Economic Regulation Authority

Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 1 July 2022 to 30 June 2025

Draft determination

31 March 2022

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Economic Regulation Authority

Level 4, Albert Facey House

469 Wellington Street, Perth WA 6000

Telephone 08 6557 7900

Email info@erawa.com.au

Website www.erawa.com.au

This document can also be made available in alternative formats on request.

National Relay Service TTY: 13 36 77

Invitation to make submissions

Submissions are due by 4:00 pm WST, Thursday, 28 April 2022

The ERA invites comment on this paper and encourages all interested parties to provide comment on the matters discussed in this paper and any other issues or concerns not already raised in this paper.

We would prefer to receive your comments via our online submission form

https://www.erawa.com.au/consultation

You can also send comments through:

Email: publicsubmissions@erawa.com.au
Post: Level 4, Albert Facey House, 469 Wellington Street, Perth WA 6000

Please note that submissions provided electronically do not need to be provided separately in hard copy.

All submissions will be made available on our website unless arrangements are made in advance between the author and the ERA. This is because it is preferable that all submissions be publicly available to facilitate an informed and transparent consultative process. Parties wishing to submit confidential information are requested to contact us at info@erawa.com.au.

For further information please contact

General Enquiries

Sara O'Connor
Ph: 08 6557 7935 | Mob: 0414 452 305
info@erawa.com.au

Media Enquiries

Natalie Warnock
Ph: 08 6557 7933 | Mob: 0428 859 826
media@erawa.com.au

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Executive summary

The Wholesale Electricity Market (WEM) Rules and Gas Service Information (GSI) Rules require the Economic Regulation Authority to determine the allowable revenue and forecast capital expenditure for the Australian Energy Market Operator (AEMO) for the functions it performs, and the services it provides, to the electricity and gas markets in Western Australia. AEMO recovers its costs for providing these activities through fees charged to market participants, such as generators and retailers.

On 17 December 2021, AEMO submitted its proposal for allowable revenue and forecast capital expenditure for the sixth review period, from 1 July 2022 to 30 June 2025 (AR6). In its proposal, AEMO requested total allowable revenue of $156.2 million and forecast capital expenditure of $69.4 million for its WEM functions. For its GSI functions, AEMO proposed total allowable revenue of $5.3 million and forecast capital expenditure of $0.4 million.

AEMO's proposed allowable revenue for its WEM functions has increased by 64 per cent compared to forecast expenditure at the end of the current funding period.[1] Forecast capital expenditure for the AR6 period shows a 16 per cent reduction from current levels.

The ERA must ensure that approved costs align with AEMO's functions to deliver its services and functions under the WEM Rules and GSI Rules. During the AR6 period, this includes proposed funding for AEMO to deliver WEM reform projects required under the energy transformation program. It is reasonable to expect an increase in AEMO's proposed costs given the scale and timing of the energy transformation program. However, there has been a 50 per cent increase in the overall forecast capital expenditure to deliver the WEM program, from an initial estimate in 2019 of $60.7 million to $91.2 million in AEMO's funding proposal, of which $44.6 million will be expended in the AR6 period.

The ERA understands the risk to AEMO and the market if AEMO is insufficiently funded to deliver its obligations and perform its functions. However, the ERA must also ensure that AEMO is not overcompensated through funding determinations, with the risk that inefficient costs are passed through market fees to consumers at a time when cost of living expenses are rising and workers could potentially face real wage reductions.[2]

The ERA has taken a dual approach to reviewing costs proposed for AR6:

- A detailed, bottom-up analysis of the individual elements that underlie the proposed cost forecasts.
- A top-down review of AEMO's governance process for preparing its funding proposal to determine how robustly the proposed cost forecasts were internally challenged.

Bottom-up analysis

The ERA examined and interrogated AEMO on the proposed allowable revenue and forecast capital expenditure for the AR6 forecast in detail. This included reviewing and analysing:

- The information provided in support of a request for 33 new permanent staff positions.
- AEMO's fixed asset register and the operational lives used to estimate depreciation and amortisation expense, to recognise the reduction in value of capital assets over the AR6 period.

1 Compared to AR5 forecast actuals.

2 Reserve Bank of Australia, 2022, *Statement on Monetary Policy – February 2022*, (online).

- Individual line items making up supplies and services, accommodation, and Information Technology (IT) and telecommunications cost categories.
- The approach taken to determine the number and costs of staff and contractors assigned to capital projects.
- The new method for assessing and quantifying project contingency costs.
- The individual items comprising each project cost.

The ERA's draft decision is not to approve all the costs proposed for AR6 and it has partially rejected some costs within the allowable revenue cost categories and most forecast capital project costs. Further details are given in the draft determination below.

Top-down review

The ERA has longstanding concerns about AEMO's governance process around preparing its funding proposals, which it has raised in previous allowable revenue determinations. AEMO stated that its AR6 proposal had undergone a more exhaustive challenge process than previous funding proposals.

The AR6 proposal had 11 internal reviews from July to December 2021. However, the overall challenge process does not appear to have had significant effect on the funding proposal. Sample committee minutes indicate a focus on how the costs could be better explained or justified to the ERA and the market, rather than demonstrating how AEMO would deliver its functions and services in an efficient and least-cost manner.

The ERA continues to be concerned about how rigorously AEMO's governance process around its funding proposal ensured the least cost delivery of AEMO's obligations under the WEM Rules and GSI Rules. While there has been some improvement since the last determination process, AEMO has not provided sufficient evidence to the ERA that its:

- Staffing levels and operational processes are efficient.
- Decisions to bring IT systems, solution development and maintenance in-house represent the most cost-efficient options. AEMO did not provide business cases to show consideration of alternative options in support of capital investment decisions.

Draft determination for the WEM for AR6

The ERA's draft decision is to approve $135.9 million in allowable revenue, which is $20.3 million or 13 per cent lower than the $156.2 million proposed by AEMO. The ERA has rejected certain costs that did not meet the requirements of the WEM Rules, summarised below.

Included in AEMO's proposed labour costs are 33 new permanent staff positions. The ERA has not approved $7.4 million in proposed labour costs, equivalent to nearly three-quarters of those new permanent positions. AEMO has not made a strong enough case to demonstrate that its current staffing levels were insufficient, and that it had taken all steps to improve the efficiency of its processes and systems, before proposing to hire new staff. Unless AEMO provide further evidence to fully justify increased staffing, the ERA sees no reason to shift from this position in its final determination.

Other proposed costs not approved in their entirety result in reductions to proposed allowable revenue. These are a reduction of $1.8 million in existing labour costs to adjust for the unlikely backfilling of operational staff seconded for short periods of time to capital projects, and a reduction of $3.1 million for labour included in proposed operating projects where costs are

very uncertain. AEMO has the option of re-presenting these operating project costs for approval during AR6 through in-period submissions.

The reductions to other AEMO operating costs categories are supplies and services, borrowing costs and IT and telecommunications (a reduction of $5.1 million from the proposed $29.2 million), and the depreciation and amortisation expense (a reduction of $2.9 million from the proposed $50.9 million), which results from changes to the underlying capital asset costs.

The ERA has not approved the entirety of AEMO's proposed forecast capital expenditure, due to:

- Rejecting capital expenditure that did not meet the funding approval criteria in the WEM Rules (a reduction of $9.0 million).
- Revising project contingency funding (a reduction of $6.5 million) to remove allowances for unsubstantiated or poorly defined risks. In preparing its final determination.
- Replacing estimated labour costs allocated to capital projects, with actual staffing costs wherever possible (a reduction of $2.1 million).

As a result, the ERA's draft determination is to approve $52.0 million in forecast capital expenditure, which is $17.4 million or 25 per cent lower than the $69.4 million proposed by AEMO.

The ERA's draft determination is to approve AEMO's proposed GSI allowable revenue and forecast capital expenditure for the AR6 period, as proposed.

The ERA's draft determination on the allowable revenue and forecast capital expenditure proposed by AEMO for the AR6 period, is summarised in Table 1 on page vi.

Market fees

The ERA has compared estimated market fee levels at the end of the AR6 period to levels at the end of the AR5 period. Under AEMO's proposal, WEM fees would increase by 83 per cent. The increase under the ERA's draft determination is 70 per cent, which is still significant. Essentially, savings anticipated when AEMO took on the market operation and system management role in Western Australia are not yet evident. There is a question whether the SWIS has benefitted from leverage of AEMO's larger scale operation in the National Electricity Market.

Consultation

Stakeholder comments in response to the ERA's issues paper reflect widespread concerns about AEMO's efficiency. The ERA's findings detailed in this draft determination identify that there is scope for AEMO to become more efficient in its operations.

The ERA is seeking comment from stakeholders on any aspect of the ERA's draft determination, by 28 April 2022. The ERA will use the stakeholder feedback to inform its final determination for the AR6 period, which will be published on its website on 31 May 2022.

Table 1: ERA's draft determination on AEMO's AR6 proposal ($ million)

Expenditure category	AR6 proposed	Draft determination	Variance
WEM			
Allowable revenue	156.2	135.9	(20.3)
Total forecast capital expenditure	69.4	52.0	(17.4)
• - Facilitating Energy Transformation Strategy	54.0	41.4	(12.6)
• - Other (business-as-usual) capital	15.4	10.6	(4.8)
GSI			
Allowable revenue	5.3	5.3	-
Total forecast capital expenditure	0.4	0.4	-
Total AEMO allowable revenue	**161.5**	**141.2**	**(20.3)**
Total AEMO forecast capital expenditure	**69.8**	**52.4**	**(17.4)**

Source: AEMO's AR6 proposal and ERA analysis

1. Introduction

The ERA must determine the allowable revenue and forecast capital expenditure for AEMO for the functions and services AEMO provides to the Western Australian electricity and gas markets under the WEM Rules and GSI Rules. AEMO recovers its expenditure through fees charged to market participants.

This is the sixth allowable revenue period for the market operator in Western Australia. AEMO estimates its funding requirements every three years, with the current funding period ending on 30 June 2022, and the next period extending from 1 July 2022 to 30 June 2025. AEMO can make an in-period submission for additional funding for a project or activity fulfilling an obligation under the market rules, throughout the AR6 period.

1.1 AR6 review process and funding approval timeline

On 17 December 2021, the Minister for Energy gazetted changes to the WEM Rules and GSI Rules establishing a revised review process and timeline for AEMO's AR6 funding proposal.[3]

The new rules required the ERA to publish a funding proposal guideline to assist AEMO to prepare its submission for the AR6 review period. The ERA published its proposal guideline on 29 October 2021, setting out the information to be provided in a funding submission and the process the ERA will follow to make its determination.[4]

The ERA received a submission from AEMO on 17 December 2021 seeking approval of its proposed allowable revenue and forecast capital expenditure for the AR6 period.[5] AEMO's proposal noted that it had reviewed and updated its submission to meet the requirements of the proposal guideline where practicable.[6]

The ERA published AEMO's proposal as soon as it was received and an issues paper on 8 February 2022.[7] The ERA also published two supporting documents provided by AEMO, the AEMO Western Australian IT Roadmap 2022-2025 and the FTE Resources Estimate: WA Departments and WA Support Functions, on 25 February 2022.[8]

The ERA received six submissions in response to its issues paper, from Alinta Energy, the Australian Energy Council, Bluewaters Power, Collgar Wind Farm, Perth Energy and Synergy.[9] Feedback from these submissions is presented against relevant topics below and a summary of any remaining points is provided in Appendix 5.

This draft determination outlines the ERA's initial findings from its review of AEMO's proposal and provides an indicative view of the level of funding approved for AR6. The ERA is seeking feedback from interested parties on its draft determination and will consider feedback received

3 Government of Western Australia, 2021, *Western Australian Government Gazette 212/2021 – 17 December 2021*, pp. 5589-5595, (online).

4 Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submissions under the WEM Rules and GSI Rules*, (online).

5 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, (online).

6 Ibid, p. 21.

7 Economic Regulation Authority, 2022, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

8 These documents are published on the ERA's website (online).

9 Ibid.

in response to both the issues paper and this draft determination when making its final determination.

The ERA will continue to review the proposal and engage with AEMO throughout the review period on matters that require clarification and further detail. If variation occurs between the funding amounts approved in the draft and the final determinations, it will be explained in the final determination. All forecast capital numbers in the draft determination include an allowance for project contingency, unless stated otherwise. All figures are nominal.

Consultation on the draft determination will close on 28 April 2022, following a four-week consultation period. The ERA will be unable to accommodate requests for additional time to make submissions, as it is required to publish its final determination by 31 May 2022.

1.2 ERA's obligations under the market rules

The WEM Rules and GSI Rules set out the ERA's obligations and matters for consideration by the ERA when undertaking its review. The ERA's obligations under the WEM Rules, which are similar to the GSI Rules (see Appendix 8), are set out below.

The ERA must ensure that, when determining the allowable revenue and forecast capital expenditure for AEMO or undertaking a reassessment of AEMO's allowable revenue and forecast capital expenditure:

- The allowable revenue is sufficient to cover the forward-looking costs of AEMO performing its functions.
- The allowable revenue and forecast capital expenditure includes only those costs that would be incurred by a prudent provider of AEMO's services, acting efficiently, to achieve the lowest practicably sustainable cost of performing AEMO's functions.[10]

The ERA is also required to benchmark the allowable revenue and forecast capital expenditure against the costs of providing similar functions and/or projects in other jurisdictions where possible. The ERA can also consider any other matters it regards as relevant to its determination.

When making its determination, the ERA may do any, or all, of the following:

- Approve the costs of any project or of AEMO performing its functions.
- Reject the costs fully or partially or substitute those costs with costs the ERA considers meets the requirements.
- Recommend to AEMO that some of the costs be considered through an in-period application for additional funds or in a subsequent review period.[11]

1.2.1 Application of legal test

To determine AEMO's allowable revenue and forecast capital expenditure, the WEM Rules and the GSI Rules require the ERA to only approve costs that would be incurred by a prudent provider acting efficiently to achieve the lowest practicably sustainable cost of performing

[10] Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.5(b), (online). Gas Service Information Rules, 17 December 2021, Rule 109(2)-(3), (online).

[11] Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.6(d), (online). Gas Service Information Rules, 17 December 2021, Rule 109(6), (online).

AEMO's functions while effectively promoting the market objectives.[12] As a result, the ERA expects AEMO to demonstrate how its proposed costs will achieve the lowest practicably sustainable costs of delivering AEMO's functions.

The ERA published a proposal guideline that outlined a two-pronged approach to assess the prudence and efficiency of AEMO's costs as required by the WEM Rules and GSI Rules.[13]

To assist the ERA in its assessment of the prudence of AEMO's costs, AEMO can provide evidence that a project is necessary, that there is a clear connection between the forecast costs and AEMO's functions, and that the scope of the project provides the functions as described in the WEM Rules and/or GSI Rules and no more.

To assist the ERA in its assessment of the efficiency of AEMO's costs, AEMO can provide evidence that demonstrates a consistent model/approach to estimating project costs; a competitive procurement process; a thorough governance process to challenge project cost estimates; and an options analysis to evaluate whether the chosen solution is the lowest practicably sustainable cost.

When reviewing AEMO's proposal, the ERA has applied the two-pronged test outlined in the procedure guideline as required by the WEM Rules and GSI Rules. As part of the test, the ERA also considered how the proposed costs will effectively promote the market objectives and any other matters that the ERA considers relevant to its determination. Relevant excerpts of the WEM Rules and GSI Rules that outline the ERA's and AEMO's obligations as part of this determination are provided in Appendix 6 and Appendix 7.

The ERA's determination is based on the evidence that AEMO has provided to substantiate its proposal. The ERA may not be able to approve costs where AEMO has not provided sufficient evidence to demonstrate the costs meet the legal test.

At a stakeholder forum in early March 2022, AEMO advised market participants that it would move costs for expenditure on proposed projects from the AR5 period into the AR6 period, which would likely result in increased expenditure in AR6.[14] This has not been formally communicated to the ERA.

If AEMO wants to revise its proposed costs for the AR6 period, it needs to provide this information to the ERA by 26 April 2022, so the ERA can take this updated information into account for the final determination.[15] Failure to provide information by the specified date may be considered a breach of the WEM Rules.

[12] Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.5(b), (online). Gas Services Information Rules, 17 December 2021, Rule 109(2)-(3), (online).

[13] Economic Regulation Authority, 2021, *Guideline to inform funding submissions under the WEM Rules and GSI Rules*, Section 3.8.1, p. 8, (online).

[14] Australian Energy Market Operator, 2022, *Western Australian Electricity Consultative Forum, Meeting 35 – 3 March 2022, Item 4 – AR6 update*, (online).

[15] The ERA Secretariat has previously communicated this date to AEMO.

2. Overview of outcomes in AR5

The ERA reviewed AEMO's expenditure during the AR5 period (1 July 2019 to 30 June 2022) to understand the costs proposed for the AR6 period. Based on AEMO's expectation of costs included in its submission, AEMO will underspend on allowable revenue and overspend on forecast capital costs by the end of the AR5 period. AEMO has indicated to the ERA that following the draft determination, AEMO will provide updated cost forecasts.

Table 2: ERA approved costs and AEMO's forecast costs to the end of AR5 ($ million)

	AR5 determination*			AR5 forecast actual			Variance between total (%)
Expenditure category	**WEM**	**GSI**	**Total**	**WEM**	**GSI**	**Total**	
Allowable revenue	99.8	6.1	**105.9**	94.3	4.8	**99.1**	6.4
Forecast capital expenditure	80.4	0.5	**80.9**	82.8	0.28	**83.08**	(2.7)

**AR5 determination includes in-period submission*
Source: ERA analysis

Allowable revenue in the AR5 period is forecast to be 6.4 per cent lower than the amount approved in the ERA's determination. Forecast costs against the AR5 determination vary between cost categories, with some costs being higher than approved and others significantly lower. Both labour and accommodation costs are forecast to be higher while IT and telecommunications, supplies and services, and depreciation are forecast to be lower.

The forecast costs for depreciation and amortisation are affected by delays in the delivery of capital projects. The reduced depreciation expense in the AR5 period does not represent cost savings to the market, it simply pushes depreciation on the assets into later allowable revenue periods due to delays in assets being placed in service and therefore the depreciation on these assets commencing.

For the AR5 period, the ERA approved expenditure based on the forecast costs of 18 separate capital projects totalling $66.3 million, which included contingency costs of $11.4 million.[16] A further $14.6 million was approved as an in-period submission for the DER Roadmap, making the total approved forecast capital expenditure for AR5 $80.9 million.[17]

The forecast capital expenditure against the projects included in the $80.9 million is $70.2 million (Appendix 13). The balance of the forecast capital expenditure of around $13 million has been spent, or is forecast to be spent, against projects that were not specifically included in the AR5 submission and of which the ERA had no oversight until AEMO lodged its AR6 submission. While the ERA acknowledges some of these projects may form part of projects specified for the AR5 period, AEMO did not provide information to link this expenditure back to specific AR5 projects. Full details of these project costs can be found in Appendix 13.

16 Economic Regulation Authority, 2019, *Australian Energy Market Operator Allowable Revenue and Forecast Capital Expenditure 2019/20 to 2021/2022 – Final determination*, (online).

17 Economic Regulation Authority, 2020, *Australian Energy Market Operator in-period funding submission for implementation of the Distributed Energy Resources Roadmap actions – Final determination*, (online).

A review of the actual expenditure on projects included in the AR5 determination showed that, of the 18 included projects, seven exceeded budgets (including contingency) to a total of $8.1 million, five projects with a combined budget of $6.6 million were not started, and six projects were forecast to be completed within $0.1 million of the approved budget.

A detailed analysis on a project-by-project basis revealed that AEMO has substantially underspent on projects outlined in its proposal by around $11 million. However, in total AEMO spent more than it had outlined it would spend in its AR5 proposal by around $2 million. The difference was spent on projects that cannot be tracked back to projects specifically budgeted for and tested for prudency by the ERA.

To fund the projects that have exceeded the approved AR5 budget and the projects that were not included as part of the AR5 proposal, AEMO has utilised $12.5 million from projects that were completed under budget or not commenced, and a further $6.3 million from contingency funding approved, but not required to complete projects. This activity is allowed under the WEM Rules and GSI Rules.

The flexibility AEMO has with approved funding can lead to a situation where AEMO expends funding on projects not approved by the ERA because they did not meet the funding approval requirements. An example of this is AEMO's expenditure on its digital roadmap projects in AR5.

Digital expenditure in AR5

In its AR5 funding proposal, AEMO proposed funding of $12.7 million in the WEM for the digital roadmap project, which involved the introduction of a common centralised platform upon which to build future IT infrastructure.

However, in its final determination on AEMO's funding for AR5, the ERA approved only $4.5 million of the forecast capital expenditure identified for the digital roadmap project.[18] This was because AEMO had not conducted a separate exercise to determine and provide evidence to identify the benefits Western Australia could expect from the digital roadmap project.

Instead, to inform the ERA's final determination, AEMO provided indicative and high-level cost benefit outcomes for Western Australia's inclusion in this project. For example, AEMO indicated that the digital platform would lower capital and operating costs by 15 per cent to 35 per cent. Using AR4 and AR5 costs as a guide, and assuming no change in AEMO's functions or data requirements, AEMO estimated that a 15 per cent operating cost saving would have been $450,000 per year during AR4, and $500,000 per year during AR5. In its AR5 determination, the ERA noted that it had no issue with the digital roadmap project in principle, just that the benefits to Western Australia had not been fully detailed and quantified.

Following on from this, in August 2021, AEMO reported to industry that it was expecting to spend $7.6 million on digital roadmap projects in total.[19] This was $3.1 million higher than the amount that was approved in the AR5 determination by the ERA. AEMO had locked in the costs for this project for the future, despite the ERA's determination on funding for this project, and despite AEMO not having provided evidence for the benefits of this project. See section 5.3.5 for discussion of digital roadmap projects in AR6.

[18] Economic Regulation Authority, 2019, *Australian Energy Market Operator Allowable Revenue and Forecast Capital Expenditure 2019/20 to 2021/2022 – Final determination*, p. 35, (online).

[19] Australian Energy Market Operator, 2021, *Western Australian Electricity Consultative Forum, Meeting 32 – 18 August 2021, Item 2 – AEMO Operational Updates*, (online).

3. AEMO's AR6 proposal

A summary of AEMO's AR6 funding proposal for WEM and GSI allowable revenue and forecast capital expenditure, and how it compares with the funding approved for AEMO in the AR5 period, is presented in Table 3.

Table 3: AEMO's approved funding for AR5 and proposed funding for AR6 ($ million)

	AR5 1 July 2019 to 30 June 2022**			AR6 1 July 2023 to 30 June 2025*			Variance between total (%)
Expenditure category	**WEM**	**GSI**	**Total**	**WEM**	**GSI**	**Total**	
Allowable revenue	99.8	6.1	**105.9**	156.2	5.3	**161.5**	52.5
Forecast capital expenditure	80.4	0.5	**80.9**	69.4	0.4	**69.8**	(13.7)

*Source: *AEMO's AR6 proposal (online).*
***ERA's AR5 determination (online).*

AEMO's AR6 funding proposal for forecast allowable revenue represents a significant increase compared to the allowable revenue approved and expended in the previous review period.

Although forecast capital costs for AR6 are lower than the total approved for AR5, forecast capital costs for individual programs of work, such as WEM reform projects, have increased substantially from the levels AEMO forecast during the AR5 period. Additionally, AEMO has flagged its intention to make an in-period funding submission for some projects that may increase the total forecast capital expenditure for the AR6 period to a value substantially more than approved for AR5 (section 5.3.6 below notes that the possible additional expenditure associated with these projects ranges from $32 million to $64 million).[20] It is not unreasonable to expect higher capital costs in the current environment of large transformational change.

The cost of AEMO meeting its gas market information service obligations has historically been much lower than AEMO's costs to meet its obligations in the WEM. In AR6, AEMO's forecast GSI costs remain small and there is little change from the GSI costs approved for the AR5 period.

Based on its proposal, AEMO predicted an increase in average WEM market fees from $1.143 per MWh in the AR5 period to $1.823 per MWh in the AR6 period (60 per cent). However, if other potential capital projects are delivered during the AR6 period, the average WEM fee will increase to between $2.403/MWh and $2.536/MWh by the end of the AR7 period.[21]

Excluding an in-period funding submission, AEMO estimated that if the 60 per cent increase in average WEM fees is passed through to residential customers, the part of the annual residential electricity bill representing market fees will increase from $10.11 in the AR5 period

[20] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure for 2022-23 to 2024-25*, p. 73, (online).

[21] Ibid, p. 74.

to approximately $16.56 in the AR6 period, equating to an increase of $6.45 per year on the average residential customer bill.[22]

Stakeholder views on market fees

In response to the ERA's issues paper, all stakeholders expressed concern in relation to the rise in AEMO's expenditure and the cost of market fees (Appendix 5).

For example, Alinta Energy noted its objection to the proposal and expressed its concern that AEMO had not substantiated why the significantly higher expenditure was necessary to perform its functions or how the proposed costs represented the lowest practicably sustainable cost of implementation.[23] Alinta considered that AEMO's proposal risked negating the benefits of WEM reform, locking in long-term cost increases for customers without providing commensurate benefits, setting a precedent that would allow AEMO to increase customer costs significantly without an appropriate rationale in future periods, and imposing unreasonable costs on generators that could not be recovered in offers.

Bluewaters Power similarly noted the costs of reforming and supporting the WEM had grown, relative to earlier estimates and any quantifiable or communicated benefit, especially given the "makeup of the WEM, which is a net settled and heavily bilaterally contracted market with relatively few participants."[24] Bluewaters considered that the benefit gained from creating and maintaining such a complex system was difficult to justify and questioned the value for money of the reform process.[25]

Bluewaters encouraged the ERA to consider the impact of the proposed expenditure on future WEM fees, including in the next allowable revenue period, and to continue questioning the prudency, efficiency, and deliverability of the key programs of work.[26] Bluewaters described the upward trajectory of market fees as serious and unsustainable, and considered that there seemed to be an understanding that future fees were likely to increase rather than plateau or reduce.[27] Bluewaters considered that there was a trade-off between the accuracy of the forecast expenditure and revenue requirement, and the certainty and consistency of WEM fees, and highlighted that in-period adjustments were difficult for market participants to budget for.

Collgar Wind Farm was concerned with the substantial increase in AEMO's proposed expenditure and the subsequent increase in market fees.[28] Collgar noted that market fees currently represented about 8 per cent of its total costs and would increase to over 12 per cent if AEMO's proposed revenue and capital expenditure was approved, and 16 per cent if the $60 million in additional in-period capital costs were approved. Collgar considered that additional market fees would further constrain the resources available for market participants' own activities, including reform implementation, which could risk market participants being ill-prepared for the start of the new market design and other regulatory deadlines.

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22 AEMO calculated the AR5 average tariff as $1.066/MWh/ 1000 x (13 kWh per day) x 2, as the fee is charged to both generation and load. AEMO considered that its calculation was indicative only, as AEMO has no control or visibility of how market participants absorb or pass-through costs to end use customers.

23 Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, p. 1. (online).

24 Bluewaters, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, p. 1. (online).

25 Ibid, p. 1.

26 Ibid, pp. 2-3.

27 Ibid, p. 2.

28 Collgar Wind Farm, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

Collgar warned that the proposed expenditure for the AR6 period should not become the new baseline against which future allowable revenue and forecast capital expenditure submissions were compared and that any new reforms should be considered on their own merit to assist in mitigating expenditure creep.

The Australian Energy Council (AEC) considered that end customers had borne the cost of higher market fees over recent allowable revenue periods and would have to bear another incremental cost in the combined increase in allowable revenue and capital expenditure in AR6.[29] The AEC considered that any forecast costs should be reasonable and justifiable, keeping market fees to a minimum, and that AEMO should provide evidence the requested revenue and capital expenditure was in the long-term interests of consumers in relation to the price, quality and reliability of goods and services provided.

The AEC also suggested the ERA may consider assessing whether the proposed significant increase in market participant fees created a barrier to competition for new market entry. The AEC advocated for market participants not having to pay for government-led market reform. The AEC considered that funding reform via market fees made it difficult for AEMO to minimise market fees and could disproportionately penalise existing market participants, as fees are charged on a $/MWh basis.

Synergy acknowledged that a greater understanding of the scope of the WEM reform program had required AEMO to revise its cost estimates but considered the approximately $30 million increase to be a substantial leap that would significantly increase market fees over the next three allowable revenue periods.[30] Synergy suggested that being the largest participant in the market, it would pay most of these market fee increases, which would be passed onto electricity customers.[31] Synergy considered that the overall cost and fee impact of implementing the new market made it paramount to ensure that the market participants who will benefit from the new regime paid for it equitably.

Synergy recommended the ERA considers the impact of each element of AEMO's proposal on the overall transition path for WEM fees and future allowable revenue periods to ensure there was no inter-generational wealth transfer.

In its proposal, AEMO acknowledged that the costs of delivering the State Government's WEM reform program were "substantial" and that market participants were "concerned about the cost."[32] However, AEMO considered that it had "applied additional rigour in its forecasting and governance process," including:

- Reviewing cost estimates against historical estimates, market testing and benchmarking.
- Refreshing some processes, such as those used to estimate labour costs and project contingencies.
- Subjecting the costs to top-down challenges by management, the AEMO executive leadership team, and the AEMO board.[33]

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29 Australian Energy Council, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

30 Synergy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

31 Synergy does incur a large portion of the market fees, as it is the largest generator in the market but the government has discretion over how much of the fees are passed through to the consumer.

32 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority*, *Allowable Revenue and Forecast Capital Expenditure for 2022-23 to 2024-25*, p. 6, (online).

33 Ibid.

4. ERA draft determination

After conducting a forensic review of AEMO's proposed costs and applying the legal test explained in section 1.2.1, the ERA partially rejects AEMO's proposed allowable expenditure for AR6 of $156.2 million and substitutes an allowable expenditure of $135.9 million. This represents a reduction of $20.3 million or 13 per cent. Similarly, the ERA partially rejects AEMO's forecast capital expenditure of $69.4 million to $52.0 million, which represents a reduction of $17.4 million or 25 per cent.

The ERA's determination to partially reject AEMO's proposed allowable revenue (Table 4) and forecast capital expenditure (Table 5) for AR6 with the ERA's substituted costs is due to a combination of correcting for errors in calculations, removing expenditure that does not meet the funding approval criteria and applying a more consistent approach to calculating labour costs and project contingencies.

Table 4: Variance in proposed and draft determination allowable revenue, by reason

	$ million	Variance %
AEMO proposed WEM allowable revenue	**156.2**	
Eliminating overlap of capital and operating expenditure labour included in AEMO's proposal	(1.8)	(2.5)
Eliminating cost of new staff not approved	(7.4)	(10.1)
Adjusting operating cost categories	(5.1)	(14.7)
Eliminating labour costs in operating expenditure projects not approved	(3.1)	(94.0)
Reduction from recalculated depreciation and amortisation and borrowing costs resulting from changes to capital costs.	(2.9)	(5.7)
Draft determination WEM allowable revenue	**135.9**	**(13.0)**

Source: ERA analysis

Table 5: Variance in proposed and draft determination capital expenditure, by reason

	$ million	Variance %
AEMO proposed WEM forecast capital expenditure	**69.4**	
Variance between AEMO financial tracking spreadsheets and proposal	0.3	0.4
Substitution of salary costs for AEMO's tier rates	(2.1)	(3.9)
Adjustment to project costs by IES – table 4 IES report	(2.2)	(14.3)
Borrowing cost adjustment	(0.1)	(0.6)
Reduction for projects not approved	(5.3)	(7.9)
Reduction for revised project contingency funding	(6.5)	(48.3)
Reduction for ARENA grant – Project Symphony	(1.5)	(100)

	$ million	Variance %
Draft determination WEM forecast capital expenditure	**52.0**	**(25.1)**

Source: ERA analysis

Below, the ERA has allocated the above funding reductions back to operating cost categories (Table 6) and capital project workstreams (Table 7).

Table 6: Variance in proposed and draft determination allowable revenue by cost category

Cost category	AR6 proposed ($ million)	Draft determination ($ million)	Variance ($ million)	Variance (%)
Labour costs	73.2	60.9	(12.3)	(16.8)
Depreciation and amortisation	50.9	48.0	(2.9)	(5.7)
Supplies and services	13.0	10.7	(2.3)	(17.7)
IT and telecommunications	11.0	9.0	(2.0)	(18.2)
Accommodation	5.2	5.2	-	-
Borrowing	5.2	4.4	(0.8)	(15.4)
Adjustment*	(2.3)	(2.3)	-	-
Total allowable revenue	**156.2**	**135.9**	**(20.3)**	**(13)**

Source: ERA analysis

Table 7: Variance in proposed and draft determination forecast capital expenditure by capital project workstream

Capital project workstream	AR6 proposed ($ million)	Draft determination ($ million)	Variance ($ million)	Variance (%)
WEM reform	44.6	37.2	(7.4)	(16.6)
DER roadmap	9.4	4.2	(5.2)	(55.3)
Sustaining capex	15.4	10.6	(4.8)	(31.2)
Total forecast capital expenditure	**69.4**	**52.0**	**(17.4)**	**(25.1)**

Source: ERA analysis

The ERA's draft determination on proposed GSI funding is provided separately in section 6.

To make this draft determination, the ERA has thoroughly reviewed all the information provided by AEMO in support of its AR6 funding proposal. Given the information provided, the ERA has not approved some of the proposed costs because they do not meet the approval criteria required by the WEM Rules and GSI Rules.

Allowable revenue

The largest cost component the ERA partially rejects in AEMO's proposed allowable revenue funding is labour costs. The ERA does not approve costs identified for 24.1 of the 33.7 proposed new permanent labour positions ($7.4 million). This is because AEMO did not present a strong case to demonstrate that its current staffing levels were insufficient, nor that it had taken all steps to improve the efficiency of its processes and systems, before proposing staff increases. Refer to section 5.2.2.4 for more details.

Other cost rejections related to labour are for proposed operating projects ($3.1 million) and adjustments to existing costs ($1.8 million). The reductions to individual allowable revenue cost categories, such as supplies and services, IT and telecommunications are the result of the ERA's review of all costs. A full explanation is provided in sections 5.2.4 to 5.2.6.

The reductions to the depreciation and amortisation expense and borrowing expense is an outworking of changes made to forecast capital expenditure. See sections 5.2.3 and 5.2.7, respectively.

AEMO also proposed three operating cost projects for AR6 totalling $4 million. The costs estimated for these projects predominantly relate to early scoping of future obligations AEMO expects to incur, such as a move to settling market transactions every five-minutes instead of every half hour. The ERA considers AEMO has not sufficiently justified the prudence or efficiency of all proposed costs as required by the WEM Rules for these projects. The ERA has not approved this funding, except for one element in support of AEMO's obligations in the DER Roadmap. The timing and the nature of the projects are very uncertain, and the ERA recommends AEMO proposes more robust cost estimates as more information becomes available. Further detail is provided in section 5.2.8.

Forecast capital expenditure

The ERA rejects costs proposed for four capital projects: two in the WEM reform workstream and two in the DER workstream. This equates to a reduction of $4.6 million from AEMO's original $69.4 million forecast capital expenditure. The projects were not presented as critical to the delivery of AEMO's obligations in the Energy Transformation program. The ERA has sought to ensure that any funding reductions do not compromise delivery of either program. AEMO did not sufficiently demonstrate that these projects are part of AEMO's delivery of its obligations under the WEM and DER workstreams. Further detail is provided in section 5.3.3 and 5.3.4.

The ERA considers AEMO's method to estimate labour rates is inconsistent with the requirements of the WEM Rules and proposal guidelines. The ERA has substituted AEMO's proposed labour costs with costs the ERA considers better reflects the rule requirements by using AEMO's actual staff costs to estimate the cost of staff seconded and hired to work on capital projects. As a result, the ERA rejects $2.3 million in proposed capital expenditure labour costs. The ERA has commented on the shortcomings of AEMO's estimated labour rates in previous determinations.[34] Despite the ERA's proposal guideline including the requirement to supply actual staff costs in its AR6 proposal AEMO continues to use estimated or tiered labour rates to determine its capital labour costs for seconded staff.[35] Details on the reduction to capital staff costs are presented in section 5.3.2.

[34] Economic Regulation Authority, 2020, *Australian Energy Market Operator in-period funding submission for implementation of the Distributed Energy Resources Roadmap actions – Determination report*, p. 14, (online).

[35] Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submissions under WEM and GSI Rules*, (online).

