



Reliability and Emergency Reserve Trader (RERT) Quarterly Report Q4 2020

February 2021

A report for the National Electricity Market

Important notice

PURPOSE

AEMO publishes the Reliability and Emergency Reserve Trader (RERT) Quarterly Report under clause 3.20.6 of the National Electricity Rules.

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Executive summary

The Reliability and Emergency Reserve Trader (RERT) is an intervention mechanism under the National Electricity Rules (NER) that allows AEMO to contract for emergency reserves, such as generation or demand response, that are not otherwise available in the market. AEMO uses RERT as a safety net in the event that a critical shortfall in reserves is forecast. RERT is activated when all market options have been exhausted, typically during periods when the supply demand balance is tight.

The final quarter of 2020 saw a single RERT activation in New South Wales on 17 December 2020, to reduce the potential impact of load shedding if the largest credible contingency had occurred. The forecast reserve shortfall was 272 megawatts (MW), which developed into an actual reserve shortfall of 92 MW. AEMO instructed the activation of 38 MW of RERT for 1 hour 10 mins (with a volume of 44 megawatt hours (MWh)).

The total cost payable by AEMO for the activation in New South Wales (including the Australian Capital Territory) on 17 December 2020, was \$200,570. The cost per MWh for this RERT event was \$4,647, which is less than the average value of customer reliability¹ (VCR) of \$42,120 per MWh for New South Wales.

AEMO's contracting and activation of RERT was consistent with the principles of having the least distortionary effect on the market, while improving reliability of the system and minimising cost to consumers.

This report is published under clause 3.20.6 (b) of the NER, and accounts for reserve contracts entered into and activated by AEMO in the period from 1 October 2020 to 31 December 2020.

¹ See <https://www.aer.gov.au/system/files/AER%20-%20Values%20of%20Customer%20Reliability%20Review%20-%20Final%20Report%20-%20December%202019.pdf>.

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1. RERT activity in Q4 2020

1.1 Procurement

The 2020 Electrical Statement of Opportunities (ESOO) presented a reliability forecast against the existing 0.002% reliability standard², and against the Interim Reliability Measure³ (IRM) of 0.0006%.

For summer 2020-21, the 2020 ESOO did not forecast expected unserved energy (USE) to exceed the reliability standard nor to exceed the IRM in any NEM region. As a result no Long Notice⁴ Reserve or Interim Reserve⁵ was contracted in the National Electricity Market (NEM).

By the end of Q4 2020 (the period from 1 October 2020 to 31 December 2020), AEMO established a panel of providers for up to 1,563⁶ megawatts (MW) of potential reserve capacity across the NEM through panel agreements for the provision of reserves at Short Notice.

Note that under the panel agreements no capacity is contracted, or payments made, until a reserve shortfall arises.

In Q4 2020, Short Notice Reserve was contracted on 17 December prior to Reliability and Emergency Reserve Trader (RERT) activation as detailed below in response to a forecast Lack of Reserve 2 (LOR 2) condition⁷.

1.2 Activation

AEMO intervened in the market by activating RERT on one occasion during the reporting period, on Thursday 17 December 2020, in response to a forecast LOR 2 condition (which materialised into an actual LOR 2 condition) in New South Wales.

1.3 Costs incurred

The total amount payable by AEMO under RERT in Q4 2020 was \$200,570. Table 1 shows a breakdown of the amounts payable in New South Wales including payment type for all contracts activated in Q4 2020. No other RERT costs were incurred in Q4 2020.

Table 1 AEMO's amount payable under reserve contracts, Q4 2020

NEM region	Availability costs (\$)*	Pre-activation costs (\$)	Activation costs (\$)	Intervention costs(\$)	Total cost (\$)
New South Wales	\$0	\$0	\$194,200	\$6,371	\$200,570
Total cost					\$200,570

* Availability payments do not apply for Short Notice contracts.

² The reliability standard specifies that expected USE should not exceed 0.002% of total energy consumption in any region in any financial year.

³ The IRM is a new interim reliability measure, agreed to at the March 2020 COAG Energy Council and introduced by the *National Electricity Rules (Interim Reliability Measure) Rule 2020*, that sets a maximum expected USE of no more than 0.0006% in any region in any financial year. It is intended to supplement the existing reliability standard for a limited period of time and allows AEMO to procure reserves if the ESOO reports that this measure is expected to be exceeded.

⁴ Long Notice situations occur between 12 months and 10 weeks before a projected shortfall in reserves.

⁵ Interim Reserve contracted by AEMO in respect to an interim reliability exceedance.

⁶ Note that as of February 2021, this had increased to 1728 MW, with new panel agreements signed and old contracts expiring.

⁷ LOR 2 signals a tightening of electricity supply reserves. This condition exists when reserve levels are lower than the single largest supply resource in a state. At this level, there is no impact to the power system, but supply could be disrupted if a large incident occurred. Once a forecast LOR 2 is declared, AEMO has the power to direct generators, cancel network outages, or activate the RERT mechanism to improve the supply demand balance.

