Update to scarcity pricing settings

Decision paper

14 March 2025

ELECTRICITY AUTHORITY
TE MANA HIKO

Executive summary

The Electricity Authority Te Mana Hiko (Authority) has decided to amend the Electricity Industry Participation Code 2010 (Code) to update the scarcity pricing settings.

Increasing electrification creates opportunities for consumers. However, it also creates challenges for the security of electricity supply. At extremely rare times, there may not be enough generation to meet short periods of peak demand on the power system. When this happens, the system operator can instruct demand to be reduced to ensure stability of the power system. This reduction in demand causes price to fall. Scarcity pricing is used at these times to ensure effective price signals remain in place and incentivise necessary investment.

Scarcity prices occur only infrequently and are set high to provide important price signals. These signals are intended to create short and longer term responses:

- **Short term:** for industry participants to make more resources available ahead of time to avoid the need for emergency demand shedding. This could be through:
    - increasing offers for energy or reserves from generators or batteries
    - shifting or reducing demand.

  The application of scarcity prices in real time (if emergency load shedding occurs) also provides revenue certainty to providers of last-resort energy resources.
- **Long term:** for industry participants to invest in flexible capacity such as demand response, batteries and fast-start generation.

Scarcity prices provide an important signal to ensure consumers do not experience unnecessary interruptions to their power supply. Most consumers will not be directly affected by scarcity pricing as they pay a fixed price for their electricity.

Certainty regarding the application of scarcity pricing is needed to incentivise investment in flexible resources, including demand response and batteries, to manage the risk of short-duration supply shortages.

We have decided to update the values for energy and reserve scarcity and for controllable load

After considering submissions on our proposal and completing further analysis, we have decided to update the values for energy and reserve scarcity and the default value for controllable load:

Setting		Current setting ($/MWh)	Proposed setting ($/MWh)	Updated setting ($/MWh)	Reason for change
Energy scarcity	First 5% of demand	10,000	17,000	21,000	The energy scarcity settings have been raised to: • be more reflective of the cost of power cuts to consumers
	Next 15% of demand	15,000	25,000	31,000	

Setting		Current setting ($/MWh)	Proposed setting ($/MWh)	Updated setting ($/MWh)	Reason for change
	Remaining 80% of demand	20,000	40,000	50,000	• reflect the current economic environment These values are aligned with values from Transpower's 2018 value of lost load study inflated to 2024 values.
Reserve scarcity	First 50MW	FIR:[1] 3,500 SIR:[2] 3,000	FIR: 4,000 SIR: 3,500	FIR: 7,000 SIR: 6,500	We have reduced the number of reserve scarcity blocks to simplify the interaction between energy and reserve scarcity. The reserve scarcity settings are just higher than the cost of last-resort generation. This is to: • allow the market system to prioritise system security • reduce the likelihood of the system operator needing to apply discretionary action.
	Next 100MW	FIR: 4,000 SIR: 3,500			
	Remaining reserve (no limit)	FIR: 4,500 SIR: 4,000			
Controllable load	Default value	9,000	16,000	20,000	The controllable load value is just below the updated energy scarcity values. This is to provide a strong scarcity-like signal in the forecast market schedules.

These new values are higher than originally proposed but, after reviewing submissions, we consider these higher settings are appropriate and remain consistent with the intent of the original proposal. We believe the updated scarcity pricing settings:

- better reflect consumer expectations that power cuts should not occur while there is generation capacity available for dispatch
- better reflect the high cost of involuntary demand reduction on consumers and businesses
- improve price signals during periods of potential scarcity to assist with resource coordination and to continue to provide robust signals for investment in flexible capacity.

Our decision is consistent with the Government Policy Statement released in October 2024, which highlights the importance of accurate price signals.[3] It is also a significant step toward addressing the Market Development Advisory Group's recommendation for the Authority to

[1] Fast instantaneous reserve (FIR)

[2] Sustained instantaneous reserve (SIR)

[3] Government Policy Statement on Electricity - October 2024.pdf

update the scarcity pricing parameters in the Code to ensure they properly reflect the value of reliability to consumers (recommendation 16).[4]

Supporting competition and consumer interests

Retailers or spot-exposed consumers may pay scarcity prices if they do not have sufficient risk management contracts in place to manage their spot price exposure. An active hedge or futures market is critical to promote competition, reliability and efficiency in the wholesale and retail markets. This is reflected in our strong focus on contract markets and risk management including:

- our proposal to level the playing field so independent retailers and generators can better compete with the gentailers[5] and direct purchasers can access competitively priced risk management products
- the recent introduction of standardised super-peak hedge contracts so purchasers can manage spot price risks over peak periods. Voluntary trading of these contracts commenced on 28 January 2025
- our new competition dashboard to improve information on the over-the-counter market and broader competition measures.

The Authority is also working on several initiatives to reflect our focus on consumer interests and promote competition. These include:

- our consultations on the proposed changes to achieve the Energy Competition Task Force objectives, reflecting our strong focus on consumer interests
- the Power Innovation Pathway, demonstrating new ways we are encouraging investment and innovation.[6] This includes our support for two demand response pilots
- increasing our monitoring to ensure that scarcity pricing achieves the intended objectives and ensuring that generation offers reflect cost.

We are focused on supporting security of supply for winter 2025

We are moving quickly to improve security of supply for winter 2025. In addition to updating the scarcity pricing settings we:

- have proposed to **improve market information** by increasing the transparency of thermal fuel availability[7] and implementing improved forecasting for intermittent generation (wind and solar)
- have **enhanced outage information** and coordination by making improvements to the outage coordination process[8]

[4] Related elements of this recommendation include a review of the value of lost load and the security standards. See: Price discovery in a renewables-based electricity system: Final Recommendations PAPER 2023

[5] Energy Competition Task Force looks to level the playing field between the gentailers and independent generators and retailers | Electricity Authority

[6] Power Innovation Pathway | Electricity Authority

[7] Improving access to thermal fuel information | Our consultations | Our projects | Electricity Authority

[8] First steps in improving outage coordination | Our consultations | Our projects | Electricity Authority

- are supporting the system operator with their **review of contingent storage** arrangements[9]
- are strongly **encouraging gentailers to ensure they have adequate plans in place for winter** including contracts for fuel and ensuring generating plant is in service.

Next steps

The Code amendment will come into force on 17 April 2025. The system operator will make the necessary changes to the scarcity pricing settings in the market system.

From 17 April 2025, distributors must use $20,000/MWh as the default price for controllable load if difference bids for controllable load are requested by the system operator.

