Australian Energy Market Operator Allowable Revenue and Forecast Capital Expenditure 2019/20 to 2021/2022

Draft decision

8 May 2019

Economic Regulation Authority
WESTERN AUSTRALIA

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Economic Regulation Authority

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Invitation to make submissions

Submissions are due by 4:00 pm WST, Friday 31 May 2019

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:

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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.

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Overview

The Australian Energy Market Operator (AEMO) estimates its funding requirements for its Western Australian operations every three years. In the electricity market, these include market operation and system management of the Wholesale Electricity Market (WEM) and to prepare for and facilitate the implementation of WEM and constrained network access reform. In the gas market, AEMO's functions include operating the Western Australian Gas Bulletin Board and preparing the Western Australian Gas Statement of Opportunities.

The Economic Regulation Authority must approve only those costs "which would be incurred by a prudent provider of the services", acting efficiently and "seeking to achieve the lowest practicably sustainable costs of delivering the services".[1] AEMO can recover approved costs through market fees charged to market participants.

On 15 March 2019, the ERA received AEMO's funding proposal for the fifth allowable revenue period (AR5) that extends from 1 July 2019 to 30 June 2022. The ERA must make its final determination on AEMO's funding by 14 June 2019.

There is a three-stage process for reviewing and approving AEMO's funding for AR5. This draft decision paper outlines initial findings from the ERA's review of AEMO's proposal and indicates a level of funding approved for AR5. The draft decision includes stakeholder feedback received in response to an issues paper published on 20 March 2019.

AEMO's AR5 funding proposal

For the three-year AR5 period, AEMO has estimated allowable revenue of $98.3 million and forecast capital expenditure of $77.2 million for its functions in the WEM, and allowable revenue of $5.9 million and forecast capital expenditure of $1.3 million for its gas functions.

Allowable revenue proposed for AR5 is consistent with that approved for the previous funding period, AR4, ending 30 June 2019. AEMO's AR5 submission suggested actual total allowable revenue expenditure will be $95.4 million at the end of the AR4 funding period. For the final determination, the ERA will seek updated actual expenditure information from AEMO. This is because several projects that were scheduled to begin in the AR5 period have been brought forward and have commenced in the AR4 period. The rescheduling of these projects will change AEMO's actual total spend for the AR4 period.

There are two large-scale projects driving most of AEMO's forecast capital expenditure in AR5: WEM reform ($51.3 million) and the digital roadmap ($13.8 million). Both projects are at an early stage of development.

Reforms to the WEM are needed to accommodate changes in the electricity sector as it transitions to more renewable, and intermittent, energy generation from wind and solar farms and rooftop solar systems. The WEM reform project plans to deliver the revised market frameworks and draft rule changes needed to support a new WEM design by mid-2020. From mid-2020 onwards, AEMO plans to design, procure and implement the IT and business systems required to deliver the re-designed WEM by 1 October 2022.

AEMO's digital roadmap project encompasses all its Australian operations and will be delivered over the next five years. A proportion of the cost of this project has been allocated to Western Australia. The digital roadmap will gradually replace existing standalone systems and provide a common centralised and secure platform upon which to build all future IT

[1] Rule Change Panel, 2018, *Wholesale Electricity Market Rules (11 January 2019)*. Clause 2.22A.11, (online)

infrastructure. This is anticipated to deliver efficiencies in systems development, support services and data sharing.

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The ERA must approve funding that meets the approval criteria in the WEM rules and Gas Service Information (GSI) rules; otherwise it breaches its legislative obligations. To be approved, estimates must represent the lowest practicable sustainable cost of providing the service or function.

AEMO has acknowledged that its capital expenditure forecasts for WEM reform represent its best estimate given the information available at the time of the submission. As the reform continues to evolve it will need to review and revise its estimates. AEMO advised that top-down estimation had been used to build the IT system implementation costs in the second and third years of AR5. This is because the project is at an early stage of development. New WEM rules to enable market reform are not yet drafted, and so AEMO does not have detailed business requirements against which to specify, and then compare and cost, different IT and business systems.

AEMO has followed a consistent approach to cost estimation and project governance for its AR5 submission. However, the ERA is unable to approve funding based on high-level, top-down estimates of costs, where detailed project scopes are still being defined. AEMO expects its cost estimates will change. This suggests current estimated costs cannot be the lowest practicable sustainable cost and so do not meet the funding approval requirements in the WEM rules and in the GSI rules.

The ERA's draft decision includes approval of $13.8 million forecast capital expenditure for AR5. This is equivalent to the proposed funding for the first year of the WEM reform project, excluding contingency,[2] and including the resource costs for the core WEM reform team over the full period.

The cost estimates for these elements of the WEM reform project meet the funding requirements in the WEM rules. The ERA is satisfied that this core team represents the minimum staffing level required. AEMO has demonstrated the core team is actively working on the individual activity areas identified in tranche 1, as evidenced by information shared with stakeholders. There is also a clear deliverable mid-2020 for the team to produce draft rule changes and framework documents to enable implementation of the new market design by 1 October 2022. Given that delivery of the WEM reforms continues beyond the end of the AR5 period, there is a requirement to have a minimum core WEM reform team in place for the duration of AR5. Therefore, the draft decision is to approve capital expenditure funding for the WEM reform core team for the three years of AR5.

AEMO will need to request additional funding for the second and third years of the WEM project, once it has a set of clear business requirements and market rules against which to design, cost, procure and implement new IT and business systems. This staged approach to funding approval is supported by market participants in their submissions to the ERA's issues paper. It will also enable AEMO to use its project lifecycle costing and governance process as intended, and so have more confidence in the cost estimates submitted to the ERA for approval. However, both AEMO in its submission and the Minister for Energy in his submission to the ERA's issues paper suggest a staged funding approach such as is recommended in the draft decision will result in higher overall costs for WEM reform.