2. Reserve procurement

2.1 Long Notice and Interim Reserves

The 2020 ESOO determined that in summer 2020-21 expected USE was not forecast to exceed the reliability standard nor to exceed the IRM in any NEM region. As a result, no Long Notice Reserve or Interim Reserve has been contracted in the NEM for summer 2020-21.

The 2020 ESOO reported that, although expected USE in Victoria had declined substantially since the 2019 ESOO, some risks of load shedding remained, particularly if peak demand reached 10% probability of exceedance (POE)⁸ levels and coincided with low renewable generation, or prolonged generation or transmission outages. AEMO noted that these risks could be mitigated through the use of Medium Notice⁹ and Short Notice reserve panel agreements.

2.2 Panel arrangements

Through open tendering processes under the National Electricity Rules (NER), by the end of Q4 2020 AEMO had established a panel of providers representing estimated additional reserves of up to 1,563 MW in total across the NEM under Short Notice panel agreements. These agreements enable potential RERT providers to offer reserves in Short Notice situations on pre-negotiated contract terms, to enable AEMO to manage risks such as demand exceeding forecast expectations, and unplanned events resulting in a reduction in generation and/or network capacity. Short Notice reserve agreements were entered into in South Australia, Victoria, New South Wales, and Queensland.

In consultation with relevant state governments, and as required by the RERT guidelines¹⁰, AEMO entered into panel agreements with potential reserve providers that met detailed cost, technical, and verification criteria.

RERT resources can have different response lead times, activation conditions, costs and response capability; as a result, not all resources will necessarily be activated for a given shortfall event.

Under the panel agreements utilising Short Notice contracts, there are no fixed costs incurred, and payments will only be made based on pre-activation and/or actual megawatt hours (MWh) activated. There is no cost to consumers unless this reserve is required¹¹.

AEMO did not enter into panel arrangements for Medium Notice Reserve in Q4 2020.

2.3 Short Notice Reserves contracted

AEMO may enter into reserve contracts at short notice when the probability of load shedding (other than the reduction or disconnection of interruptible load) is, or is forecast to be, more than remote, which is when AEMO expects a LOR condition may occur¹².

The Reserve Level Declaration Guidelines¹³ provide details for determining the term and quantity associated with a reserve shortfall.

⁸ POE is the probability a forecast will be met or exceeded. The 10% POE forecast is mathematically expected to be met or exceeded once in 10 years and represents demand under more extreme weather conditions than a 50% POE forecast.

⁹ Medium Notice situations occur between 10 weeks and seven days before a projected reserve shortfall.

¹⁰ At https://www.aemc.gov.au/sites/default/files/2020-08/Updated%20Amended%20Panel%20RERT%20Guidelines%20-%202018%20August%202020%20-%20Final%20for%20publication_0.pdf.

¹¹ For more information on RERT costs, please refer to the AEMO website: <https://aemo.com.au/en/energy-systems/electricity/emergency-management/reliability-and-emergency-reserve-trader-rert>.

¹² Declarations of lack of reserve conditions are made under NER clause 4.8.4(b).

¹³ At https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Reserve-Level-Declaration-Guidelines.pdf.

Forecast or actual LOR 2 and/or LOR 3¹⁴ conditions are the main criteria for contracting Short Notice Reserve. Under AEMO’s panel arrangements, AEMO can contract for Short Notice Reserve once a forecast or actual LOR 2 and/or LOR 3 condition is identified, with no cost to consumers (unless the reserve is pre-activated or activated). As the event descriptions in Section 3.1 and Section 3.3 below show, RERT contracting occurs in the context of highly uncertain and complex power system conditions, where actual and projected reserve levels can change at short notice.

AEMO contracted for Short Notice Reserve once in Q4 2020, on 17 December 2020. This was in response to a forecast LOR 2 condition, (which developed into an actual LOR 2 condition) in New South Wales. AEMO contracted 398 MW of reserve to ensure sufficient capacity would be available in the context of a number of variables (such as pre-activation and activation lead times) which could impact the RERT capacity available to meet the forecast reserve shortfall of 272 MW, and the uncertainty inherent in power system operation.

Although AEMO contracted for a greater amount of Short Notice Reserves than the forecast LOR shortfall, no costs were incurred in doing so (because panel agreements utilise Short Notice contracts that have no ongoing fixed costs and payments are only made based on pre-activation and/or actual MWh activated).

Table 2 below shows Short Notice Reserve contract terms entered into by AEMO in Q4 2020.