We also intend to review and update the scenario for capacity shortage stress tests to reflect the new scarcity pricing values for the quarter beginning 1 July 2025.

The Authority's review of the 20 June 2024 Northland transmission tower collapse[10] highlighted the need to review the value of lost load (VoLL).[11] We will not be able to complete our work around VoLL ahead of this update to scarcity pricing settings. This is because we want the new scarcity pricing settings to be implemented by April 2025 to support security of supply in the shoulder season leading up to winter 2025. VoLL has been prioritised for review and is included in our indicative workplan for 2025/26. The results will be used to inform any proposed future updates to scarcity pricing settings.

[9] Invitation to Comment: Security of Supply Forecasting and Information Policy Review Issues Paper 2025 | Transpower

[10] Electricity Authority Report Northland tower collapse 20 June 2024

[11] VoLL represents the economic value, in dollars per MWh, that a consumer places on electricity they plan to consumer but do not receive because of a power interruption.

Contents

1. Purpose

1.1. The purpose of this paper is to inform industry and stakeholders about the Authority's decision to update the scarcity pricing settings in the Electricity Industry Participation Code 2010 (Code). This decision paper follows our November 2024 consultation.[12]

1.2. This paper explains:

(a) our decisions and responses based on feedback received from industry participants

(b) next steps for implementation.

2. Context for the Authority's decisions

Scarcity pricing plays an important role in promoting reliability for consumers

2.1. New Zealand's wholesale electricity market is where generators sell electricity, and retailers and large industrial users buy electricity. Retailers then on-sell that electricity to business and households across New Zealand.

2.2. The spot and hedge markets are the major components of the wholesale market. Prices on the spot market are calculated every half-hour and vary depending on supply and demand, and the location on the national grid.

2.3. New Zealand has a highly renewable energy system which offers many benefits. However, it means that spot prices can be volatile as they are sensitive to weather conditions. It can also create challenges for security of electricity supply, especially for periods of peak demand such as cold mornings or evenings when the wind is not blowing, and the sun is not shining.

2.4. At rare times, there may not be enough generation to meet short periods of peak demand on the power system. When this happens, the system operator can instruct[13] demand to be reduced to ensure stability of the power system. Price signals for these periods are known as scarcity prices.

2.5. Scarcity prices are set high to provide important price signals. These are:

(a) **Short term**: for industry participants to make more resource available ahead of time to avoid the need for emergency demand shedding. This could be through increasing offers for energy or reserves from generators or batteries. It could also be through shifting or reducing demand. The application of scarcity prices in real time if emergency load shedding occurs also provides revenue certainty to providers of last-resort energy resources.

(b) **Long term**: for industry participants to invest in flexible capacity such as demand response, batteries and fast-start generation. The nature of our

[12] Update to scarcity pricing settings

[13] The system operator may request demand to be reduced. If this is not enough then they may instruct demand to be disconnected.

market[14] means that it can be difficult to incentivise investment in peaking capacity that only runs for a few hours a year. These few hours are also the only times when peak prices are realised.

2.6. Our electricity market relies on accurate spot prices, including scarcity prices, to drive operational, contracting and investment decisions by market participants.

2.7. Scarcity prices provide an important signal to ensure consumers do not experience unnecessary interruptions to their power supply. Most consumers will not be directly affected by scarcity pricing as they pay a fixed price for their electricity. Growing investment in utility-scale battery energy storage systems (BESS)[15] will also help to mitigate the risk of short-term supply shortages.

A competitive contracts market can help retailers and spot-exposed consumers manage their risks

2.8. Retailers or spot-exposed consumers may pay scarcity prices if they do not have sufficient risk management contracts in place to manage their financial exposure over peak demand periods.

2.9. To manage their financial exposure to volatile or scarcity prices, retailers and large industrial users can enter into financial contracts (hedges). For retailers and large industrial users, a hedge is a form of insurance against the financial harm of high electricity prices.[16] Equally, some generators can sell their output via hedge contracts. This insulates generators against the risk of low spot prices.

2.10. An efficient and competitive wholesale market relies on both the spot market and the hedge market working together for the benefit of consumers. An active hedge or futures market is critical to promote competition, reliability and efficiency in the wholesale and retail markets. This is why we are focused on initiatives to improve contract markets and risk management.

2.11. Package One of the Energy Competition Task Force aims to enable new generators and independent retailers to enter and better compete in the market. This package includes initiatives to improve hedge market arrangements.

2.12. Included in Package One is standardised super-peak hedge contracts. These contracts are a new risk management tool to manage spot price risks over peak periods.[17] Voluntary industry trading of these contracts commenced on 28 January 2025.

2.13. Package One also includes our recent proposal to level the playing field so independent retailers and generators can better compete with the gentailers.[18]

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[14] New Zealand has an energy-only market. In an energy-only market, generators are only compensated for power that has been produced. Other jurisdictions also operate capacity markets, where generators are compensated for the potential to generate electricity when needed. Capacity markets operate in addition to an energy market. Other energy-only markets include Australia's national electricity market (NEM), Texas (ERCOT), Singapore and Canada (Alberta).

[15] Our system currently has a 35MW (35MWh) BESS at Rotohiko and Meridian's 100MW (200MWh) Ruakākā BESS is expected to be fully commissioned in April 2025. There is an additional 200MW of committed or actively pursued BESS capacity expected to be commissioned in the next two years.

[16] These can be over-the-counter trades or other forward market arrangements: Hedge market | Electricity Authority

[17] https://www.ea.govt.nz/news/general-news/super-peak-hedge-contract-to-trade-in-january/

[18] Level playing field measures | Our consultations | Our projects | Electricity Authority

2.14. We also want to provide the market with more information on risk management contracts to enhance transparency and facilitate ongoing monitoring of the market. We updated hedge disclosure obligations in October 2024 to improve information to the market about over-the-counter (OTC) hedge contracts. We will soon publish a competition dashboard to provide information on the availability of hedges, including flexibility products, as well as a range of broader competition measures.

2.15. In addition to initiatives to promote hedge markets, the Authority is also working on several initiatives to reflect our focus on consumer interests and promote competition. These include:

(a) our consultations on the proposed changes to achieve the Energy Competition Task Force objectives, reflecting our strong focus on consumer interests

(b) the Power Innovation Pathway, demonstrating new ways we are encouraging investment and innovation19

(c) increasing our monitoring to ensure that scarcity pricing achieves the intended objectives and that generation offers reflect cost.