[2] This is discussed in section 5.2.1

AEMO suggested that if it has funding certainty for the full three years, it can enter into commercial contracts with greater confidence and secure more economic contract rates. It would also avoid additional costs required to develop in-period submissions.

The Minister for Energy's submission also stated that "failure by the ERA to provide AEMO funding certainty over a multi-year period will detract from its ability to plan for reform and increase the costs of AEMO's work program".

These submissions did not provide evidence of additional costs that may be incurred. With the decision to allow core WEM reform team costs for the three-year AR5 period, the ERA is not aware of other costs that would result from a staged funding approach. However, if AEMO can provide information in a public response to this draft decision that demonstrates that the overall cost of the WEM program will increase as a result of having staged funding, then the ERA can take it into account in the final determination.

The Minister for Energy's submission also proposed that AEMO's WEM reform costs in AR5 will not change regardless of the market and policy settings adopted. However, AEMO's submission suggested that WEM reform costs will reduce if the project can leverage off new systems and IT infrastructure delivered as part of its digital roadmap project.[3] AEMO's submission also stated that it "will continue to refine and review the expenditure program to ensure activities are developed for the lowest sustainable cost".[4] Stakeholders have already observed changes in the proposed costs of WEM reform. Between information presented at the WA Electricity Consultative Forum in January 2019, and AEMO's submission in March, WEM reform costs increased by $4.39 million. During the ERA's review process, AEMO has provided several updates to project cost estimates since making its submission in March 2019.

AEMO's digital roadmap costs and benefits have been estimated in total for all Australian operations. Costs have been apportioned to Western Australia with an assumption that similar benefits will be realised in the WEM as have been estimated for the National Electricity Market. This maybe correct, but it has not been demonstrated. Detailed costs and benefits of the digital roadmap for Western Australia have not been determined. Therefore, the ERA has not approved any funding for the digital roadmap in its draft decision. AEMO should separately identify the costs and benefits for Western Australia that are anticipated to be delivered by the digital roadmap, compared to alternative options such as a Western Australian specific roadmap. Alternatively, AEMO could provide an estimate of the resources and other costs required to undertake this work. Either option could be provided to the ERA for consideration in the final determination.

The ERA's draft decision approves funding for three capital projects that were initiated and partially funded in AR4. The projects' scopes are defined, and project implementations are generally well advanced. AEMO has demonstrated prudent cost management and the cost estimates meet the funding approval requirements.

AEMO has also proposed 13 small-scale projects. Some of these projects are sufficiently developed to meet the funding approval criteria, and some are not. Details on individual capital projects are provided in Appendix 1.

In previous determinations, the ERA has accepted the inclusion of contingencies for capital projects, where the reasons for the contingencies are clearly defined and based on identified risks and proposed risk mitigation measures.

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3 AEMO, 2019, *2019-2022 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 81. (online)

4 Ibid. PP. 77

AEMO's submission outlined its approach to calculating project contingencies. However, the information provided does not clearly demonstrate that contingencies have been applied to individual projects based on identified tangible risks, but rather they have been applied as a 'standard' additional cost component (30 per cent) and for a small number of projects varied up or down.

In many cases this appears to be because projects included in the submission are in a very early stage of development and not yet defined fully. The project contingency has been added to acknowledge uncertainty. However, there is an alternative approach.

WEM rules provide for AEMO to incur allowable revenue and forecast capital expenditure, up to 15 per cent and 10 per cent respectively, over approved funding levels, before it needs to come back to the ERA for an in-period adjustment. This WEM rule mechanism and these allowances can be used as provision for contingency on AEMO's total capital program. This mechanism could be used as an alternative means of recognising uncertainty in AEMO's total capital program. The allowances could be a means of providing project contingency without requiring explicit identification of project risks. Alternatively, AEMO needs to provide clear, risk-based justifications of why individual project contingencies are required, and why they should be separately funded.

AEMO has advised that it prefers to reserve the 10 per cent and 15 per cent allowances for unbudgeted rule changes approved during an allowable revenue period. At public forums,[5] stakeholders have expressed the view that AEMO should have a minimum provision in its allowable revenue and/or forecast capital expenditure for the development and implementation of business-as-usual rule changes.

The ERA recommends that AEMO estimate and propose an amount to be included in its AR5 funding for developing and implementing business-as-usual rule changes during AR5 period. This estimate should be based on currently expected or known rule changes (outside the WEM reform program).

The ERA's draft decision is to approve GSI and WEM allowable revenue in principle. However, not approving some capital projects requires adjustments to depreciation charges and resource capitalisation charges in AEMO's forecast allowable revenue. The ERA requests AEMO to submit an updated allowable revenue in response to the draft decision.