Table 2 Term of Short Notice Reserve contracts

Provider	Term start	Term end	Term duration	Capacity (MW)	Region	Basis for contract
OneSteel NSW Pty Ltd	17 Dec 2020 14:40	17 Dec 2020 18:30	3 hrs 50 mins	38	New South Wales	Forecast LOR 2
Paper Australia Pty Ltd	17 Dec 2020 14:40	17 Dec 2020 18:30	3 hrs 50 mins	20	New South Wales	Forecast LOR 2
Progressive Green Pty Ltd	17 Dec 2020 14:40	17 Dec 2020 18:30	3 hrs 50 mins	40	New South Wales	Forecast LOR 2
Tomago Aluminium Company Pty Ltd	17 Dec 2020 14:40	17 Dec 2020 18:30	3 hrs 50 mins	300	New South Wales	Forecast LOR 2

Chapter 3 details the conditions leading up to activation of RERT.

2.4 AEMO's methodology for contracting RERT

AEMO’s Procedure for the Exercise of the Reliability and Emergency Reserve Trader¹⁵ sets out the methodology which it follows in determining the triggers for RERT, as well as the quantity and term of reserves contracted.

AEMO followed its procedures and the NER in contracting for Short Notice RERT, including:

- RERT Panel recruitment.
- Publication of notices.
- Requiring that unscheduled reserves are not otherwise offered to the market or engaged.
- Determining the term and quantity of reserves to be contracted.
- The basis for determining the estimated Value of Customer Reliability (VCR).

¹⁴ LOR 3 indicates the balance of supply and demand is so tight that load shedding is imminent or has begun.

¹⁵ At https://www.aemo.com.au/-/media/files/electricity/nem/emergency_management/rert/procedure_for_the_exercise_of_reliability_and_emergency_reserve_trader_rert.pdf.

Under NER clause 3.20.2(b), AEMO must have regard to the RERT principles in exercising the RERT. These principles stipulate that AEMO is to take actions that have the least distortionary effect on the operation of the market, and actions taken should aim to maximise the effectiveness of reserve contracts at the least cost to end use consumers of electricity.

When entering into reserve contracts, AEMO factored these RERT principles into its decision-making:

- To minimise distortionary effects on the operation of the market, AEMO categorises RERT into the following three types based on their pre-activation and activation times:
 - Type 1 – capacity that can be pre-activated and activated in less than 30 minutes. These contracts are pre-activated and activated post-contingency when an actual LOR 3 occurs.
 - Type 2 – capacity where the sum of the pre-activation and activation lead times is greater than 30 minutes, but the activation lead time alone is less than 30 minutes. This means that for this capacity to be activated post-contingency (when an actual LOR 3 occurs), it must be preactivated in advance of the actual LOR 3.
 - Type 3 – capacity whereby activation requires more than 30 mins. This capacity need to be pre-activated and activated in advance to ensure RERT is delivered on time.
- The use of these categories allows for minimal pre-activation and activation, since Type 1 and 2 categories can be activated post-contingent (during LOR 3). This not only minimises impacts on the market, but also maximises the effectiveness of reserve contracts at the least cost to end use consumers of electricity.
- During the RERT procurement process, AEMO implemented the use of VCR as the maximum for assessing offers by potential RERT providers. As a result, no RERT contract AEMO entered into exceeds VCR.

3. Intervention on 17 December 2020

3.1 Decision to intervene

Thursday 17 December 2020 saw warmer than forecast weather conditions in New South Wales, with temperatures reaching 32.8°C at Bankstown Airport and 33.4°C at Penrith. These warm temperatures were accompanied by high humidity and dew points. The day-ahead forecast operational demand was 10,905 MW at 1700 hrs and the 4-hour ahead forecast was 10,928 MW at 1700 hrs.

At 1249 hrs on 17 December 2020, AEMO declared a forecast LOR 1 condition for New South Wales from 1530 hrs to 1800 hrs. The forecast capacity reserve requirement was 1,415 MW, but the minimum capacity reserve available was 1,166 MW.

At this time approximately 3,405 MW of scheduled generation was expected to be unavailable in New South Wales at 1700 hr, including:

- Bayswater Unit 2 (660 MW).
- Bayswater Unit 4 (660 MW).
- Hunter Valley Gas Turbines (30 MW).
- Liddell Unit 1 (450 MW).
- Liddell Unit 2 (450 MW).
- Mount Piper Unit 1 (700 MW).

At 1300 hrs, 747 MW of semi-scheduled generation (out of 3,891 MW of installed capacity) was forecast to be available at 1700 hrs in New South Wales, based on the 4-hour ahead forecast.

Transmission outages were also in place at this time, as detailed in Table 3 below.