The Authority's decision is aligned with the Government Policy Statement

2.16. Our decision to update the scarcity pricing settings strongly aligns with the Statement of Government Policy (GPS) to the electricity industry.[20] The GPS sets out that the Authority has an important role in:

> *"Ensuring that spot price signals accurately reflect the supply and demand balance, recognising that efficient spot prices in periods of extremely tight supply will be very high."*

2.17. Our decision is also aligned with the Market Development Advisory Group's (MDAG) work on *Price discovery in a renewables-based electricity system*.[21] In their report, MDAG highlights that volatile prices are a feature of a renewables-based system and acceptance of increased spot price volatility is fundamental for wholesale market participants to manage their risks.

2.18. MDAG recommended the Authority update the scarcity pricing parameters in the Code (recommendation 16). MDAG consider that an update of scarcity pricing parameters:

> "*supports accurate price signals to assist operational coordination (unit commitment) decisions and promote efficient pricing in periods of scarcity, which is extremely important over time to achieve efficient consumption and investment decision in our energy-only market*."

2.19. MDAG also noted that accurate scarcity prices will be critical to making the business case for flexible capacity.

2.20. We consider that this update to scarcity pricing addresses part of MDAG's recommendation, noting that there is still work to be done around the value of lost load (VoLL) and the security standards.

[19] Power Innovation Pathway | Electricity Authority

[20] Government Policy Statement on Electricity - October 2024.pdf

[21] Price discovery in a renewables-based electricity system: Final Recommendations PAPER 2023

Further work is required to update the value of lost load and stress tests

2.21. The Authority's review of the 20 June 2024 Northland transmission tower collapse also highlighted the need to review VoLL.

2.22. We will not be able to complete our work around VoLL ahead of this update to scarcity pricing settings. This is because we want the new scarcity pricing settings to be implemented by April 2025 to support security of supply in the shoulder season leading up to winter. Updated settings will assist with resource coordination during peak demand periods and will reduce the likelihood for the public to unnecessarily suffer disruptions to supply.

2.23. VoLL has been prioritised for review and is included in our indicative workplan for 2025/26.[22] When we review VoLL, we will use the results to inform any future updates to the scarcity pricing settings.

2.24. We will also review and update the stress test scenarios[23] to ensure they reflect the new scarcity values for the quarter beginning 1 July 2025.

2.25. The stress testing regime requires disclosing participants in the wholesale market to apply a set of standard stress tests to their market position. Stress tests are intended to fit with the arrangements that industry participants already have in place for monitoring their exposure to spot price risk.

The Authority is focused on supporting security of supply for winter 2025

2.26. We are moving at pace to implement initiatives to support security of supply for winter 2025.

2.27. We consider that this update to scarcity pricing settings will:

(a) better reflect consumer expectations that power cuts should not occur while there is generation capacity available for dispatch

(b) better reflect the high cost of involuntary demand reduction on consumers and businesses

(c) improve price signals during periods of potential scarcity to assist with resource coordination and to continue to provide robust signals for investment in flexible capacity.

2.28. In addition to this update to scarcity pricing settings, we are supporting security of supply for winter 2025 by:

(a) our decision to enhance outage information and coordination by making improvements to the outage coordination process[24]

(b) implementing improved forecasting for intermittent generation (wind and solar)[25]

(c) proposing to increase the collection and publication of thermal fuel information[26]

[22] See Appendix A of our recent levy consultation: Proposed levy-funded appropriations 2025/26

[23] Stress tests | Electricity Authority

[24] Authority acts fast to improve the rules on outage coordination | Electricity Authority

[25] Improving the accuracy of intermittent generation forecasts | Our projects | Electricity Authority

[26] Improving access to thermal fuel information | Our consultations | Our projects | Electricity Authority

(d) supporting the system operator with their review of contingent storage arrangements[27]

(e) strongly encouraging gentailers to ensure they have adequate plans in place for winter including contracts for fuel and ensuring generating plant is in service.

3. Decisions on scarcity pricing settings and responses to submissions

3.1. On 1 November 2024, we published a consultation paper *Update to scarcity pricing settings*. The consultation period closed on 29 November 2024. We received 11 submissions in response to our consultation paper.[28]

3.2. Table 1 summarises our decisions on the new scarcity pricing settings.

Table 1: Updated scarcity pricing values

Setting	Updated value ($/MWh)	
Energy scarcity	First 5% of demand	21,000
	Next 15% of demand	31,000
	Remaining 80% of demand	50,000
Reserve scarcity	Fast instantaneous reserves	7,000
	Sustained instantaneous reserves	6,500
Controllable load (default value)	20,000	

3.3. This section summarises the Authority's decisions and feedback we received on our proposal to update:

(a) energy scarcity values

(b) reserve scarcity values

(c) the default value for controllable load.

[27] Invitation to Comment: Security of Supply Forecasting and Information Policy Review Issues Paper 2025 | Transpower

[28] Update to scarcity pricing settings | Our consultations | Our projects | Electricity Authority

The Authority will raise the energy scarcity values to better reflect the value of lost service

3.4. The new energy scarcity values are $21,000/MWh for the first 5% of demand, $31,000/MWh for the next 15% of demand and $50,000/MWh for the remaining 80% of demand.

3.5. The new values are broadly consistent with values from Transpower's 2018 VoLL study inflated to 2024 values.

The Authority's 1 November 2024 proposal

3.6. The current prices for energy scarcity are $10,000/MWh for the first 5% of demand, $15,000/MWh for the next 15% of demand and $20,000/MWh for the remaining 80% of demand.

3.7. We proposed to raise these values to $17,000/MWh, $25,000/MWh and $40,000/MWh respectively. The intent of the proposal was for energy scarcity to better reflect the high cost of involuntary demand reduction on consumers and businesses by aligning these values with VoLL.

3.8. The proposed values were also intended to allow the market system to prioritise the dispatch of high-priced generation over emergency load shedding.

What submitters said

3.9. Most submitters supported our proposal to raise energy scarcity values.

3.10. The Independent Electricity Retailers[29] and Orion did not support our proposal to raise these values.

3.11. There was mixed support for our proposal to align energy scarcity values with the values from Transpower's 2018 VoLL study.

3.12. NewPower, Electricity Networks Aotearoa (ENA), Meridian and Transpower supported our proposal. However, Mercury, Genesis and Contact Energy believed the energy scarcity prices should be higher than we proposed. Contact Energy considered that the prices should be adjusted to 2024 price indexed VoLL to align with the current market and underlying economic costs.

3.13. Meridian Energy suggested that duration may be a beneficial element to consider when using VoLL to set energy scarcity prices. For example, if there is an energy shortfall for a prolonged period (hours or days), then it may not be appropriate for prices to remain at the same scarcity pricing level as consumers find ways to respond.