The ERA thoroughly reviewed AEMO's new method and calculation of project contingencies. The ERA maintains its view from the AR5 final determination that project contingency calculations should be risk-based. The new contingency calculation method used to calculate contingency costs for the AR6 period is an improvement on previous methods. However, the ERA is concerned that unknown, not applicable, and immaterial risks were all assigned a contingency value in the AR6 proposal. In addition, calculated risks were rounded up to the nearest whole number and different scales were used for different projects. The ERA rejects $6.5 million from the overall project contingencies of $14.7 million proposed for projects comprising capital expenditure in AR6. Further details are provided in section 5.3.7.

Other observations through the review process

In its proposal, AEMO attributed increasing complexity in the market as driving many of the forecast costs in the AR6 period. Despite the increasing costs AEMO's proposal presented benchmarking information to suggest that although its costs were increasing, they were comparable to the cost of market and system operators in other jurisdictions.[36]

The WEM Rules and GSI Rules require the ERA to benchmark AEMO's costs where appropriate. The ERA commissioned the Lantau Group to undertake this work and a summary of Lantau's initial findings is included in section 4.1.

During the review, the ERA also reviewed AEMO's governance process in the development of the AR6 proposal. The ERA has longstanding concerns about the depth of AEMO's challenge sessions when reviewing estimated project costs. This concern has been raised in previous allowable revenue determinations.[37] The ERA's observations on AEMO's governance process are provided in section 4.2.

AEMO has indicated to the ERA that it expects that its cost estimates for the AR6 period will increase from its original proposal and has committed to providing the ERA with updated information following publication of its draft determination. The ERA strongly recommends that AEMO provides the information in sufficient time for the ERA to review in advance of the final determination, to ensure that AEMO has the funding necessary to complete the intended reforms in an efficient and timely manner.

If the evidence provided by AEMO does not meet the level of detail required by the WEM Rules, GSI Rules and the proposal guideline, demonstrating how its proposed costs will achieve the lowest practicably sustainable cost of delivering AEMO's functions, the ERA may reject the proposed costs associated with the project or function either partially or fully, as necessary. Where the ERA rejects AEMO's costs, it may substitute the costs with costs that the ERA considers meet the requirements of the WEM Rules and GSI Rules.

4.1 Benchmarking

The ERA engaged the Lantau Group to undertake a benchmarking exercise and provide advice to the ERA on how AEMO's historic and proposed costs compared to those of market operators and system managers in other jurisdictions.

The jurisdictions selected and studied by the Lantau Group for the benchmarking exercise were selected based on similarities to Western Australia and the availability of public data. Costs for market and system operators were considered from jurisdictions including the

[36] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority*, *Allowable Revenue and Forecast Capital Expenditure for 2022-23 to 2024-25*, pp. 35-39, (online).

[37] Economic Regulation Authority, 2020, *Australian Energy Market Operator in-period funding submission for implementation of the Distributed Energy Resources Roadmap actions – Final Determination*, p. 26, (online).

National Electricity Market (NEM), Singapore, New Zealand, United Kingdom, Korea, and the United States. The United States included two combined market/system operators: Pennsylvania, New Jersey, and Maryland (PJM) and New England (ISO-NE). The similarities between the selected jurisdictions and the WEM included:

- Market size – the WEM is a comparatively small market in terms of volume, similar in size to New Zealand and Singapore.
- Market complexity – indicators of complexity differ for market operations and system management:
  - Market operations – level of commercial participation and trading, generation mix, and number of regulatory or planning jurisdictions.
  - System management – network constraints, rooftop solar penetration, share of renewable generation, number of generators, length of transmission network and frequency of extreme weather events.

As explained by the Lantau Group, all jurisdictions in the sample, except for New Zealand, have not-for-profit market operators that recover their costs through market fees, and all jurisdictions are regulated. In New Zealand, the regulator contracts out the various services required to run an electricity market. This is a competitive procurement process with contracts awarded for approximately five to eight-year terms that can be extended. The New Zealand Exchange has been the market operator since 2009, following the acquisition of M-co, which was the market operator since the market commenced in 1996.

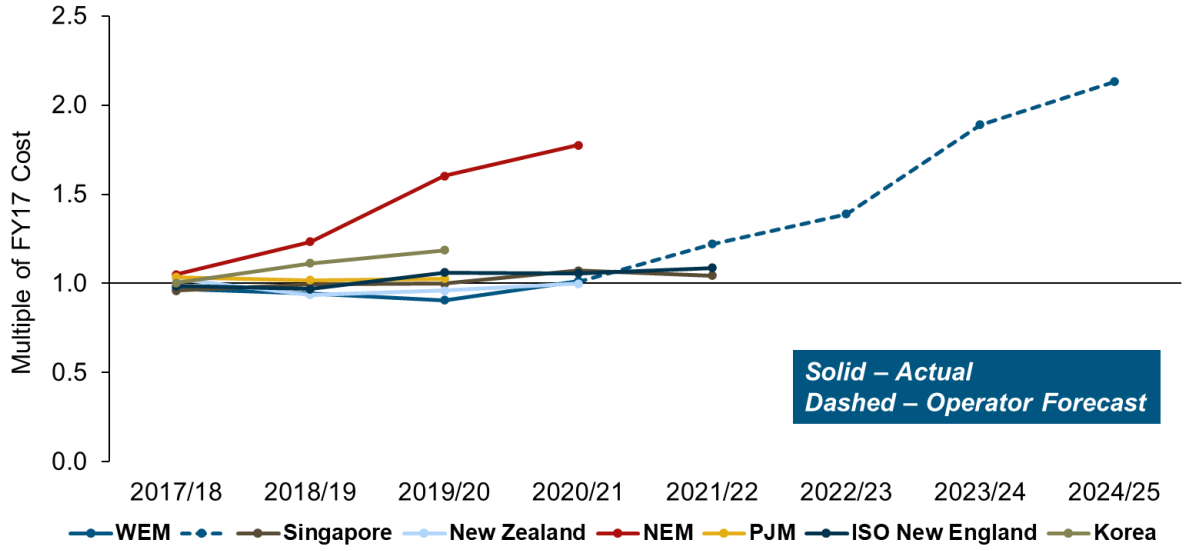
Western Australia is not directly comparable to any other market, given its design, functions, size, and the ongoing reform process. However, the comparison to other jurisdictions is useful to demonstrate the costs of performing similar duties and to help understand the drivers of costs in these jurisdictions. The following information is based on the Lantau Group's initial analysis.

Benchmarking observations

After declining between 2016/17 and 2019/20, AEMO's total operating costs for the WEM and GSI, based on the AR6 proposal are expected to nearly double over the next four years. In 2019/20, the annual total operating cost spend was $28.6 million. This is expected to increase to $63.8 million in 2024/25.

Figure 1 presents a comparison of combined market and system operation costs over time for each jurisdiction, calculated by totalling the yearly annual market and system operation costs and dividing them by the yearly consumption for that jurisdiction. These costs are then normalised to the earliest year in the data, 2016/17, which is set at a value of 1, to show the change in costs compared to 2016/17 over time.

Figure 1: Total cost of combined operations (market operations and system management) per MWh



Source: The Lantau Group's initial analysis for the ERA.

The Lantau Group noted that comparing market operation costs separately demonstrates that market operation costs per MWh have been increasing in all jurisdictions considered. In the WEM, AEMO's AR6 proposal demonstrates that the increase is driven by labour numbers and the market operation proportion of depreciation and amortisation expense. Market operation costs in the NEM have increased in response to the development and implementation of reforms such as five-minute settlement.

At several points in its proposal, AEMO noted that increasing complexity in the WEM was increasing costs:

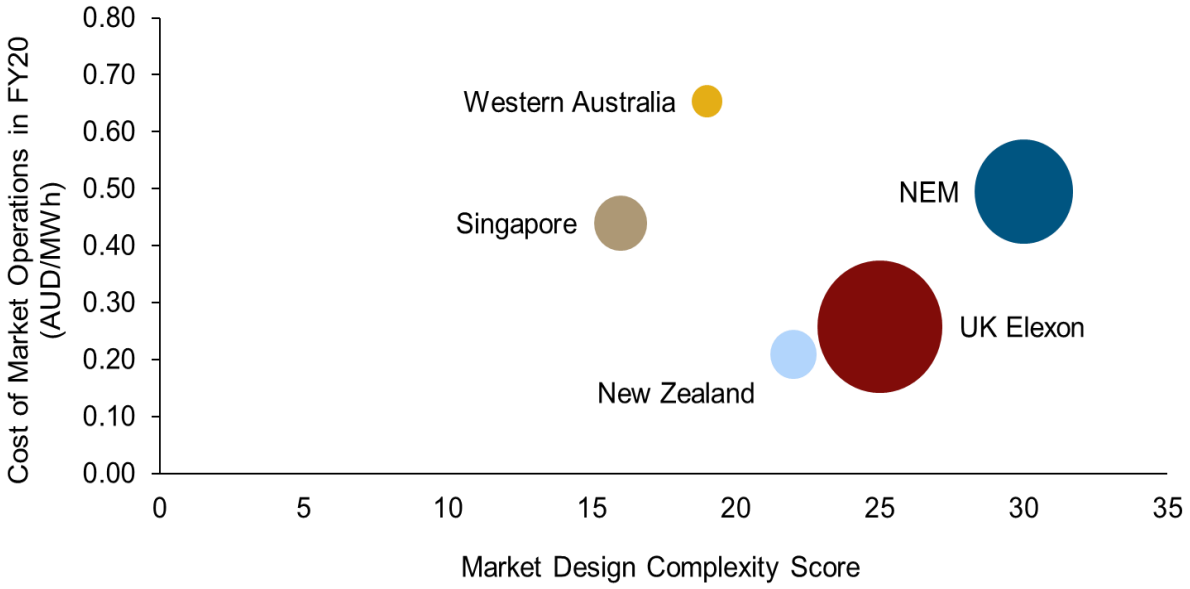
> The resourcing uplift is driven by the new market operating arrangements and increases to the volume and complexity of market settlements and prudential management.[38]

Accordingly, the Lantau Group considered the degree of complexity in market operations by rating each jurisdiction against a series of indicators of market complexity.[39] These included the number of products traded, variation in generation mix, length of trading interval, frequency of gate closure, number of shareholders and participants. The Lantau Group combined this information into Figure 2 below, which illustrates each jurisdiction's market design complexity score as a function of market operating costs in AUD/MWh, and network consumption (in MWh) in 2019/20.

[38] Australian Energy Market Operator, 2021, *FTE resource estimate, WA departments and WA support functions*, p. 8, (online).

[39] The ratings were between 1 – simple and 5 – very complex. Had a jurisdiction been rated very complex in all market complexity indicators, the highest market complexity score was 35.

Figure 2: Market design complexity, cost, and annual network consumption (MWh)[40]



Source: The Lantau Group's initial analysis for the ERA.

Figure 2 shows that the WEM has the highest market operation cost AUD/MWh, even though the Lantau Group rated the WEM as having the lowest annual network consumption, and as being a relatively less complex market compared to the other jurisdictions.

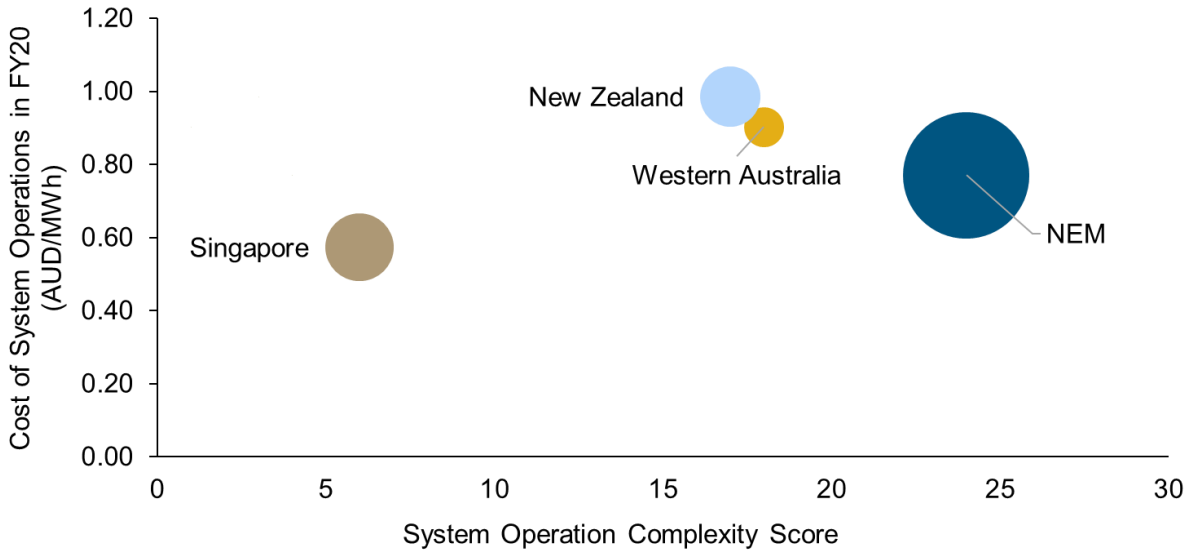
The Lantau Group also compared system operation costs between different jurisdictions, with a focus particularly on smaller jurisdictions: New Zealand (Transpower) the Singapore Power System Operator (PSO), and AEMO in the NEM. The degree of complexity in system operations was considered by rating each jurisdiction on a series of indicators of system complexity.[41] These included network congestion, the penetration of rooftop solar, the share of renewables in the overall generation mix, the length of transmission lines and the number of extreme weather events.

The Lantau Group combined this information into Figure 3 below, which illustrates each jurisdiction's system operation complexity score as a function of system operating costs in AUD/MWh, and annual network consumption (MWh).

[40] Bubble size represents annual network consumption in FY20 (MWh).

[41] The ratings were between 1 – simple and 5 – very complex. Had a jurisdiction been rated very complex in all market complexity indicators, the highest market complexity score was 35.

Figure 3: System operation complexity, cost, and annual network consumption (MWh)[42]



Source: The Lantau Group's initial analysis for the ERA.

In Figure 3, the Lantau Group rated the WEM as having the lowest network consumption, but the second highest system complexity and second highest cost of system operation in 2019/20.

Benchmarking conclusion

Consistent with the Lantau Group's rating of the WEM as having a moderate to high system operation complexity, its system operation costs were the second highest when compared to the other jurisdictions.

However, the ratings provided by the Lantau Group of market operation complexity showed that whilst the WEM has the second lowest market design complexity and the lowest annual network consumption, it has the highest cost of market operations when compared to the other jurisdictions that were considered in 2019/20.

4.2 Governance

AEMO's Board approved the AR6 funding proposal for submission to the ERA. The Managing Director/Chief Executive Officer was accountable for the development of the allowable revenue and forecast capital expenditure proposal, with the executive leadership team providing support in terms of financial stewardship.[43]

Key members of the executive sat on the AR6 steering committee, which was specifically appointed to ensure scrutiny and challenge of AEMO's forecast expenditure, with a particular focus on WEM reforms and DER.[44] Review, approval, and project delivery was governed by

[42] Bubble size represents annual network consumption in FY20 (MWh).

[43] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 33, (online).

[44] According to AEMO, its AR6 Steering Committee makes investment decisions, monitors investment benefit realisation, determines which initiatives will be submitted to the Board for further approval and sets the overall investment framework. It oversees project status, helps with issue resolution, endorses timing or budget changes and has the authority to release funds (including contingencies) or change scope (both of which may go to the Board for endorsement).

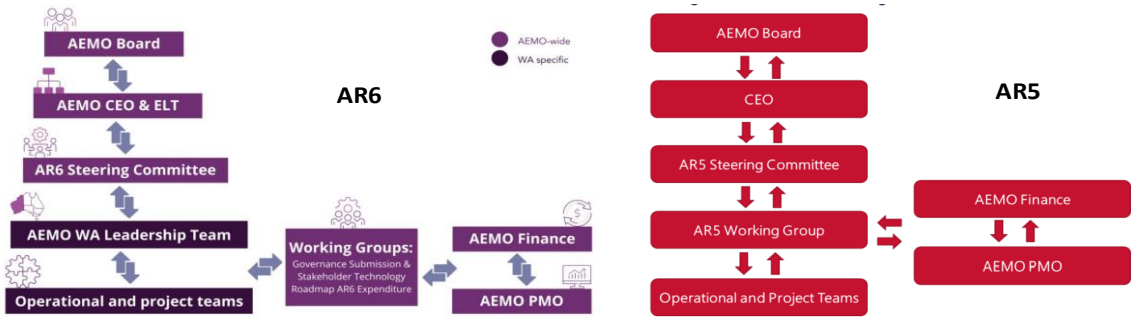
AEMO's project management framework, with funding approval granted through the project process and ongoing reporting on major projects such as WEM reform.[45]

AEMO's proposal noted that the AR6 forecast was subjected to top-down challenge by its Western Australian management team.[46] AEMO also required each project owner and management to consider a list of questions designed to ensure that AEMO met the requirements of the WEM Rules and GSI Rules in terms of prudence – "is now the right time and is it the right solution?" – and efficiency – "is it the right cost and how much is it going to cost participants?"[47]

Given the materiality of the proposed costs to deliver AEMO's obligations and services under the Energy Transformation Strategy, AEMO noted that its proposal was founded on a "more exhaustive governance process than prior revenue and capex reviews."[48]

Upon review, AEMO's governance structure has changed little between AR5 and AR6 as shown in Figure 4 below.

Figure 4: AEMO governance structure for the past two allowable revenue periods[49]



Source: AEMO's AR6 and AR5 proposal documents

The roles and responsibilities of the various groups is consistent between the two allowable revenue periods. In AR6, the Western Australian leadership team and working groups had the same responsibilities as the AR5 working group. The operational and project teams in AR6 had more responsibilities than their contemporaries in AR5, including responsibility for project contingency calculation and justification, engaging with stakeholders and responsibility for assessing resourcing requirements.

In its AR6 proposal, AEMO noted that:

> All opex and capex forecasts have for the AR6 period been subject to a series of top-down challenges by the WA Leadership Team, AR6 Steering Committee, ELT and Board, with information more granular at the lower management levels.[50]

45 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 29, (online).

46 Ibid.

47 Ibid.

48 Ibid, p.30.

49 Ibid. and Australian Energy Market Operator, 2019, *2019-2022 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, p. 29, (online).

50 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure for 2022-23 to 2024-25*, p. 45, (online).

AEMO's proposal explained that the purpose of its top-down challenge process was to:[51]

- Test the cost estimates and ensure a wider review is applied to the forecast to identify synergies and overlaps. Typically, this resulted in a reduction in the initial forecast.
- Consider the costs based on historical expenditure and future drivers such as changes in participation and activity volumes.
- Identify opportunities to better manage the variable cost components of any expenditure (for example, the use of temporary or permanent resources).
- Include a cost-saving target or efficiency factor, designed to promote outperformance of the expenditure forecast where practicable.

The ERA asked AEMO to provide additional information on the timing and the nature of the top-down challenges to understand the level of rigour applied through the challenge process.

AEMO provided a governance timeline for the AR6 proposal and examples of the minutes from a couple of the steering committee sessions to the ERA as commercial-in-confidence information. The timeline showed 11 internal reviews of the proposal between July 2021 and December 2021: four of those by the board. Each review considered different elements of the proposal. The ERA's review confirms that AEMO's proposal underwent multiple top-down reviews.

The ERA then reviewed the minutes of two steering committee reviews: one on the forecast of allowable revenue and one on the forecast capital expenditure. This was to assess how robustly the AR6 funding proposal was challenged by the committee.

The questions asked and points raised in the minutes did not appear to challenge the costs. Instead, committee members discussed how the costs could be better explained or justified. An example discussion from the committee's review of forecast operating costs considered how AEMO should better highlight the benefits Western Australia receives from sharing AEMO-wide IT solutions. The discussion did not consider if the underlying IT solutions were efficiently costed, neither did the minutes indicate that the committee discussed the allocation of AEMO-wide costs to the WEM.

In the steering committee's review of forecast capital costs, there was evidence of challenge to the calculated project contingency levels and AEMO's program management office had reconsidered the contingency calculator tool following that challenge. When the committee challenged whether the proposed costs were efficient, it appeared satisfied that the challenges that had taken place by other groups in the governance process were sufficient.

From the information reviewed, the ERA did not find much evidence of the purpose of the top-down challenge process, with its focus on costs, being applied in practise. The only main reductions in costs from the top-down challenge were the 5 per cent efficiency saving applied to labour costs in the final year of AR6, and the 1 per cent vacancy rate applied each year. The 5 per cent efficiency saving in the final review period amounted to a saving of $6.8 million, while the 1 per cent vacancy rate savings were $0.8 million for 2022/23, $1.0 million for 2023/24 and $1.1 million for 2024/25.

[51] Ibid, pp. 44-45.

Stakeholder views on governance

Perth Energy supported AEMO's approach of internally challenging its proposed cost by its senior management and board, as this focus should encourage good cost control.[52]

In contrast, Bluewaters considered that AEMO did not have sufficiently appropriate governance structures in place.[53] Given the scant detail and lack of cost-benefit analyses in AEMO's proposal, Bluewaters observed there were unlikely to be many market participants that would be able to justify, via a board process, the level of additional expenditure AEMO was seeking. Bluewaters considered that an independent, bottom-up review of the appropriateness of AEMO's structure, resources, and governance of its WEM operations, was critical for maintaining AEMO's credibility.

Collgar suggested a potential governance reform whereby funding was approved in the original submission but could only be spent subject to a trigger being met (for example, notification from the Coordinator of Energy that a policy decision has been made).[54]

AEMO acknowledged that it prefers "to slightly overestimate capex than underestimate" it.[55] Given AEMO's role in ensuring the ongoing security of the electricity system, the ERA understands the risk to AEMO and its customers, the market, of AEMO being insufficiently funded to perform its functions under the market rules.

After reviewing the information AEMO provided in support of its governance process for the AR6 funding proposal, the ERA considers that opportunities exist for AEMO to improve its governance. These opportunities cover three main areas discussed below.

4.2.1 Options analysis

The ERA has reviewed samples of AEMO's investment request documentation. Project managers used these documents to initiate a project and request project funding. The investment request document requires project managers to list any alternative options they have considered before proposing the project in question. The information on alternative options provided in this document is short, often with just a few words for description, and there is no qualitative or quantitative analysis of why other options were rejected in favour of the preferred option.

The shortfall in options analysis is particularly acute when NEM systems or practices are recommended and then adopted for the WEM. Market participants in the WEM expect economies of scale and scope from having AEMO operate across both the WEM and NEM. For example, Synergy considered there was greater opportunity to achieve the economies of scale and scope that were envisaged when the decision was made to adopt systems and processes from the NEM. Anecdotally, the ERA has been advised that the WEM benefits from systems and practices adopted from the NEM, but these benefits are rarely demonstrated in AEMO's regulatory funding proposals.

The ERA recommends that for future funding proposals, AEMO extends its exploration of options early in the project evolution process and provides more qualitative and quantitative

[52] Perth Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[53] Bluewaters Power, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[54] Collgar Wind Farm, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[55] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure for 2022-23 to 2024-25*, p. 24, (online).

explanation of why the proposed project is preferable to alternative solutions. For NEM solutions adopted in the WEM, the ERA would expect to see the NEM options qualitatively and quantitively compared to a WEM standalone solution.

4.2.2 Critical decisions

AEMO's AR6 proposal identified multiple systems that are being developed in-house, rather than by purchasing a third-party solution, such as a settlement system. Third-party systems usually enable a degree of customisation and can be maintained and updated through a service level or maintenance agreement with the third-party supplier or licenced support contractors.

The decision to bring system development in-house is pivotal to the costs and maintenance associated with projects. This is particularly true when there are subsequent dependencies and costs associated with this decision, such as where a system is developed in-house, and the development and cost of development of subsequent systems and software is also internalised. Similarly, the decision to internalise key functions, such as forecasting and engineering advice, is also significant.

Depending on the stage of project development, the decision to bring system development or a main process in-house may not be clear in AEMO's three-yearly funding proposal. Consequently, the ERA cannot assess whether the decision to internalise system development or an important function is prudent or efficient. Once funding is approved, the ERA has no oversight of the economic efficiency of these critical decisions.[56]

The ERA recommends these critical decisions, and their associated cost implications are shared with industry. Transparency, outside a regulatory determination, will help market participants better understand the implications on market fees of the cost decisions AEMO is making compared to the expected benefits from internalising a system and/or function.

4.2.3 Project scoping

AEMO's proposal provides summary descriptions of projects but does not detail how project scoping ensures the operating or capital project delivers outcomes consistent with AEMO's obligations under the market rules so that projects deliver an appropriate level of functionality for AEMO. Project scoping should not be too little that AEMO cannot deliver on its obligations under the market rules, and not too great that the systems being developed are gold-plated and provide functionality that is over and above what AEMO is required to deliver.

AEMO does consider project scope at the point the project manager develops an investment request to initiate a project and project funding. Project scopes are also reviewed as the project passes through project gates, and funding for the next stage of the project is approved by AEMO's internal investment committee.

The ERA considers a better way for AEMO to demonstrate that project scopes are reasonable when requesting funding approval from the ERA would be to:

[56] For instance, the ERA had approved $4.5 million for the digital roadmap project in AR5 instead of $12.7 million proposed by AEMO, as the ERA considered the benefits of the common centralised platform had not been fully justified. In August 2021, AEMO reported to industry that it was expecting to spend $7.6 million on digital roadmap activities, which was $3.1 million higher than the amount approved by the ERA. See section 2 for further information.

- Provide documented evidence, such as meeting minutes, to demonstrate that project scopes have been assessed at the program level, and to ensure projects are delivering AEMO's obligations under the market rules and not over or under-delivering.
- Record how and why project scopes change or are reassessed over the allowable revenue period. These changes in scope should be endorsed, with reasons by the appropriate oversight committee.
- Record how the project remains focussed on scope through the project development and implementation process to avoid project scope creep.

5. Detailed assessment of AEMO's WEM costs

Given that AEMO's forecast allowable revenue for AR6 represents a significant increase compared to previous review periods, and consistent with its obligations under the WEM Rules, GSI Rules and the proposal guideline, the ERA has undertaken a forensic approach to reviewing AEMO's proposal and making its determination.

The sections below briefly summarise each cost item in AEMO's proposal, the ERA's review process and findings related to these costs, and the ERA's draft determination on the approved costs based on its analysis. Further detail demonstrating the ERA's approach to analysis is included in appendices.

5.1 AEMO's WEM functions

AEMO performs system and market operations in the South West Interconnected System (SWIS). The WEM Rules place obligations on AEMO to administer the reserve capacity mechanism and operate and settle the short term electricity market (STEM), the load following ancillary service market and the real-time balancing market (see clauses 2.1A.1A and 2.1A.2 in Appendix 6 and Appendix 7).

AEMO's system management team undertakes long-term system planning and manages the electricity system in the SWIS to ensure it operates in a secure and reliable manner. System management is responsible for procuring adequate ancillary services where Synergy is unable to meet the ancillary service requirements or where system restart and spinning reserve are available at a lower cost.

AEMO has information release and market administration functions, including proposing and changing market procedures, and it is required to publish the Western Australian Electricity Statement of Opportunities, and maintain and update a congestion information resource and a DER register. AEMO also plays a part in preparing for and facilitating the implementation of the WEM reform program, including constrained network access reforms.

AEMO provides advice to the Technical Rules Committee and Western Power, and support to the Minister for Energy, Coordinator of Energy, and the ERA.

5.2 WEM operating expenditure

The ERA's draft determination for WEM operating expenditure is $135.9 million, which is 13 per cent less than AEMO's proposal of $156.2 million. This section considers each of the operating expenditure cost items forecast by AEMO and provides an overview of the ERA's approach to analysis and justification for its draft determination. A summary of the draft determination for WEM operating expenditure is provided in section 5.2.1.

5.2.1 ERA's draft determination on WEM operating expenditure

The ERA has undertaken a detailed investigation into each category of operating expenditure proposed by AEMO. The ERA considers that there are examples in almost all operating categories where AEMO has not fully justified its proposed expenditure to meet the requirement for approval outlined in the WEM Rules. Consequently, the ERA has partially rejected some of AEMO's proposed operating expenditure.

The ERA has not approved all of the costs associated with AEMO's proposed new permanent staff positions. AEMO did not present a strong case to demonstrate that its current staffing levels were efficient, nor that it had taken all steps to improve the efficiency of its processes and systems, before proposing staff increases. Further information is presented in section 5.2.2.4.

The partial approval of individual allowable revenue cost categories, such as supplies and services, IT, and telecommunications, is provided in sections 5.2.4 to 5.2.6.

The approval of the depreciation and amortisation expense and borrowing expense is an outworking of changes made to forecast capital expenditure. The ERA has determined expenses for both categories that are lower than the expenses proposed by AEMO as the ERA has determined a forecast capital expenditure lower than AEMO's proposal. See sections 5.2.3 and 5.2.7 respectively.

AEMO also proposed three operating cost projects for AR6 totalling $4 million. The costs estimated for these projects predominantly relate to early scoping of future obligations AEMO expects to incur, such as a move to five-minute settlement. Except for funding in support of a known AEMO obligation in the DER Roadmap, the ERA has not approved the funding. The timing and the nature of the projects are very uncertain, and the ERA recommends AEMO proposes more robust cost estimates as more information becomes available. See section 5.2.8.

Table 8: AEMO proposed and ERA draft determination on WEM operating expenditure

Operating cost category	AR6 proposed ($ million)	Draft determination ($ million)	Variance ($ million)	Variance (%)
Labour costs	73.2	60.9	(12.3)	(16.8)
Depreciation and amortisation	50.9	48.0	(2.9)	(5.7)
Supplies and services	13.0	10.7	(2.3)	(17.7)
IT and telecommunications	11.0	9.0	(2.0)	(18.2)
Accommodation	5.2	5.2	-	-
Borrowing	5.2	4.4	(0.8)	(15.4)
Adjustment for over/under recovery	(2.3)	(2.3)	-	-
Total allowable revenue	**156.2**	**135.9**	**(20.3)**	**(13)**
Operating projects (included in costs above)	**3.9**	**0.20**	**(3.70)**	**(94.9)**

Source: AEMO's AR6 proposal and ERA's analysis

5.2.2 Operating expenditure labour costs

AEMO has sought funding for approximately $73 million in labour costs for its operating expenditure over the AR6 period. Labour costs are a high proportion of both the operating expenditure costs and the proposed capital expenditure costs, which is largely due to AEMO's decision to conduct work in-house rather than outsourcing work. The capital expenditure labour costs are presented in section 5.3.2.

AEMO has requested funding over the AR6 period to employ 33.7 new full time equivalent (FTE) staff the end of the AR6 period, over and above its existing estimated 104 FTEs.[57]

5.2.2.1 AEMO's proposed operating labour costs

In support of its AR6 proposal, AEMO provided the ERA with additional information on its labour cost estimates:

- A staff manifest showing a breakdown of labour costs for all AEMO Western Australian staff.
- A consolidated workforce plan (an Excel workbook), which provided an overview of the labour allocation across all capital and operating expenditure projects.

A large proportion of the labour applied to capital projects is drawn from internal operating labour resources. The extent to which these resources are replaced has implications for the projected operating labour costs. The ERA's proposal guideline requires AEMO to provide detailed information on how it determined labour allocation on projects through information such as individual position titles and actual salaries or contractor costs.[58] This allows the ERA to evaluate if labour has been allocated to projects and internal operations correctly and to ensure there is no double counting of operating labour costs on capital projects.

AEMO's proposed labour costs as part of its operating expenditure for the AR6 period are summarised in Table 9. These reflect staffing costs presented in AEMO's workforce plan before negative adjustments of vacancy allowances (applied over the whole of AR6) and an adjustment for backfilling (applied over the whole of AR6), and AEMO's operating cost savings target (only applied in the final year of AR6).

[57] AEMO did not provide a clear indication on how many staff work on Western Australian operations in at the commencement of the AR6 period. The staff manifest contained details on 238 positions many of which are contractors or NEM staff working on capital expenditure projects. The workforce plan for operating expenditure comprised 266 discrete rows for staff not identified as working on projects split across different Western Australian cost centres. Presentations were provided on current staffing levels but only covered 83 positions in the different cost centres in Western Australia and excluded information where no new staff were proposed to be employed (such as the GSI). The existing staff numbers have been calculated based on the sum of operating expenditure FTE staff in the workforce plan, without the negative adjustments and the allocation of new staff.

[58] Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submissions under the WEM Rules and GSI Rules*, pp. 5-6, (online).

Table 9: AEMO proposed operating expenditure labour costs ($ million)[59]

Activity	Labour costs			
	2022/23	2023/24	2024/25	**AR6**
Market operations	7.9	9.2	9.2	**26.3**
System management	13.5	15.9	16.9	**46.3**
GSI	1	1	1	**3**
Operating expenditure[60]	**22.4**	**26.1**	**27.2**	**75.7**
AEMO negative adjustments	(0.7)	(0.7)	(1.3)	(2.7)
Workforce plan proposed operating expenditure	**21.8**	**25.4**	**25.8**	**73.0**

Source: ERA analysis of AEMO workforce plan

5.2.2.2 ERA's review and findings on proposed labour operating costs

The workforce plan provided by AEMO did not provide clear information on the exact size of AEMO's standing workforce, movement from operational roles to capital project roles, and where new roles would sit. There were inconsistencies between the workforce plan, the staff manifest and the individual project financial tracking workbooks, and with the proposal.[61]

Labour comprised the largest single element of the proposed operating costs for which AEMO is seeking funding. However, the labour force costings contained substantial errors and the cost build up from this foundation renders the cost estimates unreliable. For example:

- Payroll tax in AEMO's costings range from 5.3 per cent to 9.3 per cent, while the base payroll tax rate in Western Australia is based on a sliding scale between 5.5 per cent and 6 per cent. [62] This indicates that payroll tax has been overestimated in AEMO's costings.
- Long service leave allowance was included in AEMO's labour costing at a rate of 2 per cent, while AEMO's Enterprise Bargaining Agreement (EBA) stipulates a rate of 2.5 per cent.[63]

59 Some fields in Table 9 may not sum due to rounding.

60 These values are derived from those contained in the workforce plan accompanying the submission. They do not reconcile exactly with those in the submission.

61 For example, many projects have inconsistent position numbers and titles between the workforce planning workbook, the staff manifest and project financial workbooks. Some positions are simultaneously listed as vacant and occupied. Some positions were noted in the staff manifest but not in the workforce planning workbook, while some position numbers were noted with more than one position title. The financial tracking sheets did not contain position numbers, rather contained names and titles. The operating expenditure labour costs does not tally exactly with the AEMO submission.

62 Western Australia has the most complex payroll tax of all jurisdictions with a base rate of 5.5 per cent up to a salary of $100 million and 6 per cent above this up to $1.5 billion. Most jurisdictions in the National Energy Market have payroll tax values of less than 5 per cent. In Queensland and South Australia, the payroll tax rates are 4.95 per cent, New South Wales, and Victoria it is 4.85 per cent, and in Tasmania it is 6.1 per cent.

63 Fair Work Commission, *AEMO Enterprise Agreement 2018*, p.32, (online).

- AEMO assumed a worker's compensation premium of 1 per cent, which exceeds the industry standard rate of 0.7 per cent for office-based businesses.[64] AEMO also incorrectly applied the premium to the base salary and superannuation rather than the base salary plus the performance incentive.

AEMO will need to rectify these in any revisions to its proposed operational expenditure costings and workforce plan.

Many of the methods and assumptions underlying AEMO's labour costs were not clearly documented, and calculations were not provided. The ERA considers the submission documents have not undergone a thorough quality assurance process.

AEMO's proposal includes a reduction of $1.2 million where backfilling of permanent positions when staff are moved from operating expenditure projects (business as usual) to capital expenditure projects would not occur. AEMO has moved away from its previous default position where all project staff drawn from operational areas were backfilled. AEMO included a line item in its workforce plan on the overlap between operating and capital expenditure to account for positions it considered unlikely to be backfilled.

AEMO was unable to provide its calculation of this value and the assumptions it used.

5.2.2.3 Draft determination on operating labour costs

The ERA has used its own estimates of the effect of backfilling on proposed labour operating costs in a manner consistent with that it applied to the DER Roadmap in-period submission during AR5.[65] This has resulted in a $1.5 million reduction in these costs.

The ERA has removed internally sourced staff that would not normally be subject to backfilling from forecast operating costs.[66] To remove operating costs for positions that should not be backfilled, the ERA has used the individual's actual labour cost in the calculation. The ERA applied the following assumptions when undertaking its backfilling calculations:

- Consistent with AEMO's higher duties practices, periods of equal to or less than 10 consecutive days per month are not backfilled. [67]
- Contract labour will only be brought in for a minimum period of three months.
- Senior project staff will not be backfilled for periods of less than six months FTE.[68]
- Fractions of the cumulative FTEs less than the 10-day backfilling threshold are also assumed not to be backfilled.