Tables summarising the ERA's draft decision against AEMO's proposal are provided below.[6]

Table 1: AEMO's proposed funding for AR5 and the ERA's draft decision ($ nominal)

Item	AR4 approved	AR4 actual	AR5 proposed	AR5 draft decision	Variance
WEM allowable revenue	93,649	89,906	98,348	96,645	(1,703)
WEM forecast capital expenditure	32,113	29,357	77,203	20,813	(56,390)
GSI allowable revenue	5,619	5,460	5,893	5,893	-
GSI forecast capital expenditure	1,118	698	1,273	116	(1,157)

5 AEMO, 2019, *WA Electricity Forum – meeting notes January 2019*, (online).

6 Small variances in the tables are due to rounding.

Table 2: Proposed and draft decision funding for WEM Market Operations ($nominal)

Item	2019/20	2020/21	2021/22	AR5 total
AEMO proposed				
Allowable revenue	**13,695**	**14,109**	**14,959**	**42,764**
Forecast capital expenditure – Business-as-usual	9,197	2,127	1,689	13,013
Forecast capital expenditure – market reform	4,516	10,463	10,646	25,624
Forecast capital expenditure-total	**13,713**	**12,590**	**12,335**	**38,637**
ERA draft decision				
Allowable revenue[7]	**13,656**	**13,847**	**14,509**	**42,012**
Forecast capital expenditure – Business-as-usual	4,038	267	129	4,434
Forecast capital expenditure – market reform	3,948	1,441	1,486	6,875
Forecast capital expenditure-total	**7,986**	**1,708**	**1,615**	**11,309**
Allowable revenue variance	*(39)*	*(262)*	*(450)*	*(752)*
Capital expenditure variance	*(5,727)*	*(10,882)*	*(10,720)*	*(27,328)*

Table 3: Proposed and draft decision funding for WEM System Management ($nominal)

Item	2019/20	2020/21	2021/22	AR5 total
AEMO proposed				
Allowable revenue	**17,866**	**18,594**	**19,123**	**55,584**
Forecast capital expenditure – Business-as-usual	7,893	2,769	2,280	12,942
Forecast capital expenditure – market reform	4,516	10,463	10,646	25,624
Forecast capital expenditure-total	**12,408**	**13,232**	**12,926**	**38,566**
ERA draft decision				
Allowable revenue	**17,820**	**18,182**	**18,632**	**54,634**

[7] For this draft decision, the ERA has adjusted the allowable revenue by removing the depreciation for the capital projects that are not approved. No further adjustments (to employee benefits or other positions) have been made. AEMO will need to re-submit its allowable revenue to flow through all required adjustments from the removal of capital projects.

Forecast capital expenditure – Business-as-usual	2,351	125	153	2,629
Forecast capital expenditure – market reform	3,948	1,441	1,486	6,876
Forecast capital expenditure-total	**6,299**	**1,566**	**1,639**	**9,504**
Allowable revenue variance	*(46)*	*(412)*	*(492)*	*(950)*
Capital expenditure variance	*(6,109)*	*(11,666)*	*(11,287)*	*(29,062)*

Table 4: Proposed and draft decision funding for GSI ($nominal)

Item	2019/20	2020/21	2021/22	AR5 total
AEMO proposed				
Allowable revenue	2,045	1,925	1,923	5,893
Forecast capital expenditure	590	362	322	1,273
ERA draft decision				
Allowable revenue	2,045	1,925	1,923	5,893
Forecast capital expenditure	72	20	24	116
Allowable revenue variance	-	-	-	-
Capital expenditure variance	*(518)*	*(342)*	*(298)*	*(1,157)*

1. Introduction

The Economic Regulation Authority is responsible for determining the allowable revenue and forecast capital expenditure the Australian Energy Market Operator (AEMO) can recover through fees charged to market participants.[8] The expenditure covers the services AEMO provides in the Western Australia electricity and gas markets.

AEMO estimates its funding requirements every three years. The current funding period ends on 30 June 2019 and the next funding period extends from 1 July 2019 to 30 June 2022.

AEMO can apply to the ERA to approve additional funding within a three-year funding period, if:

- Budgeted capital expenditure for a financial year is 10 per cent greater than the forecast capital expenditure approved by the ERA for the review period.[9]
- Revenue recovery for a financial year is likely to result in allowable revenue greater than 15 per cent of the allowable revenue approved by the ERA for the review period.[10]

1.1 Funding approval process and timeline

On 15 March 2019, the ERA received a submission from AEMO seeking approval for its allowable revenue and forecast capital expenditure for the fifth allowable revenue (AR5) period, from 1 July 2019 to 30 June 2022. This proposal covers AEMO's activities in the Wholesale Electricity Market (WEM) and its Gas Service Information (GSI) functions.

On 20 March 2019, the ERA published AEMO's proposal and a short issues paper. Submissions were received from eight interested parties and a summary of the major points from these submissions is provided in chapter 4.

There is a three-stage process for reviewing and approving AEMO's funding for AR5. This draft decision paper outlines initial findings from the ERA's review of AEMO's proposal and provides an indicative level of funding approved for AR5.

The ERA is seeking feedback from interested parties on its draft decision, and will take into account stakeholder feedback received in response to the issues paper and this draft decision when making its final determination.

The ERA will continue to analyse AEMO's proposal and engage with AEMO on matters of clarification and detail throughout the review period. Any variation in the funding amounts approved in the draft and final determinations will be explained in the final determination paper.

Consultation on this draft decision paper closes on 31 May 2019. Requests for additional time to make submissions will not be accommodated, as the ERA must publish its final determination on AEMO's AR5 funding proposal by Friday 14 June 2019.

8 Rule Change Panel, 2019, *Wholesale Electricity Market Rules*, clause 2.22A.2 (online)

9 Ibid, Clause 2.22A.9

10 Ibid, Clause 2.22A.8

2. AEMO's AR5 funding proposal

AEMO's AR5 funding proposal covers:

- Business-as-usual functions in the Wholesale Electricity Market (WEM), including market operation and administration, system planning and system management.[11]
- WEM reform activities including preparing for and facilitating the implementation of WEM and constrained network access reform.[12]
- Functions under the Gas Service Information (GSI) rules, such as operating the Western Australian Gas Bulletin Board and preparing the Western Australian Gas Statement of Opportunities.[13]

Most WEM allowable revenue expenditure ($98.3 million) is for AEMO's business-as-usual activities.