Submitters raised the need to update VoLL

3.14. Mercury and Genesis support a review of VoLL to inform the energy scarcity settings. Mercury believed that scarcity values should not be finalised until the Authority has reviewed VoLL. Genesis thought the proposal is a good interim step and we could revisit the scarcity pricing settings once VoLL has been reviewed.

[29] 2degrees, Electric Kiwi, Octopus Energy and Pulse Energy.

3.15. The independent retailers thought the Authority should commission a report on scarcity values using international studies instead of using Transpower's VoLL study.

Submitters raised the need to update scarcity pricing and VoLL more regularly

3.16. NewPower, Mercury and Transpower raised the need for the Authority to review scarcity prices more regularly than every five years as required by the Code.[30]

3.17. Mercury also raised the need for VoLL to be reviewed more regularly.

Submitters raised concerns regarding competition and impact on consumers

3.18. The independent retailers did not consider that an update to scarcity pricing should be prioritised at this time. They think that the Authority should focus on resolving problems in the wholesale and hedge markets, which they believe are adversely affecting competition in the retail market. They consider that scarcity pricing changes would have a greater impact on independent electricity retailers and would increase barriers to competition.

3.19. Orion believed that increased scarcity pricing costs will be passed on to consumers through retail pricing. Transpower also believed that retailers are likely to include the costs of risk management in their fixed rates to customers.

Submitters identified the potential for generators to manipulate offer prices

3.20. Orion believed that raising scarcity prices does not address the underlying issue seen on 10 May 2024, and would not prevent generators from strategically setting offers just below scarcity pricing thresholds.

3.21. The independent retailers were also concerned about the potential for generators to game the new settings.

3.22. Meridian noted that generators may simply choose to increase offers in line with the increase in energy scarcity prices. They agreed with our assessment that monitoring and enforcement of trading conduct provisions is required to ensure that offer prices are justified. Transpower also emphasised the importance of robust monitoring.

The Authority's response

The Authority will update scarcity pricing settings now to support security of supply for winter 2025

3.23. We think it is appropriate to act quickly and update the scarcity pricing settings ahead of winter 2025 to support security of supply. We consider the new settings to be an improvement on the current settings and are appropriate to implement now.

3.24. We have considered submissions and have adjusted the settings to reflect feedback. The new settings were presented as a potential metric in our consultation paper.[31] Our consultation paper also acknowledged that energy scarcity prices

[30] See clause 13.58AB.

[31] See paragraph 6.12 of our consultation paper.

would need to rise further than proposed if reserve scarcity prices are set higher than the price of last-resort generation.[32]

3.25. We originally proposed to align energy scarcity prices with 2018 VoLL. However, following further analysis of reserve scarcity prices,[33] we determine that it is appropriate to raise energy scarcity prices further than we originally proposed and align them with 2024 price-indexed VoLL.[34] We also consider that it is reasonable to reflect the current economic environment as noted in Contact Energy's submission.

3.26. We acknowledge the comments regarding the need to update VoLL. However, we disagree that VoLL should be reviewed before updating the scarcity pricing settings. We do not consider it prudent or necessary to wait for a VoLL review before updating the scarcity pricing settings.

3.27. As noted in our consultation paper, a full review of VoLL is complex and it would take considerable time and resource to conduct a full study. The scarcity pricing values used in the market system are intended to be related to the concept of VoLL but are separate to true VoLL. Scarcity pricing is a tool to signal the supply and demand balance in the wholesale market in periods of tight supply, whereas VoLL is used for investment and reliability assessments.

3.28. When we review VoLL, we will use the results to inform any proposed future updates to the scarcity pricing settings. VoLL is being prioritised for review and is included in our indicative workplan for 2025/26.

3.29. We regularly monitor peak capacity issues and will initiate another scarcity pricing review before the next five-year period if it is needed to support system security. Future updates can be performed quickly if needed. Recent examples of where we have acted quickly include:

(a) improvements to the rules for outage coordination[35]

(b) development of new standardised flexibility products.[36]

3.30. We acknowledge Merdian's feedback about the duration of shortages. However, scarcity pricing is intended to be applied for short duration capacity issues over peak periods. It is not related to high prices as a result of longer-term energy shortages. Therefore, we do not consider it necessary to incorporate duration of shortages into the scarcity pricing settings.

The Authority is prioritising competition and security of supply

3.31. We acknowledge the concerns raised by the independent retailers regarding the need to prioritise competition.

3.32. Section 2 provides more information on our initiatives to:

(a) support security of supply for winter 2025

(b) improve hedge markets and risk management

[32] See paragraphs 6.16 and 6.17 of our consultation paper.

[33] See Box 2 on page 20 for more detail.

[34] We applied the producer price index and rounded the values to the nearest $1,000. The rounded values were the same as applying the consumer price index.

[35] Authority acts fast to improve the rules on outage coordination | Electricity Authority

[36] Standardised Flexibility Co-design Group recommendations published | Electricity Authority

(c) promote competition in the wholesale market.

3.33. As noted in section 2, our decision to update the scarcity pricing settings is strongly aligned with both MDAG's work and the GPS.

Monitoring and compliance play an important role to promote transparency and confidence

3.34. We agree that monitoring plays an important role to provide confidence in the market and to provide accountability to consumers.

3.35. We see value in providing transparent information where needed, and we have exercised our powers this year more than ever before. We are increasing our monitoring so that participants are clearly accountable to electricity consumers.

3.36. An example of our increased monitoring is the thermal fuel data gathered under the Authority's section 46 information gathering powers. This was to provide us better visibility of thermal stockpiles and supply arrangements to understand the impact on security of supply.

3.37. We will manage the risk of generators setting offer prices close to scarcity prices through strong monitoring and compliance.

3.38. The Authority's Market Monitoring team actively monitors trading conduct. This includes monitoring offer prices and how offers are changing over time.

3.39. The trading conduct rule requires generators to submit offers which are consistent with those made where no generator could exercise market power.[37]

3.40. We publish a weekly trading conduct report[38] which monitors underlying wholesale price drivers to assess whether trading periods require further analysis to identify potential non-compliance with the trading conduct rule.

3.41. We have recently updated our weekly trading conduct report to include analysis of offers over $1,000/MWh. This provides transparency on whether generators are setting very high offer prices including just below scarcity prices.