[64] A rate of 1 per cent is comparable to the workers compensation premium attracted by electronic equipment manufacturing and substantially higher than nominally expected for energy sector entities and office-based activities. See Workcover WA, 2021, Government Gazette, No. 63, online.

[65] Prior to calculating the effect of reduced backfilling on OPEX, the ERA corrected the errors in payroll tax, long service leave and workers compensation found in AEMO's calculation of staff costs.

[66] This is consistent with the ERA's decision on backfilling made on AEMO's previous AR5 in-period submission. See ERA, 2020, *AEMO in-period funding submission for implementation of the Distributed Energy Resources Roadmap actions – Determination report*, pp. 14-20, (online).

[67] Fair Work Commission, *AEMO Enterprise Agreement 2018*, Clause 26, p. 18, (online).

[68] In this analysis, senior project staff refers to staff salaried at tier three or higher. Staff were allocated to different costing tiers based on their role within projects and the organisation. There are four functional tiers with some distinction for staff with fewer entitlements (such as contractors). The ERA's evaluation of the tiers as a costing method is included in Appendix 3.

AEMO's workforce plan indicated substantial unknown positions, drawn from the existing workforce that are intended to work on capital projects. However, AEMO had not identified the specific people and their associated position numbers. Many of the projects using these unknown resources were underway at the time of the AR6 submission. This finding was unexpected as AEMO should be aware of which staff are working on current projects. For example, the WEM reform core and WEM digital platform projects have unidentified staff resources first used in November 2021.

The number of FTEs using generic position titles such as Senior Analyst, Project Lead or simply SME challenges accurate costings. This is particularly problematic for backfilling estimates as there is no indication whether these employees will be drawn from AEMO's NEM or WEM workforces. In the absence of data, the ERA has assumed resources will be drawn from the WEM and reduced proposed labour costs to align with backfilling requirements in AEMO's EBA. In these circumstances the ERA has substituted indicative labour costs values based on job titles of AEMO's existing staff.

Operational cost reductions are summarised in Table 10.

Table 10: Adjustment to labour operating costs ($ million)[69]

Project accounting	Labour costs			
	2022/23	2023/24	2024/25	AR6
Labour operating costs initially proposed by AEMO less adjustments for:	**22.4**	**26.1**	**27.2**	**75.7**
AEMO's vacancy allowance (1 per cent of labour costs across AR6)	(0.2)	(0.2)	(0.1)	(0.5)
AEMO's efficiency target (5 per cent of labour costs in 2024/25)	-	-	(1.0)	(1.0)
AEMO's revised labour operating costs without backfilling[70]	**22.4**	**25.9**	**26.1**	**74.2**
AEMO's backfilling allowance (The overlap of labour costs between capital expenditure and operating expenditure)	(0.5)	(0.5)	(0.2)	(1.2)
AEMO's revised labour operating costs[71]	**21.8**	**25.4**	**25.8**	**73.0**
ERA's estimate of the additional reduction required to ensure backfilling assumptions are consistent with AEMO's EBA requirements[72]				
Unidentified positions (Indicative labour costs used to remove assumed backfilling under the 10-day equivalent threshold)	(0.5)	(0.5)	(0.4)	(1.3)
Identified staff positions (Actual labour costs used to remove assumed backfilling under the 10-day equivalent threshold)	(1.0)	(0.5)	-	(1.5)
Subtotal of ERA estimate	(1.5)	(1.0)	(0.4)	(2.9)
Revised operating expenditure	**20.8**	**24.9**	**25.7**	**71.4**

Source: AEMO AR6 proposal and ERA analysis

5.2.2.4 AEMO's proposed new FTE staff

AEMO proposed 33.7 FTE in its proposal, as "an uplift in human resources is still required to ensure WA's market and power system can continue to operate efficiently, compliantly and within acceptable risk tolerances."[73]

AEMO undertook a review of staffing across each of its Western Australian departments to calculate the number of additional staff required to fulfil its obligations under the WEM Rules. AEMO provided an additional document for publication that set out its process and reasoning behind the proposed staff increase. AEMO argued that higher resource requirements were

69 Totals in Table 10 may not sum exactly due to rounding

70 These values are derived from AEMO's workforce plan and differ slightly on aggregate from AEMO's proposal.

71 Ibid.

72 This substitute's AEMO's $1.2 million backfilling allowance.

73 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, FTE resources estimate – WA departments and WA support functions*, p.3, (online).

"driven by the new market operating arrangements and increases to the volume and complexity of market settlements and prudential management."[74]

Stakeholder views on new FTE staff

Alinta questioned how AEMO determined its need for $24.5 million in additional spending on labour for 31 new FTEs, and whether AEMO benchmarked these costs.[75] Alinta considered managers may have a perverse incentive to overstate their requirements and grow their teams, and limited incentive to minimise their costs. Noting that AEMO's responsibilities have not changed since the last period, Alinta concluded that AEMO's proposal to increase its FTE count to support market development may be unnecessary.

Bluewaters noted the proportionately large value of additional labour expenditure compared to the number of new FTEs and recommended the ERA examine costs set aside for these positions.[76] Bluewaters suggested AEMO should be required to articulate each new forecasted FTE role and the cost of staffing these roles.

Collgar considered it is essential that AEMO is adequately resourced for reform implementation but noted that AEMO should be subject to the same fiscal constraints faced by market participants.[77] Collgar stated the ERA should be satisfied that AEMO's resourcing was proposed at an efficient level and was fit for purpose. Collgar suggested benchmarking should include comparisons with the private sector as well as broader AEMO and government entities, and that AEMO must demonstrate its chosen implementation methods were "the best value, fit for purpose, and not unduly conservative.[78]"

Synergy considered that AEMO's approach to developing its labour cost forecasts using a bottom-up build of resource requirements was reasonable, but it must be balanced by a robust top-down challenge, ideally with rigorous efficiency targets applied to it.[79] Synergy considered the 5 per cent reduction to the bottom-up labour forecast was too conservative. Synergy suggested there was further scope for stronger efficiency targets, given the degree of uncertainty on how much effort the new market will require, coupled with the flexibility available to AEMO in terms of resourcing options and expenditure overrun allowances.

Synergy also considered the ERA cannot better understand the impact of reforms on AEMO's operations than AEMO. Synergy recommended the ERA avoid a granular challenge of AEMO's labour bottom-up build and instead looks at alternative options, such as applying a top-down efficiency mechanism that sets a target operating cost benchmark.

5.2.2.5 Draft determination on new FTE staff

The ERA has reviewed the reasons AEMO provided for these new permanent staff members and stakeholder comments on the proposed labour uplift in its draft determination. The ERA must assess the suitability of the proposal including AEMO's bottom-up evaluations and its internal challenge processes.

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74 Ibid, p.8, (online).

75 Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

76 Bluewaters Power, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

77 Collgar Wind Farm, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

78 Ibid.

79 Synergy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

AEMO sought substantial new resources that would increase its operational workforce by around a third. To support its argument on the resource requirements AEMO provided a supporting document on the FTE assessments.[80] AEMO divisional managers also presented on the resource requirements to the ERA in a workshop on 14 February 2022, and the accompanying presentation documentation provided on 21 February 2022.

The ERA approves costs equivalent to 9.3 new FTEs for AR6, which it finds to be prudent and efficient. Overall, the ERA considers AEMO has not provided sufficient justification to demonstrate that the current level of staffing in some teams, such as the market operations team, and the operations, governance and integration team, were efficient for their existing activities before they requested new permanent positions.[81] For example, the market operations team did not use timesheets to document its existing activities and its functional review assumed the high degree of manual data cleaning and invoice checking would continue despite the higher degree of automation. The team has also been operating adequately without backfilled resources and staff vacancies without a reported degradation in services. Substantial resources are also deployed in the reserve capacity mechanism team to clean data from a small number of third parties with limited demonstrable effort to resolve problems at the source.

Rather than applying a consistent, robust, evidence-based process, each divisional manager conducted their own needs assessments and so consequently the approach and results were quite varied. One common element across all divisions was the assumption that existing processes and resourcing was efficient. Rather than demonstrating need through a bottom-up assessment of workplace needs for the new market, AEMO opted for a lighter review focused on incremental changes to market functions.

AEMO placed substantial emphasis on a more complex market without consistently drawing the link to the activity needed to operate it beyond the substantial platform improvements that should deliver process efficiencies and lower resource requirements. For example, with five-minute dispatch the capacity to undertake the degree of manual oversight of offers that exists now is not feasible. In-built input rules established in the new market systems should prevent input error and free up resources to be deployed elsewhere.

It was apparent from material provided that two areas within AEMO were understaffed. The ERA has approved prudent and efficient costs for additional FTEs to correct this. The reserve capacity team is currently operating with 10 FTEs, which is two more than its expected total at the end of the AR5 period.

The ERA has also approved prudent and efficient costs consistent with 2.8 FTEs to correct for existing understaffing in the power system operations team. The ERA considers that, given it takes approximately two years to train an individual to the required standard for a power system operator, AEMO should not enter AR6 without a trainee position available in the team. Consequently, the ERA has approved costs relating to an additional FTE for the power system operations team in the draft determination.

Most of the permanent staff in the reform and market development team are on secondment to the market and regulatory design capital project. As the design project closes when the new market goes live in October 2023, the seconded staff will return to their former positions. The ERA has not approved the cost for an additional 1.9 FTEs to this team as the ongoing

[80] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, FTE resources estimate – WA departments and WA support functions*, (online).

[81] There are 6 broad teams in AEMO's WA function (WA Market Operations; Reserve Capacity; WA Reform and Market Development; Power Systems Operation; Power System & Market Planning; Operations Governance and Integration) and support functions.

requirements of WEM reform are still uncertain. Further detail on the second stage of the energy transformation program will emerge through 2022 and 2023. AEMO can make additional application for staff supported by a robust business case once more information becomes available through AR6.

The ERA has rejected costs for the 9.9 FTEs AEMO proposed for the Western Australian support team. AEMO requested an additional 9.9 FTEs, most of which were IT staff (8.1 FTEs) to support the increased number of Western Australian systems. AEMO's supporting information on its labour numbers acknowledged that:

> Technology resource requirements increased from ~12FTE to ~23FTE over the AR5 period, as more systems and IT solutions (e.g., settlement system changes (RoPE and SMST)) increased the scope of the WA Solutions team's responsibilities. This trend will continue into the AR6 period, as the breadth of systems and scope of work for the team increases.[82]

The ERA did not expressly approve additional operating cost expenditure in AR5 for an increase of 11 IT staff. The ERA approved capital expenditure in AR5 for AEMO to develop and refresh its IT systems to ensure they were suitable for the new market design. However, AEMO did not identify the need for additional IT staff in operating costs at the time. The ERA requires AEMO to demonstrate that the increase in IT staff over AR5 is efficient before requesting additional staff for the IT team over AR6. In addition, AEMO needs to make it very clear what any new staff would be doing and what steps AEMO had taken to minimise any additional IT effort through automation and resource reallocation before requesting new staff.

The ERA recognises that additional engineering effort will be required in the power system planning team. This is driven by changing power system conditions that require new models to be developed and more complex system analysis to be conducted in greater volumes. Overall, AEMO has proposed an increase of 8.8 FTEs to undertake a variety of tasks in the team including power system modelling, investigating power system events, and improving forecasting. AEMO's submission was unclear on the extent to which engineering resources could be deployed to meet multiple needs. For example, a single individual may not be investigating power system events all the time, so outside of an investigation they could be engaged in other activities. AEMO's proposal refers to an AEMO-wide engineering framework but has provided insufficient evidence of the benefits of including Western Australia in the framework to justify additional staffing.

A summary of the ERA's draft determination on the proposed staff numbers is included in Table 11 below with additional information provided in Appendix 4.

Table 11: AEMO proposed and ERA draft determination on new permanent FTE increases for AR6 (number of FTEs)

Department or function	FTE at end of AR5	FTE at end of AR6	Proposed increase	Draft determination increase
Market operations	10.0	16.0	6.0	-
Reserve capacity	8.0	12.0	4.0	2.0
Reform and development	1.7	3.6	1.9	-

[82] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, FTE resources estimate – WA departments and WA support functions*, p. 26, (online)

Department or function	FTE at end of AR5	FTE at end of AR6	Proposed increase	Draft determination increase
Power system operations	15.0	17.8	2.8	3.8
Power system planning	15.5	24.3	8.8	3.5
Operations, governance and integration	8.0	9.1	1.1	-
Western Australian support	37.3	47.2	9.9	-
Western Australian management	6.0	5.2	-0.8*	-
Total	**101.5**	**135.2**	**33.7**	**9.3**

Source: AEMO AR6 proposal and ERA analysis

**Note:The reduction of (0.8) was applied by AEMO to reflect a 5 per cent efficiency target and 1 per cent vacancy rate in the last year of AR6.*

5.2.3 Depreciation and amortisation

AEMO's proposed depreciation and amortisation

Depreciation and amortisation expense is the second largest of the operating expense categories in AR6. AEMO's total proposed depreciation expense in AR6 is $50.9 million. This is 146 per cent higher than that forecast for the AR5 period. This significant increase in depreciation and amortisation is in line with expectations with $26.8 million of capital projects being completed and transferred into service during AR5 and a further $126 million expected to be completed in AR6.

Australian Accounting Standards require intangible assets with a finite useful life to be amortised systematically over the useful life of the asset.[83] The amortisation method used needs to reflect the pattern in which the assets future economic benefits will provide benefit to the organisation. If the pattern of benefit is unable to be reliably determined, then the straight-line method is used. Amortisation commences when the asset is available for use.

Under accounting standards, the amortisation period and the amortisation method for an intangible asset must be reviewed at least at each financial year end. This review is generally undertaken by the organisation and checked and signed off by the external auditors of the company. If the expected life of an asset is different from previous estimates, then the amortisation period and therefore the amortisation charged to the income and expenditure statement is changed, accordingly.

[83] Australian Accounting Standards Board, Compiled Accounting Standard AASB 138 – Intangible Assets, (online).

In the AR6 proposal, AEMO has followed Australian Accounting standards for both capitalising assets and the depreciation/amortisation of these assets.

Stakeholder views on depreciation and amortisation

Alinta considered it was difficult to determine whether AEMO was recovering its capital expenditure via depreciation consistently, using "acceptable accounting principles," because the proposal does not outline what assets will be depreciated, over what useful life, and only provides the total depreciation per annum.[84]

Alinta noted, however, that based on the shape of depreciation over the AR5 period and the proposed depreciation over the AR6 period, AEMO appeared to be depreciating most of the value of its assets over an unreasonably short period, which undermined the case for investment through implying a very short useful period. Alinta considered that this was inconsistent with 'acceptable accounting principles,' as per 2.22A.5 of the WEM Rules.[85]

Synergy commented that the systems put in place by AEMO will likely operate for over a decade and accordingly, consideration should be given to recovering costs over the operational life of the assets, rather than the notional economic life.[86] Synergy recommended the ERA seek opportunities to soften the price impact for market participants and consumers by considering whether the depreciation schedule for the new market systems was appropriate.

Similarly, the AEC suggested that costs may be higher if AEMO calculated depreciation on a straight-line basis using the capital expenditure on an asset with a short economic life.[87] Both Synergy and the AEC encouraged the ERA to explore other depreciation methods, such as the real annuity method.

Review, findings and draft determination on depreciation and amortisation

A review of proposed depreciation and amortisation for the AR6 period reveals that AEMO is calculating depreciation on a straight-line basis over the useful life of the asset. The ERA considered if alternative methods, such as the declining balance and the sum of the years' digits method plus the real annuity method, were more appropriate to determine these annual costs. Both the declining balance and the sum of the years' digits method result in higher depreciation costs in the earlier years of an assets life. These methods are generally used if the value of an asset is more likely to decline quicker in the early years of its life. The ERA does not consider this is the case with AEMO's assets.

The use of the real annuity method of depreciation is linked to the future cash flows of an asset. As none of the assets of AEMO generate cash flows (AEMO's cash flows are generated by the recovery of costs) the ERA does not consider this method to be appropriate for the calculation of depreciation.

The ERA has reviewed the effective life of the assets that AEMO has capitalised over the AR6 period. The effective life of the assets varies between three to five years for software and tools, five years for hardware, and 10 years for systems or new platforms. The effective life allocated

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84 Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

85 Ibid, p. 2.

86 Synergy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

87 Australian Energy Council, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

to the various classes of assets is considered appropriate by the ERA with the two exceptions noted below.

AEMO had applied short operational lives to two systems developed as part of the WEM reform program. AEMO's rationale for expensing the costs over only three years is that both systems will need to be replaced or significantly modified with the introduction of five-minute settlement (see section 5.3.6) and the new market settlement system. Costs for these assets total $11.7 million and the shorter effective life affects the amortisation expense in the AR6 and AR7 periods.

The ERA has completed a detailed review of the type of capitalised costs forming the asset base and the amortisation of these assets. The ERA is satisfied that both are in accordance with Australian Accounting Standards for intangible assets and concur with AEMO's initial assessments for effective life. AEMO's proposed depreciation and amortisation for AR6 compared to values in the AR5 period and the ERA's draft determination are shown in Table 12.

Table 12: AEMO proposed and ERA draft determination on depreciation and amortisation costs in AR6 ($ million)

AR5 determination	AR5 actual forecast	AR6 proposed	**Draft determination**
23.6	20.7	50.9	**48.0**

Source: AEMO AR6 proposal and ERA analysis

With many of the capital projects being completed and entered into service mid-way through the AR6 period, the full effect of amortisation for these projects is not seen until AR7. Table 13 shows the periods assets are entered into service and Table 14 shows the projected depreciation of the assets built into the AR5 period and those proposed in the AR6 period over their effective lives. Table 15 shows the effect the ERA's proposed reduction in capital expenditure for AR6 will have on the depreciation expense over the AR6 to AR9 periods.

Table 13: Capital assets entered into service ($ million)

Existing assets 2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	Total
28.1	24.9	91.3	10.4	5.1	4.1	4.1	**168.0**

Source: AEMO AR6 proposal and supporting documents

Table 14: Amortisation of capital assets in service ($ million) as per AEMO's proposal

AR6	AR7	AR8	AR9
50.9	62.2	37.0	14.0

Source: AEMO AR6 proposal and supporting documents

Table 15: Amortisation of capital assets in service ($ million) after ERA adjustments

AR6	AR7	AR8	AR9
48.0	56.3	33.6	10.2

Source: ERA analysis

Final approved depreciation and amortisation operating expenditure will depend on the ERA's approval of capital expenditure for the AR6 period.

5.2.4 Accommodation

AEMO proposed accommodation costs

In Western Australia, AEMO currently leases offices in the Perth CBD and data warehouse space for its servers in Malaga.

AEMO does not propose to increase the accommodation footprint during the AR6 period. While employee numbers are forecast to increase considerably, AEMO has shifted to more flexible working arrangements, with employees now adopting a mix of working from home and in the office. The proposed operational expenditure on accommodation includes utilities and outgoings, such as water, electricity and building management costs, leased assets and occupancy lease interest.

Forecast accommodation costs are up by 34 per cent on the estimated actual costs from AR5, mainly due to changes in accounting practices, rather than actual increased expenditure.

Prior to 1 July 2021, AEMO partially capitalised accommodation costs based on a fixed rate per hour on FTE hours worked on capital projects. This policy ceased with the introduction of accounting standard AASB 16 and, as a result, all occupancy costs are either expensed at the time they are incurred or are accounted for as prescribed by AASB 16. Under this accounting standard, lessees are required to recognise assets and liabilities for all leases with a term of more than 12 months unless the underlying asset is of low value. The lessee is required to recognise a right of use asset representing its right to use the underlying leased asset and a lease liability representing its obligation to make lease payments.

Prior to the introduction of this accounting standard, operating expenditure for operating leases, such as accommodation, was the actual payment made under the lease arrangement. Costs remained flat throughout the period of the lease. Under AASB 16, operating expenditure now consists of the amortisation of the capitalised right of use asset over the period of the lease and an interest component for the lease liability. Operating expenditure for leased assets is higher in the earlier years of a lease when the lease liability and therefore the interest is higher.

Review, findings, and draft determination on accommodation costs

The proposed operating expenditure in the AR6 period for accommodation reflects the lease terms of AEMO's current accommodation leases and the accounting requirements of AASB 16, except for the Malaga data centre. The current lease on this property is due to expire in June 2024. AEMO have stated that systems hosted in this data centre require real time applications and are therefore not suitable candidates for AEMO's public cloud environment. AEMO's intention is to renew the contract with the existing data centre. This intention is reflected in the AR6 proposal. AEMO's proposed accommodation costs for the AR6 period compared to values in AR5 and the ERA's draft determination are shown in Table 16.

Table 16: AEMO proposed and ERA draft determination on accommodation costs in AR6 ($ million)

AR5 determination	AR5 actual forecast	AR6 proposed	Draft determination
1.6	3.8	5.2	**5.2**

Source: AEMO AR6 proposal and ERA analysis

5.2.5 Supplies and services

AEMO proposed supplies and services costs

Supplies and services include costs for consultants, licences, training, travel, subscriptions, and corporate services. AEMO's proposed expenditure of $13 million for supplies and services in AR6 is 8 per cent higher than its forecast of actual expenditure in AR5.

Review, findings and draft determination on supplies and services costs

During the AR5 period, AEMO completed a project to bring system management services in-house. Prior to this, system management services had been provided by Western Power to AEMO, with Western Power paid through a service level agreement, captured as consulting costs. The AR5 period included approximately $4.5 million of consulting costs for the Western Power services agreement.

Once the system management services were transferred to AEMO, its consultancy costs were expected to reduce.[88] However, the saving has been offset by significant proposed increases in:

- Legal consultant costs up from $0.3 million to $0.9 million in AR6.
- The allocation of corporate costs (finance, legal, human resources) to Western Australia (termed enterprise recoveries by AEMO) up from $2.3 million to $2.9 million.
- Subscriptions and research data costs up from $0.5 million to 1.6 million.
- Training costs up from $0.7 million to $1.6 million.
- Other costs, supplies and services, increasing from $0.2 million to $0.7 million.

AEMO has advised that the increase in legal consultants is based on the increased risk of disputes as the new market goes live. The ERA considers this increase to be excessive, given that AEMO has in-house legal counsel who could assist with any disputes that arise and the number of any disputes likely to occur cannot be substantiated. The ERA proposes to partially reject legal consulting costs of $0.4 million.

Enterprise recoveries are costs charged to Western Australia under AEMO's corporate allocation policy. These costs are based on Western Australia's portion of total FTEs. The proposed increase is largely driven by the proposed increase in Western Australian FTEs. As the ERA proposes to only be approve costs attributed to 9.3 of the 33.7 FTEs requested, the ERA has similarly approved the enterprise recovery costs.

The other supplies and services category includes around $0.4 million of costs associated with the DER network services marketplace trial and design project. This is an operational project that comprises two actions identified within the DER Roadmap. The second of the two action points requires AEMO to commence the development of trials for a distribution services market for network support by July 2024. This action is dependent on the completion of Project Symphony and other DER projects. The ERA considers it is not prudent to approve costs pertaining to this operational project at this point in time and rejects the associated supplies

[88] In its submission, Perth Energy questioned whether there is a similar reduction in Western Power expenditure because Western Power would have been responsible for system life extension prior to the move of the system to AEMO.

and services costs accordingly. Any costs related to this operational project should be included in an in-period submission.

Training costs can be broken into two categories, those provided by employees and those provided by external consultants. AEMO advised that the costs for training provided by employees totals $0.54 million and assumed that operational staff involved in this training will be backfilled during the training period. The ERA disagrees with the assumption that operational staff will be backfilled when providing in-house training that runs for a matter of hours at a time. Consequently, the ERA has rejected this cost in the draft determination. Included in the training provided by external consultants is an allowance per FTE. This allowance is based on 145 FTEs. As all additional FTEs are not expected to be approved for AR6, the ERA partially rejects $0.2 million in training expenditure.

The ERA has partially rejected $0.5 million in expenditure on subscriptions and research data costs. While some uplift of costs in this category is expected due to the changes to the market, the ERA has not been given sufficient information to justify the full increase from $0.5 million to $1.6 million as proposed by AEMO.

AEMO's proposed supplies and services costs for the AR6 period compared to values in AR5 and the ERA's draft determination are shown in Table 17.

Table 17: AEMO proposed and ERA draft determination on supplies and services costs in AR6 ($ million)

AR5 determination	AR5 actual forecast	AR6 proposed	Draft determination
17.3	12.4	13.0	**10.7**

Source: AEMO AR6 proposal and ERA analysis

5.2.6 IT and telecommunications

AEMO's proposed IT and telecommunications costs

IT and telecommunications costs include IT support, software support contracts, telecommunications, IT leased assets and cloud costs.

AEMO's proposed expenditure for IT and telecommunications in AR6 is $11 million against a forecast actual of $4.8 million for AR5. Proposed AR6 expenditure sees increases in costs from forecast actual AR5 expenditure across many of the expense lines in this category, with the biggest increases being in:

- cloud costs, up from $0.1 million in AR5 to $3.4 million in AR6,
- software support, up from $3.3 million to $5 million, and
- other IT, up from zero to 0.8 million.

Other IT costs consist of $228,000 for laptops, computer screens and a new screen for the upgrades to the Perth Control room, and $520,000 for software for the Network Services Market Trial in 2024/25.

Review, findings and draft determination on IT and telecommunications costs

The ERA approves costs for the upgrades to the control room as proposed by AEMO.

However, consistent with the ERA's approach to determine the supplies and services expense (section 5.2.5), the ERA has rejected costs for the second of two actions in the DER Roadmap,

summarised under the DER network services marketplace trial and design project. The ERA considers it is not prudent to approve costs pertaining to this operational project at this point in time and rejects the associated IT and telecommunications cost accordingly. Any costs related to this operational project should be included in an in-period submission.

The increase in cloud costs is expected as AEMO transitions its IT infrastructure away from the traditional hardware and data centre solution to a cloud solution. As an offset to this cost increase, the ERA would expect to see a decrease in hardware and software maintenance, software support, accommodation and depreciation relating to hardware and software in the existing environment. In its proposal, AEMO stated that the use of a cloud environment provides a more secure, sophisticated, and scalable suite of IT solutions, and reduces AEMO's on-site server and infrastructure costs.[89] It is unclear as to whether AEMO has included these expected savings in its AR6 operating cost forecasts.

To determine cloud costs in the AR6 period, AEMO used a model to trend and then track cloud costs direct from major cloud suppliers like Microsoft. From this information, AEMO derived the costs of cloud environments as the projects go through their lifecycle. This method does not consider best practices in cloud workload and configuration and refresh processes. Research shows that without employing optimisation tools, cloud costs for businesses are often up to 50 per cent higher than they need be. The ERA partially rejects cloud costs of $1 million in AR6 to account for AEMO employing tools to optimise cloud usage and therefore costs.

Software support has largely been driven by the requirement for additional Oracle and Plexos licences to support the new market platforms.

AEMO's proposed IT and telecommunications costs for AR6 compared to values in AR5 and the ERA's draft determination are shown in Table 18.

Table 18: AEMO proposed and ERA draft determination on IT and telecommunications costs in AR6 ($ million)

AR5 determination	AR5 actual forecast	AR6 proposed	Draft determination
8.2	4.8	11.0	**9.0**

Source: AEMO AR6 proposal and ERA analysis

5.2.7 Borrowing expenses

AEMO proposed borrowing expenses

AEMO's borrowing facilities increased from $238 million in 2020 to $358 million in 2021. This increase reflects the significant expenditure on capital projects in both the WEM and NEM. AEMO's accounting policy is to capitalise interest on projects that are in progress then, once the asset is in service, to expense the ongoing borrowing cost as operating expenditure. This approach is in line with Australian Accounting Standards (AASB 123).

Alinta considered AEMO's proposal did not provide adequate information on its borrowing costs, and so it could not evaluate whether AEMO was borrowing at reasonable costs, managing its debt levels prudently, planned to increase borrowings in the future, or had over-

[89] Australian Energy Market Operator, 2021. *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p.62, (online)

recovered its borrowing costs in the past.[90] Alinta considered that the absence of previous borrowing costs indicated that AEMO had sufficient cash to cover its previous capital expenditure and would not require further depreciation of AR5 capital expenditure in the current period.

Review, findings, and draft determination on borrowing expenses

Total interest expensed in the AR5 period was negligible, as assets relating to the Western Australian operation were mostly written off. The significant amount spent on capital assets and the transfer of these assets into service during the AR6 period will result in interest being allocated to operating expenditure in Western Australia consistent with the AEMO accounting policy and generally accepted accounting principles.

The interest rate applied to AEMO borrowings is the Bank Bill Swap Rate (BBSW) plus the average credit margin on existing term borrowing facilities. The interest rate being applied to the average borrowings over the AR6 period is in line with the one-year and three-year BBSW rates as they currently stand. While the current BBSW rate is low the one-year and three-year rates increase materially, as expected, due to the uncertainty time creates. Consequently, the interest being applied to the high debt levels in 2023/24 and 2024/25 affects both proposed borrowing costs and the ability to determine these costs with any degree of accuracy.

With no distinct debt facility applicable to the WEM, the only borrowings AEMO has calculated are borrowing expenses based on the average level of borrowings for the period. AEMO determined average borrowings using the opening balance plus the value of any assets transferred into service for the year, taking into account depreciation expensed. The ERA is not satisfied by the accuracy of AEMO's proposed borrowing costs. The ERA requested cash flow information for the Western Australian operations only, but AEMO was unable to provide this information.

The ERA has constructed a cash flow based on an opening asset base of $28.1 million with equal monthly revenues and recurring expenditure for each year and with capital projects included in the month those projects are expected to become operational. The ERA has calculated interest based on these monthly cash flows. AEMO's proposed borrowing costs for AR6 compared to values in AR5 and the ERA's draft determination are shown in Table 19.

Table 19: AEMO proposed and ERA draft determination on borrowing expenses in AR6 ($ million)

AR5 determination	AR5 actual forecast	AR6 proposed	Draft determination
-	-	5.2	**4.4**

Source: AEMO AR6 proposal and ERA analysis

The final borrowing costs approved in AR6 will be dependent on the total capital expenditure approved and the expected changes to timing for capital projects going into service during this period.

[90] Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

5.2.8 Operating expenditure projects

AEMO proposed operating project costs

AEMO has included $3.9 million for projects in the proposed operating expenditure for the AR6 period. The inclusion of projects in operating expenditure is a departure from the policy adopted in previous submissions where all costs relating to a project were capitalised. Operating expenditure includes costs for:

- $2.0 million for DER network services marketplace trial and design – this project is driven by one of AEMO's obligations under the DER Roadmap.
- $0.9 million for five-minute settlement project planning - this project aligns the frequency of settlement of market transactions with the frequency of dispatch in the WEM, by increasing the frequency at which market transactions are settled from every 30 minutes to every five minutes.
- $1 million for WEM reform decommissioning – this is the forecast cost for taking existing WEM systems out of service once the new market design, and underlying new system, is operational.

Review, findings, and draft determination on operating project costs

The ERA has reviewed these costs and confirmed that they are operating costs for early planning or research activities and do not result in the creation of a separately identifiable asset with a future benefit to AEMO. For costs of internally generated assets to be capitalised under the relevant accounting standards (AASB 138), both conditions must be met.

The ERA has reviewed the proposed operating projects, the costs for which almost all fall in the final year of the AR6 period. The one exception is the development of the initial design for the framework for a distribution services market, with fit-for-purpose arrangements for dispatch and settlement, which is being driven by the DER Roadmap, published in 2019.

The ERA approves only the $0.2 million required for work on the development of the initial design for the framework for a distribution services market, as this project is the most certain and most advanced of the operating projects. AEMO should seek funding for the balance of the operational projects in an in-period submission, when there is more certainty around the timing and requirements for the projects and a stronger case for cost estimates.

As a result, the ERA's determination on the corresponding labour cost and the IT and telecommunication cost categories are $3.1 million and $0.5 million respectively lower than AEMO's proposal.

5.3 WEM capital expenditure

The ERA's draft determination is for WEM capital expenditure of $52.0 million. The sections below consider each of the capital expenditure cost items forecast by AEMO in turn and provide an overview of the ERA's approach to analysis and justification for its draft determination. A summary of the draft determination for WEM capital expenditure is provided in section 5.3.1.

5.3.1 The ERA's draft determination on WEM forecast capital expenditure

The ERA's draft determination on WEM forecast capital expenditure is $52.0 million. This is $17.4 million (25.1 per cent) lower than the $69.4 million proposed by AEMO for the AR6

period. The reasons supporting the ERA's decision are outlined in sections 5.3.2 to 5.3.7**.** The variance between AEMO's proposed costs and the ERA's determined costs for each of the capital work programs and total project contingencies are summarised in Table 20.

Table 20: AEMO proposed and ERA draft determination on WEM capital expenditure ($ million)

Forecast capital expenditure	AR6 proposed	Draft determination	Variance	Variance (%)
Facilitating the Energy Transformation Strategy	41.2	**34.3**	(6.9)	(16.7)
WEM sustaining capital expenditure	13.5	**9.5**	(4.0)	(29.6)
Contingencies	14.7	**8.2**	(6.5)	(44.2)
Total forecast capital expenditure	69.4	**52.0**	(17.4)	(25.1)

Source: AEMO AR6 proposal and ERA analysis

Labour costs remain the largest component of AEMO's capital program (84 per cent). The ERA has reviewed AEMO's approach of determining labour quantities and costs across the capital projects program in section 5.3.2. The ERA's draft determination on AEMO's two capital expenditure workstreams – facilitating the Energy Transformation Strategy and WEM sustaining capital expenditure – are presented in sections 5.3.3 and 5.3.5 respectively. Project contingency costs are discussed in section 5.3.7.

5.3.2 Capital expenditure labour costs

5.3.2.1 AEMO's proposed capital expenditure on labour

The labour element of AEMO's forecast capital expenditure (excluding project contingency) is summarised in Table 21.

Table 21: AEMO proposed labour costs ($ million)

Activity	Labour costs			
	2022/23	2023/24	2024/25	AR6
Capital expenditure projects	29.1	19.4	9.7	**58.2**

Source: AEMO proposal workforce plan

As explained in section 5.2.2.2, AEMO provided three sources of data to support its proposal: a workforce plan that allocated staff to capital projects, a financial tracking sheet for each project showing all the costs for that project, and a staff manifest (a list of staff positions with corresponding breakdown in labour cost information for each position).

AEMO's proposed labour costs for capital projects was calculated using a tier (or unit) rate multiplied by the number of FTE days the individual was expected to work on the capital project. Some staff would be allocated to multiple projects.

Labour tier rates

AEMO reviewed a subset of the costs of AEMO staff and contractors who had worked on capital projects in 2020/21. Staff costs were grouped based on seniority and skill set into five

groups for permanent staff and five groups for contract staff. AEMO then calculated an average unit rate for each tier. The five tier rates for contract staff were lower, reflecting a more modest remuneration package without performance incentives and long service leave entitlements. AEMO used each individual's tier rate, multiplied by their estimated FTE days, to build up labour costs for each project.

Labour quantity

AEMO estimated the quantity of FTE days allocated to each capital project based on actual staffing levels for projects already in progress. For new projects AEMO applied its standard approach to project management and costing – explained as its "T-shirt sizing approach". This approach populates the projects with a core team and draws in other expertise as required.[91]

Stakeholder views on capex labour costs

Perth Energy noted that it had been seeking greater understanding of AEMO's growing expenditure on new IT systems and at the same time increasing staff base.[92] Regarding AEMO's reference to a peak in activities and resourcing effort during the real-time and essential services market launch, and a bedding down period of 12 to 18 months following this, Perth Energy stated that it was important that any temporary resource needs were not embedded into AEMO's ongoing staffing levels. Perth Energy expected that initially it may be better to over-staff a little, but as AEMO developed experience with the new markets and new tools over the first year or so, the numbers could be optimised.

Alinta also considered that increased investment in systems should allay or reduce the need for FTEs rather than lead to the need for additional capital expenditure to replace systems, and additional FTEs to "support functions associated with growth in systems."[93] Alinta questioned whether AEMO's investment in systems was efficient if it required significant increases in personnel and considered that these functions could be performed by staff no longer involved in market development, as this phase of the WEM Reform project concluded.

Similarly, the AEC noted that AEMO's proposal of 31 new FTEs was a significant increase and came when more processes were being automated.[94] The AEC encouraged the ERA to thoroughly review the labour cost estimates and satisfy itself that these positions were justified and could not be performed more economically in another way (for example, through short-term contracting or reallocating existing teams).