WEM forecast capital expenditure, $77.2 million, is allocated 34 per cent to business-as-usual activities and 66 per cent to AEMO's WEM reform project. Just under half of the business-as-usual forecast capital expenditure is allocated to AEMO's digital roadmap project.

GSI expenditure is small in comparison to the WEM: $5.9 million in allowable revenue, and $1.3 million in forecast capital expenditure.

2.1 Allowable revenue

AEMO grouped its expenditure into four expense categories in AR5: employee benefits, supplies and services, depreciation and accommodation. AEMO has not included borrowing costs into its allowable revenue for AR5. The allocation by expense categories for the WEM is shown in. Figure 1 below.

Overall, allowable revenue proposed for AR5 is five per cent higher than the amount approved in AR4. Employee benefits expense is 24 per cent higher than that approved for AR4. This is driven by higher staff numbers and salary increases from AEMO's 2018 Enterprise Agreement. However, the increase is partially offset by a 19 per cent reduction in supplies and services expenditure from bringing IT support and system management IT functionality in-house.

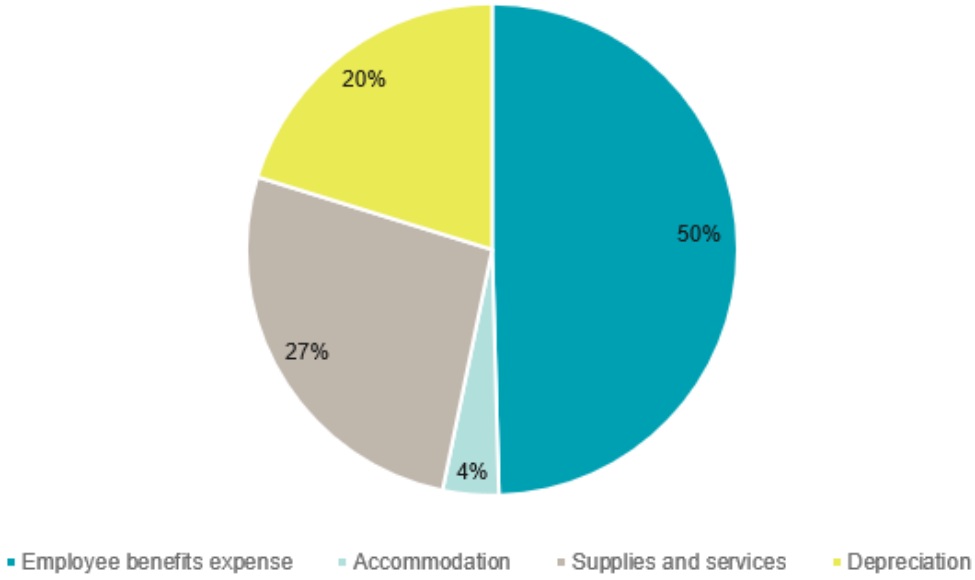
AEMO has applied different escalation factors on the different cost categories to reflect contractual obligations (for employee and accommodation costs) and has applied an average CPI of 2.1 per cent across the AR5 period. Following publication of the 2019/20 State Budget on 9 May 2019, the ERA recommends AEMO should update its CPI assumptions to align with the State Budget forward estimates.

11 AEMO's business-as-usual functions are listed in WEM Rule 2.22A.1.

12 AEMO's market reform activities are listed in WEM Rule 1.20.

13 Rule Change Panel. 2019, *Gas Service Information Rules*, clause 8 (online)

. Figure 1 WEM allowable revenue by expense category



Source: ERA analysis of AEMO data

Resource expenditure for employees, contractors and consultants drives 50 per cent of the allowable revenue and 62 per cent of the forecast capital expenditure. During AR5, AEMO will increase temporary resources to undertake capital projects. The increased numbers of contract staff and consultants will reduce as capital projects are delivered in later allowable revenue periods.[14] The WEM reform timeline anticipates that the new market will commence on 1 October 2022. This date falls in the first year of AR6.

AEMO is also seeking to increase its permanent operational staff, predominantly in system management and is in response to bringing all remaining systems management systems in-house.

During AR4, AEMO relocated to a single Perth office. The cost of this accommodation in AR5 has increased, as AEMO now occupies an additional half floor in the same building to house the anticipated increase in staff over AR5.

Over half of the expenditure on supplies and services is for payments to consultants (legal, IT and others). However, overall expenditure on supplies and services in AR5 is lower than that approved for AR4. This is a result of AEMO bringing system management systems in-house and ceasing the service level agreement it has with Western Power.

Depreciation forecast for AR5 is 13 per cent higher than was approved for AR4. This is because the depreciation charges from capital projects completed in AR4 and in the first two years of AR5 are incurred during AR5. The depreciation charges for the two largest capital projects (WEM reform and digital roadmap) are not included in AR5 depreciation. The capital costs of these two projects will be depreciated over later allowable revenue periods.

[14] The next allowable revenue period after AR5 is AR6, which runs from 1 July 2022 to 30 June 2025.