3.42. We will monitor if offer behaviour has changed following the implementation of the new scarcity pricing settings. This is consistent with our approach to monitoring and the need to continue to evolve indicators and modelling tools.[39]

3.43. Our monitoring will highlight any trading periods that appear inconsistent with competitive market conditions. For any such trading periods, further analysis will generally involve a detailed analysis of offers by traders and generation types, and a comparison of offers to economic cost. We may also ask participants for information they hold in relation of the period of interest.

3.44. Cases may be passed on to the Authority's compliance team, with the ability for cases to be elevated to the Rulings Panel[40] if there is a potential Code breach.[41]

[37] See clause 13.5A of the Code.

[38] Data and insights | Electricity Authority

[39] Long-form report

[40] Electricity Rulings Panel | Electricity Authority Rulings Panel

[41] Or, where appropriate, according to our compliance strategy and policies: Our compliance strategy, framework and policies | Electricity Authority

3.45. Our post implementation review of trading conduct provisions shows that the provisions appear to be having an impact on generator behaviour and that prices tend to reflect underlying conditions.[42]

The Authority will reduce the number of reserve scarcity tranches and raise the reserve scarcity values

3.46. We will reduce the number of reserve scarcity tranches from three tranches to one tranche each for fast instantaneous reserves (FIR) and sustained instantaneous reserves (SIR) to make scarcity price signals easier to understand.

3.47. We will raise the reserve scarcity values to $7,000/MWh for FIR and $6,500/MWh for SIR. We have chosen to increase these prices from what was originally proposed in response to feedback from submitters. The new values will allow the market system to prioritise system security and reduce the likelihood of the system operator needing to apply discretionary action.

The Authority's 1 November 2024 proposal

3.48. The current settings for reserve scarcity are summarised in Table 2.

Table 2: Current constraint violation penalties for reserve scarcity situations

Tranche	Fast instantaneous reserve contingent risk violation ($/MWh)	Sustained instantaneous reserve contingent risk violation ($/MWh)	Quantity (MWh)
1	3,500	3,000	50
2	4,000	3,500	100
3	4,500	4,000	No limit

3.49. We proposed to reduce the number of reserve scarcity blocks to one block each for FIR and SIR and to set the scarcity price at $4,000/MWh and $3,500/MWh respectively.

3.50. The intent of the proposal was to reduce complexity and to make scarcity price signals easier to understand. The middle tranche for reserve scarcity was chosen following analysis of current reserve offer prices.

What submitters said

Submitters supported the proposal to reduce the number of reserve scarcity tranches

3.51. Most submitters supported our proposal to reduce the number of reserve scarcity tranches.

3.52. NewPower considered that reducing the number of tranches could have negative effects. They sought further clarification on why we have proposed this change, other than to reduce market complexity.

[42] Long-form report

3.53. Meridian proposed to limit the quantity of reserve scarcity to reduce the risk of cascade failure rather than setting no limit. They noted that when there is reserve scarcity, there is a point where automatic under-frequency load shedding (AUFLS) will not be enough to prevent cascade failure following a contingent event. If this happens, the system operator will resort to demand management. This effectively creates a limit on the reserve scarcity quantities.

3.54. Merdian suggested that this limit could be calculated by the Reserve Management Tool (RMT) and passed to the Scheduling, Pricing and Dispatch tool (SPD) as an input for every trading period. Alternatively, the Authority could consider setting a threshold that approximates this limit.

Submitters thought reserve scarcity prices should be higher than proposed

3.55. Mercury, NewPower, Contact and Transpower thought that reserve scarcity prices should be higher than we proposed.

3.56. Mercury believed that the proposed reserve prices were too low which could artificially hold down prices.

3.57. NewPower believed that the reserve scarcity prices should rise in proportion to the energy scarcity prices and be set around $7,650/MWh for FIR and $6,800/MWh for SIR. NewPower believed these high values were needed to attract investment in BESS. They also believed that making the settings too low would reduce system security too often.

3.58. Contact believed that the reserve scarcity prices should be higher than the cost of last resort generation. They believe that higher reserve prices would likely bring more reserve capacity into the market, including batteries and interruptible load.

3.59. Transpower believed that the proposed settings were still relatively low when compared to energy offer prices and could result in the system operator applying discretion to manage system security.

The Authority's response

3.60. We have considered the feedback received and have decided to reduce the number of reserve scarcity tranches and raise the reserve scarcity prices.

3.61. The reduction in the number of reserve scarcity tranches is consistent with our proposal.

3.62. The reserve scarcity prices that we intend to adopt are higher than initially proposed. However, we consider that they are consistent with the intent to reduce the need for system operator discretionary action and reflect some of the feedback received in the consultation process. Our consultation paper presented reserve scarcity prices higher than the price of last-resort generation as an alternative option.[43]

[43] See paragraph 6.16 of our consultation paper.

The Authority will reduce the number of reserve scarcity tranches to reduce operational complexity and promote clear price signals

3.63. A single scarcity price for each type of reserve will simplify the interaction between energy and reserve scarcity. Reserve scarcity settings are complicated due to the potential for multiple risk setting plant and simultaneous FIR and SIR scarcity.

3.64. The new settings do not provide enough 'room' for three reserve scarcity tranches to emerge before energy scarcity prices.

3.65. Reducing the number of reserve tranches removes the price signal for reserve scarcity prices to increase as system security reduces. However, one tranche for reserve scarcity will maintain the signal that system security has been reduced.

3.66. On balance, we consider the benefits of reducing complexity outweigh the cost of removing some reserve price signals. The simplification to one tranche still maintains key price signals and participants will be able to see the quantity of reserve scarcity in the Wholesale Information Trading System (WITS).

3.67. We have considered Meridian's suggestion to limit the quantity of reserve scarcity for a contingent event (CE). We agree with Meridian's comment that there is theoretically a limit where there may not be enough reserves and AUFLS to prevent cascade failure following a CE.

3.68. However, we do not consider it necessary to calculate or define this limit for a CE. RMT already calculates this limit for an extended contingent event (ECE). If RMT determines there is sufficient reserve to cover an ECE, then there is also sufficient reserve to cover a CE. This is because the ECE risk is always larger than the CE risk. See Box 1 for more information.

3.69. Therefore, we consider that there is no need to apply a limit to reserve scarcity for a CE to avoid cascade failure. The current process allows the system operator to assess the situation dynamically and act appropriately.

Box 1: Reserve scarcity and the interaction with extended contingent events

The system operator procures sufficient reserves to recover system frequency following a contingent event (CE) or an extended contingent event (ECE).