Table 3 Transmission outages impacting New South Wales reserve by 1300 hrs on 17 December 2020

Equipment	Outage start date	Outage end date	Recall time	Constraints binding	Comment
Liddell unit 1 330/22 kV transformer	1/12/20	17/12/20 2331 hrs	2 hours	No constraint invoked	Generating unit not available for service.
Liddell unit 2 330/22 kV transformer	9/10/20	31/12/20	99 hours	No constraint invoked	Generating unit not available for service.
Directlink DC3	13/10/20	23/01/21	No recall available	Yes	Estimated 60 MW reduction in transfer capacity from Queensland to New South Wales
Gullen Range – Crookwell 3H 330 kV line	01/12/20	19/12/20	36 hours	Yes	Estimated 500-700 MW reduction in transfer capacity from Victoria to New South Wales

At 1328 hrs, Liddell Unit 3 tripped while generating 325 MW, and by 1400 hrs the forecast peak operational demand had increased to 11,159 MW at 1700 hrs.

The decrease in available capacity, combined with the increase in forecast demand, led AEMO to declare a forecast LOR 2 condition for New South Wales at 1411 hrs, following an update to the 1400 hrs Pre Dispatch Projected Assessment of System Adequacy (PDPASA)¹⁶ run.

The LOR condition was forecast to occur between 1530 hrs and 1730 hrs with a minimum forecast reserve of 471 MW, which was 272 MW lower than the LOR 2 trigger level of 743 MW. This meant AEMO needed up to 272 MW of additional reserves in New South Wales to remove the threat of load shedding between 1530 hrs and 1730 hrs if the largest credible contingency in New South Wales eventuated (in this case, a trip of one circuit of the Queensland – New South Wales Interconnector [QNI]).

To maintain power system reliability, AEMO determined that contracting of reserves would be required on the basis of the forecast LOR 2 condition, with a substantial estimated reserve shortfall of 272 MW.

3.2 Assessment of market response and latest time to intervene

At 1411 hrs on 17 December 2020, AEMO issued market notice MN 81318¹⁷, declaring a forecast LOR 2 condition in New South Wales from 1530 to 1730 hrs, seeking a market response and noting that the latest time to intervene had not yet been determined.

Where market mechanisms are not successful in alleviating a reserve shortfall and the latest time to intervene has been reached, AEMO may intervene in the market by issuing a direction or a clause 4.8.9 instruction or by exercising the RERT in accordance with NER clause 3.20.

¹⁶ PASA is the tool for forecasting the adequacy of the power system to stay within the reliability standard. PDPASA runs half-hourly, covering the next trading interval until the end of the next trading day.

¹⁷ All market notices are published at <https://aemo.com.au/Market-Notices>.

AEMO's approach to determining its choice of supply scarcity mechanism when the need for intervention arises (RERT, direction or clause 4.8.9 instruction) is detailed in the Interim Supply Scarcity Procedure¹⁸.

In making this decision, AEMO must use reasonable endeavours to choose the mechanism, or combination of mechanisms, that is effective in addressing the supply scarcity conditions while minimising the associated direct and indirect costs.

On 17 December 2020, AEMO complied with NER clause 3.8.14 and followed its procedures in determining that RERT was the appropriate mechanism to address the conditions of supply scarcity¹⁹, since:

- No scheduled plant was available for direction, and
- The cost of activating RERT was less than that of issuing a clause 4.8.9 instruction, determined as the average aggregate VCR for New South Wales as published by the Australian Energy Regulator (AER).

On the basis of the contracted notification lead times for the available reserves required to address the relevant LOR declaration, at 1428 hrs AEMO issued MN 81329 declaring the latest time to intervene as 1430 hrs.

At 1438 hrs, AEMO advised the market²⁰ of its intention to commence RERT contract negotiations for the period from 1440 to 1830 hrs. At 1440 hrs, AEMO issued invitations to tender for the provision of 398 MW of Short Notice Reserve for the period from 1440 hrs to 1830 hrs. Note that no costs are incurred in contracting Short Notice Reserves.

3.3 Intervention event

RERT contracts vary in terms of pre-activation and activation lead times, as well as response times (for example, an industrial load responding to a request to reduce load under RERT may need several hours to prepare plant or undertake a safe shutdown) and minimum continuous run times.

Due to the fast response times of some RERT contracts (Type 1 and 2), AEMO can defer activation of these contracts until after a LOR 3 condition arises. This enables AEMO to avoid activation costs until or unless additional reserves are required in real time.

On 17 December 2020, in response to a forecast LOR 2 condition in New South Wales, AEMO pre-activated one contract (RERT 1²¹ – 40 MW) at 1500 hrs. This contract required one-hour pre-activation lead time and one-hour activation lead time, meaning the earliest that AEMO could activate this reserve was 1600 hrs to be effective at 1700 hrs. AEMO did not activate this contract.

At 1520 hrs, AEMO activated one other contract (RERT 2 – 38 MW). This contract required a two-hour activation lead time, effective from 1720 hrs.

Following the pre-activation of RERT 1 and the activation of RERT 2, a number of factors contributed to uncertainty and influenced significant changes to the reserve outlook.

