network exceeds distribution capacity (local over-current, under-voltage) Rapidly increasing penetration of in-home EV chargers adds significantly to ICP-level peak demand, especially if a peak is coincident with traditional winter evening peak demand periods. Similarly, electrification of process heat could result in the same risk. Issues may emerge at sub-transmission, distribution and/or LV network levels but possibly more acute at LV as LV networks are expected to experience materially different demand profiles from consumer EVs. **Initial evaluation:** **Likelihood Unlikely**	**Regulatory arrangements appear effective; at least for now** EDBs and regulators have a relatively long run-up to material levels of suburban EV charging. Time-of-use price signalling is already signalled as being acceptable by the Authority, which can regulate distribution pricing. The Commission periodically polls regulated businesses for emerging issues. If investments in network monitoring and/or capacity become an issue, the Commission has the regulatory tools to assess and adjust asset management plan expectations and price-quality path regulation.	The SRC notes this evaluation
2	New technology	Distribution congestion – export from consumer premises exceeds distribution capacity (local over-current, over-voltage) Rapidly increasing consumer investments in distributed energy resources (DER) at consumer premises overwhelms existing levels of distribution network (11 kV) and	**Regulatory arrangements appear effective; at least for now** EDBs and regulators have a relatively long run-up to material levels of changes to DER. Time-of-use price signalling is already signalled as being acceptable by the Authority, which can regulate distribution pricing. The Authority can also	The SRC notes this evaluation

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		low voltage network (LV, i.e. 400/230 V) hosting capacity. Consumer solar and battery installations inject excess energy into premises (decreasing net import from the network at irregular times of the day) or inject excess net energy into the network at irregular times of the day. **Initial evaluation:** **Likelihood Unlikely**	amend Part 6, which deals with connection of distributed generation to address a problem. The Commission periodically polls regulated businesses for emerging issues. If investments in network monitoring and/or capacity become an issue, the Commission has the regulatory tools to assess and adjust asset management plan expectations and price-quality path regulation. The Authority regulates connection of distributed generation under Part 6 of the Code. Part 6 requires that distributors publish connection and operation standards that can impose relevant standards for connection equipment. If there is an issue, it is to do with the lack nationally consistent approaches by the 29 distributors.	
3	New technology	(L4) Reduced resilience through greater dependence on automation/AI. EDBs' reliance on IT systems for monitoring and diagnosis leads to more frequent supply interruptions, impacting supply reliability. **Initial evaluation:** **Likelihood Unlikely**	**Regulatory arrangements appear effective; at least for now** EDBs and regulators have a relatively long run-up to any material issues in this area. Properly deployed, increased reliance on automation and AI may in fact improve resilience especially in rarely encountered operational circumstances. As with most longer term risks, regulatory reviews need to maintain a watchful stance and act if/when the risk becomes a shorter term or pervasive risk.	The SRC notes this evaluation
4	New technology	LV networks are not closely monitored by EDBs. Lack of monitoring of LV network status (energisation, voltage, power flow, consumer net demand/injection), outage information and lack of access to	**Regulatory arrangements appear effective; at least for now** EDBs and regulators have a relatively long run-up to monitor and investigate this risk. The price-quality regulated EDBs together can charge consumers around $1b per year, which can be used for innovative approaches or new technology.	The SRC notes this evaluation

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		information available from advanced meters leads to increasing reliability and power quality issues. **Initial evaluation:** **Likelihood Likely**	The 0.1% refers to an additional incentive mechanism that is in addition to the other incentives to innovate, with funding already available. The Commission's price-quality path regulation provides an additional incentive mechanism that is in addition to the other incentives to innovate, with funding already available., If investments in network monitoring become an issue, the Commission has the regulatory tools to assess and adjust asset management plan expectations and price-quality path regulation. This will require close and enduring engagement by the Commission and the regulated EDBs. A possible issue is that not all EDBs are subject to price-quality path regulation. This may have delivered good outcomes for affected consumers under relatively steady-state circumstances but may not be fit-for-purpose in the future if/when consumers adopt new DER and EV technologies at scale.	
5	Cyber risk	Inadequate cyber security of critical network and non-network systems leads to material harm to those systems. Impacting supply reliability. A bad actor gains access to and control of critical IP network-connected operational equipment, such as Supervisory Control and Data Acquisition (SCADA) and network protection systems and uses this access to disrupt or destroy network equipment. Successful attacks on non-network IT systems may afford access to critical business systems.	**Regulatory arrangements may not be effective** Information disclosure requires publication of asset management plans. However, making mitigation strategies and defensive measures public could be counter-productive if it provides information that bad actors may use against the EDB. *We understand that reports related to this risk have been commissioned in some cases but, for obvious reasons, these are kept confidential.* *Needs further assessment by specialists.*	The SRC will investigate incorporating questions about minimum standards for cyber-security into the cyber-security survey. The SRC considers this is an area which should be