A CE is typically the sudden loss of a single generating unit or a single pole of the HVDC. An ECE is typically the sudden loss of the HVDC bipole or multiple generating units. An ECE is (by definition) larger than a CE, so the system operator also relies on AUFLS to recover the system frequency following an ECE. The Policy Statement defines CEs and ECEs and how they are managed.

The system operator will allow reserve scarcity for a CE because AUFLS is available to prevent cascade failure if the reserves procured is not sufficient to recover system frequency. However, the system operator does not allow reserve scarcity for an ECE. This is because there is no further back up to prevent cascade failure.

This means that the system operator will always ensure there is sufficient reserve and AUFLS to cover an ECE. If there is not enough to cover the ECE risk, the system operator would manage demand before reducing reserves.

When there is reserve scarcity for a CE, it means that the CE is treated in a similar way to an ECE (ie, the system operator relies on available reserves and AUFLS to prevent cascade failure). As the ECE risk is always larger than the CE risk, there is no risk of cascade failure by allowing unlimited reserve scarcity for a CE.

The Authority will raise reserve scarcity prices higher than originally proposed

3.70. We have raised the reserve scarcity prices to be just higher than the cost of last-resort generation. This will allow the market system to prioritise the dispatch of high-priced generation before reducing system security. The new settings are similar to the alternative for reserve scarcity that we identified in our consultation paper.[44]

3.71. This will also reduce the likelihood of the system operator needing to apply discretionary action such as dispatching a generator out of merit order to manage system security.

3.72. However, this means that we have also raised the energy scarcity price from what was originally proposed.

3.73. Box 2 explains how the different scarcity pricing settings interact with each other and provides further information on how they were selected.

3.74. We acknowledge that these values need to work in conjunction with strong monitoring. Scarcity prices will not operate as intended if generators submit offer prices that are close to or above the scarcity values.

3.75. Generators have put in very high offer prices before, as seen on 10 May 2024. This is why the Authority closely monitors trading conduct to promote fair and transparent behaviour and to protect consumer interests. See paragraphs 3.34 to 3.45 for more information.

[44] See paragraph 6.16 of our consultation paper.

Box 2: Summary of scarcity pricing settings

The new scarcity pricing settings work together to meet several goals.

Reflect the high cost of emergency load shedding

To achieve this, energy scarcity prices are more closely aligned with VoLL. See paragraph 3.25 for more detail.

Prioritise a reduction in security over emergency load shedding

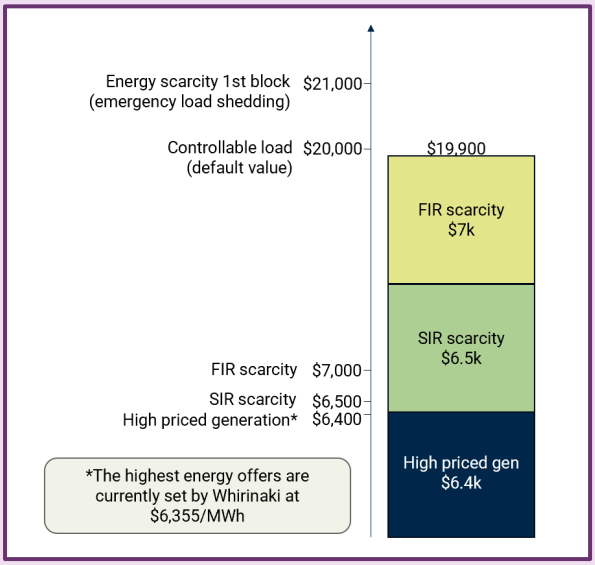
To achieve this, the FIR ($7,000/MWh) and SIR ($6,500/MWh) scarcity prices are set lower than the first 5% block of energy scarcity ($21,000/MWh).

Prioritise dispatch of high-priced generation over emergency load shedding

To achieve this:

- energy offer prices cannot be set too close to energy scarcity prices. This is managed through monitoring of trading conduct (see paragraphs 3.34 to 3.45).
- there must be enough 'room' between reserve scarcity prices and energy scarcity prices. Scarcity price values have been selected so that the potential marginal cost of last-resort generation ($19,900/MWh) is lower than the energy scarcity value ($21,000/MWh). The potential marginal cost of last-resort generation is the combined cost of last-resort generation ($6,400/MWh), SIR scarcity ($6,500/MWh) and FIR scarcity. This allows for the possibility that FIR and SIR may be in shortfall together. Energy scarcity prices aligned with 2024 price-indexed VoLL allow enough room for the new reserve scarcity prices to emerge.
- there is 5% headroom between the potential marginal cost of last-resort generation and energy scarcity prices to allow for transmission losses.

Figure 1: How scarcity pricing settings work together to prioritise dispatch of high-priced generation over emergency load shedding



Prioritise system security (when resource is available) and reduce the need for system operator discretionary action

To achieve this, the SIR scarcity price ($6,500/MWh) is set higher than the cost of last-resort generation (approximately $6,400/MWh).

The Authority will raise the default value for controllable load from $9,000/MWh to $20,000/MWh

3.76. We have decided to raise the default value for controllable load from $9,000/MWh to $20,000/MWh to better align with the updated energy scarcity value of $21,000/MWh (lowest block).

The Authority's 1 November 2024 proposal

3.77. The current value for controllable load is $9,000/MWh.

3.78. We proposed to raise this value to $16,000/MWh to align with the proposed energy scarcity price of $17,000/MWh (lowest block).

3.79. The intent of the proposal was to ensure that controllable load continues to be priced at just below energy scarcity to provide a strong scarcity-like price in the forecast market schedules.

What submitters said

Submitters supported the proposal to raise the default value for controllable load

3.80. All submitters who commented on our proposal supported raising the default value for controllable load to align them with updated energy scarcity values.

3.81. Transpower agreed with the proposal but recommended that we clarify that controllable load prices only apply in the price-responsive schedule (PRS).

3.82. Contact Energy supported the proposal but believed a longer-term solution needed to be found for an efficient market signal for the dispatch of controllable load.

Distributors raised concerns regarding controllable load shifting from distributors to retailers

3.83. Orion, Wellington Electricity, Vector and ENA raised strong concerns around our statements signalling the need for controllable load to shift from distributors to retailers. They were generally supportive of innovative and competitive approaches but noted the importance of controllable load operation for many distributors. They cautioned against shifting control of controllable load to retailers and considered that this load could be shared between distributors and other parties.

3.84. Orion, Wellington Electricity and ENA also expressed concerns that the proposal clashes with Code Review Programme #6 regarding sharing control of load between distributors and others. Vector also noted that the proposal could clash with clauses 5.1 to 5.3 of the Default Distribution Agreement (DDA). These clauses relate to load management on distribution networks.