At 1522 hrs, AEMO reclassified the loss of Bulli Creek – Dumaresq 8L and 8M transmission lines as a credible contingency after detecting lightning in the area. Constraints were initially invoked until 1630 resulting in a 205 MW reduction in transfer capacity across QNI, impacting New South Wales reserve levels. These constraints were extended to 1700 hrs at 1557 hrs. The reclassification was counteracted by a reduction in the forecast peak operational demand, whereby the 1600 hrs PDPASA run saw the forecast peak demand reduce to 10,847 MW at 1700 hrs.

¹⁸ At https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/procedures/so_op_3703---short-term-reserve-management.pdf?la=en.

¹⁹ Indicating conditions in which the available supply may become insufficient to securely meet demand for energy. This is different from the concept of 'supply scarcity' as defined in the frequency operating standard.

²⁰ MN 81332.

²¹ Under the Reliability Panel's RERT guidelines, AEMO is required to publish the name of the counterparty to the contract and the volume and timing of reserves procured under the contract, however AEMO must treat other information on panel membership as confidential.

Maximum operational demand observed on the day peaked lower and earlier than forecast, with 10,788 MW at 1630 hrs, following which AEMO cancelled the forecast LOR 2 condition in New South Wales at 1647 hrs due to the improved reserve situation. However, due to continued lightning in the area, the constraints for the reclassification of QNI were further extended at 1632 hrs to end at 1800 hrs. The reduction in QNI capacity of 205 MW between 1700 hrs and 1800 hrs in the 1700 hrs PDPASA run pushed New South Wales back into an LOR 2 condition.

At 1719 hrs, AEMO declared an actual LOR 2 condition in New South Wales from 1710 hrs, which was forecast until 1830 hrs. The minimum forecast reserve of 588 MW was 92 MW lower than the LOR 2 trigger of 680 MW. At this time AEMO had already activated 38 MW of RERT contracts on the basis of the previous forecast LOR 2 condition. AEMO did not activate or pre-activate additional reserves at this time, since activation could not be achieved on time due to the lead times of the remaining contracts.

At 1809 hrs, the actual LOR 2 condition was cancelled on the basis of the improved reserve situation in the 1800 hrs PDPASA run. The following factors contributed to the improved reserve condition:

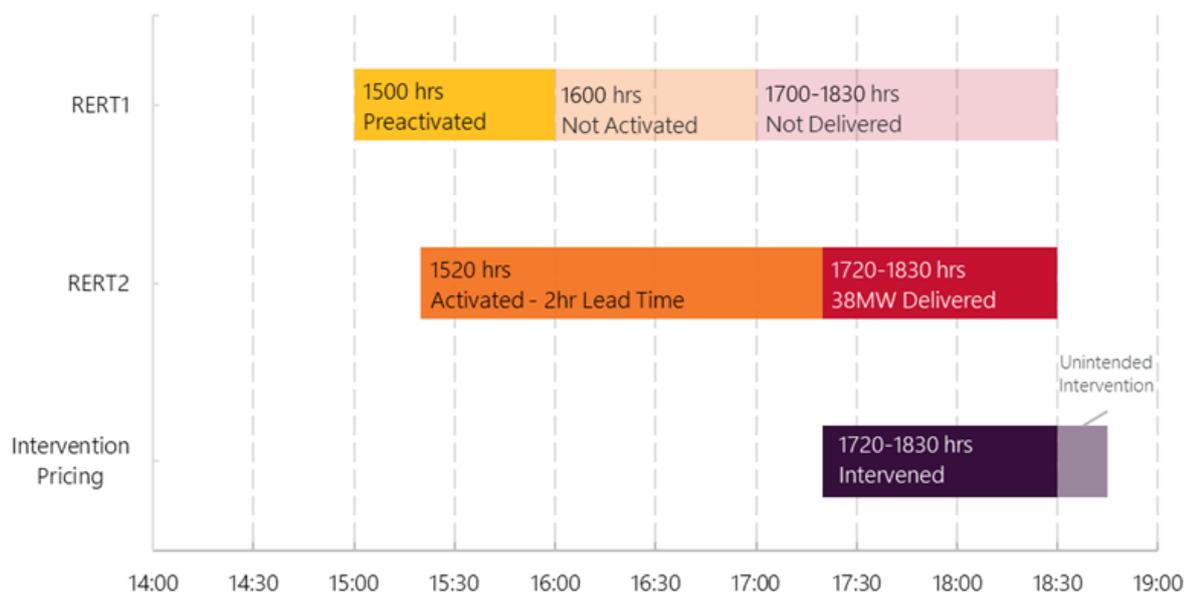
- Cancellation of QNI reclassification at 1744 hrs.
- Reduction of consumption, by at least 340 MW of price-responsive load in New South Wales for the majority of the period between 1630 hrs and 1840 hrs.
- An estimated further reduction of up to 50 MW of Essential Energy controlled load, which was voluntarily reduced to assist reserve conditions between 1600 hrs and 1900 hrs.
- Activation of 38 MW of RERT.