Synergy also requested that the ERA consider the prudence of establishing permanent resources in the early, uncertain, stages of the new market, as compared to using flexible resourcing arrangements.[95] Synergy recommended the ERA consider the temporary nature of these positions and whether outsourcing was a cost-effective and viable alternative to in-

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91 Where a project is entirely new and without precedent, AEMO will adopt a T-shirt sizing approach (i.e. small, medium, large, extra-large) to estimate the effort and resources required to deliver the project. From there, AEMO will estimate each element from a zero base, using prevailing market conditions and unit rates to determine costs where possible. Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 44 (online).

92 Perth Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

93 Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

94 Australian Energy Council, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

95 Synergy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

sourcing, as it avoids establishing long-term recurrent costs and annual adjustments associated with permanent staff.

Synergy questioned whether AEMO had considered a similar sized shift back from capital to operating expenditure but could not see this occurring within the AR6 period. Synergy recommended the ERA consider whether capitalised resources should continue beyond the commissioning of the various systems, or if the resources can be redeployed back into the business, offsetting the labour uplift in the later years of AR6 and into AR7.

5.3.2.2 ERA's review and findings on capital labour cost estimates

Initially, the ERA reviewed the three sources of data for consistency: the workforce plan, financial tracking sheet and staff manifest. The information in the three sources could not be reconciled.[96] After discussion with AEMO, the ERA focussed on the workforce plan and staff manifest to review AEMO's capitalised labour cost estimates.

In a previous determination, the ERA expressed the following concerns with AEMO's calculation of tier rates:

> The overlap between tiers in the sample analysed by the ERA indicates the tiers do not clearly represent clusters of roles with similar competencies, responsibilities and pay rates.[97]

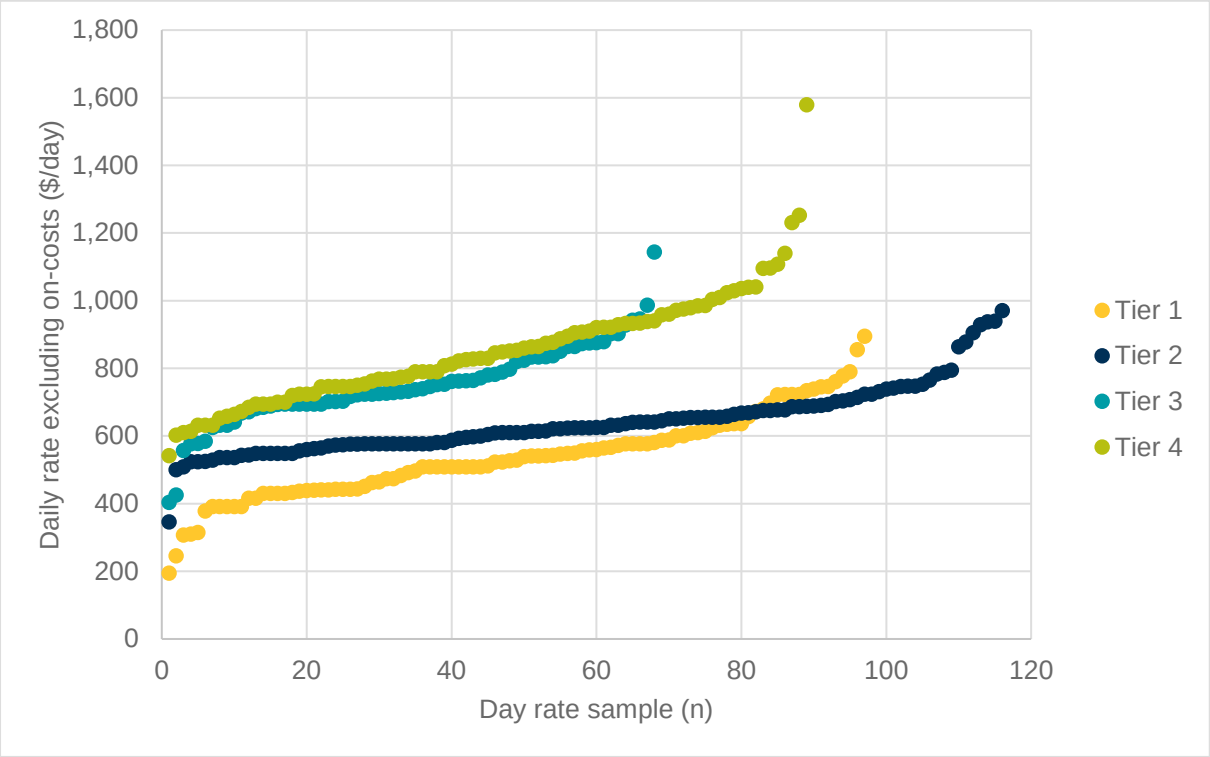
In its previous determination, the ERA chose to substitute actual costs for existing staff and estimated costs, based on market rates for new staff. Despite this, AEMO still used tier rates for capital costing purposes in AR6.

The ERA has reviewed AEMO's revised approach to calculating tier rates. Although AEMO had used a different sample of costs to estimate tier rates, the ERA found that there was still no discrete grouping of salary costs as demonstrated in Figure 5. A review of the top 10 per cent of the total salary sample contained representatives from all four of the employee cost tiers.

[96] The financial tracking sheets contained position names and titles but not position numbers. The staff manifest contained position titles and numbers but not names. The workforce planning sheet contained position titles and numbers but not names.

[97] Economic Regulation Authority, 2021, *AEMO in-period funding submission for the implementation of the DER Roadmap actions – Determination report*, p. 16 (online).

Figure 5: AEMO labour cost sample by tier[98]



Source: ERA analysis of AEMO data[99]

The ERA recognises that it may be more convenient for AEMO to use 10 unit rates, rather than numerous individual staff costs as a guide when in the early stages of project costing. However, the WEM Rules require the ERA to approve the lowest practicably sustainable costs when determining AEMO's funding. Using AEMO's tier rates overestimates capital labour costs.

Consequently, to ensure a determination consistent with the WEM Rules, the ERA has used projected salary costs based on current actual AEMO salaries. For projects where AEMO has indicated the position will be drawn from internal staff, tier rates were substituted with actual average staff costs for comparable positions. For positions for which no AEMO data was available, tier rates have been substituted with industry values derived from salary guides adjusted to account for AEMO's employment practices.[100]

By substituting the tiers for actual salaries, the ERA has partially rejected AEMO's proposed capital expenditure labour costs of $2.1 million.

The ERA has reviewed and used AEMO's estimated FTE days from the workforce plan. There are multiple individuals working on each capital project. However, the majority of projects began in AR5 and are underway as they enter the AR6 period. Consequently, the FTE day contribution expected from individuals working on projects are known or can be estimated by AEMO with some certainty.

98 The top employee tier only included one employee and so was not included in the ERA's analysis of staff tier rates.

99 Appendix 3 outlines the ERA's evaluation of AEMO's method to determine labour cost estimates.

100 AEMO indexes salaries to the 75th percentile of the relevant industry. To emulate this practice, the mid-point between the average and maximum values for the relevant position based in Western Australia were used.

5.3.2.3 Adjustments to capital expenditure labour costs

For the reasons outlined above, the ERA considers that some of the costs proposed by AEMO do not meet the requirements of the WEM Rules. Following clause 2.22A.6(c) of the WEM Rules, the ERA substitutes the labour costs in capital expenditure proposed by AEMO with actual salary information for named staff, average AEMO rates for staff identified as coming from internal resources and market rates for external contractors on capital projects and AEMO internal staff where the ERA had no other salary data. This results in a partial rejection of $2.1 million in labour costs as part of capital expenditure in AR6.

There appear to be differences between the labour costs in the workforce plan from which the costs were calculated for the draft determination and the financial tracking sheets, resulting in differences in the calculated values and the summation of costs from the individual projects. These will need to be rectified by AEMO for the final determination.

The adjustments to labour capital costs described above are reflected in the discussion on capital project costs in the remaining sections of chapter 5.

5.3.3 WEM reform program

5.3.3.1 AEMO's proposed capital expenditure for WEM reform

AEMO had planned the WEM reform program of work to span both AR5 and AR6 funding periods. At the time the ERA made its AR5 determination, AEMO's total forecast capital expenditure for the WEM reform program was $60.7 million. Of this amount, $2.3 million had been incurred in 2018/19, $51.2 million was proposed for the AR5 period and $6.7 million forecast for the AR6 period.[101]

AEMO's proposed capital expenditure for the total WEM reform project has increased to $91.2 million, a 50 per cent increase in funding compared to the estimate in AR5. By the end of 2021/22, AEMO expects to have incurred capital expenditure of $46.6 million, with a further $44.6 million to be incurred in the first two years of AR6. During the AR5 period, AEMO undertook a substantial rescoping and reforecasting of the WEM reform program.

AEMO's AR6 submission acknowledged that, for the WEM reform program, "the original scope and complexity of the program was underestimated."[102] On reflection, AEMO suggested that in AR5 it had produced "an overly optimistic total forecast for WEM reform given the limited detail on policy and implementation requirements at the time."[103]

In its submission, Alinta questioned how AEMO underestimated the initial costs of the WEM reforms so dramatically.[104] Alinta noted most of the information papers summarising the new market's design had been released prior to AEMO's AR5 submission in June 2019. Earlier versions of the proposed reforms were available for about two years prior via the consultation process in which AEMO was closely involved.

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101 Australian Energy Market Operator, 2019, *2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, p. 79, (online).

102 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 92, (online).

103 Ibid.

104 Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

In its AR6 submission, AEMO noted the points at which new WEM Rule changes had been gazetted through the energy transformation program. AEMO's proposal described how this information had prompted a review and reforecast of the WEM reform program:

> Since the original forecast was developed in early 2019, the scope has crystallised and AEMO now has a much greater understanding of the scale of changes to the WEM Rules and therefore the technical requirements of the new systems. This in turn informs what WEM Procedures and other key documentation needs to be developed, and the business and process change necessary to give effect to the reforms.[105]

AEMO's main reforecasting process took place over May to July 2021. The process included consideration of 14 separate work packets, conducted over 50 internal workshops, with 70 employees and contractors. In AR6, AEMO has identified 25 individual projects at a cost of $44.6 million: a base cost of $33.2 million plus $11.4 million in contingency (34 per cent).

Alinta considered that AEMO's earlier estimates would have been factored into decisions to pursue WEM reform and suggested that the reforms would have been significantly re-shaped or deferred, had AEMO appraised its costs at approximately $90 million from the outset.[106]

The last forecast underwent an internal top-down challenge. This review increased the overall forecast costs after drawing on lessons learned from implementing five-minute settlement in the NEM. Although AEMO acknowledges that costs can rise, the outcome of this challenge runs counter to AEMO's assertion that:

> The purpose of the top-down challenge is to test the cost estimates (opex or capex) and ensure a portfolio-wide or enterprise-wide view is applied to the forecast. This allows synergies or potential overlaps to be identified, typically resulting in a reduction in the initial forecast.[107]

A summary of the allocation of WEM reform project costs (excluding contingency) over AR4, AR5 and AR6 is shown in Table 22, below. A list of all the WEM reform projects and their individual cost allocations over the periods is provided in Appendix 10.

Table 22: AEMO's proposed WEM reform program costs by allowable revenue period

	AR4	AR5	AR6	Total
WEM reform program costs ($ million)[108]	1.5	45.1	44.6	**91.2**
Allocation by allowable revenue period (%)	1.6	49.5	48.9	**100**

Source: ERA analysis of AEMO information

[105] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 87 (online).

[106] Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[107] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 44 (online).

[108] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 87 (online).

Other stakeholder views on WEM reform

Alinta suggested that the increase in WEM reform costs indicated that AEMO was commissioning new systems and hiring new personnel, rather than leveraging expertise and systems from its NEM operations.[109] Alinta considered that such investments appeared disproportionate to the size of the markets that the WEM reforms would create, for example, the essential system services market for Contingency Reserve Raise and Lower, which would cost many times the current cost of the services and would therefore outweigh the benefits of WEM reform.

Alinta highlighted that AEMO's proposed expenditure on WEM reform would be significantly higher than the major reforms of the past, such as the Independent Market Operator's $10.55 million spend to implement the Market Evolution Program and $13.352 million spend to establish system management's IT system.

Synergy noted that it is keen to see the new market established by 1 October 2023, with investment in the WEM reform program prioritised ahead of AEMO's other programs of work to ensure timely delivery of a functioning market.[110] Synergy considered that the revised WEM reform capital expenditure forecast suggested AEMO would spend a similar amount in the next 18 months as it did over the AR5 period and recommended the ERA scrutinise whether this was deliverable, given the other projects proposed for the AR6 period.

5.3.3.2 ERA's review and findings on the WEM reform program

The analysis of the allocation of WEM reform project costs over AR4 to AR6, demonstrates that the WEM reform program is just over halfway through as AEMO enters AR6. To assess the proposed WEM reform costs, the ERA has considered the implications of a possible reduction in the funding proposed for AR6 on the overall delivery of the WEM reform program.

There are six projects that are either completely or substantially (over 90 per cent) complete by the end of AR5. The WEM Rules do not provide for the ERA to retrospectively consider whether the expenditure on these projects was efficient. The remaining funding proposed for AR6 for these six projects is $0.4 million, which the ERA approves in the draft determination.

There are eight WEM reform projects in progress at the start of AR6 and another eight projects that are due to begin within the AR6 period.

The eight projects in progress at the beginning of AR6 include development of the digital platform to support new WEM systems and development of the new dispatch model and its user interface. Development of support systems and processes, such as the reserve capacity mechanism and settlement process to support the new market design, are also underway. Overall, the proposed capital cost of projects that are at least halfway through as they enter AR6 amounts to $26 million.

Internal and external labour comprise the majority of costs for WEM reform projects that are underway. The number of FTEs working on a project varies from seven to 24, with an average of 16 FTEs per project. These staff are a combination of existing AEMO staff seconded to capital projects and contract staff. Given the projects have been running since AR5, these internal staff will have already been seconded or hired. Similarly, consultants will have signed

[109] Alinta Energy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[110] Synergy, 2022, Submission to *Australian Energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

agreements and, along with other staff, will be engaged in hardware and software development.

The ERA is concerned that if the costs of these projects were to change substantially, this could affect delivery of the WEM reform program. Therefore, in the draft determination, the ERA has approved the capital costs of these eight projects as proposed, subject to the substituted capital labour costs (as outlined in section 5.3.2.3) and the partial rejection of contingency calculations (as outlined in section 5.3.7.3). The ERA has determined forecast capital expenditure on the eight in progress WEM reform projects as $23.7 million, which is $3.7 million or 9 per cent lower than AEMO's proposed cost, as shown in Table 23.

Table 23: AEMO's proposed and ERA's draft determination, ongoing WEM reform projects ($ million)

	Base project cost	Contingency	Total project cost
AEMO proposal	19.7	6.3	26.0
ERA determination	**20.0**	**3.6**	**23.7**
Variance (%)	2	(43)	(9)

Source: AEMO proposal and ERA's analysis

The forecast capital expenditure for the eight projects that begin and end within the AR6 period is $16.8 million. This is equivalent to 38 per cent of the WEM reform capital expenditure in AR6. Except for one small consultant cost, all of the proposed costs are for internal labour. The number of FTEs working on the projects varies from 5 to 32, with the average being around 12 individuals.

Three of these projects sit on AEMO's critical path to deliver the WEM reforms. These are:

- The integration and market trial project – to test and trial the new WEM systems and processes before the new market design commences.
- Commissioning test reform – to ensure market participants can operate in the new market.
- Short-term Projected Assessment of System Adequacy (ST PASA) project – so AEMO can improve its forecasting, given the volatility of intermittent renewable generation and network congestion, to support market participants' bidding into the new market.

Three other projects – hypercare and support, compliance reporting, and STEM reform – are also tied to the commencement of the new market in October 2023. Hypercare and support is to have AEMO staff available to help market participants through the first six months of the new market and for AEMO to be able to respond quickly to issues, through changes to system or processes, as and if they arise.

The compliance reporting project will create the ability to gather and report on AEMO's compliance with multiple aspects of the operation of security constrained economic dispatch. Consequently, the compliance reporting capability will be needed as the new market goes live.

The STEM reform project will be completed in advance of the new market start date. This is to ensure market participants can continue to buy and sell electricity in a day-ahead forward market to manage their contracted position. The STEM reform project includes changes to STEM systems and processes related to the new market arrangements.

Collectively, these six projects are estimated to cost $13.9 million. The ERA is concerned that if the costs of these six projects were to change substantially, this could affect delivery of the WEM reform program. Therefore, in the draft determination, the ERA approves the capital costs of these six projects as proposed, subject to the substituted capital labour costs (as outlined in section 5.3.2.3) and the partial rejection of contingency calculations (as outlined in section 5.3.7.3). The ERA determines forecast capital expenditure on these six in-progress WEM reform projects as $13.2 million, which is $0.7 million or 5 per cent lower than AEMO's proposed cost, as shown in Table 24.

Table 24: AEMO's proposed and ERA's draft determination, new WEM reform projects ($ million)

	Base project cost	Contingency	Total project cost
AEMO proposal	10.0	3.9	13.9
ERA determination	**10.0**	**3.2**	**13.2**
Variance (%)	(0)	(18)	(5)

Source: AEMO proposal and ERA's analysis

The two remaining projects are the system operation planning tool project and the Dispatcher Training Simulator integration and security constrained and economic dispatch offline tools project. The combined proposed capital costs of these projects are $2.9 million. AEMO considered both projects would deliver operational efficiencies but did not quantify those likely benefits.

The system operations planning tool project proposed costs ($0.9 million) are for:

- Delivering WEM Procedures and supporting processes required to support new obligations under the reformed market (new system restart obligations). It will also develop minor tools to extract data from new market systems in a format capable of being imported into existing power system security assessment and modelling tools such as E-terra and DiSILENT.

The Dispatcher Training Simulator integration and security constrained and economic dispatch offline tool project's proposed costs ($2.1 million) are for:

- Extensions to the new market dispatch model "WEMDE" and market participants access to the dispatch model "WEMDE-UI" into a simulation environment and combined with the dispatcher training simulator component of the power system tool E-terra. This capability is to assist in the training of new system operators.

The ERA is concerned that neither of these projects meet the funding approval requirements in clause 2.22A.5 of the WEM Rules. AEMO's system management function is not in question and training of power system operators is an important part of AEMO's competency in system management. However, AEMO has not provided any explanation as to how the improvements to system operator training or the addition of 'minor tools' will improve AEMO's performance in managing the system.

For example, there is no assessment of how or if the current power system operator training will be insufficient for the new market or if the tools proposed by the two projects will address any gaps. There is insufficient information provided by AEMO for the ERA to determine how these projects directly contribute to AEMO performing its system management function under

the WEM Rules, nor whether the proposed funding is the 'least sustainable practicable cost' of providing those functions.

For the reasons outlined above, the ERA considers the costs proposed by AEMO do not meet the requirements of the WEM Rules. Following clause 2.22A.6(c) and (d), the ERA rejects the costs for these projects. The ERA recommends AEMO consider these costs in future review periods or provide further evidence to quantify the benefits prior to the ERA's final determination on AR6.

To reconsider this funding in the final determination, the ERA would need to see quantification of the expected benefits from the two projects offset the proposed costs of the projects as these projects do not meet the funding approval requirements in the WEM Rules and the projects do not appear to be closely tied to the WEM reform program.

5.3.3.3 Draft determination on WEM reform forecast capital expenditure

The ERA has rejected costs for two projects in the WEM reform program and partially rejects costs in the labour cost and contingency calculation components. As a result, the ERA's determination on the WEM reform program is $37.2 million (including contingency), which is $7.4 million or 16.6 per cent lower than the $44.6 million proposed by AEMO.

5.3.4 Western Australian DER program

5.3.4.1 AEMO's proposed capital expenditure for the Western Australian DER program

AEMO's DER work program arose from the State Government's DER Roadmap, which contains a series of actions to integrate electricity generated from rooftop solar systems into the WEM and ensure the ongoing stability of the electricity network.[111] For its DER program across the AR5 period, AEMO has spent $4.8 million and is estimated to spend an additional $5.8 million in project costs plus $1.3 million in contingency.[112] AEMO is on track to be approximately $4 million under its $14.6 million budget for DER by the end of the AR5 period (30 June 2022).

AEMO completed establishing the DER register in the AR5 period under budget. Three projects – Project Symphony, technology integration and DER participation – will continue into the AR6 period due to delays with project partners, resource availability and project scope refinement.[113]

AEMO is seeking $9.4 million (including $1.4 million in project contingency) over the AR6 period to complete three in-flight projects and commence four new capital projects.[114,115] Labour costs will continue to be the largest expenditure category (92 per cent), followed by

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111 Australian Energy Market Operator, 2020, *Adjustment to 2019-22 Forecast Capital Expenditure – DER Roadmap Implementation Costs*, pp. 6-7, (online).

112 The ERA received AEMO's actual spend till September 2021 and forecast spend between October 2021 and June 2022 (the remaining AR5 period). AEMO has indicated it will provide updated financial documents prior to the ERA's final determination.

113 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, pp. 114-115, (online).

114 The funding sought for ERA approval is lower than the funding required to complete the in-flight projects. This is due to the application of a $1.5 million grant from the Australian Renewable Energy Agency (ARENA) that will be applied to *Project Symphony* in AR6. This is discussed further in Appendix 12.

115 There is an additional DER project – DER Network Services Marketplace Trial & Design – which is treated as an operating expense and discussed in section 5.2.8.

software (5 per cent), project financing (2 per cent) and travel and accommodation (1 per cent).

5.3.4.2 ERA's review and findings on the DER capital program

In AR6, approximately 19 FTE will be required to complete three in-flight projects at an estimated cost of $2.3 million, compared to 53 FTE at a cost of $6.6 million in AR5. Other external contractor labour costs, such as services and consultancy agreements, have decreased by 54 per cent from AR5 to $1.1 million in AR6. The cost to finance these projects has increased by 110 per cent since AR5 to $0.16 million due to a change in the accounting method. Software costs, which include cloud costs, software licenses and security, are forecast to decline by 9 per cent in AR6 to $0.4 million.

In its issues paper, the ERA noted that two projects – market visibility and DER data access and management – were driven by AEMO's own initiative based on its assessment of market and system need, and not directly arising from any actions in the DER Roadmap.[116]

The market visibility project is intended to expand AEMO's existing suite of data dashboards and data visualisation packages to include specific information for DER aggregators. This will include more information for DER aggregators such as participation requirements, market outcomes and conditions. AEMO identified the key objective of this project is to encourage the active participation of DER in the WEM and SWIS, given the increasing impact of DER on the power system. AEMO is seeking $1.5 million over AR6 to fund the market visibility project, comprised of internal labour costs ($1.2 million), project contingency ($0.25 million), software ($0.07 million) and project financing costs ($0.02 million).

The DER data access and management project is intended to enhance the existing DER Register, with inclusion of improved distribution network level data on passive DER generation and consumption. This additional data will inform AEMO's operation and understanding of risks associated with DER tripping and weather-driven events. AEMO is seeking $2.1 million over AR6 to fund this project, comprised largely of labour costs ($1.8 million), project contingency ($0.3 million), and project financing costs ($0.01 million).

The ERA acknowledges there are benefits to increasing awareness of, and access to, market data, particularly for new and potential entrants to the DER market. However, given that these projects are driven by AEMO's own initiative, the ERA sought feedback via the issues paper from market participants on AEMO including these costs in its proposal.

A range of stakeholders expressed concern over AEMO's request for funding for these two projects. Alinta Energy questioned whether spending on projects not directly related to AEMO's obligations but driven by market need was necessary to AEMO's functions under the WEM Rules and noted its doubts about whether such investment was prudent, efficient, and reduced costs over the longer term.[117]

The AEC considered projects driven by AEMO's initiative should not automatically receive funding until the benefits and market need were justified with sufficient detail, such as who is driving the need, who benefits from the project, and whether this project will be the best use of resources.[118] Bluewaters Power considered these projects should be assessed to identify

[116] Economic Regulation Authority, 2022, *Issues Paper, Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 1 July 2022 to 30 June 2025*, p. 26, (online).

[117] Alinta Energy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[118] Australian Energy Council, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

any additional benefit to the market and if the cost was appropriate.[119] Synergy recommended these projects be deferred.[120]

The ERA's proposal guidelines and the WEM Rules require the ERA to first assess whether the project is necessary and there is a clear connection between the forecast cost, AEMO's functions and the project scope. Second, the ERA must consider whether the project is costed efficiently.[121]

AEMO noted the scope of DER Roadmap does not confine AEMO to proposed projects. AEMO considered the scope of these projects are driven by system and market needs and would be required to support systems and market operations. AEMO considered these projects arise from its obligations under WEM Rules 1.2.1(a) to (e), 2.1A.1A and 2.1A.2(d) and (n)) and disagreed with the ERA's assertion in its issues paper that these projects are out of scope.

AEMO's reference to WEM Rule 1.2.1 outlines the general WEM objectives. The reference to WEM rule 2.1A.1A confers the function on AEMO of ensuring that the SWIS operates in a secure and reliable manner. Clause 2.1A.2(d) allows AEMO to do anything that it determines to be conducive or incidental to the performance of the functions under the WEM Rules. There is no WEM Rule 2.1A.2(n).

The ERA requested AEMO to provide evidence of any stakeholder consultation or market assessment that it relied upon to guide its assessment of the necessity for, and benefits derived from, these projects. AEMO advised comprehensive stakeholder engagement had not yet been undertaken for these two projects, and it intended to undertake detailed options assessments and needs analysis as the projects progress.

5.3.4.3 Draft determination on WA DER capital program

The ERA considers the evidence provided is not sufficient to conclude the necessity for the market visibility and DER data access and management projects. Neither project is necessary for the successful completion of the in-flight projects, or the commencement of other projects required by the DER Roadmap. In its proposal, AEMO indicated that these projects are driven by system and market needs; however, based on stakeholder feedback to the issues paper, it appears there is limited support from market participants for these projects.

For the reasons outlined above, the ERA considers the costs proposed by AEMO for these two projects do not meet the requirements of the WEM Rules. Following clause 2.22A.6(c) and (d), the ERA rejects the costs for these two projects. The ERA recommends AEMO consider these costs in future review periods or provide further evidence to quantify the benefits prior to the ERA's final determination on AR6.

The ERA has also rejected the following costs:

- $0.9 million AEMO proposed for engaging external consultants where the scope of work is not sufficiently advanced. The ERA recommends that AEMO submit an in-period request for this funding once the scope of activities is sufficiently granular to develop a thorough estimate. This is presented in Appendix 10.

[119] Bluewaters Power, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[120] Synergy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

[121] Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submissions under the WEM Rules and GSI Rules*, Section 3.8.1, p. 8, (online).

- $0.2 million in the project cost for the electric vehicles in the DER register project. The ERA compared AEMO's cost of establishing the DER Register – which it completed under budget – with its proposed cost to upgrade the existing register with electric vehicle data and identified cost and resource inefficiencies. This is presented in Appendix 10.

As a result, the ERA's draft determination on the DER program is $4.2 million (including contingency), which is $5.2 million or 56 per cent lower than AEMO's proposed capital cost of $9.4 million.[122]

5.3.5 WEM sustaining capital expenditure program

5.3.5.1 AEMO's proposed capital expenditure for WEM sustaining capital expenditure program

AEMO's proposed sustaining capital program of $15.8 million (including contingency) is a combination of 39 individual projects, most of which are IT capital projects. The projects are grouped into two workstreams: Western Australian technology ($10 million) and enterprise systems ($5.8 million).

The WEM sustaining capital program projects for the AR6 period are yet to commence and are still in the concept phase of project planning. In its proposal, AEMO stated these projects are critical upgrades and system lifecycle replacements across AEMO's IT systems that operate the WA power system and markets.[123]

Western Australian technology

The Western Australian technology workstream includes three groups of projects: capability uplift, lifecycle and WEM rule changes. These are summarised below:

- Capability uplift – AEMO has proposed $1.3 million for three capability uplift projects:
  - Wide area monitoring systems (WAMS) software – this project will monitor aspects of power system security, such as system strength and inertia, in the WEM.
  - Transient stability tool – this project will monitor wind turbine operation, to provide real-time identification of system security problems associated with intermittent generation, such as wind farms.
  - Introduction of AEMO's operations simulator tool (currently operating in the NEM) – this project is designed to improve AEMO's ability to predict and analyse wind and solar generated energy's impact on the power system.
- Lifecycle – AEMO has proposed $7.7 million for its lifecycle program. This includes six projects aimed at upgrading hardware and software to ensure AEMO's 470 IT systems are fit for purpose, reliable, and cost effective to run. The six projects are:
  - Enterprise data platform (EDP) – this project aims to deliver data automation, a central data repository, data consumption, analytics and visualisation, data governance and data support and maintenance.

[122] The ERA considers the cost of the DER program for AR6 is $5.7 million, which will be partly funded by $1.5 million ARENA grant in AR6 and therefore the ERA's draft determination is for the difference ($4.2 million). This is consistent with AEMO's approach in its proposal to the ERA and further explained in Appendix 10.

[123] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25,* p.78, (online).

  - Legacy market systems – this project upgrades existing, or legacy, components of AEMO's WA market applications.
  - Integration project – this project will replace nine unsupported applications with applications based on AEMO's preferred IT structure and framework. These changes will improve visibility of critical market transactions and enhance the security of data exchanges.
  - Perth computer room – this project involves the replacement of all end-of-life computer room hardware with current equipment, to reduce the risk of technical failure and associated business impacts.
  - Itron Upgrade 2 – this project upgrades AEMO's load forecasting software, a critical system that supports market operations.
  - Certificate authority - this project is to develop a solution to enable participants access to AEMO's systems once the existing 'public key infrastructure' expires in the AR6 period.
- Rule changes – The proposed funding for this project of $1.0 million is to cover the generic costs of any WEM Rule changes that may occur during the AR6 period.

Enterprise workstream

AEMO's enterprise workstream, estimated at $5.8 million for the AR6 period, covers a further four projects: energy management system, cyber, operational forecasting and infrastructure (Norwest data centre). Three of these, the energy management system, cyber security system and infrastructure, are national projects. Costs are allocated to Western Australia based on differing methods as outlined below.

- Energy management system – AEMO's energy management system (EMS) is critical to AEMO's ability to monitor, control and optimise energy management. The same versions of EMS exist in both the WEM and NEM and will reach end of life in July 2024.
  - Cost estimates for the e-terra system were provided by the vendor and allocated to the WEM at 18 per cent, based on use of the system.
- Cyber security program – It is AEMO's view that Western Australia benefits from economies of scale and experience by utilising the national cyber security team in place of adopting a standalone cyber security project. The cyber work streams focus on ransomware resilience, threat detection and response, threat and vulnerability management and identity and access management.
  - Western Australia was allocated 11.8 per cent of the total forecast cost based on the proportional average use of the system in the WEM compared to the NEM.
- Infrastructure (Norwest data centre) – This project involves replacement of end-of-life data centre hardware to reduce the risk of technical failure and associated adverse business impacts. The Norwest data facility hosts Western Australian system management and market operations application and services. The Norwest data centre also hosts several NEM services and AEMO shares the costs associated with the Norwest data centre with AEMO's Western Australian operations:
  - Western Australia was allocated 11.7 per cent of the forecast project cost, which was allocated based on the number of WEM servers (218) relative to the total number of operational servers (1860).[124]

[124] Ibid, p. 130.

- Operational forecasting – AEMO developed the AEMO Fusion Methodology to improve AEMO's accuracy in forecasting power system requirements. Forecasting accuracy has become difficult with increased penetration of variable renewable technology, including distributed energy resources and climate induced stress from extreme weather events. In the NEM, operational forecasting has been applied to reduce the cost of frequency regulation.

5.3.5.2 ERA's review and findings on the sustaining capital expenditure program

Given the highly technical nature of the sustaining capital workstream, the ERA sought advice from a specialist consultant, Intelligent Energy Systems (IES) to inform its determination.

AEMO reiterated to IES that the projects under the sustaining capital program would not result in any meaningful operational efficiencies. However, the benefits relate to market efficiency gains that are generally hard to quantity. IES noted that 31 of the sustaining capital program projects proposed by AEMO are internally developed. Many of these projects relate to bespoke systems within the lifecycle project streams, cyber security, and operational forecasting systems. AEMO's reason for adopting these projects are to reduce future costs and remove external vendor support reliance.

IES has suggested multiple reductions to AEMO's proposed spend on sustaining capital program expenditure, which include:

- Removing licence and cloud costs for some projects where AEMO did not adequately explain why licence costs were required, or where cloud costs were treated as a capital expense rather than an operating expense.
- Removing costs associated with penetration testing in the lifecycle projects. AEMO allocated penetration testing costs to each lifecycle project in a generic 'per application' allowance to all underlying projects. This sometimes resulted in penetration testing costs being up to 40 per cent of some projects' base costs. Penetration costs have been removed from projects, including the Itron project, that will not interface with applications external to AEMO's systems.

The capital contingencies for all sustaining capital projects were adjusted consistent with the ERA's findings on proposed capital contingencies as noted in section 5.3.7**.**

5.3.5.3 Draft determination on WEM sustaining capital expenditure program

In making its draft determination, the ERA has considered IES's advice, which was based on information provided by AEMO, including details of AEMO's purchasing and market testing processes, to validate cost assumptions. The ERA has also reviewed the information provided by AEMO and agrees with IES's recommendations to reduce the proposed spend on AEMO's sustaining capital program expenditure for the AR6 period as outlined in section 5.3.5.2.

Based on a review of AEMO's funding proposal by an external consultant and ERA's analysis of labour and contingencies, the ERA's draft determination of AEMO's sustaining capital expenditure for the WEM is $10.5 million. This is $4.9 million or 33 per cent lower than AEMO's proposed cost of $15.7 million, as shown in Table 25.

Table 25: ERA's draft determination on AEMO's proposed WEM sustaining capital expenditure summary ($ million)

Project	AR6 proposed cost	Draft determination	Variance	Variance (%)
Western Australian technology				
Capability uplift	1.3	**0.9**	(0.4)	(30.8)
WEM rule changes	1.0	**0.3**	(0.7)	(70.0)
Lifecycle	7.7	**5.9**	(1.4)	(19.2)
Enterprise systems				
Energy management system	1.4	**1.8**	0.4	28.6
Cyber	3.0	**1.3**	(1.7)	(56.7)
Operational forecasting	1.1	**0.1**	(1.1)	(91.7)
Infrastructure (Norwest Data Centre)	0.2	**0.2**	-	-
Total	15.7	**10.5**	(4.9)	(33.1)

Source: ERA analysis of AEMO data

Each of the projects listed in the above table are comprised of several sub-projects. A complete breakdown of each project listed above and reasoning for the cost reductions can be found in Appendix 11.

5.3.6 Potential projects not currently included in AR6 forecast

AEMO's proposal identifies several projects for which "insufficient information is available at the time of preparing the AR6 proposal to inform a robust capex forecast."[125] These projects include:

- Five-minute settlement (see section 5.2.8) - this project aligns the frequency of settlement of market transactions with the frequency of dispatch in the WEM, by increasing the frequency at which market transactions are settled from every 30 minutes to every five minutes.
- DER participation implementation - this project builds on from the Project Symphony orchestration pilot and the DER participation project design program. DER participation will be fully implemented in the WEM once the detail of key policy decisions and new market arrangements are in place.
- Reserve capacity mechanism and cost allocation reviews - a future requirement for funding for reforms to AEMO's systems and processes may arise following Energy Policy WA's reviews of the reserve capacity mechanism and cost allocation.

AEMO considers that these capital expenditure projects may arise during the AR6 period but has not included them in the AR6 expenditure forecast due to uncertainty surrounding their timing and scope. AEMO suggests that the potential additional expenditure associated with these projects ranges from $32 million to $64 million. AEMO modelled the impact of incurring

[125] Ibid, p. 78, (online).

the additional expenditure of these three projects on WEM fees in AR6 and AR7 and found that the average WEM fee would increase to between $2.403/MWh and $2.536/MWh by the end of the AR7 period.

Bluewaters noted that it was yet to see a cost benefit analysis which provides comfort to market participants that five-minute settlement should proceed. Bluewaters considered that the WEM may continue to introduce poor value-for-money reform at the expense of market participants and, ultimately, consumers.

Perth Energy acknowledged the extensive changes being made to the WEM and how AEMO operated and that substantial increases in AEMO's operating and capital expenditure were likely to be justified. However, Perth Energy requested that AEMO's move to five-minute settlement was backed up by some analysis, based on experience within the NEM, and showing how the cost of five-minute settlement will flow through to customers. Perth Energy was concerned about AEMO's ability to deliver its project commitments due to the significant delay in acknowledging that the new WEM start needed to be pushed back.