2.2 Capital projects

AEMO's submission outlined the approach it took to estimate and internally approve capital costs for the three-year AR5 period. It used a standardised cost estimation model and an internal top-down challenge approach to determine which proposed projects were to be included in the AR5 funding proposal.[15] AEMO has an established governance structure with clear roles and responsibilities that it used to develop the AR5 submission. AEMO's Board endorsed the AR5 funding proposal.[16]

Although AEMO used its corporate project lifecycle and governance procedures to prepare its AR5 submission, AEMO also acknowledged that its confidence in estimates varied:

> The timing of the three-year AR5 forecast requirements result in many projects being developed and assessed at an earlier stage than would otherwise be expected in the AEMO governance lifecycle. As a result, the level of detail and/or confidence in estimates will vary across projects – especially those moving into or starting later in the AR5 period or those of significant scale and duration.[17]

AEMO managed uncertainty when estimating capital project costs by applying project contingencies. It began with a project contingency of 30 per cent, which was then adjusted upwards or downwards after considering several factors that included:[18]

- Timing of the cost estimate (e.g. are there known business requirements and/or has rule drafting been provided?).
- Nature of the project (e.g. is this lifecycle upgrade for a known application or is it a bespoke project based on specific regulatory requirements?).
- Size and complexity of project (e.g. is it a small internal project or is it a multi-year project with multiple vendor and stakeholder interactions?).
- Nature and status of risk, assumptions, issues and dependencies.

Overall, AEMO included project contingency expenditure of $17.9 million in its AR5 submission, or 30 per cent of the total forecast capital expenditure. Contingency percentages for individual projects ranged from 10 per cent to 56 per cent. Most of the 22 capital projects identified in its proposal have contingencies of 29 per cent or higher.

Ongoing decisions have affected AEMO's cost estimates. AEMO has made several adjustments to its expenditure estimates since making its submission. One project has been cancelled and expenditure for others brought forward into AR4. Both actions have reduced forecast capital expenditure in AR5. Such adjustments to estimated project costs are identified as part of the ERA's draft decision in chapter 5.

The two largest capital projects, WEM reform ($51.3 million) and digital roadmap ($13.8 million) are discussed separately below.

15 AEMO, 2019, *2019-2022 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 29 to 31 (online)

16 Ibid, P. 29

17 Ibid, P. 48, footnote 19

18 Ibid, P. 48

2.2.1 WEM reform

In June 2018, the Minister for Energy conferred additional functions upon AEMO to "prepare for" and to "facilitate the implementation of" WEM and constrained network access reform.[19]

The WEM reform program must deliver a new wholesale electricity market design, to be operational from 1 October 2022. The main elements of the new WEM design are known: security constrained economic dispatch, co-optimised energy and ancillary services markets, facility bidding, and some form of constrained network access.

However, details on these market features are only just beginning to emerge through two Market Advisory Committee working groups: one led by the Public Utilities Office, the Market Design and Operation Working Group, which is providing advice on market design and operation, and the Power System Operation Working Group led by AEMO, which is providing advice on the technical operation of the power system.

AEMO acknowledged the current uncertainty in the market reform program and stated that the "precise detail of the revised market design is still being defined and will continue to evolve".[20]

Given the uncertainty surrounding the market reform program, AEMO advised that it has provided its "best estimate based on the information available"[21] and will continue to "refine and review the expenditure program to ensure activities are developed for the lowest sustainable cost".[22]

AEMO grouped[23] its market reform activities into three categories:

- Market design – designing, developing and consulting about changes to the legislation applying to the WEM, including the market rules.
- Implementation – procuring, developing and testing all systems, tools and procedures.
- Program management – project management, governance, planning, change management and stakeholder management activities.

AEMO's submission provided a high-level WEM reform timeline. This shows that market design activities will continue to mid-2020 culminating in the approval, by the Minister for Energy, of revised Wholesale Electricity Market (WEM) rules to enable security constrained economic dispatch. Implementation activities will increase from mid-2020 through the end of the AR5 period in readiness for the planned start date for the new market design, on 1 October 2022.

2.2.2 Digital roadmap

AEMO is developing the digital roadmap for all its Australian operations.[24]

> The Digital Roadmap sets out a strategy whereby AEMO's systems, data repositories, computing platforms, cyber security and technical solutions will be consolidated and

19 Rule Change Panel, 2018, *Wholesale Electricity Market Rules (11 January 2019)*. Clause 1.20, (online)

20 AEMO, 2019, *2019-2022 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, P. 77 (online)

21 Ibid, P. 77

22 Ibid, P. 77

23 Ibid, P. 107

24 Ibid, P. 67

simplified for use by all parts of the organisation, with flow on benefits to participants and consumers.

Western Australia's share of the Digital Roadmap expenditure is $13.8 million, allocated $12.7 million to the WEM and $1.1 million to GSI. AEMO provided commercial-in-confidence information to the ERA on how it allocated costs to Western Australia.

In its AR5 submission, AEMO identified some of the anticipated benefits based on analysis of National Electricity Market data and systems and stated, "it is reasonable to assume similar benefits will be realised in the WEM".[25]

[25] Ibid, P. 72

3. ERA's obligations under the market rules

The Wholesale Electricity Market (WEM) rules identify the ERA's obligations for approving AEMO's funding. Allowable revenue and forecast capital expenditure approved by the ERA "must include only costs which would be incurred by a prudent provider of the services", acting efficiently and "seeking to achieve the lowest practicably sustainable costs of delivering the services" in accordance with the market rules and while effectively promoting the WEM objectives.[26] The funding approval requirements apply to both AEMO's WEM and Gas Service Information (GSI) functions.

Under the WEM rules, this funding approval requirement applies to AEMO's market operation and system management functions, as well as to the additional market reform functions conferred on AEMO by the Minister for Energy through a change to WEM rule 1.20 in June 2018.

To be able to demonstrate lowest practicably sustainable costs and approve AEMO's funding, the ERA should be able to establish that:

- There is detailed information on the activities to be undertaken by AEMO, including how these activities contribute to the market objectives.
- The cost estimates are provided by robust models and governance mechanisms such that AEMO, market participants and the regulator have confidence in the cost estimates underpinning the submission.
- AEMO has considered different ways of delivering the projects/outcomes and demonstrated that the preferred option is lowest practicable sustainable cost, such as through option analysis and/or cost benefit analysis.