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		Initial evaluation: **Likelihood Likely**		considered by the regulator.
6	Regulatory arrangements	Reliance on historical levels of SAIDI/SAIFI for information disclosure and setting price-quality paths: • may not be an effective indicator of long run reliability • may not be sufficient to bring underlying reliability issues to the surface. Consequently, there is a risk that EDBs may not invest to achieve efficient reliability levels, leading to diminished supply reliability. **Initial evaluation:** **Likelihood Likely**	**Regulatory arrangements may not be effective** SAIDI/SAIFI metrics are not perfect, but appear to be a practical measure that EDBs and the Commission have good data for. The compliance and enforcement effects are quite strong, with recent court imposed penalties in the millions. Key issues: - There's a time lag between poor asset management (e.g. under-investment and high SAIDI). Recognising this, the Commission looks at other measures like asset age and condition as well. - It's difficult to assess what consumers think of the price-quality trade-off. When engaged, consumers typically don't want to pay extra for better quality, which is why the Commission uses historical data as a baseline. The Commission is encouraging EDBs to improve their consumer engagement to better understand this. It's also made more difficult by different consumers having different preferences – that are supplied from the same network. - SAIDI and SAIFI data excludes the low voltage part of the network, which might be an increasingly large source of problems with high EV penetration. Further, the price-quality path aspect applies only to EDBs subject to price-quality path regulation. Default price-quality paths represent a simplified, low burden regulatory approach to regulating monopoly infrastructure businesses. Customised	The SRC notes it would be practical to see what the ENA work looks like (ENA has a quality working group) and then revisit this.

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
			price-quality paths are provided as the mechanism for addressing situations where a EDB considers the default path does not meet its specific needs. However, EDBs have argued that CPP applications have a high barrier as they are costly to prepare and give rise to a significant burden of business disruption. EDBs can also apply for a quality standard variation.	
7	Regulatory arrangements	Regulatory arrangements are not sufficient to incentivise innovation. For example EDBs have an incentive on them to grow their RAB. Technology may be exacerbating how these arrangements are being perceived. **Initial evaluation:** **Likelihood Uncertain**	**Current regulatory arrangements may require review as new technology impacts on EDBs become more certain** This is a difficult risk to assess. The risk is not that there's a chance that innovation is not incentivised at all, rather the risk is that insufficient innovation occurs (although 'insufficient' is at best a qualitative assessment). Even then, innovation needs to be linked to reliability. The Commission discussed this in their reasons paper on the 2020 price-quality path reset for EDBs. The section is worth reading in whole at this link, page 80, paragraphs 4.52 – 4.55.	The SRC notes this evaluation
8	Regulatory arrangements	The review of the 'Tree Regs', announced in 2015 but only started in 2019 due to competing priorities, fails to capture the potential to improve supply reliability. The specific risk is that the review will not provide the workable process and risk based approach that EDBs seek. **Initial evaluation:** **Likelihood Likely**	**Current regulatory arrangements are ineffective** As concluded in MBIE's scoping review, the current arrangements are inadequate. The full review, while started, appears to operate at a low priority and, at this stage of the process, there is a significant likelihood that EDBs may not get the improvements they seek.	The SRC consider the completion of the review of the 'Tree Regs' is critical to the safe operation of the industry.