Perth Energy considered that spreading the cost of implementing DER aggregation participation might not be fair if it's spread across the wholesale market instead of directed to Synergy's customers unless residential customers are made contestable customers.

Synergy supported AEMO's proposal to exclude less certain projects like five-minute settlement, participation of DER aggregation, and participation in stage two, Energy Transformation Strategy, projects from the AR6 forecast until they are better understood or required by policy and substantiated by an out of period funding request. Synergy recommended the ERA and AEMO take any opportunity to defer capital projects (such as the DER projects not specified as DER Roadmap actions and discretionary IT projects such as cyber security), except for WEM reform.

5.3.7 Contingency costs

5.3.7.1 Proposed contingency costs

AEMO's forecast cost estimates for all capital expenditure projects include a contingency cost, reflecting AEMO's level of confidence in its base cost estimate and an assessment of project-specific risks.[126] AEMO holds the contingency costs in reserve to cover and alleviate cost exposure associated with specific risks and uncertainty and only releases it if that risk is realised, subject to senior management approval and a formal change request process.[127]

AEMO also has several other mechanisms at its disposal for addressing uncertainty in forecasting project costs for the AR6 period:

- The WEM Rules allow for revenue recovery or capital expenditure of at least the lower of 10 per cent or $10 million greater than the amount in the ERA's determination at the end of the review period.[128]
- If a project does not have a defined scope, AEMO can request a small sum of money for regulatory planning.[129]

[126] Ibid, p. 24, (online).

[127] Ibid, p. 49, (online).

[128] Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.13, (online).

[129] Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submission under the WEM Rules and GSI Rules*, p. 3, (online).

- AEMO can make an in-period submission for funding when the scope and details of a project become known.[130]

In practice, AEMO can address the uncertainty in each capital expenditure project using any or all options, depending on the stage of project development. In its proposal, AEMO considered that it is generally more beneficial to market participants and AEMO to "slightly overestimate" the forecast capex amount in each period.[131]

There is no requirement for AEMO to spend up to its approved forecast amount in the review period and, once the ERA approves AEMO's forecast capital expenditure, AEMO does not need to spend the approved contingency costs on the projects the funds were approved for, which may result if the anticipated risks associated with these projects do not arise.

The ERA has no regulatory oversight over any unspent contingency costs. In AR5, the ERA approved $11.4 million in project contingency costs of which, AEMO used $5.1 million for the relevant AR5 projects. For the remaining projects in AR5, for which a $6.3 million contingency cost was identified, AEMO did not use the approved contingency costs for the projects they were approved for, and instead used them for other capital projects.

AEMO's proposal indicated that it has changed the way it sets project contingency costs from AR5, in which it relied on a standard contingency factor, to place more emphasis on quantifying project risks, which reduce as the project matures.[132] [133] AEMO developed its own methods for calculating the contingency costs associated with individual projects, drawing from other recognised methods of contingency cost calculation, and based on the projects' stage of development:

- Method 1 – used for calculating a contingency cost percentage that is multiplied against the project's base estimate to produce a contingency cost for the project. This percentage is calculated using AEMO's fixed contingency cost calculator at the idea stage of a project, based on a predefined (fixed) list of 10 questions to assess risk across all projects.
- Method 2 – used for calculating the 'most likely' contingency cost for a project in the planning and execution stage, and updated throughout each project lifecycle, as the expected monetary value (EMV) of a tailored list of risks associated with that project.[134] The EMV of a specific risk to a project is calculated using AEMO's EMV Tool by estimating the probability of that risk occurring and multiplying it by the estimated cost of the impact of that risk occurring. The contingency cost is then calculated by summing the EMVs of all identified risks for a particular project.
- Method 3 – a method combining method 1 and method 2 above, in which project managers can opt to carry-forward 5 per cent of the contingency cost calculated using method 1 when developing method 2, to ensure ''unknown unknowns" can be catered for.

AEMO also employed a fourth method of contingency cost calculation for one specific project, which was estimated based on the contingency cost of a previous project involving the same IT systems.

130 Ibid, p. 9.

131 Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 24, (online).

132 Ibid, p. 47, (online).

133 AEMO used the 'cone of uncertainty' to illustrate its assumption of how the level of uncertainty changes over the lifecycle of a project. Ibid, p. 49.

134 The lists of different risks identified between projects vary.

With method 3, AEMO indicated that project managers each had discretion about whether they would carry 5 per cent of the fixed contingency amount forward to the EMV tool to cover "unknown unknown" risks. Every project manager took this option. Thus, AEMO's proposed contingency costs were largely based on the use of AEMO's fixed contingency cost calculator (method 1, used for 23 projects) or the combination of the fixed contingency cost calculator and the EMV tool (method 3, used for 16 projects). A summary of the number of projects using each method of contingency cost calculation is provided in Appendix 12.

AEMO noted in its proposal that many of its projects were at the very early stage of conception, with contingency cost calculations using AEMO's fixed contingency cost calculator, ranging from 5 percent to 80 per cent.[135] Additionally, project contingency cost calculations at a program level ranged from 10 per cent to 33 per cent, with an average of 26 per cent.

AEMO considered that these contingency cost levels are reasonable and efficient when compared to AEMO's past performance, when reflecting on internal models and studies of project cost overruns, and when compared to estimations from other estimating tools.[136]

In its proposal, AEMO also considered that building in project contingency costs reduces the need to make substantially costly in-period adjustments to the forecast, through in-period submissions. Several stakeholders commented on the use of in-period submissions for additional funding.

Stakeholder views on contingency costs

Alinta considered that while AEMO's claim that the contingency amount proposed for the AR6 period would avoid it making substantially costly in-period adjustments appeared logical, AEMO may not use the contingency cost for this intended purpose and may spend it regardless of whether it was required. Given this, and that the ERA has no oversight over how contingency costs are spent once approved, Alinta did not support allowing AEMO any contingency costs, and instead, recommended that AEMO be required to make an in-period submission should it require additional revenue.

Synergy, Perth Energy and the AEC also supported deferring projects with uncertain costs and making in-period submissions. Synergy considered this would achieve an appropriate balance between the accuracy of project costs and the forecast revenue, market transparency, and the certainty and consistency of market fees.

However, Perth Energy suggested more work was needed to develop certainty or defer the work for these future projects to AR7. The AEC considered the ERA should not approve allowable revenue and capital expenditure requests relating to future market reforms that do not have regulatory certainty in terms of government approval, timeframes, design, and implementation. Nevertheless, the AEC considered that deferring projects with uncertain costs to in-period submissions would minimise contingency costs and allow the ERA to scrutinise the projects when they are better defined.

The AEC further noted that the effect of delaying projects is that:

- there is no way for market participants to accurately include unknown future costs in their long-term contracts,
- market participants risk impacting their competitiveness if the costs they include are too high,

[135] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, p. 47, (online).

[136] Ibid, p. 48, (online).

- if market participants defer including these costs, then future contracts may not reflect all the market fees.

Accordingly, the AEC suggested that AEMO should continually refine the potential costs and give regular updates to assist market participants in their forecasting.

AEC also indicated that AEMO should be required to provide transparency on how it used the excess contingency costs in AR5 to help inform the ERA's decision making on appropriate contingencies for AR6, and that AEMO be required to disclose to the market how it will spend the contingency balance, should it not fully use the approved AR6 contingency funds on the identified AR6 projects.

Collgar recognised the uncertainty around future policy decisions and that resourcing presents substantial challenges in forecasting workflows, resources, and budgets. Accordingly, Collgar supported having an additional pool of money for these activities but considered this should only be accessed when the activities eventuate and should be subject to the same regulatory oversight.

Collgar considered that contingency costs must only be used for approved projects and minor *ad hoc* expenses, not for substantial projects not approved in the original submission. Collgar indicated that release of approved funding could be subject to a trigger event (such as a policy decision) being made, thereby saving the additional process and cost of in-period submissions and allowing for swift implementation.

Synergy considered the ERA should challenge the level of contingency costs in the WEM reform forecast and the most appropriate form of financial governance to ensure AEMO works within the base cost estimate and only spends contingency costs where there is a compelling case to do so.

Synergy recommended the ERA closely scrutinise the contingency cost included in AEMO's forecast because, while there was no incentive for AEMO to over-forecast (because it is a not-for-profit organisation), there is also no incentive for AEMO to stretch to deliver projects at a lower cost to market participants and consumers. Synergy recommended the ERA consider the appropriateness of contingency costs applied to each project forecast, and where it is high, seek further information from AEMO. If appropriate justification is not provided, Synergy recommended the project be disallowed until a fully formed business case is provided to the ERA.

The ERA considers that the combination of the annual true-up process and AEMO's new reporting obligations (to be included in ERA's new regulatory reporting guidelines) will provide transparency and accountability in relation to how AEMO spends excess contingency funds, helping to allay the concerns expressed by stakeholders above.[137]

5.3.7.2 ERA's review and findings on contingency cost methods and calculations

Method review

Consistent with Synergy's recommendations, and based on the understanding that the inclusion of contingency costs in project cost estimation is good practice, the ERA conducted a detailed assessment of AEMO's methods of calculating contingency costs, summarised below.[138] The ERA first considered whether the methods would consistently produce the same

[137] Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.7 to 2.22A.9 and 2.22A.11, (online).

[138] Economic Regulation Authority, 2019, *Final Determination, Australian Energy Market Operator Allowable Revenue and Forecast Capital Expenditure 2019/20 to 2021/2022*, p. 31 (online).

results if applied, for example, by different project managers for the same project, and whether the method effectively measures the contingency costs that it sets out to measure.[139]

AEMO did not provide the ERA with measures of reliability and validity for its contingency methods, noting instead that it would test this later in the AR6 review period once some of the projects had been completed. The ERA considers that the contingency cost calculation methods could have been applied to previously completed projects in AR5 or to projects completed in the NEM, where the contingency cost calculators are also employed, to test how reliably and validly its methods produced the actual contingencies required for these completed projects.[140]

At a high level, the use of method 1 to provide contingency cost estimations at the concept stage of project development, producing much larger estimations to reflect the larger uncertainty at this stage of development compared to projects at the planning and execution stage, appears reasonable.

However, once the much larger contingency is approved by the ERA it is locked in for the review period. Later, as more details about the project materialise, the extra approved contingency cost becomes redundant and is available to spend, without regulatory oversight. Given the option to make an in-period submission, a more efficient solution may be to propose contingency costs when the details of the projects firm-up.

Whilst method 1 likely employs a more consistent approach to contingency cost estimation than the other methods, because it employs the same predefined list of 10 questions to assess risks across all projects, the identification of risks for a specific project using method 3 is more subjective, with one project manager possibly identifying different risks to another project manager.[141] Additionally, the higher the number of risks included in the contingency cost calculation using method 3, the higher the contingency cost that will be calculated for that project.

Subjectivity characterises any method of contingency calculation and is difficult to minimise.[142] However, the goal is to limit subjectivity as far as possible, without making the method too rigid, to guard against bias. In the case of a regulated entity that is seeking funding over a three-year period, bias may result in the entity padding out costs to ensure that it has sufficient funds at the end of the review period to complete its projects.

Method 3, used in the planning and execution stage of the project, also allows for the allocation of costs for ‘unknown unknowns,’ which is not provided at the concept stage of development in method 1, when the least certainty about a project exists. This appears to be an illogical application of this parameter, which is largely unnecessary, given the overspend allowance in the Market Rules.

In contrast to the application of the EMV of risks to calculation of the required contingency costs for projects in the current context using method 3, the EMV statistical technique is

139 That is, the ERA considered the reliability and validity (respectively) of AEMO’s methods.

140 Given the use of the same calculators in the NEM, the methods could also have been tested using completed east coast projects.

141 In some of AEMO’s EMV workbook calculators, project managers identified only two risks, whilst in others, project managers identified up to 9 risks. This may also vary for projects in different stages of development.

142 Transport and Infrastructure Council, 2018, *Australian Transport Assessment and Planning Guidelines, 02 Optimism Bias*, p. 8, (online), [accessed 31 January 2022].

commonly employed to calculate the average outcome when the future includes scenarios that may or may not happen, using decision tree analysis.[143]

The use of EMV in decision tree analysis requires a risk neutral assumption (neither risk averse, nor risk seeking).[144] To the extent that AEMO expresses a preference for overestimating costs, that AEMO can add any number of risks to its calculation of contingency costs, and that any unused contingency costs can be applied to projects that AEMO would like to undertake (without regulatory oversight), the use of EMV in contingency cost estimation in the current context is problematic.

The estimate of the required contingency cost using method 4 (based on a related earlier project) is a relatively quick method of estimation that can be useful when there is a high degree of uncertainty associated with a project or there is no other method available. However, in comparison to other methods, this method lacks precision because each project has unique constraints and requirements such that, factors and allowances developed for the previous project (that might not be applicable to the current project) will be applied.[145]

Whilst the methods chosen by AEMO for contingency cost calculation in AR6 include probabilistic elements, which is a step up from the deterministic approach used in AR5, AEMO may have done better to employ just the one recognised, rigorous, probabilistic method and applied that consistently across all projects. This would have led to a simpler process of contingency cost estimation and review, without using unnecessary parameters, thus ensuring greater discipline on the calculation of AEMO's contingency costs.[146] [147]

Assessment of contingency cost calculations

AEMO initially provided contingency cost calculators for its capital projects to the ERA to support its proposed contingency costs for AR6 with its submission on 17 December 2021. Following requests for further information on these calculators, AEMO provided a selection of revised contingency cost calculators to the ERA on 22 February 2022. The ERA's assessment of AEMO's contingency cost calculators was based on the most recent version of the calculator submitted for each project, whether submitted in December or February.

Given the lack of a consistent approach to contingency cost calculation in the AR6 proposal, the ERA employed a principles-based approach to assessment of AEMO's calculations, drawing from a review of the literature on contingency cost estimation.[148] The main principles employed in the ERA's assessment and the areas that they relate to are set out in Appendix 12.

The ERA identified several issues with the contingency cost calculations for the AR6 proposal, summarised in Table 26.

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[143] For an example, see Figure 11-15, pp. 345 of Project Management Institute (2017). *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Sixth edition.

[144] Project Management Institute (2008). *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Fourth edition, (online), [accessed 27 January 2022].

[145] Transport and Infrastructure Council, 2019, *Australian Transport Assessment and Planning Guidelines, 01 Cost Estimation*, p. 4, (online), [accessed 31 January 2022].

[146] Consistent with the principle of parsimony. Bakhshi, P. and Touran, A. (2014). *An overview of budget contingency calculation methods in construction industry*. Procedia Engineering, Vol. 85, pp.52-60, (online), [accessed 7 February 2022].

[147] Transport and Infrastructure Council, 2018, *Australian Transport Assessment and Planning Guidelines, 02 Optimism Bias*, p. 6, (online), [accessed 31 January 2022].

[148] This analysis involves the application of principles that are considered to reflect the intention of regulation to the assessment of AEMO's funding determination by the ERA, to ensure that the assessment is consistent, transparent, and fair.

Table 26: Issues with contingency cost calculations

Method	Issue
Method 1	• The value of each risk rated as 'N/A' or 'immaterial' was added to the total risk in the contingency cost calculator as 0.5 per cent. • Different scales were used to calculate different contingency cost percentages for different projects, with one scale producing significantly higher costs.
Methods 2 and 3	• "Unknown unknown" risks were valued at 5 per cent of the cost calculated using the method 1 contingency cost calculator and carried forward to the calculation of contingency costs using method 2, at the planning and execution stage of development. • Some total estimated forecast capital costs in the contingency cost calculators were greater than in AEMO's proposal, as they represented projects spanning both AR5 and AR6, rather than just the AR6 period. Consequently, the calculated contingency costs were larger than required for AR6. • AEMO carried contingency costs forward from AR5 to AR6. • In some contingency cost calculators, it appeared from the wording that the EMV was calculated prior to determining the impact and likelihood of the project, rather than the other way around, or that the cost impact of the risk was mistakenly entered into the EMV column (given the comparably higher risk impacts observed in the calculator). • Contingency costs were included for risks that the ERA considered would not be incurred by a prudent provider of the services provided by AEMO in performing its functions, acting efficiently, to achieve the lowest practicably sustainable cost.[149] For example: - Allowance was included for risks that were considered unlikely to happen and rare, despite AEMO having access to overspend provisions. - Allowance was included for 'possible' risks, which can be responded to very subjectively, leading to bias in estimation. - Often the risks identified in calculating contingency costs could be mitigated by coordination between different AEMO project managers, planning or maintaining a dialogue with EPWA. • Contingency costs were calculated for delays in several projects against the base estimate for just one specific project, on which the time frame for completion of the other projects was considered dependent. • Contingency costs were included to allow for more resourcing of projects that were already in-flight, in which project managers should have already had a good understanding of the resources needed and included them in base estimates. • "Ball-park" impact costs were used in the EMV contingency calculator for some projects because the project manager considered that they were unable to cost the risks at that time. • Contingency costs were included for projects where it was considered that market participants may not see the value in the infrastructure being developed by AEMO and may choose not to use it. • In one contingency cost calculator, labour rate increases were allowed for in contingency cost calculations that were already included in base cost estimates.

[149] Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.5(b), (online). See also section 1.2.1 of this determination.

Method	Issue
All methods	• The sum of the contingency costs for each project were rounded up to the nearest whole number.

Source: ERA analysis of AEMO data

The ERA's principles-based assessment of the contingency cost calculations and its rationale for rejecting any costs is presented in Table 42 of Appendix 12. In summary, the ERA rejected contingency costs included for:

- unknown unknowns,
- risks with impact values that were rated as "N/A" or "Immaterial"
- rounding of risk percentages up the nearest whole number
- risks that were considered unlikely to happen or rare
- other costs, including projects that had been calculated using a bespoke method.

The ERA also substituted proposed contingency costs carried forward from AR5 to AR6 with AR6 costs alone.

Compared to the figures provided in the AR6 proposal, the actual contingency percentages provided to the ERA by AEMO and calculated using method 1, ranged from 9.5 per cent to 43.80 per cent, while the contingency percentages identified in projects using method 3, ranged from 9.21 per cent to 39.11 per cent.

Following the ERA's assessment, the contingency percentages using method 1, ranged from 7.00 percent to 43.30 per cent, whilst the contingency percentages calculated using method 3, ranged from 0.00 percent to 38.14 per cent.

5.3.7.3 Draft determination on contingency cost estimation

Based on the ERA's principles-based approach to assessing AEMO's contingency calculations (Appendix 12) and the base cost estimates set out in the sections above, the ERA's draft determination on AEMO's proposed contingency costs is $8.2 million. This is $6.5 million or 44 per cent lower than the $14.7 million in contingency costs proposed by AEMO. The ERA considers AEMO has not sufficiently justified the prudence or efficiency of all proposed contingency costs as required by the WEM Rules. The ERA's detailed analysis of contingency costs is presented in Appendix 12.

At this stage, the ERA has not substituted the contingency cost calculations using different scales for different projects or rejected imprudent risk cost calculations. The ERA has opted to allow AEMO to rework its contingency cost calculations and provide further information ahead of the ERA's final determination to ensure that:

- The same scale is used in method 1 (ranging from 0 to 1) for all projects where costs are calculated using the fixed calculator.
- EMV calculations are correctly derived from likelihood and cost impact estimates.
- Only the costs for risks that would be incurred by a prudent provider of the services provided by AEMO in performing its functions, acting efficiently, to achieve the lowest practicably sustainable cost for projects are included in AEMO's contingency calculations using the EMV Tool, particularly for those projects that are already in train.

AEMO will need to resubmit the contingency cost calculators to the ERA in sufficient time to allow for assessment, prior to the ERA making its final determination.

6. Detailed assessment of AEMO's GSI costs

6.1 AEMO's GSI functions

AEMO has several functions under the GSI Rules, which include operating and maintaining the Gas Bulletin Board, administering the registration process for gas market participants' registration, preparing, and publishing the Gas Statement of Opportunities (GSOO) and monitoring and assisting the ERA with GSI Rules compliance.

AEMO may recover its costs as allowable revenue for performing these functions under the GSI Act, the GSI Regulations and the GSI Rules. The ERA is required to determine if AEMO's allowable revenue is sufficient to cover AEMO's costs to perform its GSI functions, where AEMO acts as a prudent provider of services in performing its functions. AEMO is also required to act efficiently to achieve the lowest practicably sustainable cost to deliver those functions while effectively promoting the GSI objectives.

For its GSI functions in the AR6 period, AEMO has proposed allowable revenue of $5.5 million and capital expenditure of $0.4 million.

6.2 GSI operating expenditure

6.2.1 AEMO's proposed GSI operating expenditure

AEMO's actual AR5 operating expenditure of $4.8 million was 20 per cent less than the ERA's approved operating expenditure for AR5 of $6.1 million.

Labour costs account for 56 per cent of AEMO's AR6 proposed operating expenditure for GSI, $5.5 million and represent a 3 per cent increase since AR5. During the AR6 period, AEMO is required to undertake a review of GSOO and to publish it by July 2024. Labour costs associated with AEMO's GSOO do not appear to be included in 2022/23, as AEMO intends to outsource this work to consultants.

AEMO has included a remuneration adjustment in its proposed labour costs to meet its EBA. The EBA resulted in an increase of 2.8 per cent to GSI labour costs. A portion of AEMO's national cyber security support is also allocated to GSI labour costs.

Other large changes in AR6 operating expenditure compared to AR5 include financing costs and an approximately 71 per cent increase in utility and occupancy costs. There were no capitalised accommodation costs included due to a change in accounting policy whereby AEMO now expenses accommodation rent rather than capitalising it, as in AR5.

Under the IT and telecommunications category, there was a 64 per cent or $0.008 million decrease in cloud costs for AR6, an increase of 106.66 per cent to $0.137 million for software support contracts, and a 116 per cent increase to $0.031 million for minor purchases. The increase in software support contracts also includes cloud service contract costs.

6.2.2 ERA's draft determination on GSI operating expenditure

All AEMO's proposed GSI operating expenditure for AR6 has been adequately explained and is sufficient to cover AEMO's GSI functions. AEMO's AR6 GSI operating expenditure is only marginally higher than its actual spend for AR5, with the increase in labour costs explained by an increase in salaries required by the EBA and an increase in consultant fees for them to

undertake the five yearly GSOO review. The ERA considers AEMO has sufficiently justified the prudence and efficiency of its proposed GSI operating expenditure for AR6.

Following clause 109(6) of the GSI Rules, the ERA approves the GSI operating expenditure of $5.5 million as proposed by AEMO.

6.3 GSI capital expenditure

6.3.1 AEMO's proposed GSI capital expenditure

AEMO has proposed funding of $0.4 million for two capital expenditure projects in AR6:

- $0.23 million for the Gas Bulletin Board lifecycle investment.
    - The bulletin board is a public website containing information and data on the production, transmission, storage, and usage of natural gas in Western Australia.
    - AEMO proposes to upgrade the bulletin board website to a new form of code and to move the data into its own digital platform (the cloud). AEMO carried out a similar project during the AR5 period for the STEM that was delivered for $0.4 million. The bulletin board project is proposed to be carried out entirely by AEMO's staff with all costs associated with this project being labour.
- $0.15 million for the GSI allocation (0.6 per cent) of the AEMO-wide cyber security project.
    - AEMO commenced a central cyber security program in 2019, which covers all aspects of cyber security. AEMO suggested that the benefit of AEMO's Western Australian operation sharing AEMO's national cyber security program is a much lower cost compared to developing and delivering its own cyber security program.

6.3.2 ERA's draft determination on GSI capital expenditure

AEMO's GSI capital expenditure projects are necessary to ensure AEMO's GSI functions are efficient and compliant with the national institute of standards and technology. The ERA considers AEMO has sufficiently justified the prudence and efficiency of its proposed GSI capital expenditure for AR6.

Following clause 109(6) of the GSI Rules, the ERA approves the GSI capital expenditure of $0.4 million as proposed by AEMO.

Appendix 1 List of Tables

Appendix 2 List of Figures

Appendix 3 Evaluation of tier costing method

This appendix details the ERA's analysis of AEMO's method for determining labour costs as part of its proposed operating and capital expenditure in AR6. The ERA's determination on labour costs relating to operating and capital expenditure are presented in sections 5.2.2 and 5.3.2 respectively.

Evaluation of AEMO tier costing method

AEMO has provided some supporting information on the tiers they used for estimating in-house staff rates. The ERA has identified problems with AEMO's sampling, method and costing, as set out below.

Problems with the sample

Nominally AEMO uses five groupings with two tiers in each grouping reflecting permanent and contract staff. Tiers one to five are for permanent staff and tiers six to ten are for contract staff. The only difference between the permanent and contract staff are the entitlements where permanent staff have access to the bonus system and long service leave. The top category (tier 5 for permanent and tier 10 for contract staff) covers a single position - the Executive General Manager of Western Australian Operations. The sample of staff labour rates was provided for a sample of 370 people, grouped into tiers one to four.

It is not clear how the sample relates to labour rates in Western Australia. Other jurisdictions such as Melbourne and New South Wales have higher costs for comparable positions.[150] A sample of 370 exceeds the total number of staff working in Western Australia at least three times. This skews the costs upwards.

Problems with the method

While the method employed to determine labour rates might be appropriate for an internal budget estimate, it is too imprecise for an allowable revenue determination. This is because the sample is not weighted by the labour reflected on the projects or by jurisdiction. This means that, for any group of staff, if either the lower cost employees or higher cost employees conduct most of the work, the actual costs will diverge materially from the estimated costs.

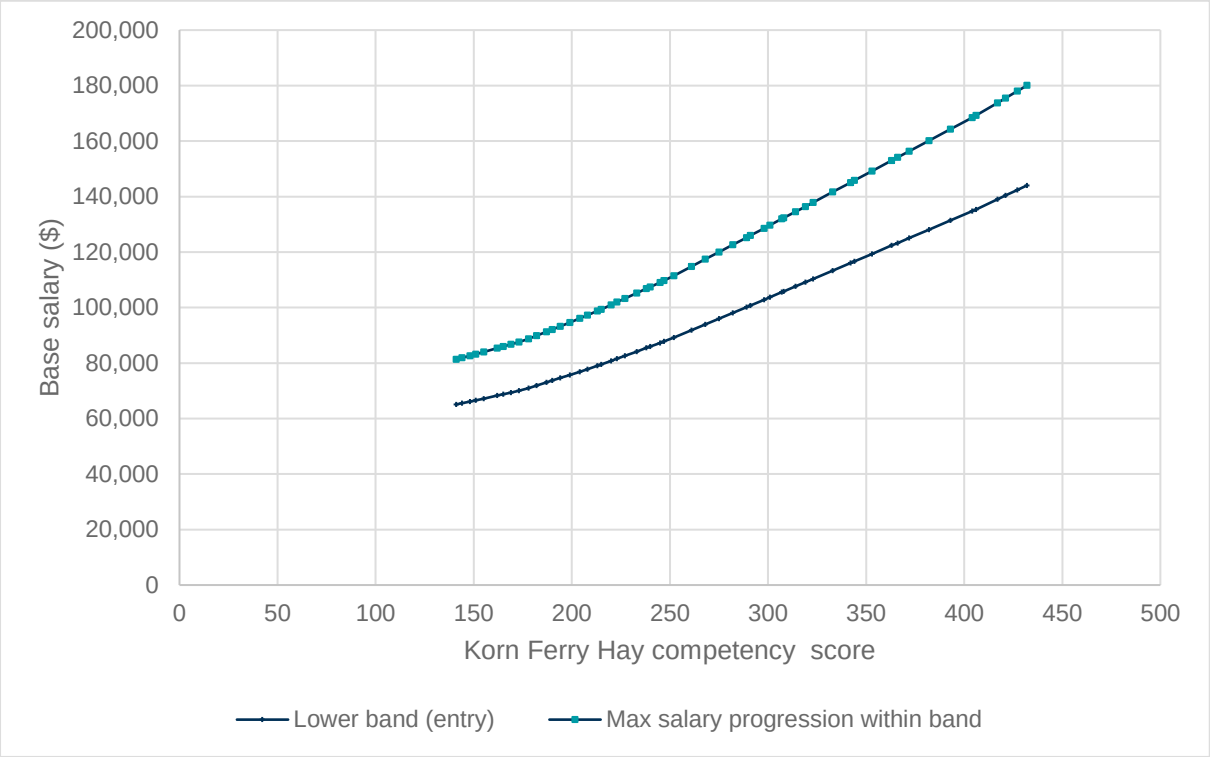
Problems with the costing

There is a fundamental disconnection between AEMO's remuneration policies and the tier rates. AEMO remunerates its employees based on a continuum of positions remunerated based on a measure of workplace skills and competence termed the Korn Ferry Hay competency score. Employees (if employed consistent with the enterprise bargaining agreement; EBA) enter the organisation at 80 per cent of the 75th percentile of the industry ranking for a position, based on the Korn Ferry Hay's score, and work their way to the 75th percentile for their competency band.[151] The salary points based on the scores form a continuum of salary, with no clear grouping (Figure 6).

[150] Obtain supporting reference from salary surveys.

[151] Australian Energy Market Operator, 2018, *Enterprise bargaining agreement, Fair Work Commission*, p. 32, (online).

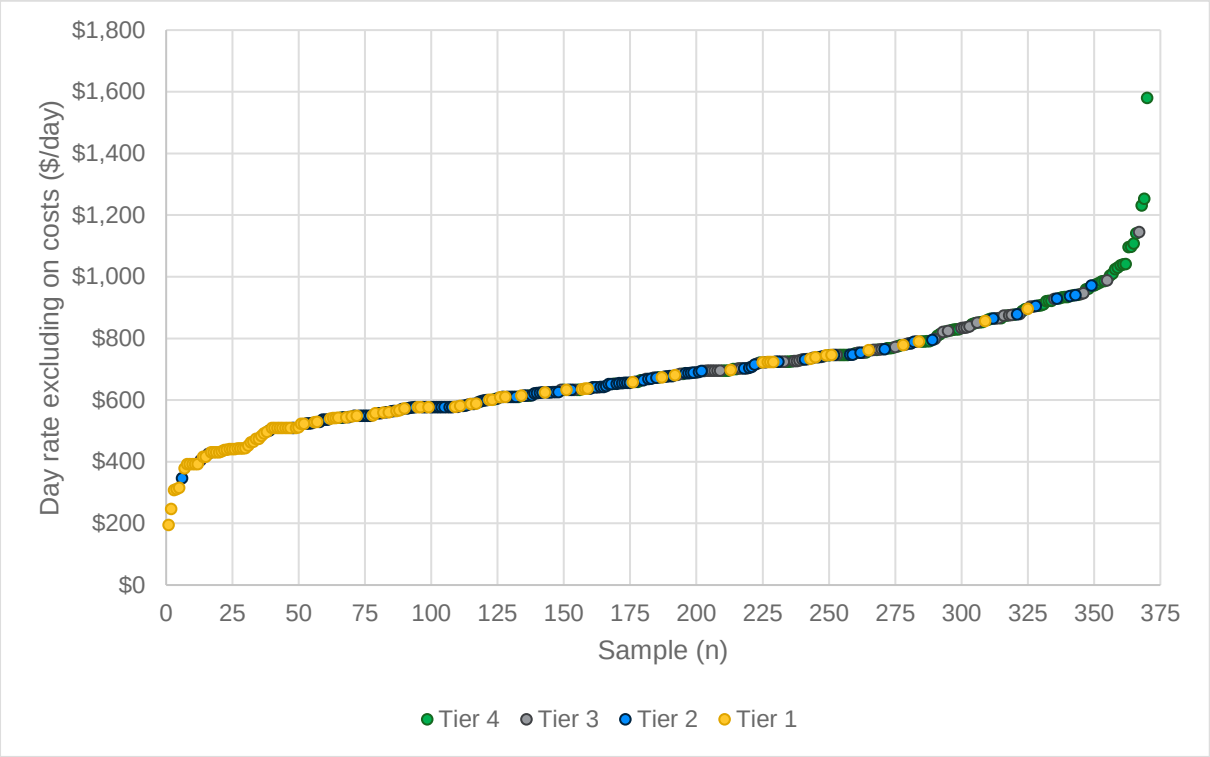
Figure 6: AEMO salaries by Korn Ferry Hay competency score



Source: ERA analysis of AEMO enterprise bargaining agreement

This method does not apply a degree of segregation or grouping that is implied by the use of separate tiers, where people are classed into one of five base groupings along their organisational or management strata, being: analyst, senior, principal/lead, specialist/management, or executive general manager. No data is provided on the salary level for the fifth tier. The data on the tiers indicates that, in practice, role salaries are not segregated into such groupings. The top 15 per cent of the sample contains representatives from all four tiers (Figure 7).

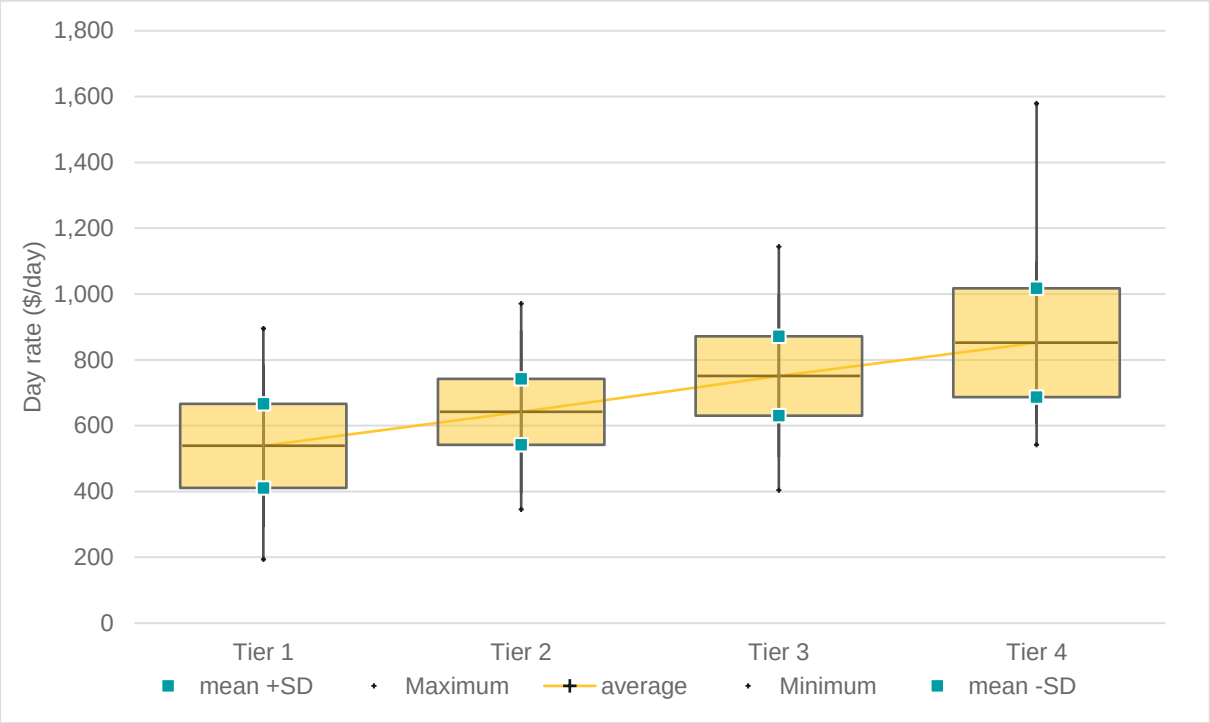
Figure 7: AEMO tier day rate population sample



Source: ERA analysis of AEMO data

The degree of overlap between the tiers is apparent in Figure 8, where the population within one standard deviation of the mean in one tier substantially overlaps the population in the neighbouring tiers. This indicates that the population segregation along management lines using the tiers bears no close relationship with remuneration in practice.

Figure 8: Population distribution statistics for the tiers



Source: ERA analysis of AEMO data

AEMO's use of the tier method was rejected for the DER roadmap funding because the overlap between tiers of actual salaries did not reflect "a robust clustering of competencies and responsibilities to use as the basis for forecasting new staff costs." The ERA found that the use of the tiers "overestimated the cost of existing staff".[152] In the material provided to the ERA on the tiers, AEMO acknowledged that even without accounting for any weighting for duties performed, the rates over-estimate project costs. This poses a risk to market participants (and therefore consumers) that the projects are likely to cost less than anticipated. AEMO is also at risk if its proposal is rejected as it may have inadequate resources to complete the necessary tasks.

In an effort to avoid capitalising staff leave entitlements, AEMO made several adjustments to the tier rates and the project workforce plan. In calculating the working days in the year, AEMO reduced the number of working days in the year from around 260 days down to 230 days – ten for public holidays and 20 for annual leave days. While AEMO reduced the salary package cost to maintain relativity, it grossed up the FTE count in the workforce plan to compensate. Grossing up the person hours to compensate for leave renders the adjustments pointless, and excessively complicates the workforce costings.