The WEM rules state that where possible the ERA should benchmark the allowable revenue and forecast capital expenditure against the costs of providing similar services in other jurisdictions.

3.1 Application of the funding approval obligations

Application of the funding approval obligations is straightforward for some elements of AEMO's AR5 funding proposal, but not for others. Below is a summary of how the ERA has applied the funding approval requirements in this draft decision.

Allowable revenue

AEMO's business-as-usual functions in AR5 are mostly unchanged from those at the end of AR4,[27] and most allowable revenue expenditure (99 per cent) is for business-as-usual activities. Therefore, the ERA followed the same process for reviewing allowable revenue expenditure in AR5 as it has in previous reviews.

The ERA has grouped capital projects into three broad categories for approval purposes.

[26] Rule Change Panel, 2018, *Wholesale Electricity Market Rules (11 January 2019)*. Clause 2.22A.11, (online)

[27] In AR5, AEMO will complete the transition of system management systems from Western Power and will take over all functions that were provided by Western Power during AR4.

Existing capital projects initiated and partially funded in AR4

Typically, these projects are well advanced as they enter the AR5 period. The ERA reviewed the appropriateness of funding for these projects in the previous AR4 allowable revenue period. AEMO has identified and assessed options for project delivery before choosing its preferred option. Cost estimates for these projects in AR5 are robust, the resources delivering the projects are known and so project contingencies can be expected to be relatively low.

AEMO has a track record of regularly delivering projects below budget. As with allowable revenue expenditure, it is relatively straightforward for the ERA to assess the expenditure for this group of capital projects against the funding approval criteria in the WEM rules.

New small-scale capital projects

There are several different drivers for the new, small-scale capital projects, including:

- external drivers, such as implementing accepted rule changes
- projects driven by audit findings
- projects to replace end-of-life IT systems or software.

The ERA has reviewed each project individually, and requested additional information from AEMO before applying the funding approval criteria in the draft decision.

New large-scale projects in early stages of development

The digital roadmap and WEM reform projects fall into this category and comprise most (83 per cent) of AEMO's forecast capital expenditure in AR5. AEMO's submission advised that in the second half of AR5:

> Top-down estimation has been used to build the implementation costs given current program timing and lack of new rules and therefore detailed business requirements. Modelling is based on high-level policy design with reference to previous cost estimation carried out for the EMR, other relevant AEMO IT projects, and the experience of AEMO's Program Management team.[28]

In meetings to discuss its submission, AEMO acknowledged that it preferred having a greater level of certainty on the business requirements needing to be delivered before it can clearly specify IT systems and business processes. To manage the absence of such certainty, AEMO included a higher contingency, on top of the estimated project costs.

Once new WEM rules have been developed, AEMO will be better able to specify the required systems and business processes. AEMO can then compare different options and estimate the costs of designing, procuring and delivering these systems and processes. AEMO could leverage off an existing National Electricity Market system, procure a system off the shelf, or build a bespoke system for the WEM. There will be different costs, risks and implementation timelines for each option.

The funding approval requirements in the WEM rules are challenging to apply before alternative delivery options have been analysed and the lowest practicably sustainable cost identified. However, to fulfil its obligations under the WEM rules (clause 2.22A.11), the ERA must apply the funding approval criteria to AEMO's AR5 submission.

[28] AEMO submission, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 83. (online)

Some projects, including the digital roadmap and WEM reform projects, include high level funding estimates as these projects are still in the early stages of development. With such uncertainty, funding estimates for these projects are unlikely to meet the approval criteria of being lowest practicably sustainable cost.

The ERA has grouped AEMO's capital projects against three broad categories for funding approval purposes and included the forecast costs for each group of projects in Table 5 below.

Table 5: Grouping of capital projects for funding approval purposes

Initiated and partially funded in AR4	New, small scale projects	New, large-scale and early stage projects
$5.7 million	**$7.7 million**	**$65.0 million**
Power system operation (including both e-terra implementation and upgrade projects)	POMAX EDM application and database upgrade	Digital roadmap
Reduction of prudential exposure (RoPE) phase 2	POMAX settlements replacement	WEM reform
System Management system transition	Business continuity capability	
	STEM Fortran replacement	
	Hardware and software life cycle support	
	Enhanced control room tools	
	Demand and renewable energy forecasting	
	Market Operator interface	
	PASA process improvement	
	System Management application remediation	
	Spinning reserve cost allocation (RC_2018_06)	
	Administrative improvements to outage process (RC_2014_03)	
	Identity and access management	

The ERA has summarised its draft decision on each of these groups of projects in chapter 5.2. Information on individual projects is provided in Appendix 1.

4. Public consultation on the issues paper

On 20 March 2019, the ERA published an issues paper[29] to assist interested parties make submissions on any aspect of AEMO's proposal. The ERA asked interested parties to review AEMO's proposal in detail. As two of the major capital projects are at an early stage of development, stakeholders were asked if they preferred the ERA to approve funding:

- for the full three years of the AR5 period
- through a staged approach where AEMO proposes additional funding as clarity and certainty develops through the market reform program.

Submissions to the issues paper closed on 15 April 2019. The ERA received eight submissions: from the Australian Energy Council, Bluewaters Power, the Chamber of Commerce and Industry of Western Australia, the Minister for Energy, NewGen Power Kwinana, Perth Energy, Synergy and Western Power. Submissions are available on the ERA's website.