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
9	Asset management related	Consumers connected downstream of N security networks (at distribution, sub-transmission and/or transmission levels) receive lower reliability network service that may not meet their expectations. Both planned and unplanned outages trigger loss of supply unless local backup solutions are provided (by the consumer or that network asset owner). **Initial evaluation:** **Likelihood Likely**	**Current regulatory arrangements are likely effective** Disclosure of asset management plans provides a major focus on each EDB's approach to setting security levels in different supply situations. Forecast expenditures to maintain and improve supply security are also provided. EDBs are required to seek consumer feedback on their approaches to asset management. The Commission's asset management focus may highlight opportunities to improve the cost-effectiveness of supply alternatives, particularly given the capabilities of new technologies and rapidly decreasing costs. For example, consumer solar PV, batteries and so-called 'smart network' technologies may provide cost-effective solutions that can be tailored to meet individual consumer preferences and reliability values. The Commission's resilience and risk preparedness paper linked here has some relevant discussion.	The SRC notes this evaluation
10	Asset management related	Asset failure – societal cost of the failure is not reflected. Inappropriate assessment and/or application of Value of Lost Load (VoLL) parameters and local load duration profiles in network development planning. **Initial evaluation:** **Likelihood High**	**Current regulatory arrangements are likely ineffective** Related to risk 9. Over time, VoLL assessments and their application within regulated asset management planning have become more granular in terms of their ability to take account of local circumstances. For example, transmission planning historically used a VoLL of $20,000/MWh for all grid exit points, regardless of the consumers within and circumstances of the supplied region. However, probabilistic network planning approaches are well established and used in other jurisdictions related to distribution. For example, the Australian Energy Regulator (AER) requires that regulated EDBs use probabilistic planning	The SRC agree with the principle of a probabilistic approach to asset management should be used.

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
			techniques in their expenditure planning. Similar to the recent focus on asset criticality, probabilistic expenditure planning could be considered for application in New Zealand. Probabilistic planning approaches take local load duration (i.e. 'peakiness') and a more disaggregated consumer VoLL profile into account in expenditure decision making.	
11	Asset management related	(part L3) Ageing and/or under-invested distribution assets lead to deteriorating supply reliability and a bow wave of expenditure to recover the situation. **Initial evaluation:** **Likelihood Possible**	**Current regulatory arrangements are likely effective for non-exempt EDBs** The Commission has both the regulatory tools (information disclosure and price-quality path regulation) and the strategic focus on asset management to bring issues to light (information disclosure) and track the businesses' own monitoring and decision making (disclosure of asset management plans). However, the regulated businesses themselves have a major role in outcomes for their consumers, making decisions that balance performance with profitability. EDBs exempt from price-quality path regulation may have a greater ability to avoid early detection as compared with non-exempt EDBs. Lacking access to a CPP may also leave an exempt business 'on its own' facing up to its consumer owners and justifying accelerated price rises. The recent CPP decision for Aurora showed that regulation can deliver an outcome that should provide a recovery path. Time will tell whether the performance/profitability settings inherent in the Commission's decision are efficient.	The SRC notes this evaluation
12	Asset management related	(P5) Insufficient information	**Current regulatory arrangements are likely effective** The Commission's information disclosure toolset provides a wide range of regularly updated performance metrics	The SRC notes this evaluation.

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		sharing and planning amongst industry participants in relation to reliability of supply risks. **Initial evaluation:** **Likelihood Unlikely**	enabling analysis and benchmarking across EDBs. While it may impose a burden on the resources of some EDBs, the highly structured data gathering approach itself conveys notions of good industry practices, i.e. the performance metrics a EDB should be tracking itself. An example of this effect is the degree of sophistication of the current structured, documented AMPs as compared with where EDB practices were at under less regulated arrangements, say 20 years ago. A possible area for improvement could be sharing the lessons from major supply failure events. The natural initial stance of a EDB (or transmission owner) in a major event is to protect its reputation by controlling the process and information released, at least until the causes and effects are well understood by it, and likely forgotten by affected consumers. The 2014 Penrose fire is a memorable major event that brought to light the failure to recognise the fundamental risk of co-locating numerous cable circuits, including numerous cable joints, in a single open-air trench. The Minister's rapid initiation of an inquiry under section 18 of the Act ensured this did not happen and that lessons learned, disseminated across industry, were a primary objective of the inquiry. Not all major events might invoke a similar level of Ministerial interest and we consider more transparent and certain process would assist in disseminating lessons learned from lower impact but interesting and informative events.	The SRC suggests that a good step for sharing lessons would be to mandate that all asset owners publish reports on major asset failures
13	Asset management related	(P6) Changes in industry live line and supply restoration operating guidelines lead to reduced supply reliability performance. **Initial evaluation:**	**Regulatory arrangements are unlikely to have a material bearing on this risk** … at least as they relate to supply reliability. The change in some EDB (and Transpower) policy in recent years has been driven by safety risk concerns.	The SRC notes this evaluation