Conclusion

Without a material improvement in the method since it was first presented in AEMO's DER roadmap AR5 in-period submission, the tiers do not provide a sound basis for quantifying staff costs. In place of the tier rates, the ERA has substituted actual staff salaries and entitlements. Fixed term contract staff rates are based on a combination of indicative staff costs at a

[152] Economic Regulation Authority, 2020, *Australian Energy Market Operator in-period submission for implementation of the distributed energy resources roadmap - Determination Report*, pp. 15-21, (online)

comparable level, with comparable titles moderated with salary survey information published by recruitment consultants.

Appendix 4 Evaluation of AEMO's proposed new labour positions

This appendix details the ERA's analysis and draft determination on costs for additional labour as part of AEMO's operating expenditure in AR6. The ERA's draft determination is presented in section 5.2.2.4.

Market operations

Market operations runs the day-to-day market interface and settlement systems. It operates the day ahead and real time markets, settlement systems, market registration and prudential management, as well as market customer support.

The market operations team nominally comprises 10 full time equivalent (FTE) staff spread across its functions. These are summarised in Table 27. AEMO advises this team has been running with 2 to 3 vacancies for an extended period of time. Six FTEs are allocated to WEM reform projects and they have presumably been backfilled. AEMO made no mention of any increase in errors, reduction in service levels, or the need to recall staff from WEM reform projects with the current staffing levels.

Table 27: Market Operations FTE by function

Function	End of AR5	End of AR6	Change over AR6
Settlements	2.6	5.2	2.6
Gas bulletin board (WA) - daily operations and registration	1.2	1.2	-
WEM daily operations – STEM and bilaterals	1.1	1.1	-
Metering verification and validation	1.1	1.1	-
Team management	1.1	1.7	0.6
Prudentials	0.7	0.9	0.2
WEM daily operations – Balancing and LFAS ➔ RTM including ESS	0.6	2.8	2.2
WEM registration & standing data	0.6	0.6	-
Reporting & analysis (QED, KPIs, ERA)	0.6	0.6	-
Market system business owner (UAT, release management)	0.3	0.6	0.3
Market participant training	0.3	0.3	-
Indicative FTE totals	**10.3**	**16.7**	**6.4**

Source: AEMO's proposal supporting documents

AEMO's reasoning for the need for additional staff in AR6 is that it is "driven by the new market operating arrangements and increases to the volume and complexity of market settlements and prudential management".[153] Specifically AEMO argues:

- There will be an increased number of markets operating, both ESS, day ahead and real time energy markets.
- The market operations team has responsibility for oversight of inputs to the dispatch system, including a shift from 90 minutes in advance dispatch to five minutes in advance of dispatch.
- There will be more inquiries from market customers with the new market design.
- The frequency and complexity of settlement operations will increase.
- Invoices will have more details on them to validate.
- A more dynamic settlement system requires more frequent prudential management.

ERA assessment of need

The staffing functions are estimates prepared by AEMO, as this team does not use timesheets. Some elements of the allocation of resources look unreliable.

A substantial amount of time is spent conducting metering verification, nearly double that of operating the balancing and LFAS markets and individually reviewing the settlements systems outputs. The staff allocation to training delivery is seven times the estimated time spent delivering training of three half days every one to two months.

The responsibility for the 'market system business owner' refers to WEM Rule 2.36 and relates to the software certification requirement, ensuring appropriate testing is undertaken, software logs are maintained, and procedures for information exchange between AEMO and Western Power are upgraded, modified, repaired or replaced where they are not fit for purpose. No explanation has been provided for the existing staff allocation for a fairly static requirement, where much of the documentation would be integrated into the software development process. It is not clear why this would require an uplift in resourcing.

While there will be more markets, there is only one new service being provided – rate of change of frequency. A greater degree of automation and some staff practices, such as reviewing submissions in the 90 minutes ahead of dispatch, might be expected to reduce the staffing requirement in the new market. The new market systems will also have in-built input filters to prevent non-compliant offers from being accepted.

With more frequent settlements, the prudential requirements should reduce as they are smaller quantities being settled at a time, diminishing the exposure. The overall quantity of verification through settlements is the same, it is simply broken into smaller portions so that while the number of runs will increase, the number of intervals to settle reduces. It isn't clear there will be a net increase in effort required.

The information provided by AEMO did not quantify what efforts had been made to rectify faults from data provided by Western Power, requiring 1.1 FTE to validate on the input side and checking invoices on the outputs side. This team has responsibility for the procedures covering information exchange between AEMO and Western Power. AEMO has produced no

[153] Australian Energy Market Operator 2021, *FTE resource estimate – WA departments and WA support functions*, p.8, (online).

evidence of the purported errors, their frequency or materiality, to warrant the level of manual validation proposed to be required.

It is expected there will be an increase in the level of service necessary to support market participants in the transition to the new market. The capital expenditure projects include substantial internal training allocation and the allocation of training specialists to develop and deploy training materials. Any training requirements are expected to be temporary and short term.

The ERA sought information from AEMO on the comparable relative team sizes in the NEM, however, AEMO had not provided the information at the time of writing this draft determination.

The ERA's draft determination is to reject AEMO's proposed costs attributed to an additional 6.4 FTEs as AEMO hasn't demonstrated that its current and proposed processes are efficient and does not justify its proposed resource increases. It has not explained why the shortcomings in the current system cannot be rectified in the development of the new market systems and why automated screening cannot be used to automate the high degree of manual validation currently undertaken. AEMO will have the capacity to use over-run costs to manage the overlap staff returning from capital expenditure projects at the transition to the new market or it can share floating resources with the reserve capacity team. If an ongoing staff level increase is warranted, AEMO can more accurately estimate the workload needed post transition to the new market and submit and in-period submission for the additional staff, supported by a robust evidence-based business case.

Reserve capacity

The reserve capacity team oversees the operation of the reserve capacity cycle and prepares the electricity statement of opportunities and the gas statement of opportunities. The FTE allocation to the reserve capacity team is nominally 8 staff to the end of the AR5 period but is currently operating at ten, which it seeks to increase to 12 by the end of the AR6 period.

AEMO's proposed FTE increase is outlined in Table 28. The team nominally operates with eight FTEs but is currently operating with ten.

Table 28: Reserve capacity FTE by function

Function	End of AR5	End of AR6	Change over AR6
ESOO including reliability assessment and ESROI interval	2.5	2.98	0.48
Bilateral trade declaration and CRC applications (no VPPs included)	2.25	2.93	0.68
GSOO	1.2	1.2	0
Team management	1	1.25	0.25
Stakeholder management, RC inbox management, calls, papers and ad-hoc analysis	0.3	0.5	0.2
BRCP	0.25	0	-0.25
RC testing	0.25	0.38	0.13
Market training	0.25	0.25	0
Progress reports and security deposits/returns	0.1	0.15	0.05
SME support to rule and procedure changes & upkeep of procedures	0.09	0.5	0.41
Managing and processing EOI submissions, reporting and indicative facility class assessment	0.05	0.3	0.25
NAQ assessment (RCM limit advice and constraint equations) & capacity credits	0.01	0.32	0.31
Commercial operation status assessment & facility sub-metering	0.01	0.1	0.09
RCM review	0.01	0.35	0.34
GSOO five yearly review	0	0.25	0.25
Leave backlog	0	0.5	0.5
WOSP support	0	0.01	0.01
Indicative FTE totals	**8.27**	**11.97**	**3.7**

Source: AEMO's proposal supporting documents

AEMO's reasoning for the proposed increase in staff is recent changes to the reserve capacity mechanism (RCM) and reductions in the cost of battery energy storage systems.[154] Specific assumptions underpinning AEMO's proposed staff increases are:

[154] Labour report, p. 11

- Staff will be required to establish and operate the NAQ and other associated complexities.
- AEMO anticipates up to 64 applications for capacity from non-scheduled generators and ten from existing asset owners investing in batteries.
- AEMO expects that ten new standalone storage facilities and 12 virtual power plants will apply for capacity credits over AR6.

ERA assessment of need

The current need outlined by AEMO includes activities already transitioned to the ERA (such as the benchmark reserve capacity price).

AEMO has provided an improbable assessment of the number of capacity applications it anticipates it will receive. Nevertheless, AEMO's breakdown of resources needed to process the expressions of interest in the reserve capacity cycle indicate that a single additional FTE is adequate to meet the demand. Classifying the resource applications into type should be well supported by the expert assessment provided by the applicant.

The NAQ, while complex, will be largely automated. Once established the process comprises iterative runs of the same model. The individual runs are expected to be relatively fast (in the order of seconds to run, if not minutes). While AEMO might be expected to induct market participants into the new process (such as through workshop presentations or one on one meetings), once understood, it should not require a high level of ongoing support by AEMO.

AEMO has advised that it spends a large quantity of resources quality assuring inputs from a small number of known participants. AEMO has not explained why it hasn't been able to manage this process, and why it can't build input quality control into its systems and automate the screening of erroneous data. The incentive should lie with the applicant to submit appropriate information to the process.

The ERA's draft determination is to reject AEMO's proposed funding for four additional staff as is not justified by the material provided. The ERA considers that two additional staff, reflecting current levels, should be adequate to manage the expected workload over AR6.

WA reform and market development

The WEM reform and development team are responsible for "co-ordinating AEMO's efforts to prepare for and facilitate the evolution and development of the WEM and WEM rules." [155] AEMO's current staffing for this team is summarised in Table 29. AEMO has benchmarked its requirements against the previous market operator's (Independent Market Operator) market development team of 5-7 FTEs.

Table 29: WA reform FTE by function

Function	End of AR5	End of AR6	Change over AR6
Manager market development	0.2	1	0.8
Principal business lead	1	1	0
Market operations business lead	0	1	1

[155] Workforce doc, p15

Function	End of AR5	End of AR6	Change over AR6
System management business lead	0	1	1
Indicative FTE totals	**1.2**	**4**	**2.8**

Source: AEMO's proposal supporting documents

AEMO argues that the current effort is capitalised but as the projects are completed and implemented, the follow up work should transition back to a smaller permanent team to support ongoing market development. AEMO argues that having just four FTE in the unit would reflect a return to pre reform levels when the IMO undertook market development.

ERA assessment of need

The IMO team, operating with 5 to seven staff, were substantially responsible for the rule change process. When AEMO took over responsibility for market operation and system management from the IMO, AEMO did not have responsibility for the rule change process. Instead, the rule change function was firstly transferred to the Rule Change Panel and later to EPWA. The remaining (four) staff were what AEMO considered necessary to meet its support functions to the Market Advisory Committee. The proposed staffing requirements for the rule change process exceeds the one to three FTE requirements above the four FTE AEMO has proposed to retain post reform. This would appear to excessive after accounting for the change in AEMO's functions.

Any ongoing reform requiring substantial support from AEMO would be expected to lead to new projects likely to be capitalised in the same manner as the current reform program. The staff requirements to deliver the reform program might be expected to form part of this cost. AEMO's additional staff requirements in this unit are not considered justifiable at this time.

Power system operations

AEMO's power system operations unit operates the control room and is responsible for the day-to-day dispatch and operation of the SWIS and the maintenance of power system security in real time. AEMO currently operates with fifteen FTEs, which it seeks to increase to 17.8 FTEs (Table 30).

Table 30: Power system operations FTE by function

Function	End of AR5	End of AR6	Change over AR6
Generation dispatch	5.6	5.6	-
Generation dispatch skills maintenance and development	0	0.5	0.5
Power system security	5.6	5.6	0
Power system security skills maintenance and development	0	0.5	0.5
Controller SME input into compliance and BAU projects	0	0.5	0.5

Function	End of AR5	End of AR6	Change over AR6
Training content development and delivery	0	0.5	0.5
Team operational performance and compliance	0	0.8	0.8
Trainees	3	0	-3
Leave coverage	0.8	2.3	1.5
Leave backlog	0	0.5	0.5
Team Management	1	1.2	0.2
Indicative FTE totals	**16**	**18**	**2**

Source: AEMO's proposal supporting documents

AEMO anticipates it will still require two operators per shift and there is current under-resourcing in the control room. AEMO advises it is finding it difficult to retain operators with some staff approaching retirement and new operators not seeing the role as a long-term career. Some staff have material leave balances that need to be cleared, with under-staffing a contributing factor. The training and induction to become a system operator takes two years.

ERA assessment of need

The ERA accepts the control room is currently under-staffed and that this is a critical function for AEMO. With a two-year lead time on new control room operators, it is expected AEMO will need more resources to ensure the control room is properly staffed over the course of AR6. Consequently, the ERA's draft determination is to approve funding for an additional trainee, above AEMO's proposed staffing increase, to ensure this critical function is adequately staffed.

Power system and market planning

The power system and market planning team within system management provides short to medium term planning functions to support the control room operators. The team currently comprises 16 FTEs, which AEMO proposed to increase to 24 FTEs by the end of AR6 (Table 31).

Table 31: Power system and market planning FTE by function

Function	End of AR5	End of AR6	Change over AR6
Transmission outages assessment and approval	2	2	0
GPS negotiations	1.5	0.5	-1
Team management	1.2	1.3	0.1
Power system modelling and analysis	1	2	1

Function	End of AR5	End of AR6	Change over AR6
DER integration and impact assessment	1	1	0
Development of constraints	1	1	0
Generation outage assessment and approval	1	1	0
Real time planning and engineering support	0.8	1	0.2
Dispatch planning	0.8	0.5	-0.3
Operational forecasting activities	0.8	1.5	0.7
Maintenance and updating of operational forecast model	0.8	1	0.2
Incident investigation	0.7	1.5	0.8
Ensuring short term power system security	0.7	0.7	0
Data analysis and reporting	0.5	0.5	0
Medium term power system security	0.5	1.5	1
GMP approval and monitoring	0.5	1	0.5
Commissioning activities including SCADA	0.3	0.4	0.1
Tool development	0.2	0.2	0
ESS quantities determination and review	0.2	0.2	0
Operational engagement with stakeholders (Western Power, Participants, ERA)	0.2	0.2	0
ESS accreditation	0.2	0.2	0
Medium term forecast and generation adequacy assessment	0.2	0.5	0.3
Training	0.1	0.1	0
Providing power system and technical requirements for market development	0	0.2	0.2
Plan to transition from synchronous generation	0	0.5	0.5
Perform engineering analysis & implement ops solutions for transition from synchronous generation	0	2	2

Function	End of AR5	End of AR6	Change over AR6
Development and management of congestion information resource	0	1	1
Providing technical input to determining NAQ	0	0.5	0.5
Indicative FTE totals	**16.2**	**24**	**7.8**

Source: AEMO's proposal supporting documents

AEMO argues it requires additional engineering support to manage a greater likelihood of system security risks driven by the transformation and technology change in the market and the changing market demand profile. AEMO advises it has found difficulty in recruiting experienced engineers but has a promotional path to promote staff as they become more experienced.

AEMO further argues that more engineers are needed to develop and perform new modelling, investigate events of concern, review ongoing system security needs, including supporting the Technical Rules Committee and network development plans. AEMO is also seeking additional staff to resource the development of AEMO's proposed Engineering Roadmap. AEMO has argued that the increased levels of automation do not necessarily translate into lower staff resource requirements. It considers the outputs from automation need verification, updating and amendment.

ERA assessment of need

The ERA recognises that the market's operating environment has become more challenging over time and that additional resources may be necessary to meet the market's emerging system security needs. However, some of the cases to support new staff were not concrete and were scant on detail, for example, the engineering roadmap. Many of the activities identified could also be provided by specialist consulting engineering services, such as developing specialised tools and models. This approach may allow a more cost-effective development model that does not appear to have been considered by AEMO. AEMO needs to demonstrate the benefit of developing activities in-house, in an environment where it is experiencing difficulty in recruiting experienced staff that might deliver the projects in a shorter time frame, with a higher degree of reliability.

The ERA's draft determination is to approve the costs associated with the additional 3.5 FTEs for power system and market planning. Additional staffing requirements can be addressed through in-period submissions, supported by robust business cases and options analysis of alternative means of meeting the market's needs.

Operations, governance and integration

AEMO advises this unit provides a central point of contact for the control room operators analysing and verifying generator performance standard data and monitoring the compliance of the controllers with the new market rules and issuing dispatch advisories. The operations, governance and integration team comprises 8 FTE staff which AEMO proposes to increase to 9.1 (Table 32).

Table 32: Operations governance and integration FTE by function

Function	End of AR5	End of AR6	Change over AR6
Control room support	1.55	2	0.45
Compliance monitoring and investigation	1.2	1.6	0.4
Market Participant support activities (inc. training)	1.15	1.8	0.65
Team management	1	1	0
Knowledge management	1	1	0
Market data transactions	0.8	0.5	-0.3
OT/IT support	0.8	0.4	-0.4
Outage management support	0.6	0.6	0
Reporting	0.2	0.4	0.2
Management of ancillary services contracts	0.2	0.1	-0.1
GPS	0	0.3	0.3
DER Register	0	0.1	0.1
Support for Energy Transformation Strategy (ETS) Stage 2	0	0.25	0.25
Indicative FTE totals	**8.5**	**10.05**	**1.55**

Source: AEMO's proposal supporting documents

AEMO argues it needs additional resources to ensure the control room operators conform to the new market arrangements, and develop new procedures and work instructions documentation. It also anticipates it will need to conduct additional training support for market participants.

ERA assessment of need

Some of the functions for the existing market (such as managing ancillary service contracts) will go, and the needs associated with any future reform program are not yet defined. The potential overlap with market operations and the queries from market participants that are already managed by AEMO was not clear. Nor was it clear why AEMO anticipates a higher level of non-compliance in the new market, warranting investigation. Many of the compliance and monitoring functions do not reside with AEMO.

The ERA's draft determination is to reject AEMO's proposal for new resourcing as it has not demonstrated that the level of resourcing is efficient or the need for new resourcing. AEMO can provide an in-period submission seeking new resources, supported by a robust evidence-based business case.

WA support staff

The technology support activities are undertaken by central AEMO staff, booked to Western Australian activities via time sheets. These activities include external operations, strategy and markets, corporate services including HR, finance and governance. Aside from one additional proposed FTE for operations and finance, AEMO does not expect corporate service functions to change over AR6. The numbers proposed for support staff are for digital support staff alone.

These resources currently comprise around 23 FTEs, supporting AEMO's WEM IT systems, which AEMO proposes increasing to 31 staff (Table 33). Some functions identified by AEMO do not appear resourced and won't be resourced into the future (enterprise data services).

Table 33: WA support staff by function

Function	End of AR5	End of AR6	Change over AR6
Enterprise application services	16	21.8	5.8
Enterprise infrastructure & operations	6.9	6.8	-0.1
Strategy & architecture	0	0.2	0.2
Cyber security	0	2.2	2.2
Operations and finance	Information not provided		1
Indicative FTE totals	**22.9**	**31**	**9.1**

Source: AEMO's proposal supporting documents

AEMO argues that although the number of applications is comparable, the complexity of the new systems is higher. It also argues that it needs additional resources to meet emerging cyber security threats and to deliver digital platform improvements. One additional FTE is identified for operations and finance.

ERA assessment of need

AEMO's proposal for digital support staff comprises the largest single expansion of resources across the AR6 period. In its submission on AR5, AEMO provided no indication the digital support team would near double in size. The ERA did not support the level of expenditure on AEMO's digital roadmap, and it is not clear where the higher expenditure has come from.

Some development activities (such as the NAQ and constraint management) are discrete capital projects, in which AEMO appears to be double counting. AEMO cannot support the case that it's support requirements materially increased with the transfer of existing applications from Western Power to AEMO for systems that will subsequently be replaced through capital expenditure projects.

The ERA's draft determination is to reject AEMO's proposed new staffing positions for WA support services until it is clear where the funding for the existing staff has come from, and that the allocation of resources is demonstrably efficient. With the IT resources being centrally located, with time booked to WA, the skills base to deliver the necessary requirements should already exist. AEMO can provide an in-period submission for extra resources, supported by a robust business case, with fully costed alternatives and a review of current resource allocations to WA.

Appendix 5 Submissions received

The ERA received six submissions in response to its issues paper from Alinta Energy, the AEC, Bluewaters Power, Collgar Wind Farm, Perth Energy and Synergy. Feedback from these submissions is presented against relevant topics in the main body of the report and a summary of any remaining points is provided in Table 34 below.[156]

Table 34: Summary of stakeholder feedback

Stakeholder	Feedback
Substantiation of AEMO's proposal	
Alinta Energy (Alinta)[157]	Alinta was concerned that AEMO has not substantiated why the significantly higher expenditure is necessary to complete the WEM Reforms or why AEMO's proposal represents the lowest practicably sustainable cost of implementation. Alinta Energy considered that AEMO's proposal does not substantiate why significant investment in business-as-usual activities or FTEs is necessary, as there is no indication of what risks the additional capex, power system modelling or growth in systems would avoid, or the benefits they would offer. Alinta suggested that no shareholder board would approve such a significant increase based on such a vague business case and that customers should not be asked to do so either.
Bluewaters[158]	Bluewaters considered that AEMO has not provided sufficient information at the individual project level in its AR6 submission to allow market participants or the ERA to determine that the forecast expenditure is consistent with the requirements of "clause 2.22A.11(b) of the WEM Rules or section 26(1) of the ERA Act (pp.2)."
Perth Energy[159]	Perth Energy questioned whether AEMO could provide an indication of the benefit of running Western Power's systems in-house and moving more systems onto the cloud. Perth Energy considers that this and other upgrades (such as DER access and management and plans to increase market visibility) need to provide tangible economic benefit rather than just being nice to have, and that AEMO should be able to demonstrate where the customer benefits arise from these investments. Whilst Perth Energy commended AEMO on its efforts in publishing its reasoning for its costs and addressing issues raised by market participants, Perth Energy considered the emphasis now needs to be on providing the most economical and secure supplies of energy to customers. Perth Energy recommended that the costs and benefits of market changes and initiatives proposed by AEMO, and the WA Government for AR6 and beyond, need to be identified more clearly.
Labour Costs	
Collgar[160]	Collgar noted that it understands that AEMO has a substantial reform program to undertake and that it supports this program and recognises it is essential that AEMO is adequately resourced for reform implementation. However, Collgar considered that AEMO must also be subject to the same fiscal constraints faced by market participants. Collgar noted, for example, that it has 14 staff, "only one of

156 Ibid.

157 Alinta Energy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper,* (online).

158 Bluewaters, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

159 Perth Energy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

160 Collgar Wind Farm, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

Stakeholder	Feedback
	whom is dedicated to undertaking market operation and trading activities, ensuring regulatory compliance, participating in reform and other working groups, preparing submissions, implementing the WEM and other reform and supporting staff with regulator matters (pp. 1)."
Perth Energy	Perth Energy considered that the main drivers of the proposed AEMO expenditure are the new WEM and DER Roadmap, which will profoundly affect its operations, and 5MS, which is not directly included in AR6, and that AEMO has no option other than to make sure it has the staff and resources to implement these projects within the required timeframe. Perth Energy noted that about a third of the proposed capital expenditure has been nominated to provide IT life cycle upgrades, cyber security enhancements and improved operational capabilities and that some of the proposed upgrades are end of life replacement, expansion for new services or capabilities for new obligations. Perth Energy questioned whether, given that this portion of work is replacement of Western Power systems, there is a similar reduction in Western Power expenditure because Western Power would have been responsible for system life extension prior to the move of the system to AEMO.
DER Roadmap	
Perth Energy	Perth Energy was concerned that spreading the cost of implementing DER aggregation participation might not be fair if it is spread across the wholesale market instead of directed to Synergy's customers, unless residential customers are made contestable customers.
Market fees	
Australian Energy Council[161]	The AEC considered that funding reform via market fees makes it difficult for AEMO to minimise market fees and can disproportionately penalise existing market participants, as fees are charged on a $/MWh basis. The AEC expressed concern that this would exacerbate the cross-subsidies that initially caused the problem. The AEC explained that, as market fees are charged on $/MWh basis, rooftop solar PV owners have little exposure to the additional charges, while generators and loads without rooftop solar PV are penalised for an issue they did not cause and cannot control. The AEC encouraged the ERA to review cost recovery from market participants for AEMO and address it with Energy Policy WA. The AEC suggested that the ERA should consider whether it is in the long-term interests of consumers for the WEM rules to include service standard mechanisms applicable to AEMO in the performance of its WEM functions, for which it seeks to recover costs from market participants,as market fees. The AEC considered that it is reasonable for market participants who are paying for AEMO's services to obtain visibility of its service standard performance.
Collgar	Collgar noted that increases to coordinator and regulator fees will add to the market fees borne my market participants. Collgar considered that regulator fees have increased beyond CPI or the wage-price increase, and that there is limited oversight of co-ordinator fees to ensure they are efficient and don't include additional costs transferred from the consolidated funds, thereby adding further cost pressure for market participants. Collgar considered that it is critical that consideration is given to market fees and other WEM related costs in developing and implementing market power mitigation regimes so that market participants can recover their efficient, mandatory regulatory costs.

[161] Australian Energy Council, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

Stakeholder	Feedback
Synergy[162]	Synergy noted that it expects the ERA and Coordinator of Energy to provide fee estimates reflecting the individual cost of for each entity to ensure the transfer of rule development functions from the ERA to the Coordinator of Energy does not increase the overall WEM fees.
ERA testing	
Australian Energy Council	The AEC considered that the ERA needs to satisfy itself that the proposed contingency amount in AR6 is accurate and justifiable, and that AEMO is not incentivised to over forecast contingency.
Perth Energy	Perth Energy concluded that it is appropriate that the ERA assesses AEMO's proposed expenditures in detail.
Synergy	Whilst noting that market reform comes at a cost, Synergy stressed the need to make certain AEMO's revised costs are supported by robust evidence and recommended the ERA require AEMO to provide sufficient evidence that the revised forecast is prudent, efficient, and deliverable. Synergy considered that the revised WEM Reform capex forecast suggests AEMO will spend a similar amount in the next 18 months as it did over the AR5 period and recommended the ERA scrutinise whether this is deliverable, given the other projects proposed for the AR6 period. Additionally, Synergy recommended the ERA focus on: • the prudence of the IT program of works, given competing priorities, • that there is no double recovery through cost allocation between the NEM and WEM, • the basis for the cyber security costs and whether they are efficient, • the impact of depreciation on WEM fees, • increasing labour costs not directly associated with market operation, and • achieving a reasonable transition path for market fee increases through AR6and beyond. Synergy recommended the ERA consider requiring AEMO to publish a transparent regulated revenue model for AR6 prior to the draft determination, equivalent to that provided by Western Power supporting its fifth access arrangement proposal, as it would be consistent with the requirement for transparent decision making.

Source: Stakeholder feedback (online)

[162] Synergy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 – Issues paper*, (online).

Appendix 6 AEMO's functions under the WEM Rules and GSI Rules

WEM Rules[163]

The functions conferred on AEMO in the WEM under the WEM Regulations and AEMO Regulations, as set out in the WEM Rules, are presented below.

2.1A. Australian Energy Market Operator

2.1A.1A. The function of ensuring that the SWIS operates in a secure and reliable manner for the purposes of the WEM Regulations is conferred on AEMO.

2.1A.2. The WEM Regulations also provide for the WEM Rules to confer additional functions on AEMO. The functions conferred on AEMO are:

(a) to operate the Reserve Capacity Mechanism, the Short Term Energy Market, the LFAS Market, and the Balancing Market;

(b) to settle such transactions as it is required to under these WEM Rules;

(c) to carry out a Long Term PASA study and to publish the Statement of Opportunities Report;

(cA) to procure adequate Ancillary Services where Synergy cannot meet the Ancillary Service Requirements;

(d) to do anything that AEMO determines to be conducive or incidental to the performance of the functions set out in this clause 2.1A.2;

(e) to process applications for participation, and for the registration, de-registration, transfer and Essential System Services accreditation of facilities;

(f) to release information required to be released by these WEM Rules;

(g) to publish information required to be published by these WEM Rules;

(h) to develop WEM Procedures, and amendments and replacements for them, where required by these WEM Rules;

(i) to make available copies of the WEM Procedures, as are in force at the relevant time;

(iA) to monitor Rule Participants' compliance with WEM Rules relating to dispatch and Power System Security and Power System Reliability;

(j) to support:

i. the Economic Regulation Authority's monitoring of other Rule Participants' compliance with the WEM Rules;

[163] Wholesale Electricity Market Rules (WA), 1 March 2022, (online)

ii. the Economic Regulation Authority's investigation of potential breaches of the WEM Rules (including by reporting potential breaches to the Economic Regulation Authority); and

iii. any enforcement action taken by the Economic Regulation Authority under the Regulations and these WEM Rules;(k) to support the Economic Regulation Authority in its market surveillance role, including providing any market related information required by the Economic Regulation Authority;

(l) to support the Coordinator and the Economic Regulation Authority in their roles of monitoring market effectiveness, including providing any market related information required by the Coordinator or the Economic Regulation Authority;

(lA) to contribute to the development and improve the effectiveness of the operation and administration of the Wholesale Electricity Market, by:

i. developing Rule Change Proposals;

ii. providing support and assistance to other parties to develop Rule Change Proposals;

iii. providing information to the Coordinator as required to support the Coordinator's functions under these WEM Rules; and

iv. providing information and assistance to the Coordinator and the Economic Regulation Authority as required to support the reviews they carry out under the WEM Rules;

(lB) to develop and maintain a Congestion Information Resource;

(lC) to establish, maintain and update a DER Register in accordance with clause 3.24;

(lD) to participate in the Technical Rules Committee and provide advice on Technical Rules Change Proposals as required by the Economic Regulation Authority under the Access Code, to provide submissions as part of the public consultation process in respect of Technical Rules Change Proposals and to develop and submit Technical Rules Change Proposals relating to System Operation Functions;

(lE) to support each Network Operator in relation to the standard or technical level of performance in respect of a Technical Requirement applicable to Transmission Connected Generating Systems and perform the associated functions set out in Chapter 3A of these WEM Rules;

(lF) to advise and consult with each Network Operator in respect of AEMO's System Operation Functions as contemplated under the Technical Rules applicable to the Network; and

(ll) to support the Coordinator's role, and to facilitate and implement decisions by the Coordinator and the Minister regarding the evolution and development of the Wholesale Electricity Market and the WEM

Rules, and the management of Power System Security and Power System Reliability in the SWIS; and

(m) to carry out any other functions conferred, and perform any obligations imposed, on it under these WEM Rules.

GSI Rules[164]

8 Functions and powers of the Coordinator, AEMO and ERA

(1) AEMO has the following functions and powers:

(a) to establish, operate and maintain the GBB;

(b) to register or deregister certain Gas Market Participants as Registered Participants;

(c) to register or deregister certain Facilities and to exempt certain facilities from the requirement to be registered;

(d) to prepare and publish the GSOO;

(e) [Blank];

(f) Procedure making functions, to the extent to which the Procedures relate to its functions under the Rules;

(g) [Blank];

(h) [Blank];

(i) [Blank];

(j) information gathering and disclosure functions, to the extent to which the information gathering and disclosure functions relate to its other functions conferred on AEMO under the GSI Act, the GSI Regulations and the Rules;

(ja) to support:

(i) the ERA's monitoring of person's compliance with the Rules or Procedures;

(ii) the ERA's investigation of breaches or possible breaches of the Rules or the Procedures (including by reporting possible reaches to the ERA); and

(iii) any enforcement action taken by the ERA under the GSI Regulations or Rules;

(jb) to provide information to and assist the Coordinator as required to support the Coordinator's functions under the Rules;

[164] Gas Services Information Rules, 17 December 2021, (online).

(jc) to support the Coordinator's role, and to facilitate and implement decisions by the Coordinator and the Minister, regarding the evolution and development of the GSI Rules; and

(k) any other functions conferred on AEMO under the GSI Act, the GSI Regulations and the Rules.

Appendix 7 AEMO's obligations under the WEM Rules and GSI Rules

WEM Rules[165]

2.22A. Determination of AEMO's budget

2.22A.1. Subject to the requirements of this section 2.22A, AEMO may recover its costs for performing its functions under the WEM Regulations and the WEM Rules.

2.22A.2. For the Review Period, AEMO must seek the determination of its Allowable Revenue and Forecast Capital Expenditure from the Economic Regulation Authority for its functions, in accordance with the proposal guideline referred to in clause 2.22A.9.

2.22A.3. AEMO's proposal under clause 2.22A.2A(a) or clause 2.22A.2B(a) or AEMO's application for reassessment under clause 2.22A.12 or clause 2.22A.13 must, to the extent practicable, identify proposed costs that are associated with a specific project or where that is not practicable, one or more specific functions.

2.22A.4. If AEMO appoints a Delegate, then its proposal for, or application for reassessment of, its Allowable Revenue and Forecast Capital Expenditure must separately itemise the amount payable to the Delegate.

…

2.22A.7. By 30 June each year, AEMO must publish on the WEM Website a budget for the costs AEMO will incur in performing its functions for the coming Financial Year (including, without limitation, the amount to be paid to a Delegate). AEMO must ensure that its budget is:

(a) consistent with the Allowable Revenue and Forecast Capital Expenditure determined by the Economic Regulation Authority for the relevant Review Period and any reassessment; and

(b) reported in accordance with the Regulatory Reporting Guidelines issued by the Economic Regulation Authority from time to time in accordance with clause 2.22A.9.

2.22A.8. By 31 October each year, AEMO must publish on the WEM Website a financial report showing AEMO's actual financial performance against its budget for the previous Financial Year (including, without limitation, the actual amount paid to a Delegate compared to the budgeted amount). The report must be in accordance with the Regulatory Reporting Guidelines issued by the Economic Regulation Authority from time to time in accordance with clause 2.22A.9.

…

2.22A.11. Where the revenue earned for the functions performed by AEMO via Market Fees in the previous Financial Year, is greater than or less than AEMO's

[165] Wholesale Electricity Market Rules (WA), 1 March 2022, (online).

expenditure for that Financial Year, AEMO's current year's budget must take into account any difference between AEMO's Market Fees revenue and AEMO's expenditure in the previous Financial Year by:

(a) decreasing the budgeted revenue by the amount of any revenue surplus; or

(b) increasing the budgeted revenue by the amount of any revenue shortfall.

2.22A.12. Where, taking into account any adjustment under clause 2.22A.11, AEMO's budget is likely to result in revenue recovery, over the relevant Review Period, being at least the lower of 10% of the Allowable Revenue or $10 million, greater than the Allowable Revenue determined by the Economic Regulation Authority, AEMO must apply to the Economic Regulation Authority to reassess the Allowable Revenue.

2.22A.13. AEMO must apply to the Economic Regulation Authority to determine the adjusted Forecast Capital Expenditure for the current Re view Period if the capital expenditure, over the relevant Review Period, is likely to be at least the lower of 10% of the Forecast Capital Expenditure or $10 million, greater than the Forecast Capital Expenditure determined by the Economic Regulation Authority.

2.22A.13A. If AEMO underspends on the Allowable Revenue and/or Forecast Capital Expenditure determined by the Economic Regulation Authority in a Review Period, then, for the next Review Period, the $10 million threshold in clause 2.22A.13 is to be increased to the amount equal to 30 percent of the underspend plus $10 million.

2.22A.14. AEMO may apply to the Economic Regulation Authority, at any time during a Review Period, for additional costs to be considered by the Economic Regulation Authority as part of the Allowable Revenue and Forecast Capital Expenditure for that Review Period:

(a) for the Allowable Revenue:

i. costs previously rejected by the Economic Regulation Authority pursuant to clause 2.22A.6;

ii. new costs for new projects or new functions conferred on AEMO since AEMO's proposal for its Allowable Revenue for the current Review Period was submitted; and

iii. costs which were not able to be estimated with reasonable confidence at the time the Allowable Revenue for the current Review Period was submitted; and

(b) for the Forecast Capital Expenditure:

i. costs previously rejected by the Economic Regulation Authority pursuant to clause 2.22A.5;

ii. new costs for new projects or new functions conferred on AEMO since AEMO's proposal for its Forecast Capital Expenditure for the current Review Period was submitted; and

iii. costs which were not able to be estimated with reasonable confidence at the time of the Forecast Capital Expenditure for the current Review Period was submitted.

…

2.22A.16. AEMO must make an application under clauses 2.22A.12 or 2.22A.14(a) by 31 March for the Economic Regulation Authority to make a determination before the commencement of the Financial Year to which it relates.

GSI Rules[166]

107 AEMO functions for determination of Allowable Revenue by ERA

(1) Subject to the requirements of this Part, AEMO may recover its costs for performing its functions under the GSI Act, the GSI Regulations and GSI Rules.