All submissions, with the exception of the Minister for Energy and Western Power, preferred a staged approach to approving funding for AR5. Bluewaters Power and NewGen Kwinana suggested annual funding approvals:

> Over AR4, there were several additional approvals for capex as the extent of reform became clearer, which is implicitly conducting annual approval processes. Therefore, given the extreme uncertainty over the AR5 period, an annual assessment of funding should be sought. Bluewaters also suggest that the whole funding process be performed annually, including the BAU Opex funding. An annual funding process would then mean no additional impost and should provide a better control on costs.[30]

A staged, but not necessarily annual, funding approach was also supported by the Chamber of Commerce and Industry:

> CCIWA questions the need for AEMO to be approved funding to implement systems and processes that have not been designed yet. An incremental approach to approving capital expenditure would provide more certainty about the cost of reforms as the associated analysis and design work progresses.[31]

Perth Energy recommended that WEM reform funding "must include alignment with the availability of cost benefit assessments of each block/phase/project of the WEM reform program".[32]

Synergy suggested the ERA maintain the AR4 approach whereby AEMO proposed and the ERA considered expenditure and allowable revenue in a staged manner as, and when,

[29] Economic Regulation Authority, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*. (online)

[30] Bluewaters Power, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 1. (online)

[31] Chamber of Commerce and Industry, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 2. (online)

[32] Perth Energy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 5. (online)

sufficient information and project certainty was provided. However, Synergy also recognised that it can be difficult for Market Participants to budget for in-period funding adjustments.[33]

The Minister for Energy's submission states that "failure to provide funding certainty to AEMO over a multi-year period can only detract from its ability to plan for WEM and constrained network access reform as required under the WEM Rules and may ultimately increase the costs of AEMO's work program".[34] However, the Minister for Energy also acknowledged "that many aspects of future market and regulatory design are not yet finalised and will be determined over the next 12 months".[35]

AEMO's AR5 funding submission suggested that a single funding determination will promote efficiency and eliminate the additional costs and resources required to develop in-period submissions. However, AEMO has not yet provided any evidence to support this claim, despite being asked to do so in response to the issues paper.

Western Power preferred an "administratively simple determination process provided there is an appropriate adjustment mechanism such that revenue in future determinations can be reduced should the expenditure no longer be required".[36] AEMO does adjust market fees for differences between actual and budgeted expenditure within an allowable revenue period. However, AEMO is also able to undertake other discretionary projects within its approved funding level. Unless there is an in-period submission, there is no regulatory scrutiny of whether or not the cost of these discretionary projects meets the funding requirements in the WEM rules.

Comments in many of the submissions considered forecast capital expenditure proposed for the two largest capital projects, WEM reform and the digital roadmap, particularly given that both projects are at an early stage of development. The Australian Energy Council said:

> Considering the early stage of development of the market reform program, we are concerned with the ability to assess the AEMO revenue requirement, given the detail design of the wholesale market and the Information Technology systems required to operate such a market are yet to be identified. In other words, can the allowable revenue be efficiently determined in the absence of a detailed design?[37]

Perth Energy suggested AEMO had not made a sufficiently strong case for funding the two largest capital projects:

> The WEM reform initiatives are being driven by the PUO, and the digital roadmap is being driven by technical requirements in the NEM. AEMO is yet to demonstrate that the programs in their entirety can be considered prudent (in particular the timing) or that the costs included in the forecasts is reasonable and could be considered to reflect that of a service provider efficiently minimising costs for consumers.[38]

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33 Synergy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 3. (online)

34 Minister for Energy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 2. (online)

35 Minister for Energy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 2. (online)

36 Western Power, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 1. (online)

37 Australian Energy Council, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 1. (online)

38 Perth Energy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 5. (online)

Six submissions commented on the proposed increases in future market fees. Bluewaters commented on the anticipated complexity of a new market design, "considering the makeup of the WEM, which is a net settled and heavily bilaterally contracted market, the benefit gained from creating and maintaining such a complex system at this cost is especially difficult to justify".[39] Perth Energy's submission stated "AEMO is proposing to undertake significantly higher levels of capital expenditure than in previous allowable revenue periods. This has a material impact on current and future market fees".[40]

The Australian Energy Council and Chamber of Commerce and Industry of Western Australia were also concerned about the allocation of market reform costs to market participants. This was summarised in the Australian Energy Council's submission:

> AEC believes that participant fees should relate to costs of operating the market and accordingly market participants should not pay for government led market reform. In effect, consumers are being asked to pay upfront for reforms without any guaranteed benefits. The $51M capex requirement for reform in the AR5 allowable revenue request is significant.[41]

The Chamber of Commerce and Industry of Western Australia's submission noted that the approach of having the market pay for government-initiated reforms is "inconsistent with that of other jurisdictions and policy agencies in Australia". The submission also recommended a review of fee allocations in the WEM.[42] Two submissions (from Bluewater and Synergy) recommended that the ERA undertake comparisons of AEMO's proposed costs against those of market operators in other jurisdictions.

39 Bluewaters Power, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 2. (online)

40 Perth Energy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 1. (online)

41 Australian Energy Council, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 1. (online)

42 Chamber of Commerce and Industry, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 1. (online)

5. ERA's draft decision

This chapter outlines the ERA's draft decision on AEMO's funding proposal for AR5. The ERA is still reviewing and analysing AEMO's proposal, so this draft decision does not provide the same level of detail as would normally be provided in a draft determination. This paper provides an opportunity for stakeholders, including AEMO, to comment prior to the ERA publishing its final determination on 14 June 2019.