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		Likelihood Likely	In the current environment, it is up to Board's and management of individual EDBs to set policy relevant to live line work and supply restoration practices. *Requires further assessment.*	
14	Asset management related	(L6) Loss of industry knowledge and capability through an aging workforce affecting supply reliability. **Initial evaluation:** **Likelihood Unlikely**	**Regulatory arrangements are unlikely to have a material bearing** Subject matter experts and highly experienced individuals eventually slow down and/or retire, move industries, move within in the industry, and suffer illnesses that affect careers. The risk expressed here may simply reflect current trends in population demographics.	The SRC notes this evaluation
15	External events with widespread or global impact	(P4) COVID-19 (or any future) pandemic harms supply reliability and leads to extended supply interruptions. The coronavirus impacts are associated with: a) personnel capability and travel, particularly in relation to mobile field service personnel moving and working between local locations and possibly multiple regions b) the lack of availability of imported goods/services, particularly network spares, replacement and development equipment. EDBs relied on current stocks of spares during the 3 lockdowns and may have depleted stocks and take time to recover, especially for overseas manufactured items. If there is another Level 3 or 4 lockdown	**Regulatory arrangements appear effective for the most part** EDBs largely took their own initiatives within nationally set movement restrictions, thereby treating the event more like a business-as-usual situation (as opposed to something that required an immediate engagement with industry regulators). For future lockdowns, there may need to be more formalised essential services status provided by the Ministry of Health and/or the Police, so that frontline line staff can traverse regions and get to trouble spots. The Authority's market monitoring function reached out to a sample of EDBs and field service providers to gain an understanding of responses taken across the distribution sector.	The SRC notes it has previously provided advice on Covid19 / pandemics.

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
		before stocks are recovered there may be issues restoring electricity supply after faults. c) general level of preparedness and responsiveness for managing incidents. **Initial evaluation:** **Likelihood Unlikely**		
16	External events with widespread or global impact	(P2) Physical attack (war, terrorism, sabotage) damages power system assets and/or cuts supply. **Initial evaluation:** **Likelihood Unlikely but finite**	**Regulatory arrangements are likely to be effective** … at least as far as they go in emphasising the criticality of developing service resilience through asset management planning.	The SRC notes this evaluation
17	External events with widespread or global impact	(P3) Natural disaster damages power system assets and/or cuts supply. **Initial evaluation:** **Likelihood Moderately likely**	**Current regulatory arrangements are likely effective** For example, the risk of an earthquake causing major disruption to electricity supplies in the capital city of Wellington gave rise to a CPP by local EDB Wellington Electricity that specifically focused on this risk. The CPP process appears to have focused on delivering a specific set of outcomes (e.g. improving the number and location of strategic spares and undertaking targeted resilience investments).	The SRC notes the Commerce Commission had an open letter (response closed 28 May) and was seeking feedback on how its regulatory work programme

#	Risk area	Risk to supply reliability	Initial evaluation: Effectiveness of current arrangements	SRC Response
			It is questionable whether exempt EDBs would have appropriate incentives to invest in significant resilience investments in the absence of the regulatory certainty that price-quality path regulation provides to non-exempt EDBs.	should be prioritised given the transition to low carbon economy and the impact of COVID-19

Table 5: Summary of initial evaluation of whether regulatory arrangements provide effective controls on the risk of generation failures (SRC16)

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
1	A thermal fuel supply failure to electricity generators.	A failure in the supply of gas, diesel or coal will reduce the electricity output of thermal generators and their availability to generate, thereby exacerbating supply-side energy and capacity constraints during periods of low hydro inflows and/or low wind/solar and/or high energy demand. **Initial evaluation:** **Likelihood: Low-to-medium likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements could be improved** It would appear prudent for the Authority to review its regulatory arrangements that influence the pricing of thermal fuel supply risk in the electricity market and the management of thermal fuel supply risk in the wholesale market. Examples of relevant initiatives the Authority is currently undertaking include its hedge market development project and its wholesale market information disclosure project.	The SRC notes the identification of this risk and will advise the Authority to consider whether the Authority and the system operator have the appropriate level of information to assess the level of risk
2	Decarbonisation policies result in insufficient reserve generation.	Ceasing to use coal as an electricity generation fuel would reduce the electricity output and availability of the three Rankine units at the Huntly power station, thereby exacerbating supply-side energy and capacity constraints during periods of low hydro inflows and/or low wind/solar and/or high energy demand. **Initial evaluation:** **Likelihood: High likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements could be improved** It would appear prudent for the Authority to review its regulatory arrangements that influence the uptake of new generating technologies and the substitution of generation fuel sources over time. The Market Development Advisory Group's report titled 'Enabling participation of new generating technologies in the wholesale electricity market' identifies a number of key issues in relation to	The SRC notes the Authority should ensure the regulatory framework is technology neutral, or where technology specific regulation is required, that this does not present a barrier to other technologies