The single activated RERT contract was completed at 1830 hrs as scheduled and after reaching its minimum run time of one hour. Figure 1 details the timing of activation.

Fluctuations in semi-scheduled and non-scheduled wind generation were observed throughout the day, with wind generation over-forecast throughout the duration of the evening peak. By 1700 hrs, wind generation was 71 MW, or 218 MW below the 4-hour ahead forecast and 190 MW below the 24-hour ahead forecast. There was no high wind-speed or high temperature cut-out observed during the event.

Solar generation was under-forecast during the early stages of the evening peak. By 1700 hrs, solar generation was 600 MW, or 110 MW above the 4-hour ahead forecast and 117 MW above the 24-hour ahead forecast.

Figure 1 Timing of activation of RERT and intervention pricing 17 December 2020



On 17 December, AEMO instructed the activation of a 44 MWh volume of RERT. AEMO notes that 43 MWh was delivered on the day. Where the volume of RERT delivered by a RERT provider is below the amount set out in the activation instruction, the payment is only for the volume delivered. Table 4 shows a breakdown of RERT activated per trading interval.

Table 4 RERT activation instructions in New South Wales on 17 December 2020

Trading Interval ending	RERT activated capacity (MW)	RERT activated volume (MWh)
17/12/2020 17:30	38 ^A	6.33
17/12/2020 18:00	38	19
17/12/2020 18:30	38	19
Total (MWh)		44.33

A. Activation started at 1720 hrs.

3.4 Intervention pricing

Intervention pricing²² was applied for this event in accordance with NER 3.9.3(b) for the intervention periods from the dispatch intervals (DIs) ending 1725 hrs to 1830 hrs on 17 December 2020.

Intervention pricing remained in place for three additional DIs after deactivation of the RERT contract (between DIs ending 1835 hrs to 1845 hrs). This occurred due to a logic issue in the tool for applying intervention constraints.

The issue occurred following the reversal of activation of a 20 MW RERT contract immediately after it had been inadvertently issued. The RERT intervention constraints were manually removed during the activation period for the 20 MW RERT contract, but erroneously remained in place between DIs ending 1835 hrs to 1845 hrs. The RERT intervention constraint was manually revoked at 1845 hrs, as soon as the error was detected.

As a result, the intervention pricing on 17 December reflects the additional 20 MW of demand from DIs ending 1835 hrs to 1845 hrs.

3.5 Changes in dispatch outcomes

The addition of RERT capacity in New South Wales had the effect of decreasing generation in New South Wales, Queensland, and South Australia, with increasing generation in Victoria when comparing the difference in output between the physical and revised pricing runs, as shown in Table 5.

Table 6 compares the variation in total interconnector flows between the physical and revised pricing runs. Aggregate flows from Queensland to New South Wales (Terranora and QNI) decreased during the RERT event. Flows from New South Wales to Victoria also decreased.

²² AEMO sets the energy or ancillary service prices at the value that would have applied had the intervention not occurred, using the intervention pricing methodology developed by AEMO under clause 3.9.3(e) – see https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/_2019/dispatch/guide-to-intervention-pricing.pdf?la=en&hash=4EB7C0EA39AB0103A5674182F58C64B8.

Table 5 Summary of total energy generation during 17 December 2020 RERT event (MWh)

	NSW	QLD	SA	TAS	VIC
Physical run	11,377	10,436	1,838	875	6,746
Revised pricing run	11,389	10,485	1,842	875	6,734
Change	-12	-49	-4	0	12

Table 6 Summary of total interconnector flows during 17 December RERT event (MWh)

	Terranora	QNI	VIC-NSW	Heywood	Murraylink	Basslink
Physical run ^A	-102	-881	-47	-358	-100	-530
Revised pricing run ^A	-113	-916	-57	-353	-107	-530
Change	11	35	10	-4	7	0

A. Positive numbers are for flows flowing north or west, negative for flows flowing south or east.

3.6 Impact on reliability

For the 17 December RERT event, there was no USE. AEMO activated RERT on the basis of a forecast LOR 2 condition (which developed to an actual LOR 2 condition), according to AEMO operating procedures.

The activation of RERT assisted in removing the reserve shortfall and reducing the risk of load shedding if a credible contingency was to occur.

4. Cost of exercising RERT

NER clause 3.20.2(b)(2) requires that when AEMO activates RERT, it should aim to maximise the effectiveness of the activation at the least cost to end-use consumers of electricity. Accordingly, AEMO activated reserve contracts based on location, cost, capacity, time to activate, minimum activation time, and the profile of the forecast lack of reserve.