…

111A Determination of AEMO's Budget

(1) AEMO must—

(a) by 30 June each year, publish on the GSI Website the AEMO Budget for the AEMO costs AEMO will incur in performing its functions for the coming Financial Year; and

(b) by 31 October each year, publish on the GSI Website a financial report showing AEMO's actual financial performance against its budget for the previous Financial Year, in accordance with the regulatory reporting guidelines issued by the ERA in accordance with subrule 109(7)(b).

(2) AEMO must ensure its budget is:

(a) consistent with the Allowable Revenue and Forecast Capital Expenditure determined by the ERA for the relevant Review Period and any adjustment; and

(b) reported in accordance with the regulatory reporting guidelines issued by the ERA in accordance with subrule 109(7)(b).

(3) Where the revenue earned for the functions performed by AEMO via GSI Fees in the previous Financial Year is greater than or less than AEMO's expenditure for its functions for that Financial Year, the AEMO Budget must take into account any difference between GSI Fees revenue and AEMO's expenditure in the previous Financial Year by:

[166] Gas Services Information Rules, 17 December 2021, (online).

(a) decreasing the budgeted revenue by the amount of any revenue surplus; or

(b) increasing the budgeted revenue the amount of any revenue shortfall.

(4) Where, taking into account any adjustment under subrule (3), the AEMO Budget is likely to result in revenue recovery, over the relevant Review Period, being at least the lower of 10% of the Allowable Revenue or $0.5 million greater than the Allowable Revenue determined by the ERA, AEMO must apply to the ERA to reassess AEMO's Allowable Revenue for the Review Period.

(5) Where the AEMO Budget is likely to result in capital expenditure, over the relevant Review Period, being at least the lower of 10% of the Forecast Capital Expenditure or $0.5 million, greater than AEMO's Forecast Capital Expenditure determined by the ERA, AEMO must apply to the ERA to reassess AEMO's Forecast Capital Expenditure for the Review Period.

(6) AEMO must make an application to the ERA under subrule 4 or with respect to Allowable Revenue under subrule 110(2) by 31 March for the ERA to make a determination of the Allowable Revenue before the commencement of the Financial Year to which the relevant AEMO Budget relates.

…

114 AEMO may recover AEMO's functions, costs Regulator Fees and Coordinator Fees

For each Financial Year, AEMO may recover from Registered Shippers and Registered Production Facility Operators:

(a) an amount equal to the AEMO Budget;

(b) an amount equal to the Regulator Fees, which amount must be consistent with the amount notified by the ERA in accordance with subrule 110A(3) or, where such amount has not been notified by the ERA in accordance with subrule 110A(3), published by AEMO in accordance with subrule 110A(5) or subrule 110A(6); and

(c) an amount equal to the Coordinator Fees, which amount must be consistent with the amount notified by the Coordinator in accordance with subrule 110B(3) or, where such amount has not been notified by the Coordinator in accordance with subrule 110B(3), published by AEMO in accordance with subrule 110B(5) or subrule 110B(6).

Appendix 8 ERA's obligations under the WEM Rules and GSI Rules

WEM Rules[167]

2.22A. Determination of AEMO's budget

...

2.22A.2B Notwithstanding clause 2.22A.2A, for the Review Period from 1 July 2022 to 1 July 2025 the following applies:

(a) the Economic Regulation Authority must publish a proposal guideline by 31 October 2021;

(b) AEMO must submit a proposal for its Allowable Revenue and Forecast Capital Expenditure to the Economic Regulation Authority for the Review Period by 31 December 2021;

(c) the Economic Regulation Authority must publish on its website a draft determination of AEMO's Allowable Revenue and Forecast Capital Expenditure for the Review Period for public consultation by 31 March 2022; and

(d) the Economic Regulation Authority must prepare and publish on its website its final determination of AEMO's Allowable Revenue and Forecast Capital Expenditure for the Review Period by 31 May 2022.

…

2.22A.5. The Economic Regulation Authority must take the following into account when determining AEMO's Allowable Revenue and Forecast Capital Expenditure or an application for reassessment to the Allowable Revenue or Forecast Capital Expenditure:

(a) the Allowable Revenue must be sufficient to cover the forward looking costs of performing AEMO's functions in accordance with the following principles:

i. recurring expenditure requirements and payments are recovered in the year of the expenditure; and

ii. capital expenditure is to be recovered through the depreciation and amortisation of the assets acquired by the capital expenditures in a manner that is consistent with generally accepted accounting principles;

(b) the Allowable Revenue and Forecast Capital Expenditure must include only costs which would be incurred by a prudent provider of the services provided by AEMO in performing its functions, acting efficiently, to achieve the lowest practicably sustainable cost of performing AEMO's functions, while effectively promoting the Wholesale Market Objectives;

[167] Wholesale Electricity Market Rules (WA), 1 March 2022, (online).

(c) where possible, the Economic Regulation Authority should benchmark the Allowable Revenue and Forecast Capital Expenditure against the costs of providing similar functions and/or projects in other jurisdictions;

(d) where costs incurred by AEMO relate to both the performance of functions in connection with the WEM Rules, and the performance of AEMO's other functions, the costs must be allocated on a fair and reasonable basis between:

i. costs recoverable as part of AEMO's Allowable Revenue and Forecast Capital Expenditure; and

ii. other costs not to be recovered under the WEM Rules; and

(e) any other matters the Economic Regulation Authority considers relevant to its determination.

2.22A.6. The Economic Regulation Authority may do any or all of the following in respect to AEMO's proposal under clause 2.22A.2A(a) or clause 2.22A.2B(a):

(a) approve the costs of any project;

(b) approve the costs of AEMO performing its functions;

(c) if the Economic Regulation Authority considers that some costs do not meet the requirements of clause 2.22A.5, reject the costs fully or partially, or substitute those costs with costs the Economic Regulation Authority considers meets the requirements of clause 2.22A.5; and

(d) recommend to AEMO that some of the costs be considered in a subsequent Review Period or in accordance with clause 2.22A.14 .

…

2.22A.15. The Economic Regulation Authority may request information from AEMO in relation to the performance of its functions under this section 2.22A. AEMO must provide the information to the Economic Regulation Authority by the time specified in a request, which must be reasonable.

…

2.22A.17. The Economic Regulation Authority may amend a determination under clause 2.22A.2(c) if AEMO makes a reassessment application under clauses 2.22A.12 or 2.22A.13 or 2.22A.14 and the Economic Regulation Authority: (a) must take the matters referred to in clause 2.22A.5 into account in determining any reassessment; (b) may consider as part of its amended determination any earlier determined costs where the Economic Regulation Authority reasonably considers it necessary to review those earlier determined costs as part of the reassessment; (c) is not required to reassess earlier determined costs in making its redetermination of the Allowable Revenue or Forecast Capital Expenditure; and (d) must complete such public consultation as the Economic Regulation Authority considers appropriate in the circumstances.

GSI Rules[168]

108A ERA to determine Allowable Revenue and Forecast Capital Expenditure for AEMO

(1) The ERA must determine the Allowable Revenue and Forecast Capital Expenditure for AEMO for each Review Period for performing its functions, in accordance with this Part.

(2) By 31 October of the year prior to the start of a Review Period, AEMO must submit a proposal to the ERA for its Allowable Revenue and Forecast Capital Expenditure for the performance of its functions over that Review Period, in accordance with the proposal guidelines referred to in subrule 109(7)(a).

(3) By 31 March of the year in which the Review Period commences, the ERA must publish on its website a draft determination of AEMO's proposed Allowable Revenue and Forecast Capital Expenditure for public consultation.

(4) The ERA must prepare and publish on its website its final determination of the Allowable Revenue and Forecast Capital Expenditure of AEMO by 30 April of the year in which the Review Period commences.

(5) Where the ERA does not determine the Allowable Revenue and Forecast Capital Expenditure of AEMO by the date in subrule 108A(4) or 108B(1)(d), the GSI Fees calculated under Division 4 of Part 7 of the Rules for the current Financial Year continue to apply until the ERA makes a determination.

(6) AEMO's proposal under subrule 108A(2) or 108B(1)(b) or application for adjustment under subrule 111A(4) or 111A(5) must, to the extent practicable, identify proposed costs that are associated with a specific project or where not practicable, a specific function or functions.

108B Transitional provisions for the Review Period from 1 July 2022 to 1 July 2025

(1) Notwithstanding rule 108A the following apply:

(a) the ERA must publish a proposal guideline by 31 October 2021;

(b) AEMO must submit a proposal for its Allowable Revenue and Forecast Capital Expenditure to the ERA for the Review Period by 31 December 2021;

(c) the ERA must publish on its website a draft determination of AEMO's Allowable Revenue and Forecast Capital Expenditure for the Review Period for public consultation by 31 March 2022; and

(d) the ERA must prepare and publish on its website its final determination of AEMO's Allowable Revenue and Forecast Capital Expenditure for the Review Period by 31 May 2022.

[168] Gas Services Information Rules, 17 December 2021, (online).

109 Matters for consideration by ERA in determining Allowable Revenue and Forecast Capital Expenditure

(1) The ERA must take the matters set out in this rule into account, and any other matters the ERA considers relevant to its considerations when—

(a) determining the Allowable Revenue and Forecast Capital Expenditure of AEMO under rule 108A and 108B; and

(b) approving adjustments to the current Allowable Revenue and Forecast Capital Expenditure for AEMO under rule 110.

(2) The Allowable Revenue of AEMO must be sufficient to cover the forward looking costs of performing AEMO's functions in accordance with the following principles—

(a) recurring expenditure requirements and payments are recovered in the year of the expenditure; and

(b) capital expenditures are to be recovered through the depreciation and amortisation of the assets acquired by the capital expenditures in a manner that is consistent with generally accepted accounting principles.

(3) The Allowable Revenue and Forecast Capital Expenditure for AEMO must include only costs which would be incurred by a prudent provider of the services provided by AEMO in performing its functions, acting efficiently, seeking to achieve the lowest practicably sustainable cost of delivering AEMO's functions, while effectively promoting the GSI Objectives.

(4) Where possible, the ERA should benchmark the Allowable Revenue and Forecast Capital Expenditure for AEMO against the costs of providing similar functions and/or projects in other jurisdictions.

(5) Where costs incurred by AEMO relate to both the performance of functions in connection with the Rules, and the performance of AEMO's other functions, the costs must be allocated on a fair and reasonable basis between—

(a) costs recoverable as part of AEMO's Allowable Revenue and Forecast Capital Expenditure; and

(b) other costs not to be recovered under the Rules.

(6) The ERA may approve project and/or function costs or, if some costs do not meet the requirements of this rule 109, reject fully or partially or substitute those costs and recommend to AEMO that some of the costs be considered in a subsequent Review Period and/or in a reassessment.

110 ERA may adjust Allowable Revenue or Forecast Capital Expenditure

(1) The ERA must reassess and may adjust the Allowable Revenue and/or Forecast Capital Expenditure for the current Review Period for AEMO where—

(a) AEMO applies to the ERA to reassess the Allowable Revenue under subrule 111A(4); and/or

(b) AEMO applies to the ERA to reassess the Forecast Capital Expenditure under subrule 111A(5).

(2) During a Review Period, AEMO may apply to the ERA for approval of an adjustment to its Allowable Revenue and/or Forecast Capital Expenditure for that Review Period:

(a) costs previously rejected pursuant to rule 109;

(b) new costs for project and/or functions since AEMO'S proposal for its Allowable Revenue and Forecast Capital Expenditure for the current Review Period; and

(c) costs which were not able to be estimated with reasonable confidence at the time of the relevant Allowable Revenue and Forecast Capital Expenditure review process.

(3) If the ERA receives an application from AEMO under subrule (2), the ERA may make a determination to adjust the Allowable Revenue and Forecast Capital Expenditure for the Review Period for AEMO.

(4) The ERA may seek information from AEMO in relation to the performance of its functions under this Division 2.

(5) The ERA must undertake such consultation as the ERA considers appropriate in the circumstances, in relation to applications for adjustment of the current Allowable Revenue and Forecast Capital Expenditure for AEMO referred to in subrule (1), and may do so in relation to an application for adjustment under subrule (2).

Appendix 9 WEM reform projects

This appendix outlines the ERA's analysis and draft determination on the WEM reform projects in the proposed capital expenditure program for AR6. The ERA's draft determination is presented in section 5.3.3.

WEM reform in the AR5 period

AEMO proposed forecast capital expenditure of $51.2 million to cover its obligations under (former) market rule 1.20.1: "To prepare for Wholesale Electricity Market and Constrained Network Access Reform; and to facilitate the implementation of Wholesale Electricity Market and Constrained Network Access Reform (including through transitional measures)."

The subject matter areas covered by the phrase 'Wholesale Electricity Market and Constrained Network Access Reform' were defined by the Minister for Energy in a letter to AEMO (published on the ERA's website).[169]

In its AR5 proposal, AEMO acknowledged that the 'precise detail' of reforms was not fully defined and so they were expecting some variance in the proposed WEM reform capital expenditure forecasts. The anticipated variance was reflected in the contingency levels applied to the base cost forecasts; an average contingency of 31 per cent. AEMO's AR5 proposal stated that AEMO "considers the increase in activity required to deliver this expenditure is well within its capabilities" and it is "well placed to commence delivery of the WEM reform program subject to funding approval".[170]

The $51.2 million forecast capital expenditure for AR5 was to cover "market and regulatory design activity and the design and implementation of the new IT systems required to enable WEM reform, programme management costs, hardware and software costs, certification borrowing costs and a contingency allowance."[171] Of this $51.2 million forecast:

- $12 million was for contingency costs.
- $39.3 million was for base costs. The two largest cost categories were:
  - Staffing at $34.1 million
  - Production of the IT platform at $3.8 million.

The assumption at the time was that AEMO would change the reserve capacity mechanism, enable grid scale storage to connect to the network, improve the ancillary services framework, and review and revise power system security and reliability requirements by the end of 2020. Following this, AEMO committed to delivering security constrained economic dispatch, constrained network access, five-minute dispatch and co-optimised energy and essential system service functionality by the proposed start date of the new market design, in October 2022. To deliver its obligations under the WEM reform program, AEMO expected that:

> adapting current applications (where appropriate) is the best and most prudent long-term solution. This includes a current design assumption that AEMO's NEMDE dispatch engine will be adapted for use in the WEM as the core market design features align with its capabilities.

[169] Australian Energy Market Operator, 2019, *2019-2022 Allowable Revenue and Forecast Capital Expenditure submission to the ERA*, p. 93 (online).

[170] Ibid, p. 47.

[171] Ibid, p. 77.

AEMO will consider building new or procuring IT systems (from external vendors) where necessary and cost effective. However, AEMO does not believe a broad vendor-driven approach to implementation is the most prudent strategy. The scale of expected change to AEMO's market and power system architecture is significant and while off-the-shelf management systems exist, AEMO believes that the risks of both higher costs and longer delivery times are significant.[172]

For AR5, AEMO's cost estimation methodology "is based on a top-down approach, given the early stage of market and regulatory design."[173] Labour estimates were based on AEMO's standard approach, plus comparisons with other projects. AEMO created 'teams' for key work areas: program management, market design, operational subject matter experts, IT design and management, and IT delivery and development.

AEMO then estimated the number of teams necessary to undertake the required activities. AEMO assumed that most of the resources needed (65 per cent) would be internal, with external contractors and consultants for the IT delivery and development activities. AEMO determined low, medium, and high cost estimates for other costs, such as hardware and software licences, certification of systems, and travel and expenses. The medium level estimates were used in AEMO's AR5 proposal. All estimated costs were allocated to one project code 'P1382 – WEM reform tranche 1 and 2'.

The evolution of AEMO's WEM reform program is summarised in Table 35 below, demonstrating how the forecast costs have changed over time.

Table 35: Evolution of the costs of AEMO's WEM reform program

Element	AR5 – Mar 2019	Jun 2020	Mar 2021	Aug 2021
Info available	High level design only	Draft WEM rules	Gazetted rules (tranches 0-3)	More rules Tranche 4a
Scope	Top down	Internal update	Bottom up build	Lessons learned from NEM
Base	48	54	69	75
Contingency costs	13 (27%)	7 (13%)	11 (16%)	15.7 (21%)
Total	**61**	**61**	**80**	**91.2**

Source: Representation of AEMO information

The following table illustrates the distribution of WEM reform project costs, excluding contingency costs, over the AR4, AR5 and AR6 periods, referred to in section 5.3.3.

[172] Ibid, p. 81.

[173] Ibid, p. 116.

Table 36: Distribution of WEM reform workstream and projects costs over the AR4, AR5 and AR6 periods (excluding contingency costs)

Workstream and project	AR4 $M and %	AR5 $M and %	AR6 $M and %	Total
WEM reform core	0.4 (3%)	5.8 (48%)	5.8 (49%)	12
Market and regulatory design	1.0 (19%)	4.3 (79%)	0.1 (2%)	5.6
Technical and process design	0.1 (7%)	1.5 (90%)	0.03 (2%)	1.6
Design planning and maintenance workstream total	**1.5 (8%)**	**11.6 (61%)**	**6.0 (31%)**	**19.1**
Digital platform	-	5.2 (54%)	4.5 (46%)	9.7
Integration and market trial	-	0.2 (5%)	3.8 (96%)	4.0
Compliance reporting	-	-	2.0 (100%)	2.0
Hypercare and support	-	-	1.4 (100%)	1.4
Integration workstream total	**-**	**5.4 (32%)**	**11.7 (68%)**	**17.1**
RCM reform	-	4.8 (63%)	2.8 (37%)	7.7
STEM reform	-	0.01 (2%)	0.6 (98%)	0.6
Legacy workstream total	**-**	**4.8 (59%)**	**3.4 (41%)**	**8.2**
Generator performance standards	-	0.9 (100%)	-	0.9
Registrations reform	-	0.9 (51%)	0.9 (49%)	1.8
Registration workstream total	**-**	**1.8 (68%)**	**0.9 (32%)**	**2.7**
Settlement enhancement	-	2.5 (100%)	-	2.5
Settlement reform	-	1.5 (40%)	2.3 (60%)	3.6

Workstream and project	AR4 $M and %	AR5 $M and %	AR6 $M and %	Total
Settlement workstream total	**-**	**4.0 (64%)**	**2.3 (36%)**	**6.3**
Constraint management	-	1.3 (98%)	0.03 (2%)	1.4
WEMDE	-	4.1 (72%)	1.6 (28%)	5.8
WEMDE user interface	-	2.2 (51%)	2.1 (49%)	4.3
Real time market submissions	-	1.4 (98%)	0.03 (2%)	1.4
Dispatcher Training Simulator (DTS) integration and SCED offline tools	-	-	1.5 (100%)	1.5
SCED workstream total*	**-**	**9.1 (63%)**	**5.3 (37%)**	**14.4**
Outage management reform	-	1.3 (93%)	0.1 (7%)	1.4
Commissioning test reform	-	0.1 (10%)	1.0 (89%)	1.1
Forecast integration	-	0.8 (93%)	0.06 (7%)	0.9
MT PASA	-	1.6 (76%	0.5 (24%)	2.1
ST PASA	-	-	0.7 (100%)	0.7
System operation planning tools	-	0.2 (18%)	0.7 (82%)	0.9
System planning workstream total	**-**	**4.0 (55%)**	**3.2 (44%)**	**7.2**
Overall WEM reform capital expenditure forecast	**1.5 (2%)**	**40.8 (54%)**	**32.7 (44%)**	**75.1**

Source: ERA analysis of AEMO data

The following table provides information on the detail of costs approved, or rejected in the ERA's draft determination, for WEM projects.

Table 37: AEMO's proposed costs for WEM reform projects and the ERA's draft determination

WEM project	AEMO proposed	Draft determination	Variance
WEM reform core	8.0	6.7	(1.3)
Market and regulatory design	0.1	0.1	-
Technical and process design	0.04	0.04	-
Digital platform	6.4	5.5	(0.9)
Integration and market trial	5.1	5.1	-
Compliance reporting	2.6	2.6	-
Hypercare and support	2.0	1.9	(0.1)
RCM reform	3.4	3.3	(0.1)
STEM reform	1.2	0.6	(0.6)
Registrations reform	1.3	0.9	(0.4)
Settlement reform	2.7	2.5	(0.2
Constraint management	0.03	0.03	-
WEMDE	1.8	1.6	(0.2)
WEMDE user interface	2.6	2.6	-
Real time market submissions	0.03	0.03	-
Dispatcher training simulator (DTS) integration and SCED offline tools	2.1	-	(2.1)
Outage management reform	0.1	0.1	-
Commissioning test reform	1.5	1.3	(0.2)
Forecast integration	0.1	0.1	-
MT PASA	1.0	0.6	(0.4)
ST PASA	1.5	1.5	-
System operation planning tools	0.9	-	(0.9)
Total	**44.6**	**37.2**	**(7.3)**

Source: AEMO data and ERA analysis

Note: Totals may not add due to rounding

Appendix 10 DER projects

This appendix provides further detail about the ERA's draft determination on capital expenditure for the DER work program, as provided in section 5.3.4.

In June 2020, the Minister for Energy placed new obligations on AEMO to implement part of the State Government's DER Roadmap.[174] The roadmap contains a series of actions to integrate electricity generated from rooftop solar systems into the WEM and ensure the ongoing stability of the electricity network.

AEMO developed its DER program to deliver action items defined by the roadmap. This included establishing the DER register, DER orchestration (Project Symphony), design work for DER participation, and commencing technology integration. To fund these new activities, the ERA approved an additional forecast capital expenditure of $14.6 million as an in-period submission in AR5.[175] No contingency was approved but AEMO was allowed to exceed its budget by the higher of $10 million or 10 per cent, as permitted by the WEM Rules.[176]

After evaluating AEMO's AR6 proposal and supporting documents, the ERA has rejected the following capital expenditure items from the DER work program:

- A forecast budget to hire external consultants for cyber security assessment, testing and specification verification, and implementation. The ERA considers it is not possible to assess whether a forecast budget is the lowest practicably sustainable cost without assessing how the budget was developed. The ERA requested AEMO to provide its analysis in which it developed these forecast budgets, to assess its robustness and appropriateness. AEMO provided a rough order of magnitude (ROM) estimate, which it considered was the most accurate estimate possible at the time of submission, given the scope of work required for this line item was still not well defined. AEMO considered a more detailed scope and cost estimate would be developed in project execution. The ERA recommends that AEMO submit an in-period request for this funding, once the scope of activities is sufficiently granular to develop a more precise estimate.
- A forecast budget to engage 2 FTE external consultants to develop its in-period funding submission for the DER Participation Implementation project. The ERA notes that developing business cases and funding proposals – akin to developing an in-period submission – are part of an organisation's business as usual activities and should not be considered a capital expense. Secondly, the ERA cannot assess the robustness of this budget forecast to determine if the cost is the lowest practicably sustainable cost.
- Total project costs of $3.6 million for the market visibility and DER data access and management projects. The ERA notes there is merit in improving visibility of and access to improved market data but is concerned these projects' scopes are not necessitated from any action of the DER Roadmap and are instead, pursued by AEMO based on its assessment of market need. Stakeholders have similarly raised concerns in their response to the ERA's issues paper. This is presented in section 5.3.4.3 of this paper.
- $0.2 million in the project cost for the EVs in the DER register project. The ERA compared AEMO's cost of establishing the DER Register, which it completed under budget, with its proposed cost to upgrade the existing register with EV data and identified cost and resource inefficiencies. For example, the core project management resource allocation in the EVs in the DER register project is approximately four times the allocation in the DER

[174] Energy Transformation Taskforce, 2019, DER Roadmap (online).

[175] Economic Regulation Authority, 2020, *Australian Energy Market Operator in-period funding submission for implementation of the Distributed Energy Resources Roadmap actions – Determination report*, p. iii., (online).

[176] Wholesale Electricity Market Rules (WA), 1 March 2022, Rules 2.22A.12 and 2.22.A.13. (online)

register project, with no complexity or reason for increased cost allocation identified. This is discussed further below.

- Some proposed contingency costs, as explained in section 5.3.7.3 and Appendix 12.

The ERA's resulting draft determination for the DER program is as follows:

Table 38: Proposed costs by project for the DER capital expenditure program ($ million)

Project	AR6 proposal	Draft determination	Variance	Variance (%)
WA DER Program	**9.4**	**4.2**	**(5.2)**	**(56%)**
Project Symphony	1.1	1.0	(0.1)	(9%)
Technology integration	1.2	0.7	(0.5)	(42%)
DER participation	0.9	0.4	(0.6)	(61%)
DER participation implementation	2.0	1.8	(0.2)	(9%)
Market visibility	1.5	0.0	(1.5)	(100%)
DER data access & management	2.1	0.0	(2.1)	(100%)
EVs in DER register	0.6	0.3	(0.3)	(46%)

Source: ERA analysis.

Note: totals may not add up due to rounding.

Project Symphony

Project Symphony (DER marketplace orchestration pilot) will deliver a virtual power plant pilot to test and demonstrate the technical capability of DER aggregators. The project commenced in 2020 from DER Roadmap, actions 22 and 23.

The scope and budget of this project is unchanged from the AR5 in-period adjustment; however, the completion of the project has been delayed from December 2022 to June 2023 due to delays with project partners.

In its AR6 proposal, AEMO is seeking 1.1 million in funding[177]. However, the proposal also states:

> AEMO has reviewed the original project budget estimates and is not requesting additional funding in AR6 above that already approved by the ERA in the AR5 period. This is as a direct result of AEMO's receipt of $2.5 million of ARENA grant funding, and confirmation from AEMO's governance committee that drawing on contingency is acceptable to manage anticipated schedule overruns.[178]

The financial tracking spreadsheets, provided confidentially to the ERA, demonstrate that AEMO has a forecast spend of $2.6 million in AR6, including an estimated contingency of $0.3

[177] Australian Energy Market Operator, 2021, *Proposal to the Economic Regulation Authority, Allowable Revenue and Forecast Capital Expenditure 2022-23 to 2024-25*, Table 43, p. 114, (online)

[178] Ibid, p. 115.

million for this project. The ERA requested AEMO clarify the inconsistencies between the proposal and the financial tracking spreadsheet.

AEMO noted that the ARENA grant contracts set out four milestones that are spread across FY22 and FY23, resulting in $1 million payable in AR5 and $1.5 million payable in AR6. The $1.5 million grant in AR6 will partially cover AEMO's expected cost of $2.6 million in AR6. As a result, AEMO's funding proposal to the ERA requests $1.1 million to cover the shortfall.

Electric vehicles in the DER register project

The EVs in DER register project is driven by the DER roadmap, actions 15 and 16.[179] Under action 16, the State Government released its WA EV plan, which includes visibility of EVs as one of its key elements.

AEMO advised the DER register currently captures EV information from a generation perspective. This project will build mechanisms to capture data on EV charging equipment and batteries that are not exporting to the grid.

AEMO is seeking $0.6 million over AR6 to fund this project, comprised largely of internal labour costs ($0.5 million), project contingency ($0.08 million) and project financing costs ($0.05 million). The project is expected to run across 11 months. Approximately 13 FTE are resourced over the project life at a cost of $0.5 million.

AEMO advised it intends to deliver this project at the lowest practicably sustainable cost by expanding the existing DER register systems and build on similar work already undertaken in the NEM to define data requirements. In supporting documents provided confidentially to the ERA, AEMO noted that it considered alternative solutions to meet its obligation to deliver the DER Roadmap, actions 15 and 16, such as establishing a register for EVs separate to the DER register. However, AEMO has not provided cost benefit analyses of alternative solutions to support its conclusion that this project will be delivered at the lowest practicably sustainable cost.

AEMO explained that the project cost has been estimated based on its experience developing similar DER registers in the WEM and NEM. The ERA notes that AEMO completed the DER register with an estimated labour cost of $0.95 million but proposes more than half that cost to expand the existing register for EV data. The ERA considers the labour resource allocation on the proposed EVs in the DER register project is inefficient compared to the completed DER register project. For instance, the core project management team for the EVs in DER register project are forecast to use nearly four times the resources utilised in establishing the DER register.[180]

Given that AEMO has demonstrated it successfully completed the DER register project within its allocated resources, the ERA proposes to scale back the proposed labour resources for the EVs in the DER register project in line with the DER register project. This results in the estimated project cost reducing to $0.3 million from $0.5 million.

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[179] DER Roadmap Action 15 requires AEMO to "deliver a register of static DER data for the SWIS, with processes to support data collection and future DSO functionality" and "establish the required regulatory arrangements for the DER register for the SWIS and the functions and obligations for AEMO, Western Power and DER providers". Energy Transformation Taskforce, 2019, DER Roadmap (online).

[180] In this analysis, the 'core project management team' includes all non-technical roles such as project manager, program manager, program owner, business lead, subject matter experts, project management analysts and support staff, and lawyers. Technical roles excluded from this analysis are IT developers, solution architects, business analysts, test analysts and solution designers. The 'resources' referred to in this analysis is the number of FTE days across the project.

Market Visibility and DER Data Access and Management projects

The market visibility project is intended to expand AEMO's existing suite of data dashboards and data visualisation packages to include specific information for DER aggregators. This will include information for DER aggregators such as participation requirements, and market outcomes and conditions. AEMO identified the key objective of this project as being to encourage the active participation of DER in the WEM and SWIS, given the increasing impact of DER on the power system.

AEMO is seeking $1.5 million over AR6 to fund the market visibility project, comprised of internal labour costs ($1.2 million), project contingency ($0.2 million), software ($0.07 million) and project financing costs ($0.02 million). Key project benefits include:

- A reduction in the load on operational staff responding to queries from new and emerging DER aggregators on the technical participation requirements.
- Improved accessibility of market information for DER aggregators.
- Increased knowledge of how devices and virtual power plants support grid security and operation.

The labour costs include $1.2 million across the following project components:

- data analysis tools and processes (13 months),
- system enhancements (12 months),
- external engagement and training (12 months),
- project management services (19 months).

The DER data access and management project is intended to enhance the existing DER register by sourcing improved distribution network level data to represent passive DER generation and consumption. This additional data will be used to gain better visibility of passive DER and load, which will inform AEMO's operation and understanding of risks associated with DER tripping and weather-driven events.

AEMO is seeking $2.1 million over AR6 to fund this project, comprised largely of labour costs ($1.8 million), project contingency ($0.3 million) and project financing costs ($0.01 million). Key project benefits include:

- Enhanced existing data management and validation by verifying the DER Register dataset with data from the Clean Energy Regulator (CER).[181] This will build new data sources to enable greater visibility of active DER, loads and power flows in the distribution network.
- Established systems to couple DER data (standing and dynamic data) with local generation and load data, to provide more accurate data into AEMO's forecasting and operational tools. This will enhance AEMO's ability to operate the WEM and maintain system security through access and use of more granular data.

The labour costs include $1.8 million across the following project components:

- Legal and regulatory analysis services (4 months).
- Program delivery and management (11 months).

[181] The Clean Energy Regulator collects and publishes a range of datasets such as small-generation units (solar panels, solar water heaters, air source heat pumps etc.) by postcode.

- Improved processes for managing decommissioned DER installations in the DER Register (2 months).
- Integration with external software interfaces to verify the compliance of DER devices with Australian Standards, to reduce manual effort (3 months).
- Implementation of data management systems (9 months).
- Testing and verification (3 months).
- Reporting and analytics (4 months).
- Automated data cleansing, to remove existing manual effort of managing data issues with Western Power (3 months).
- Enhanced visibility of DER performance risk for the AEMO control room, by providing active estimates of the risk of PV tripping based on PV generation, inverter types and geographic location of these inverters across the SWIS (3 months).
- Enhanced inputs into the ongoing spinning reserve calculation by integrating active estimates of the risk of PV trips (4 months).
- Validated DER register data with CER data, to verify accuracy of data provided by Western Power (4 months).

Stakeholder feedback

In its issues paper, the ERA noted these two projects are driven by AEMO's own initiative based on its assessment of market and system need, and not directly arising from any actions in the DER Roadmap.[182] The ERA acknowledged there are benefits to increasing awareness of, and access to, market data, particularly for new and potential entrants to the DER market. However, given that these projects are driven by AEMO's own initiative, the ERA sought feedback from market participants on AEMO including these costs in its proposal, particularly as the DER data access and management project is currently the largest in the proposed AR6 DER program.

A range of stakeholders expressed concern over AEMO's request for funding for these two projects.

Alinta Energy questioned whether spending on projects not directly related to AEMO's obligations, but driven by market need, is necessary to AEMO's functions under the WEM Rules and noted its doubts about whether such investment is prudent, efficient and reduces costs over the longer term:

> Alinta Energy contests whether this spending is necessary to AEMO's functions under the WEM Rules. Alinta Energy also doubts whether this investment would be prudent, efficient and reduce costs to customers over longer term per 2.22A.5 because:
>
> - AEMO does not attempt to forecast any quantitative benefits of this capex.
> - AEMO's AR6 proposal indicates that investment in systems and new functionality tends to 'snowball' and result in AEMO requesting increased revenue in future periods to replace or upgrade systems and hire FTEs to support them.
> - These costs would be paid by all customers, even though rooftop solar PV owners cause the current issues faced.[183]

[182] Economic Regulation Authority, 2022, *Issues paper, Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 1 July 2022 to 30 June 2025*, p. 26, (online).

[183] Alinta Energy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

The Australian Energy Council (AEC) considered projects driven by AEMO's initiative should not automatically receive funding until the benefits and market need have been justified with sufficient detail:

> The AEC considers that projects created by AEMO's own initiative should not automatically receive funding and may not be warranted during AR6 given the significant increase in WEM market participant fees. If these are genuine projects that truly meet a market need then AEMO should justify them to the ERA by providing more details on:
>
> - Who is driving the need?
> - Who benefits from these projects being delivered?
> - Why is AEMO uniquely responsible for meeting this need?
> - Is this the best use of resources?
> - Whether this will create any duplication of data.[184]

Bluewaters Power considered projects should be assessed to identify any additional benefit to the market and if the cost is appropriate:

> In order to question the reasonableness of AEMO's estimate, Bluewaters asks the ERA to scrutinise what additional benefit the market is expected to receive for the increase in cost and appropriateness of these increases, such as those outlined by the ERA in its issues paper relating to DER.[185]

Synergy recommended these projects be deferred:

> Synergy recommends the ERA and AEMO consider any opportunity to defer capital projects, with the exception of WEM Reform. A good example of where this could be considered prudent is in relation to the additional DER projects (those not specified as DER Roadmap actions).[186]

The proposal guideline and the WEM Rules require the ERA to firstly assess whether the project is necessary and there is a clear connection between the forecast cost, AEMO's functions and the project scope. Secondly, the ERA must consider whether the project is costed efficiently.[187]

AEMO noted the scope of the DER Roadmap does not confine AEMO to proposed projects. AEMO considered the scope of these projects are driven by system and market needs and would be required to support systems and market operations. AEMO considered these projects arise from its obligations under WEM Rules 1.2.1(a) to (e), 2.1A.1A and 2.1A.2(d) and (n), and disagreed with the ERA's assertion in its issues paper that the projects are out of scope.[188]

The ERA requested AEMO to provide evidence of any stakeholder consultation or market assessment that it relied upon to guide its assessment of the necessity for these projects. The

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184 Australian Energy Council, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

185 Bluewaters Power, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

186 Synergy, 2022, Submission to *Australian energy Market Operator's Allowable Revenue and Forecast Capital Expenditure Proposal for the Period 1 July 2022 to 30 June 2025 - Issues paper*, (online).

187 Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submissions under the WEM Rules and GSI Rules*, Section 3.8.1, p. 8, (online)

188 WEM Rule 1.2.1(a)-(e) outline the WEM Objectives. WEM Rule 2.1A.1A confers the function of ensuring that the SWIS operates in a secure and reliable manner on AEMO. WEM Rule 2.1A.2(d) allows AEMO to do anything that it determines to be conducive or incidental to the performance of the functions under the WEM Rules. There is no WEM Rule 2.1A.2(n).

ERA also asked AEMO if it had identified any quantifiable benefits in pursuing these projects or any quantifiable benefits in not carrying out these projects (the opportunity cost of these projects).

AEMO advised comprehensive stakeholder engagement had not yet been undertaken for the two projects. AEMO advised it intended to undertake detailed options assessments and needs analysis as the projects progress.

AEMO considered these projects are crucial for:

- Supporting efficient and prudent operational decision-making resulting from access to improved data that better reflects DER and generation patterns across the SWIS. Without undertaking the data access and management project, AEMO considers it will have to continue to utilise unreliable data sources and make more conservative operational decisions (such as constraining lower cost non-synchronous generators) to provide wider stability margins.
- Encouraging active participation of DER in the WEM and SWIS. Without undertaking the market visibility project, AEMO considers it will have to continue relying on inefficient tools such as emergency solar management and applying constraints to inverter based generators to manage DER.