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
			generating technologies participating in the wholesale market.	
3	Reduced system inertia.	In many cases, thermal generation is being replaced by non-synchronous generation, which does not provide inertia. Hence, system frequency will change more rapidly in response to supply / demand imbalances, increasing the risk of adverse grid events (eg, under-frequency events that potentially trigger automatic under-frequency load shedding (AUFLS)). **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue**	**Effectiveness of regulatory arrangements may be improved** It would appear prudent for the Authority to consider whether the design of the ancillary services arrangements are likely to remain fit-for-purpose as the mix of synchronous and non-synchronous generation continues to change.	The SRC agrees with the recommendation.
4	Inadequate security for information and internet-connected generation equipment and control systems.	A 'bad actor' disrupts generation plant operation and/or destroys generation equipment by accessing: • generation information physically or electronically (cyber attack), • generation infrastructure electronically (cyber attack). Successful cyber attacks on non-generation plant IT systems	**Effectiveness of regulatory arrangements may be improved** Information security and cyber security for generators are not regulated in a prescriptive manner. Legislation that prescribes in detail how information must be protected, or sets outcome-based performance standards will quickly become outdated.[10]	The SRC will investigate incorporating questions about minimum standards for cyber-security into the cyber-security survey. The SRC considers this

[10] Refer to the SRC paper 'Industry arrangements for information security: An overview of arrangements relating to cyber and physical security of information', 22 October 2015, p. 11.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
		may afford access to critical generation business systems. **Initial evaluation:** **Likelihood: Low-to-medium likelihood of risk becoming an issue**	However, it may be worth exploring the benefits and costs of requiring at least some generators[11] to adopt an internationally recognised cyber security maturity framework, such as the Electricity Subsector Cybersecurity Capability Maturity Model (C2M2).[12]	is an area which should be considered by the appropriate regulator.
5	Underfrequency events caused or exacerbated by generation disconnecting.	Distributed energy resources (DER) connected to distribution networks through DC/AC power inverters (inverters), and generation plant that suffer from unexpected control system behaviour, may not 'ride through' a major generation failure, thereby exacerbating under-frequency events, and potentially triggering automatic under-frequency load shedding (AUFLS). **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue in the short term**	**Effectiveness of regulatory arrangements needs to be improved** The system operator has recognised this risk and has undertaken relevant investigative work. In cooperation with the system operator, the Authority is scoping a work programme to review the performance aspects of the inverter standards for distributed generation. At the transmission level, the Authority is well underway with a review of Parts 8 and 13 of the Code that has as its objective the enablement of grid-scale (battery) energy storage systems (BESS) to provide instantaneous reserves. It would also appear prudent for the Authority to review whether the asset commissioning and testing arrangements for generation remain fit-for-purpose given	The SRC is pleased to see these risks identified and the work undertaken to manage them.

11 There may be economic grounds for putting in place a de minimis on which generators would have to adopt such a framework.

12 EMCa, May 2019. Transpower Regulatory Control Period 3 Proposal: Review of aspects of the proposed ICT expenditure, Report to New Zealand Commerce Commission.

#	Risk area	Risk to security of supply	Initial evaluation: Effectiveness of current regulatory arrangements	SRC Response
			the uptake of generation that is asynchronously connected to a network.	
6	Cascade failure from frequency or voltage excursions.	As the amount of synchronous generation falls over time and more generation asynchronously connects to a network through DC/AC power inverters (inverters) (eg, wind solar and batteries), the risk of cascade failure from frequency or voltage excursions increases. **Initial evaluation:** **Likelihood: Low likelihood of risk becoming an issue in the short term**	**Effectiveness of regulatory arrangements needs to be improved** The system operator has recognised this identified risk and has undertaken relevant investigative work. In cooperation with the system operator, the Authority is scoping a work programme to review minimum standards for inverter protection functions, monitoring capability and stable operating performance. Options being considered include whether this workstream may progress as part of the G2 work programme.	The SRC is pleased to see these risks identified and the work undertaken to manage them