3.85. Vector noted the importance of the coordination of distributed assets during grid emergencies and the need for clear load management protocols. Vector raised the need for distributors to have additional powers to manage emergency situations on their networks. They considered that provisions should be specified in the Code rather than relying on distributors to formalise these arrangements in the DDA.

3.86. Orion believed it is not in consumers' interests to prioritise dispatch of extremely high-priced generation over controlled load reduction.

3.87. Distributors raised broader concerns that are not directly related to the scarcity pricing settings or the management of controllable load. Vector raised concerns regarding the regulation of unoffered demand response. They are concerned that other parties may not have the same obligations to follow good electricity industry practice.

3.88. Full submissions are available to view on our website.[45]

The Authority's response

3.89. We have decided to raise the default value for controllable load to $20,000/MWh. This value is higher than initially proposed but is consistent with the intent of the proposal to align the value with energy scarcity prices. This was supported by all submitters who commented on the proposal.

Controllable load is an important tool for managing periods of tight supply

3.90. Currently, the system operator can call for difference bids to signal the level of controllable load for use in a grid emergency.

3.91. This process was implemented quickly via an urgent Code amendment to support security of supply for winter 2023.[46] This process was made permanent on 1 May 2024.[47]

3.92. The process provides improved visibility of the available controllable load during a grid emergency. The default value is set just below energy scarcity to provide a strong scarcity-like price signal in the forecast market schedules.

3.93. However, these bids only apply in the PRS. This means that controllable load bids are not included in the week-ahead dispatch schedule, the non-response schedule or the dispatch schedule and cannot set the final price.

Controllable load can compete with generation in the spot market

3.94. We believe that controllable load has an important role to play in providing downward pressure on spot prices while also supporting security of supply.

3.95. We agree with Orion that it would be preferable for load control to set the price rather than rely on very high-priced generation. This is why we want to see this load control priced and offered into the market as signalled in our consultation paper.

3.96. We consider that the current process for the use of controllable load during grid emergencies is a suitable interim solution while new technologies roll out and longer-term solutions are developed.

3.97. Ideally, retailers would submit bids and reduce load before emergency load shedding is required. These bids would be in the form of dispatch notification bids and would be able to set the final price.

3.98. However, we also recognise that this practice may rely on new meters to be rolled out across networks. We acknowledge that load management and control will evolve over time.

[45] Update to scarcity pricing settings | Our consultations | Our projects | Electricity Authority

[46] Decision paper - Clarify the availability and use of discretionary demand control

[47] Code amendment omnibus two

3.99. We also acknowledge that distributors currently reward consumers for use of their controllable load through controlled tariffs and deferral of network investment.

3.100. We are encouraged by new initiatives to further reward consumers such as the Resi-Flex trials.[48] We support the continued development of offerings to incentivise and reward consumers for shifting demand away from peaks.

Controllable load can be shared between distributors and other parties

3.101. We recognise distributors' concerns around the need for suitable protocols for sharing control of load between distributors and others.

3.102. We wish to clarify that the intent is to see control of controllable load *shared* between distributors and retailers. Given this clarification, we do not see any conflict between this intent and Code Review Programme #6.

3.103. However, we want to see more of this control shift towards retailers as control is currently mostly performed by distributors.

3.104. Our consultation paper intended to signal the future direction of controllable load and the market, but we acknowledge that it will take time to get the framework and Code in place. It will also take time for new technologies to roll out across networks to be able to unlock the benefits.

Trial of retailer load control reveals promising insights

3.105. The recent Powerco and Vector trial of retailer load control of hot water heating[49] is an encouraging step towards unlocking the benefits of controllable load.

3.106. The trial revealed that:

(a) spot market peaks currently coincide with transmission and distribution network peaks.[50] This means that retailers reducing demand during high spot prices currently relieves network congestion at peak.

(b) smart meters allow unique operating protocols per hot water cylinder at installation control point (ICP) level. Modern hot water cylinders (which tend to be larger than older ones) allow more load to be deferred for longer[51] and to better reflect consumer preferences about how much water needs to be heated and when.

(c) changes in use of ripple control and smart meter capability could allow more flexible demand to compete with generation in the spot market. There is the potential to reduce national peak demand by hundreds of MWs.

3.107. Powerco also noted that "retailers observe scarcity prices so have a strong incentive to maximise the use of resource at times of system scarcity even if fully hedged or vertically integrated (opportunity cost)."

[48] Orion and Wellington Electricity have teamed up with Octopus Energy to reward electric vehicle owners who allow managed off-peak charging Intelligent Octopus - Wellington Electricity 5c Resi-flex Rebate | Octopus Energy NZ

[49] See SRC08_Opportunities for use of ripple and smart meter controlled circuits for managing peaks https://www.ea.govt.nz/documents/5975/SRC_meeting_papers_-_24_October_2024.zip

[50] This trend may delink with more intermittent generation.

[51] Longer than is possible with current configuration of ripple control, and at lower incremental cost.

3.108. Furthermore, the trial also revealed potential solutions to ensure resources are well coordinated during grid emergencies. The trial included protocols to manage any potential conflicts during grid emergencies such as:

(a) Powerco retaining control of all controllable load for managing national grid emergencies and system emergencies on its own network. This was managed via the DDA.

(b) retailers were prohibited from changing their load shifting pattern during a system operator event to ensure Powerco retained control in grid emergency situations.

3.109. The trial also noted that:

> *"to be efficient and effective, the industry will need to maintain a hierarchy of control in local and national grid emergencies, and the restoration of load after an emergency. It will also require protocols for routine management to avoid adverse consequences for system reliability."*

3.110. We agree with the statements regarding emergency coordination and are committed to further discussions and trials with industry to navigate the challenges whilst also unlocking benefits for consumers. We are also aware that ENA is working on emergency load management protocols with retailers.

3.111. We believe there are valuable lessons and exciting opportunities from this trial of retailer load control and are keen to see these lessons shared more widely amongst distributors.

3.112. The next steps for this trial could be for retailers to offer this controllable load into the market via dispatch notification.

3.113. We are motivated to use trials to enhance existing demand response products. The 2023 Winter Peak Innovation Pilot[52] is an example of where we have worked with industry to improve the Code. We used lessons from this trial to reduce barriers for load aggregators, making it easier for them to participate in the dispatch notification process.

3.114. We are currently supporting two demand response pilots via the Power Innovation Pathway. The lessons from these trials may inform enhancements to the dispatchable demand and dispatch notification products to accelerate their uptake.