Table 7 shows a breakdown of the costs associated with exercising RERT during Q4 2020, which were included in the 17 December 2020²³ final statements, as per NER clause 3.20.6(f)(1). The total cost of exercising RERT was \$200,570, which includes pre-activation, activation, and intervention costs. The cost per MWh has been calculated based on the total cost divided by the MWh delivered²⁴ for the activation event. The total cost per MWh associated with exercising RERT in Q4 2020 is \$4,647.

Table 8 presents the cost recovery for each activation event, calculated by dividing the total RERT event cost by the state consumption during the relevant recovery period²⁵, as prescribed in NER 3.15.9(e).

²³ 17 December 2020 activation is detailed in final statement for 2020 Week 51.

²⁴ RERT MWh delivered is the amount of RERT actually delivered (as opposed to activated) including any over-delivery, noting that RERT providers have not been paid for over-delivery.

²⁵ 5.00 pm to 6.30 pm Australian Eastern Standard Time (AEST) on 17 December 2020.

Table 7 Costs associated with activating RERT in Q4 2020

	State	Pre-activation costs (\$)	Activation costs (\$)	Intervention costs (\$)*	Total cost (\$)	Cost per megawatt hour (\$/MWh)
17 December 2020	NSW	-	\$194,200	\$6,371	\$200,570	\$4,647

* Intervention costs represent the compensation paid to Market Participants due to the intervention event (for example, to compensate for energy generation which is displaced by RERT capacity), and to Eligible Persons (SRA holders) due to changes in interconnector flows, and therefore changes in the value of Settlement Residues. Note that these costs are subject to change under clause NER 3.12.1(a).

Table 8 Total costs recovery associated with activating RERT in Q4 2020

Event	New South Wales, 17 December 2020
Total RERT event cost (\$)	\$200,570
State consumption during the relevant recovery period (MWh)	15,194.14
Total cost recovery (\$/MWh)	\$13.20

A breakdown of the cost recovery from each Market Customer associated with RERT activation, as per NER clause 3.20.6(f)(2), is provided in Appendix A.

Activation of reserves on 17 December 2020 did not avoid load shedding, since an LOR 3 condition did not arise, however if the largest credible contingency had occurred, the cost of avoided load shedding would have been \$2.38m²⁶. Table 19 presents the estimated avoided cost of load shedding on the 17 December, if the largest credible contingency had occurred.

Table 9 Estimated avoided cost of load shedding

Event	New South Wales, 17 December 2020 (\$ million)
Estimated cost of load shedding avoided based on VCR	\$2.38

5. AEMO's intervention process

AEMO's general process for deploying RERT is documented in Procedure for the Exercise of the Reliability and Emergency Reserve Trader²⁷.

AEMO considers that it followed all relevant provisions under NER clause 4.8 in the exercising of RERT in Q4 2020.

²⁶ Calculated based on the volume of RERT delivered (43.16 MWh) and the volume of pre-activated RERT available ([13.3 MWh] taking notification periods into account), multiplied by the relevant VCR.

²⁷ At https://www.aemo.com.au/-/media/files/electricity/nem/emergency_management/rert/procedure_for_the_exercise_of_reliability_and_emergency_reserve_trader_rert.pdf.

Appendix A

Table 10 provides a breakdown of the cost recovery from each Market Customer associated with RERT activation on 17 December 2020, as per NER clause 3.20.6(f)(2).

Table 10 Market customer cost recovery for New South Wales

Market Customer	Costs recovered (\$)
1st Energy Pty Ltd	235.80
AGL Hydro Partnership	7,052.07
AGL Macquarie Pty Limited	-
AGL Sales (Queensland Electricity) Pty Limited	1.21
AGL Sales Pty Limited	36,103.67
Alinta Energy Retail Sales Pty Ltd	3,053.42
Amaysim Energy Pty Ltd	1,362.58
Blue NRG Pty Ltd	588.35
Bright Spark Power Pty Limited	8.74
Covau Pty Limited	844.72
CS Energy Limited	2.58
CSR Building Products Limited	305.07
Darlington Point Solar Farm Pty Ltd	14.61
Delta Electricity	2,054.68
Diamond Energy Pty Ltd	-18.52
Discover Energy Pty Ltd	106.60
Electricity In A Box Pty Ltd	0.22
Elysian Energy Pty Ltd	13.07
Energy Locals Pty Ltd	314.90
Energy Services Management Pty Ltd	9.09
EnergyAustralia Pty Ltd	23,655.45
EnergyAustralia Yallourn Pty Ltd	10,656.21
Enova Energy Pty Ltd	125.50
ERM Power Retail Pty Ltd	17,156.66
Globird Energy Pty Ltd	77.58
Hanwha Energy Retail Australia Pty Ltd	100.80