The ERA considers the evidence provided by AEMO is not sufficient to conclude that either project is necessary for the successful completion of the in-flight projects or the commencement of other projects required by the DER Roadmap. In its proposal, AEMO considered these projects are driven by system and market needs; however, based on stakeholder feedback to the issues paper, it appears there is limited support from market participants for the projects.

Beyond the concern of project scope and necessity, the ERA is also concerned about the prudency and efficiency of the project costs. For example:

- Project cost includes a forecast budget for 10 FTEs as a mixture of contracted resources and technology to measure and communicate data to AEMO. AEMO indicated the exact mix of resources will be established in the detailed design phase of the project but is expected to remain within the forecast budget. The ERA considers the scope of these resources is vague and unclear, and should be deferred until sufficient clarity is available.
- A core component of the project involves validating Clean Energy Regulator (CER) data with data on the existing DER register.[189] The ERA notes the following issues with this undertaking:
  - The CER data is based on information provided voluntarily so there is likely to be an information gap.
  - Consumers have up to 12 months to provide data, so there is likely to be an information lag.
  - This project component precedes other milestones in the project. If there are validation issues resulting from the concerns outlined above, it could result in the project timeline being delayed or the project scope being escalated.

In this draft determination, the ERA has not approved any funding for these two projects.

[189] CER data includes data on small scale technologies such as solar water heaters, solar pumps, solar panels, wind and hydro systems by postcode.

Appendix 11 Sustaining capital program projects

This appendix supports the information on the AR6 period sustaining capital program projects discussed in section 5.3.5 of this draft determination.

AEMO stated its proposed sustaining capital program projects for the AR6 period are essential to enable AEMO WA to continue to perform market and system operations functions, as required under clauses 2.1A.1A and 2.1A.2 of the WEM Rules. Sustaining capital program projects include development of control room tools, replacement of outdated software and hardware, and cost allocation from AEMO's national enterprise systems and services.

In AR6, AEMO proposed costs of $15.8 million for 39 sustaining capital program projects. Thirty-five of the projects relate to AEMO's WA technology, with the remaining four projects being AEMO WA's portion of AEMO's national enterprise systems' projects.

The ERA's draft determination on the sustaining capital expenditure program is $10.6 million. This is $5.1 million or 32 per cent lower than the cost proposed by AEMO. A brief description of AEMO's sustaining capital program projects and the justification for the ERA's draft determination funding are set out below.

Table 39: AEMO's proposed and the ERA's draft determination on sustaining forecast capital project expenditure in AR6 ($ million)

	Proposal	Draft determination	Variance	Variance (%)
WA Technology				
Capability uplift projects				
WAMS	0.2	0.1	(0.1)	(36%)
Transient stability tool	0.2	0.2	(0.0)	-
Operations simulator	0.9	0.5	(0.4)	(43%)
WEM rule changes projects				
WEM rule changes	1.0	0.3	(0.7)	(67%)
Lifecycle projects				
Lifecycle Perth computer room	2.0	1.9	(0.1)	(6%)
Lifecycle Itron upgrade 2	0.4	0.3	(0.1)	(25%)
Lifecycle Certificate authority 2	0.3	0.2	(0.0)	(2%)
Lifecycle enterprise data platform (EDP)	1.9	1.4	(0.5)	(26%)
Lifecycle legacy market systems	1.9	1.5	(0.4)	(21%)
Lifecycle integration costs	1.2	1	(0.2)	(17%)
Enterprise system projects				
EMS upgrade	1.4	1.8	0.4	29%

	Proposal	Draft determination	Variance	Variance (%)
Cyber	3.0	1.3	(1.7)	(56%)
Operations forecasting WEM onboarding	1.1	0.1	(1.1)	(88%)
ENT infrastructure	0.2	0.2	(0.0)	(8%)
Total	**15.7**	**10.6**	**(5.1)**	**(32%)**

Source: AEMO data and ERA analysis

WA technology

The WA technology workstream covers projects relating to upgrades and lifecycle replacements of AEMO's WEM-specific IT systems. This workstream is comprised of three main programs – capability uplift, WEM rule changes, and lifecycle. Each of these are discussed below.

Capability uplift

AEMO's capability projects are for monitoring, predicting and managing power system issues arising from increased power system complexity and issues arising from increasing PV in the WEM. The capability uplift program is comprised of three projects: WAMS, transient stability tool and operations simulator. Each of these projects are discussed below.

WAMS

AEMO is proposing to install GE Digital Energy's WAM system and control software in the control room to provide visibility of real-time data streamed from Western Power's planned trial installation of Phasor Measurement Units (PMU) in the WEM. WAM software will monitor system strength and inertia in the WEM, however WAM system and control software will not work until Western Power's PMUs are installed in the WEM. Data collected by WAM from Western Power's PMU's will be saved in the WAM database and used for power system simulation and forecasting and will be used to identify the causes of power system inefficiencies to support incident investigations. This project is to take place in October 2023 at a proposed cost of $0.2 million.

The ERA's draft determination is to reject $0.1 million proposed for this project due to uncertainty about the number of licenses required and cloud cost accounting treatment in the cost of this project. As a result, the ERA's draft determination is $0.1 million for this project.

Transient stability tool

The transient stability tool proposed by AEMO includes monitoring wind turbine operation and turbine oscillation, to provide real-time identification of system security problems associated with intermittent generation. AEMO stated that the additional information provided by the transient stability tool will enhance AEMO's ability to detect power system security issues and enable AEMO to act on those issues quickly. In addition to detecting power system security issues, AEMO stated the transient stability tool will provide better feedback to Western Power on limit equations by benchmarking against the real time limits calculated by the transient

stability tool, and provide greater scheduling accuracy. This project is targeted to commence in August 2023 and to be completed in January 2024.

The ERA's draft determination is to reject some of the contingency costs proposed for AEMO's transient stability tool in line with the ERA's determination of contingency costs in section 5.3.7. The ERA's draft determination for this project is $0.2 million.

Operations simulator

AEMO's operations simulator is a tool that is designed to improve AEMO's ability to predict and analyse wind and solar generated energy's impact on the power system. AEMO's NEM operations simulator has undergone intensive analysis, assisted operational management with power system issues, and been used in industry consultation and engineering development over the last five years. AEMO stated that the WA market and power system will use the operations simulator that is currently working in the NEM, subsequent to updates and modifications to enable its use in the WEM. AEMO has proposed that the operations simulator hardware and software will be installed in February 2025, with internal labour to commence work on the project in March 2025. AEMO has proposed cost of $0.9 million for this project.

The ERA's draft determination is to reject $0.4 million proposed for the operations simulator project, due to uncertainty about the number of licenses required and the license cost accounting treatment. The ERA's draft determination is $0.5 million for this project.

WEM Rule changes

AEMO proposed funding of $1 million to cover the generic costs of any WEM Rule changes that may occur during the AR6 period. AEMO used the t-shirt size approach to estimate its rule change costs during the AR6 period, with provisions for a small, medium, large and xx-large rule change over the AR6 period. Unlike AEMO's WEM Rule change proposal in the AR5 period, these potential WEM Rule changes are unforeseen and have not been identified.

The ERA's draft determination is to reject $0.7 million in proposed funding for the WEM Rule change project as AEMO has not sufficiently justified the costs. The ERA considers AEMO must demonstrate better governance over WEM Rule change costs. As a result, the ERA's draft determination is $0.3 million for this project.

Lifecycle

AEMO's WEM sustaining capex lifecycle program is comprised of six main projects aimed at upgrading hardware and software to ensure AEMO's 470 IT systems are fit for purpose, reliable and cost effective to run. AEMO's IT systems are required to maintain confidentiality, availability and integrity of AEMO's data. Each of AEMO's Lifecycle programs are further broken into separate projects.

Lifecycle Perth computer room

AEMO's Lifecycle Perth computer room project is a replacement of all end-of-life computer room hardware with current equipment, to reduce the risk of technical failure and associated business impacts. The components that will be replaced include user firewalls, internet firewalls, office core switches, and wireless access points, RTNET, WAN routers and DC core switches. Project costs are mainly for hardware and this project is set to take place between July 2022 and June 2023. AEMO has estimated project cost of 2 million.

The ERA's draft determination is to reject $0.1 million in proposed costs in line with its determination on contingency costs as explained in section 5.3.7 and Appendix 12. The ERA's draft determination is $1.9 million.

Lifecycle Itron Upgrade 2

Itron MetrixIDR is AEMO's load forecasting software which is a critical system that supports market operations. The first Itron upgrade took place in 2021/22 as part of the WEM Reform Program. Itron MetrixIDR produces load forecasts that are used in dispatch, and in the WEM short term PASA and medium term PASA. The upgrade is required to ensure Itron's continued operation. Labour accounts for approximately 80 per cent of this project's cost, with the remainder being for software. This project is set to take place between July 2024 and October 2024. AEMO proposed costs of $0.4 million for this project.

The ERA considers AEMO has sufficiently justified the prudence and efficiency of the costs proposed for this project. The ERA's draft determination is to approve this project's costs as proposed by AEMO.

Lifecycle certificate authority 2

This project relates to public key infrastructure (PKI), which governs access to AEMO's systems. Existing PKI security is outdated and poses a security risk. The existing PKI security will expire during the AR6 period, and a solution must be implemented to prevent participants' access to AEMO systems being revoked. This project is comprised mainly of labour costs and it is set to take place between November 2022 and March 2023. AEMO proposed costs of $0.3 million for this project.

The ERA's draft determination is to reject some of the contingency costs proposed for this project. As a result, the ERA's draft determination is 2 per cent lower than the funding proposed by AEMO..

Lifecycle enterprise data platform (EDP)

Lifecycle EDP consists of ten separate projects which aim to deliver data automation, a central data repository, data consumption, analytics and visualisation, data governance and data support and maintenance. These projects will provide an enterprise integration capability for these deliverables. Lifecycle EDP has been separated from the WEM reform program to reduce risk to reform delivery. The possibility of retaining the existing applications in their current state was dismissed due to risk exposure.

Software accounts for approximately 20 per cent of the projects' costs and the projects will take place between December 2023 and May 2025. Underlying project durations vary between one month and thirteen months. AEMO has proposed costs of $1.9 million for the ten projects comprising the lifecycle EDP project.

The ERA's draft determination is to reject some of the costs proposed for this project due to insufficient information provided by AEMO to justify costs regarding licenses and license accounting treatment, and cloud cost accounting treatments. The ERA also rejects some of the contingency costs proposed for this project in line with the ERA's determination of contingency costs in section 5.3.7. The ERA's draft determination is $1.4 million, which is $0.5 million or 26 per cent lower than the cost proposed by AEMO. resulting in a total reduction of 26 per cent.

Lifecycle legacy market systems

Lifecycle legacy market systems contains ten projects, which are to upgrade legacy components of WA Market applications to ensure AEMO's entire software stack remains supported. Underlying project durations are for two or three months between December 2023 and June 2025. The proposed costs are for labour. AEMO has proposed costs of $1.9 million for this project.

The ERA's draft determination is to reject some contingency costs in line with the ERA's determination of contingency costs in section 5.3.7. The ERA has also rejected the funding proposed for the Gas Bulletin Board, as this same funding request was also proposed in AEMO's GSI capital expenditure. The ERA's draft determination for this project is $1.5 million, which is $0.4 million or 21 per cent lower than the funding proposed by AEMO.

Lifecycle integration

Lifecycle integration consists of eight projects, which will replace nine unsupported applications as part of WEM reform and introduce an enterprise capability to AEMO's technology landscape. The benefits of implementing lifecycle integration are near real-time visibility of critical market transactions, enhanced security for data exchange and centralised access management and improved speed of market or business regulatory changes. Underlying project durations are between one and five months between December 2023 and January 2025. AEMO proposed costs of $1.2 million for this project.

The ERA's draft determination is to reject some penetration testing costs and some contingency costs.. The penetration testing costs were rejected because AEMO allocated these costs on a per application basis, which sometimes resulted in penetration testing costs being up to 40 per cent of some base costs. AEMO applied penetration costs to validate that no vulnerabilities were introduced through remediation work. However, many of the application costs, with penetration costs that AEMO included, do not and will not interface with applications external to AEMO systems. The contingency costs were partially rejected in line with the ERA's determination of contingency costs in section 5.3.7. The ERA's draft determination for this project is $1 million, which is $0.2 million or 17% lower than the cost proposed by AEMO.

Enterprise systems

As a national organisation, AEMO has several central systems and services shared across all jurisdictions, including its energy management system (e-terra) and various accounting and HR systems. Shared systems and IT platforms help reduce software, hardware, support, and lifecycle costs.

Costs for using these systems in Western Australia are allocated on a causer or beneficiary pays basis, to the WEM cost centres. The method of allocation varies.

The proposal does not provide information on whether AEMO undertakes a quantitative analysis, comparing the risks, benefits, and costs of providing standalone solutions for WA's enterprise systems to national solutions.

There is little information in the proposal on how AEMO has determined that projects undertaken at the national level, over which the ERA has no regulatory oversight, are undertaken prudently or efficiently, to show that the costs allocated to AEMO WA are also prudent and efficient.

Energy management system

AEMO's energy management system (EMS) is critical to AEMO's ability to monitor, control and optimise energy management and currently aligns with AEMO's EMS version in the NEM. AEMO's current EMS reaches the end of its life in July 2024. Failure to update EMS from July 2024 would pose an unacceptable risk to AEMO's critical operating system. AEMO is upgrading EMS nationally and the cost is being apportioned between the NEM and the WEM.

Approximately 20 per cent of the cost of this project is for software, eight per cent is for hardware, and most of the remaining costs are associated with internal labour. The project is set to take place in two stages: between July 2022 and March 2023, and then between October 2023 and March 2024.

The ERA's draft determination is to reject some of the contingency costs proposed for this project in line with the ERA's determination of contingency costs in section 5.3.7., The ERA's draft determination for this project is $1.8 million.

Cyber security

According to AEMO's proposal, AEMO's investment in cyber security is essential to maintaining the integrity of critical infrastructure. AEMO faces threats from a number of sources including nation states, rogue operators and criminal organisations. AEMO is also scrutinised by Government to ensure the security of energy supply to customers. Western Australia benefits from the advantage of economic scale and experience by utilising the national cyber security team in place of adopting a standalone cyber security project. AEMO's national cyber security work streams focus on ransomware resilience, threat detection and response, threat and vulnerability management and identity and access management. Approximately 12 per cent of this project's cost is for software, with most of the remaining costs being for internal labour. The project is to take place between July 2022 and June 2025.

The ERA's draft determination is to reject GSI cyber costs, which were also proposed in a GSI project, and to reject costs due to AEMO not providing supporting information for software costs. The ERA's draft determination is $1.3 million, which is $1.7 million or 56 per cent lower than the funding proposed by AEMO.

Operational forecasting

AEMO developed the AEMO Fusion Methodology to improve AEMO's accuracy in forecasting power system requirements. Forecasting accuracy has become difficult with increased penetration of variable renewable technology including distributed energy resources along with climate induced stress from extreme weather events. In the NEM, operational forecasting has been applied to reduce the cost of frequency regulation. Approximately 10 per cent of the project's cost is for hardware with most of the remaining costs being for internal labour.

The ERA's draft determination is to reject some of the contingency and labour costs proposed for this project, resulting in an 88 per cent reduction in funding for the project.

Infrastructure (Norwest data centre)

This project is to replace end-of-life Norwest data facility hardware to ensure the computer room maintains current and supported components, reducing the risk of technical failure and associated adverse business impacts. The Norwest data facility, which is owned and operated by AEMO, hosts WA system management and market operations application and services.

The Norwest data centre also hosts a number of NEM services and AEMO shares the costs associated with the Norwest data centre with AEMO WA.

Approximately half the costs of this project are for internal labour and approximately half of the costs are for hardware. This project is set to take place between July 2022 and September 2024.

The ERA's draft determination is to reject some of the contingency costs proposed for this project in line with the ERA's determination of contingency costs in section 5.3.7. The ERA's draft determination is $0.2 million.

Appendix 12 Contingency cost calculations

This appendix outlines the ERA's analysis and draft determination on the contingency costs proposed in the capital expenditure program for AR6. The ERA's draft determination is presented in section 5.3.7.

A summary of the number of projects using each method of contingency cost calculation is provided in Table 40.

Table 40: Showing the number of projects using each method of contingency cost calculation

Method	Number of Projects
Method 1 – Fixed calculator alone*	23
Method 2 – EMV tool alone	0
Method 3 – Combined methods 1 and 2	16
Method 4 – Bespoke method	1
No contingency allocated	2
No calculator provided as project complete	4
Total	**46**

Source: ERA analysis of AEMO data

Note: Two of the projects listed by AEMO reportedly use the fixed calculator to calculate the contingency for the project but the calculators for these projects were not provided to the ERA.

The main principles employed in the ERA's assessment and the areas that they relate to are set out in Table 41.

Table 41: Principles used to assess AEMO's contingency cost calculations

Area of consideration	Principle
General principles of cost estimation.	Including some contingency in a cost estimate is good practice. The more definition around a project (the further it is in its lifecycle), the fewer the execution uncertainties.[190] New technology that has no commercial history within the company or elsewhere requires more contingency.[191] Equipment cost estimates tend to be more accurate than estimates for other costs such that projects that have a high equipment percentage usually require less contingency.[192] As project complexity increases, the need for contingency also increases.[193] If projects are cost driven, project owners are less likely to take actions and make changes that will put cost at risk.[194] Not all risks come to fruition in a project and not all projects use contingencies, so there should be left over contingency from within and across projects.[195] Contingency calculations should be WEM and AR6 project specific. If a calculated contingency amount is very small, the project is less likely to end in major overruns if risks materialise than if the calculated contingency is very large.[196] Extremely risky or highly uncertain projects should not be funded. Base estimates in cost estimation should be developed in a robust manner due to their critical role in setting the contingency value.[197] If a risk is likely to happen with a probable impact of $100,000, then $100,000 is needed to address that risk, not a small portion of it (e.g., $20,000).

190 Borroughs, S.E. & Juntima, G., 2004, Exploring Techniques for Contingency Setting; *AACE International Transactions EST.03, Morgantown*, ES31-36, (online) [accessed 27 January 2022].

191 Ibid, pp. EST.03.3.

192 Ibid.

193 Ibid.

194 Ibid.

195 Halling. G. (2019). *Deriving certainty from uncertainty (Value from Project Risk and Contingency Management)*. PGCS, Canberra 20 & 21 August 2019. PowerPoint slides (online) [accessed 28 January 2022].

196 The concepts of 'small' or 'large' projects and the threshold between them are somewhat subjective and can vary between jurisdictions and between industries. Transport and Infrastructure Council, 2019, *Australian Transport Assessment and Planning Guidelines, 01 Cost Estimation*, pp. 4, (online), [accessed 31 January 2022].

197 Transport and Infrastructure Council, 2018, *Australian Transport Assessment and Planning Guidelines, 02 Optimism Bias*, pp. 6, (online) [accessed 31 January 2022].

Area of consideration	Principle
Contingency cost calculation methods.	A probabilistic approach should be used for cost estimation for all major initiatives, and wherever possible otherwise.[198] Contingency calculation methods should be robust and consistent. Contingency calculation methods should be based on established, and repeatable methods of assessing project risks and determining input quantities, resulting in high quality estimates that are comprehensive and as accurate as possible, and can be easily and clearly traced, replicated, and updated.[199] The percentage included to accommodate risks should reflect the outstanding project spend (the base estimate) required for completion. Subjective assessments are always at risk of bias, so it is prudent to takes steps to limit that bias.[200] Uncertainty and risks identified in project cost estimates in the AR5 period do not necessarily indicate what will happen in the AR6 period and, as such, reliance on what happened in previous review periods could lead to over or under funding of AEMO.
WEM Rules relevant to contingency cost calculations.	If risks arise that are not accounted for in AEMO's calculations, they can be addressed using the lower of 10% or $10 million greater than the amount in the ERA's determination at the end of the review period.[201] Only costs which would be incurred by a prudent provider of the services provided by AEMO in performing its functions, acting efficiently, to achieve the lowest practicably sustainable cost of performing AEMO's functions, while effectively promoting the Wholesale Market Objectives, should be included.[202] With very uncertain projects, AEMO can wait till more details come to light and make an in-period submission.[203] Funding proposed and approval is tied, where practicable, to individual projects, or where not practicable, to specific functions, in AEMO's proposal.[204]

198 Ibid.

199 Australian Government, Department of Infrastructure, Regional Development and Cities, November 2018. *Cost Estimation Guidance Note - Overview* , pp.12, (online) [accessed 31 January 2022].

200 Ibid, pp. 8.

201 Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.13, (online).

202 Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.5(b), (online)

203 Economic Regulation Authority, 2021, *Guideline to inform AEMO funding submissions under the WEM Rules and GSI Rules*, Section 3.8.1, p. 8, (online)

204 Wholesale Electricity Market Rules (WA), 1 March 2022, Rule 2.22A.3, (online)

Area of consideration	Principle
Risk impact and probability ratings using AEMO's methods.	Where there is no limit on the number of risks that can be identified, any risk can be considered 'possible' and can be included to pad out costs. Where there is access to an overspend provision: • It does not make sense to make an allowance for a risk that you consider is 'unlikely' to occur, or a risk that is rated as less than 'unlikely' (rare) to occur. • If risks are unlikely to occur, such that they are not applicable or so insignificant that they are not assessable, they should not be considered as risks. • If risks are likely to occur but their impact is 'immaterial' they should not have an impact value. Rounding of contingency values to the nearest, highest, whole number is not necessary to covering the probability and impact of identified risks.

Source: ERA analysis of AEMO data

The ERA's principles-based assessment of AEMO's contingency calculations and its rationale for a reduction in costs is presented in Table 42.

Table 42: ERA's assessment of contingency cost calculations for AR6

ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
'Unknown unknowns' valued at 5% of the value calculated using the fixed contingency calculator is carried forward to and included in the calculation of contingency using the EMV tool.	Estimation of contingency at the idea stage (e.g., $400,000 for an $800,000 project) is much larger than estimation of contingency at the execution phase (using the EMV tool). 5% of the contingency carried forward can be quite large.	Reject the 5% carried forward to execution stage in the EMV calculation.	• At the execution stage, the percentage included to accommodate risks should reflect the outstanding project spend required at that stage (not at the idea stage). • The risk of unknown unknown's materialising (e.g., a rule change affecting the project) is less likely the closer to completion a project is, as stakeholders (including EPWA) are fully informed of AEMO's progress. They do happen but not often. • No provision is made in AEMO's fixed contingency calculator for unknown unknowns, yet a portion of the fixed contingency is carried forward to the EMV tool to cover 'unknown unknown' risks. • Not all risks come to fruition in a project and not all projects use contingencies, so there should be left over contingency from within and across projects to	**$897,376**

ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
			cover unknown unknowns if they arise. • If unknown unknowns arise, they can also be addressed using the $10m overspend provision. • Prudency principle.	
Value of each risk rated as 'N/A' or 'immaterial' is added to the total risk in the fixed calculator as 0.5%.	For a $500,000 project, this is an allocation of $2,500.	Reject impact values for risks that are labelled 'N/A' or 'immaterial.	• If risks are unlikely to occur, such that they are not applicable or so insignificant that they are not assessable, they should not be considered as risks. • If risks are likely to occur but their impact is 'immaterial' they should not have an impact value. • Not all risks come to fruition in a project and not all projects use contingencies, so there should be left over contingency from within and across projects to cover risks that are rated N/A or immaterial if they arise. • If N/A or immaterial risks arise, they can also be addressed using the $10m overspend provision.	**$191,927.49**

ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
			• Prudency principle.	
Calculated risks are rounded up to the nearest whole number.	Total contingency percentage is calculated as 11.5% but rounded to 12%.	Reject rounding and work with actual calculated risks.	Rounding is not necessary to cover identified risks. Prudency principle.	**$66,503.72**
Different scales are used for different projects in the fixed calculator.	Table A Impact / Value / Percentage N/A 0 0% Low 0.3 3% Medium 1 10% High 1.8 18% Extreme 3.5 35% Table B Impact / Value / Percentage Immaterial/N/A 0.05 0.5% Low 0.1 1% Moderate 0.25 2.5% Major/High 0.4 4% Extreme 1 10%	Require AEMO to review and recalculate contingency costs using the fixed contingency calculator and the range in Table B.	• Extremely risky projects should not be funded. • With very uncertain projects, AEMO can wait till more details come to light and make an in-period submission. • Contingency calculations should be robust and consistent. • Contingency calculations should be based on established, 'repeatable' methods of assessing project risks and determining input quantities, resulting in high quality estimates that are comprehensive and as accurate as possible, and can be easily and clearly traced, replicated, and updated. • AEMO's proposal states that contingency values calculated using fixed contingency calculator	• No revision yet. The ERA requires that AEMO re-works its fixed contingency cost calculations using Table B (to ensure consistency across projects) and resubmits them prior to the ERA's final determination.

ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
			range between 5 percent and 80 percent. Table B is more consistent with this range. • AEMO sent updated calculators to the ERA on 25 February 2020 that used the scale in Table B. However, not all calculators were updated, with 4 calculators still using the scale in Table A. • AEMO expressed a preference for overstating costs in its proposal. • Subjective assessments are always at risk of bias, so it is prudent to takes steps to limit that bias. • Prudency principle.	
Other (aggregated) proposed costs inflated the contingency cost calculation at the project level	Examples include: Contingencies for specific projects as high as 102% and 93.22% were proposed as: AEMO carried forward some contingency costs from AR5 to AR6. The contingency cost calculators for some WEM Enterprise projects, included costs for both the NEM and the WEM (not just WA).	Recalculate contingencies so that they are calculated as a percentage of the base cost estimates for AR6 and include WA only. Reject contingency costs calculated using unjustifiable bespoke methods.	• AEMO noted that it put off a project for which it had calculated a contingency percentage of 115% and decided to make an in-period submission for that project. • AEMO noted that AEMO calculated the contingency for one project using a 'bespoke' method, based on a previous update to that system, due to the	**$5,188,795.37**

ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
	AEMO employed a fourth method of contingency cost calculation that is inconsistent with other methods.		uncertainty surrounding the project. • WEM Rule 2.22A.3: Funding proposed, and approval is tied, where practicable, to individual projects, or where not practicable, to specific functions, in AEMO's proposal. • Extremely risky projects should not be funded. • With very uncertain projects, AEMO can wait till more details come to light and make an in-period submission. • Including some contingency in a cost estimate is good practice. • A probabilistic approach should be used to cost estimation for all major initiatives, and wherever possible otherwise.	
Allowance is included for risks that are considered 'unlikely' to happen and 'rare' in AEMO's EMV tool.	**Unlikely risk -** interface rigidity leading to delays as other system functionality is impacted because of an inability to change interface. Team spends more time developing interfaces.	Reject contingency for risks that are unlikely to happen or are considered rare.	• It does not make sense to make an allowance for a risk that you consider is 'unlikely' to occur, or a risk that is rated as less than 'unlikely' to occur.	**Unlikely: $79,417** **Rare: $30,000**

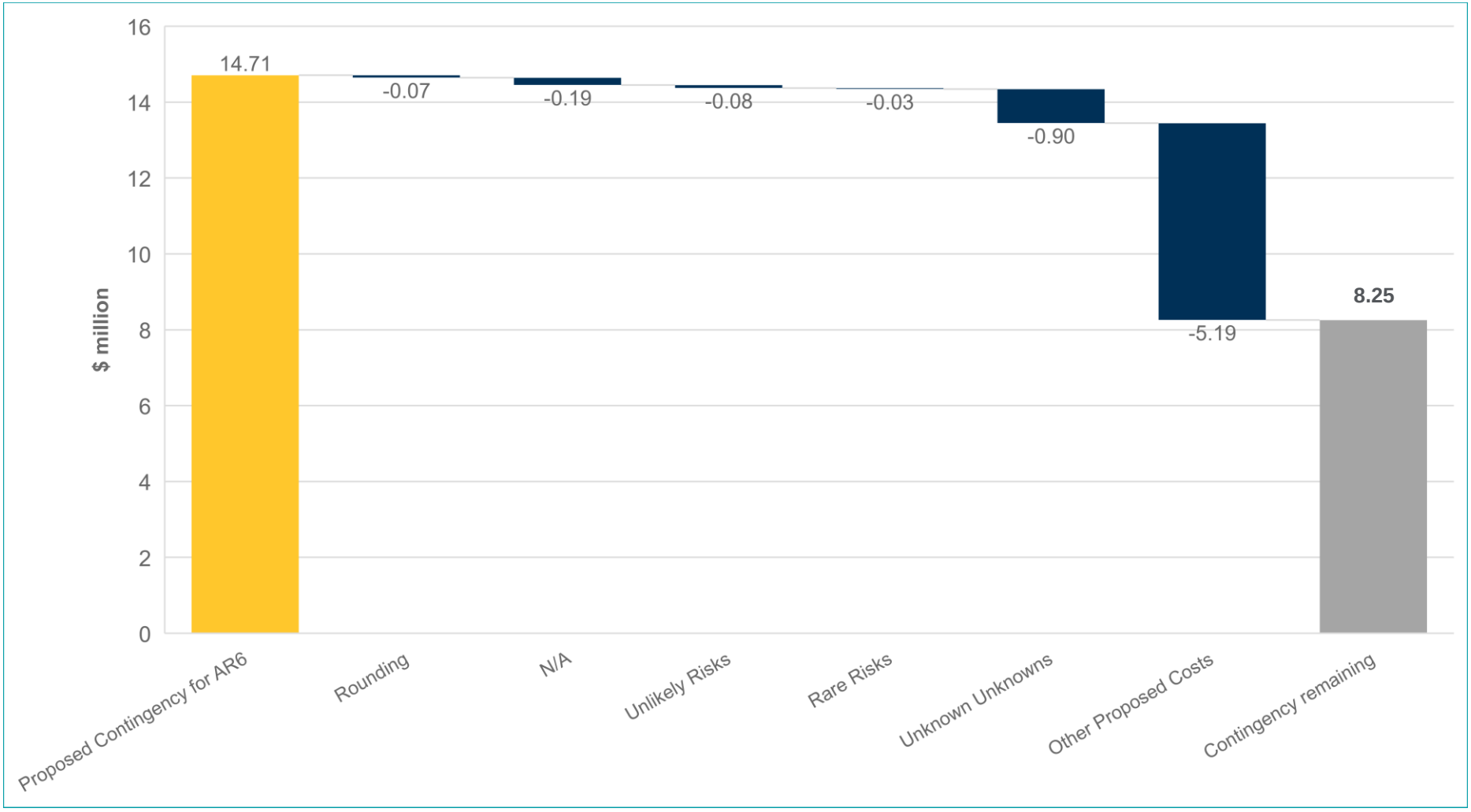
ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
	Rare risk – Certification does not happen so the team must remediate defects in either documentation or the solution, delaying project implementation.		• Not all risks come to fruition in a project and not all projects use contingencies, so there should be left over contingency from within and across projects to cover risks if they arise. • If risks arise, they can also be addressed using the $10m overspend provision. • Prudency principle.	
Contingency cost calculations using the EMV tool include imprudent costs.	Total estimated forecast capital costs in the contingency calculators were greater than in AEMO's proposal, as they represented projects spanning both AR5 and AR6. Consequently, AEMO calculated some very large contingency percentages for projects that were almost complete due to carrying contingency costs forward from AR5 to AR6. Allowance was included for 'possible' risks in the EMV tool, which can be responded to very subjectively. Other risks could be mitigated by coordination between project managers, planning, and maintaining a dialogue with EPWA. Contingency costs were calculated for several projects using the base estimate for one project on which the timing for completion was dependent.	Require AEMO to review and recalculate contingency costs using the EMV Tool. Remove funding for any risks that do not appear logical and that cannot be justified in the final determination.	• Any risk can be considered 'possible' and can be included to pad out costs. • There is inconsistency in the number and nature of risks identified by project managers (ranging from the identification of 2 to 9 risks in the EMV tools of the various projects). • Subjective assessments are always at risk of bias, so it is prudent to takes steps to limit that bias. • AEMO expressed a preference for overstating costs. • Contingency cost calculations should be robust and consistent.	• No revision has been made yet. The ERA requires that AEMO reworks its EMV contingency calculations to remove unjustifiable risks and resubmits the contingency cost calculations prior to the final determination.

ERA's concern	Example	ERA's action	Principles and rationale for ERA's actions	Cost rejected
	Costs were included for more resourcing on projects that were already in-flight, in which project managers should have had a good understanding of the resources needed and included them in base estimates, rather contingency costs. 'Ball-park' costs were provided in the EMV calculator for some projects because the project manager considered that they were unable to cost the risks. Contingency was included for sunk costs (where AEMO expected that projects may not be valued by market participants). In some calculators, EMV was calculated prior to determining the impact and likelihood of the project, rather than the other way around, and cost impacts of risks were mistakenly entered into the EMV column. In one calculator labour rate increases were allowed for in contingency costs that were already allowed for in base cost estimates.		• Contingency cost calculations should be based on established, repeatable methods of assessing project risks and determining input quantities, resulting in high quality estimates that are comprehensive and as accurate as possible, and can be easily and clearly traced, replicated, and updated. • Including some contingency in a cost estimate is good practice. • Only costs which would be incurred by a prudent provider of the services provided by AEMO in performing its functions, acting efficiently, to achieve the lowest practicably sustainable cost of performing AEMO's functions, while effectively promoting the Wholesale Market Objectives, should be included	

Source: ERA analysis of AEMO data

Figure 9 below illustrates the ERA's Draft Determination on AEMO's proposed contingency costs for AR6.

Figure 9: ERA's draft determination on AEMO's proposed contingency costs



Source: ERA analysis of AEMO data

Appendix 13 AR5 project analysis

Table 43: Comparison of AR5 determination against AR5 forecast costs ($'000)

	AR5 determination*			AR5 forecast actual			Total variance
Project	**WEM**	**GSI**	**Total**	**WEM**	**GSI**	**Total**	
Power system operation	516		516	5,130		5,130	(4,614)
System management system upgrade	2,215		2,215	3,646		3,646	(1,431)
Reduction of prudential exposure phase 2	2,478		2,478	3,069		3,069	(591)
POMAX database and metering	968		968	841		841	127
POMAX settlements replacement	1,521		1521	2,490		2,490	(969)
Business continuity capability	229	-	229	90	-	90	139
STEM Fortran replacement	448	-	448	434	-	434	14
Hardware and software lifecycle support	864	55	919	-	-	-	919
Enhanced control room tools	69	-	69	102	-	102	(33)
Demand and renewable energy forecasting	89	-	89	53	-	53	36
Market operator interface	363	-	363	-	-	-	363
PASA process improvement	-	-	-	114	-	114	(114)
System management application remediation	179	-	179	-	-	-	179
Spinning reserve cost allocation rule change	129	-	129	201	-	201	(72)
Administration improvements to outage process rule change	553	-	553	-	-	-	553
Identify and access management	112	56	168	440	-	440	(272)

	AR5 determination*			AR5 forecast actual			Total variance
Accommodation	2,054	131	2,185	-	-	-	2,185
Digital roadmap	4546	291	4837	-	-	-	4837
WEM reform	48,457	-	48,457	42,619	-	42,619	5,838
DER roadmap	14,600	-	14,600	10,930	-	10,930	3,670
Total	**80,390**	**533**	**80,923**	**70,159**	**-**	**70,159**	**10,764**

Source: ERA analysis of AEMO data.

**AR5 determination includes 2020 in-period submission and all contingencies.*

Table 44: AR5 forecast costs for projects not included in AR5 determination ($'000)

Project	Forecast costs
Cyber projects - various	2,965
Malaga DC refresh	723
AEMO web digital enhancement	438
Sharepoint platform transformation	111
RC_2018_06 full runway allocation of spinning reserve	201
RC_2019_01 relevant demand calculations	250
RC2019_03 Relevant Level Methodology	600
WA electricity demand forecasting	80
Reserve Capacity Mechanism pricing	2,151
Web portal refresh	289
BMO tie-break	94
Control room BT phone upgrade	170
WEM market modelling	329
Finance and procurement system replacement	319
Service management core	758
Event management roadmap	234
Public cloud design and build	732
Digital delivery centre build	202
Enterprise data consumption tool foundation build	67
Data governance capability	355

Project	Forecast costs
EPMO uplift	136
Digital core delivery team	238
Workstation refresh	275
Sundry small projects – under $50,000	211
Difference in AEMO submission between forecast total expenditure of $83.08 million and capital expenditure by projects worksheets of $82.08 million	1,000
Total costs	**12,928**

Source: ERA analysis of AEMO data