A more comprehensive review is needed to resolve other issues raised by distributors

3.115. We acknowledge the submissions by distributors and the comments raised regarding the need:

(a) for a holistic approach to Code amendments related to distributed energy resources

(b) for robust load-management protocols

(c) to regulate unoffered demand response

(d) for obligations on parties not covered by the Code to follow good electricity industry practice.

[52] Winter Peak Innovation Pilot

3.116. These comments are out of scope of this consultation and need further work. However, we agree the issues need to be addressed. The submissions have been passed onto the relevant policy team within the Authority, where they will be considered in the workstreams on demand management and flexibility services.

3.117. None of these comments or areas of concern affect the proposed amendments. Although the Code amendments do not directly address any of these concerns, neither do they exacerbate them, so we consider no changes to the Code amendments are necessary to address the concerns raised.

4. The amendments will promote competition, reliability and efficiency for the long-term benefit of consumers

4.1. The Authority's main objective, as outlined in section 15(1) of the Act, is to promote competition in, reliable supply by, and efficient operation of, the electricity industry for the long-term benefit of consumers.

4.2. Section 32(1) of the Act states that the Code may contain any provisions that are consistent with the Authority's objectives and are necessary or desirable to promote any or all of the matters listed in section 32(1).

The amendments are consistent with section 32(1) of the Act

4.3. The Authority considers that the Code amendments are consistent with the Authority's statutory objectives under section 15 of the Act and with sections 32(1)(a), (b) and (c) of the Act.

4.4. The Code amendments promote all three limbs of the Authority's main statutory objectives as follows:

(a) **competition** is supported through improved price signals to encourage investment in flexibility

(b) **reliability** is supported through market settings that prioritise keeping the lights on and through improved price signals for resource coordination at times of potential scarcity of electricity supply

(c) **efficient** operation of the wholesale electricity market is supported through maintaining accurate price signals during times of potential scarcity.

The benefits of the amendments are greater than the costs

4.5. We consider that the benefits of updating the scarcity pricing settings will outweigh the associated costs as described in the consultation paper. We consider that the cost benefit analysis presented in the consultation paper has not materially changed due to the higher scarcity prices than originally proposed.

4.6. The changes are primarily updates to settings in the market system and we do not expect these new settings to impose any implementation costs on participants.

4.7. Most submitters broadly supported the intent of the Authority's proposal, but some considered that:

(a) energy scarcity prices should be higher to:

(i) better reflect the value of lost service to consumers

(ii) ensure clear price signals

(iii) better align with current prices and costs

(b) reserve scarcity prices should be higher to:

(i) further reduce the likelihood of the system operator needing to apply discretionary action to manage system security

(ii) reflect the true value of reserves

(iii) support investment in flexible capacity.

4.8. These submitters generally stated that they agreed with the proposed amendment if these issues were addressed in the final amendment.

4.9. We consider our final amendment addresses these concerns, as described in section 3.

5. Next steps

5.1. The Code amendments (Appendix A) will come into force on 17 April 2025.

5.2. The system operator will make the necessary changes to the scarcity pricing settings in the market system to take effect on 17 April 2025.

5.3. From 17 April 2025, distributors must use $20,000/MWh as the default price for controllable load, if difference bids for controllable load are requested by the system operator.

5.4. We intend to update the scenario for capacity shortage stress tests to reflect the new scarcity pricing values for the quarter beginning 1 July 2025.

5.5. We will prioritise a review of VoLL for 2025/26. The results will be used to inform any future updates to scarcity pricing settings.

6. Attachments

6.1. The following appendices are attached to this paper:

Appendix A Approved Code amendments

Appendix A Approved Code amendments

Part 8 Common Quality

…

Schedule 8.3

Technical Code B - Emergencies

…

5A Request to inform the system operator of available controllable load

…

(4) If the **system operator** requests information regarding available **controllable load** under subclause (1), a **connected asset owner** who submits **difference bids** must, as soon as reasonably practicable following a request by the **system operator—**

(a) submit to the **system operator** for each **trading period** notified by the **system operator** a **difference bid** that represents a reasonable estimate of the available **controllable load** which the **connected asset owner** can use to decrease its **demand—**

(i) at each **conforming GXP** in the **connected asset owner's** network or at a **conforming GXP** nominated by the **system operator** and agreed with the **connected asset owner**; and

(ii) for the **trading period**; and

(iii) at a single price band of ~~$9,000~~ $20,000 per **MWh**; and

…

Part 13 Trading arrangements

…

13.58AA System operator to assign price and quantity values

(1) In preparing each **price-responsive schedule** and each **non-response schedule**, the **system operator** must assign the price and quantity values set out in subclause (2) to the following **demand:**

(a) in relation to a **price-responsive schedule**, forecast **demand** at a **conforming GXP** that is not the subject of a **bid:**

(b) in relation to a **non-response schedule,**—

(i) forecast **demand** at a **conforming GXP** that is not the subject of a **nominated bid;** and

(ii) **demand** at a **GXP** that is the subject of a **nominated non-dispatch bid.**

(2) The price and quantity values are as follows:

(a) ~~$10,000~~ $21,000 per **MWh** for the first 5% of the relevant **demand:**

(b) ~~$15,000~~ $31,000 per **MWh** for the next 15% of the relevant **demand:**

(c) ~~$20,000~~ $50,000 per **MWh** for the remaining 80% of the relevant **demand.**

(3) In preparing each **price-responsive schedule** and each **non-response schedule**, the **system operator** must assign the price and quantity values set out in the following table to the constraints specified in clause 12(5) of Schedule 13.3:

Tranche	Fast instantaneous reserve contingent risk violation ($/**MWh**)	Sustained instantaneous reserve contingent risk violation ($/**MWh**)	Quantity (**MWh**)
1	~~3,500~~ 7,000	~~3,000~~ 6,500	~~50~~ No limit
~~2~~	~~4,000~~	~~3,500~~	~~100~~
~~3~~	~~4,500~~	~~4,000~~	~~No limit~~

(4) In preparing each **price-responsive schedule** and each **non-response schedule**, the **system operator** must assign the price and quantity values set out in the following table to the model parameters specified in clause 1 of Schedule 13.2:

Tranche	6 second contingent risk violation ($/**MWh**)	60 second contingent risk violation ($/**MWh**)	Quantity (**MWh**)
1	~~3,500~~ 7,000	~~3,000~~ 6,500	~~50~~ No limit
~~2~~	~~4,000~~	~~3,500~~	~~100~~
~~3~~	~~4,500~~	~~4,000~~	~~No limit~~