Market Customer	Costs recovered (\$)
Infigen Energy Markets Pty Limited	415.68
Locality Planning Energy Pty Ltd	5.92
Lumo Energy Australia Pty Ltd	0.16
M2 Energy Pty Ltd (T/As Commander Power & Gas)	78.81
M2 Energy Pty Ltd (T/As Dodo Power & Gas)	826.76
Macquarie Bank Ltd	489.92
Mojo Power Pty Ltd	127.33
Momentum Energy Pty Limited	3,702.19
MTA Energy Pty Limited	23.82
Next Business Energy Pty Ltd	805.19
Online Power And Gas Pty Ltd	72.48
Origin Energy Electricity Limited	56,655.54
OVO Energy Pty Ltd	21.63
People Energy Pty Ltd	7.43
Pooled Energy Pty Limited	83.75
Power Club Limited	12.05
Powerdirect Pty Ltd	632.80
Powershop Australia Pty Limited	1,051.31
Progressive Green Pty Ltd	1,021.69
QEnergy Limited	233.56
Radian Holdings Pty Ltd	0.35
ReAmped Energy Pty Ltd	222.11
Red Energy Pty Limited	8,089.39
Sanctuary Energy Pty Ltd	0.01
Simply Energy	2,613.14
Smarestenergy Australia Pty Ltd	1.78
Stanwell Corporation Limited	6,089.72
Sumo Power	207.37
Sun Retail Pty Ltd	0.11
Tango Energy Pty Ltd	125.27
Tomago Aluminium Company Pty Ltd	12,977.05
WINconnect Pty Ltd	25.01

Market Customer	Costs recovered (\$)
Zen Energy Retail Pty Ltd	125.59
Total	200,569.99

Appendix B

Table 11 below provide a summary timeline for 17 December 2020 RERT event (which was the only RERT event in Q4 2020) and the actions taken.

Table 11 Timeline of key events on 17 December 2020

Date	Event/comment
0718 hrs	<ul style="list-style-type: none"> • MN 81288^A – forecast LOR 1 declared for New South Wales from 1600 to 1800 hrs. The forecast capacity reserve requirement was 1336 MW. • The minimum capacity reserve available is 1417 MW.
1249 hrs	<ul style="list-style-type: none"> • MN 81298 – forecast LOR 1 declared for New South Wales from 1530 to 1800 hrs. The forecast capacity reserve requirement was 1415 MW, but the minimum capacity reserve available was 1166 MW.
1411 hrs	<ul style="list-style-type: none"> • MN 81318 – forecast LOR 2 declared for New South Wales from 1530 to 1730 hrs. The forecast capacity reserve requirement was 743 MW, but the minimum capacity reserve available was 471 MW. • AEMO sought a market response but had not yet determined the latest time to intervene.
1428 hrs	<ul style="list-style-type: none"> • MN 81329 – update to the forecast LOR 2 for New South Wales • AEMO advised the latest time to intervene to be 1430 hrs.
1435 hrs	<ul style="list-style-type: none"> • MN 81331^B – actual LOR 1 declared for New South Wales forecast until 2000 hrs. The forecast capacity reserve requirement was 1419 MW, but the minimum capacity reserve available was 1129 MW.
1438 hrs	<ul style="list-style-type: none"> • MN 81332 – AEMO advised intention to commence RERT contract negotiations in the New South Wales region, for the period 1440 to 1830 hrs.
1500	<ul style="list-style-type: none"> • AEMO pre-activated a RERT contract
1519 hrs	<ul style="list-style-type: none"> • MN 81339 – AEMO advised RERT contract activated at 1720 hrs and are forecast to apply until 1830 hrs.
1523 hrs	<ul style="list-style-type: none"> • MN 81340 - AEMO reclassified the loss of Bulli Ck – Dumaresq 8L & 8M lines as a credible contingency due to lightning in the area.
1640 hrs	<ul style="list-style-type: none"> • MN 81343 – advised AEMO Intervention Event commenced (dispatch of RERT). • 38 MW of RERT was activated in New South Wales.
1647 hrs	<ul style="list-style-type: none"> • MN 81344 – cancellation of forecast LOR 2 in New South Wales from 1645 hrs.
1719 hrs	<ul style="list-style-type: none"> • MN 81347 – actual LOR 2 declared in New South Wales from 1710 to 1830 hrs. • The capacity reserve requirement was 680 MW but the minimum capacity reserve available was 588 MW.
1809 hrs	<ul style="list-style-type: none"> • MN 81366 – LOR 2 cancelled in New South Wales, at 1805 hrs.
1831 hrs	<ul style="list-style-type: none"> • MN 81367 - RERT services de-activated at 1830 hrs.

A. Forecast LOR1 condition was declared in MN 81288 at 0718 hrs, however the forecast reserve requirement and minimum capacity requirement were corrected in MN 81289 at 0729 hrs.

B. Actual LOR1 condition was declared in MN 81331 at 1435 hrs, however the timing of the duration of the LOR1 condition was updated in MN 81333 at 1445 hrs.