The draft decision cannot provide firm numerical estimates on all aspects of AEMO's proposal. For example, the draft decision does not approve funding to cover some capital projects, or approves only part of the funding requested. Removing some capital projects will affect the total allowable revenue estimate through changes to employee costs and depreciation charges. AEMO will be asked to provide a revised estimate of allowable revenue to account for changes to capital project funding.

Capital projects have been grouped into three categories for funding approval purposes. Section 5.2 provides a summary of the ERA's draft decision for each of these groups of projects. Details on individual projects are provided in Appendix 1.

5.1 WEM allowable revenue

AEMO provided detailed allowable revenue information to support its submission, consistent with information provided for previous reviews. Therefore, the ERA has applied the same approach to reviewing allowable revenue expenditure as it did in the past.

The ERA reviewed if and how AEMO's functions have changed in AR5 compared to earlier review periods, and the proposed funding for any identified function changes. The ERA assessed allowable revenue variances at a high level, comparing the allowable revenue proposed for AR5 with the actual and approved allowable revenue in AR4. Variances were also compared at a more granular, account code level: in total between AR4 and AR5, and year-by-year analysis from 2018/19 to 2021/22. Material variances were queried with AEMO.

AEMO proposed a WEM allowable revenue for AR5 of $98.3 million, which is five per cent higher than the allowable revenue approved by the ERA for AR4.

5.1.1 Employee benefits

Employee benefits expense is higher in AR5 compared to AR4 and accounts for just under half of all allowable revenue costs. The increases are driven by higher staffing levels and cost rises from AEMO's 2018 Enterprise Agreement.

Most of AEMO's full-time equivalent (FTE) staff are permanent employees and are engaged on business-as-usual activities. At the start of AR5, around a quarter of these will also spend some or all of their time on capital projects. During AR4, AEMO has engaged staff on fixed-term contracts and expects to engage further contract staff to either work directly on capital projects, or to backfill for permanent staff working on projects during AR5. Consultants will also be procured to deliver some capital projects.

Employee benefits are escalated by 2.9 per cent in accordance with AEMO's 2018 Enterprise Agreement, which covers the period November 2018 to June 2021. This agreement will expire, and a new agreement will need to be negotiated, one year before the end of AR5.

Resources have been costed using actual salaries for employees and indicative day rates for contractors and consultants. Employee and contractor costs are incurred in allowable revenue and then adjusted with a charge to capital projects, which are then depreciated over time.

The calculation of proposed employee benefits expenditure for AR5 is consistent with the escalation factors and other assumptions provided, such as FTE growth rates. The escalation factors and other assumptions were tested and found to be reasonable. Average employee costs (salaries only and total employee costs) were calculated to confirm that the growth in FTE numbers (including fixed-term contractors) is driving the increase in employee expense benefits observed in AEMO's submission over and above the escalation factor.

Employee benefits expenditure includes the salaries for all forecasts FTEs, who are expected to be employed by AEMO during AR5. These costs are then adjusted to account for the capitalisation of costs for staff who are working on capital projects.

The ERA has reviewed FTE numbers for the proposed capital projects schedules and is satisfied that the year-on-year movements are reasonable. There is an increase in permanent system management staff resulting from the transfer of system management to AEMO. Resource numbers increase during AR5 reflect the ramping-up of effort to deliver the WEM reform project. A corresponding decrease in resources will not be observed until after the new WEM design goes live in AR6 (2022/23 to 2024/25).

Although the ERA calculated average employee costs, it is aware that different rates apply for different types of FTEs and that fixed-term contractors are not eligible for all employee benefit payments (for example, long service leave). The averaging approach has been chosen to review, at a high level, the overall reasonableness of employee benefits expenditure growth over the AR5 period. The ERA continues to work with AEMO to understand the detail of staffing levels and the appropriate combination of internal, contract and consulting staff.

5.1.2 Accommodation costs

At the beginning of AR4, AEMO selected the location for its current Perth office and provided the ERA with a comparison of different accommodation alternatives.[43] The ERA's AR4 final determination considered that the "process and criteria used by AEMO to select the new office to be robust and thorough. The Authority considers AEMO's proposed accommodation cost to be reasonable".[44]

In the final year of AR4, AEMO rented an additional half floor in the same building for extra staff, contractors and consultants required for its additional WEM reform functions, conferred by the change to WEM rule 1.20. AEMO requested additional forecast capital expenditure to set up and equip this additional half floor. In its December 2018 determination, the ERA acknowledged that AEMO will require additional space, but was not satisfied that AEMO has considered all available options prior to renting the new floor[45] and did not approve additional capital funding. AEMO used available approved funds from the previous AR4 determination to fit-out and equip the additional half floor.

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43 As part of the AR4 final decision, AEMO has provided the ERA with costings for several different office spaces (all within the Perth CBD), and at that time the ERA was satisfied that the selected location represents best value for money.

44 Economic Regulation Authority, 2016, *Allowable Revenue and Forecast Capital Expenditure for the Australian Energy Market Operator 2016/17 - 2018/19 Final Determination*, PP. 15. (online)

45 Economic Regulation Authority, 2018, *Australian Energy Market Operator - Allowable Revenue and Forecast Capital Expenditure for 2016/17 to 2018/19 - Forecast Capital Expenditure Adjustment Final Determination*, PP. 28. (online)

Forecast accommodation costs in AR5 are 22 per cent above the actual expenditure incurred in AR4. This is primarily due to actual costs in AR4 being lower than anticipated rather than forecast costs in AR5 being higher. The ERA is in the process of clarifying why the actual AR4 accommodation expenditure is so low.

The proposed operational expenditure on accommodation includes utilities and outgoings, such as water, electricity and building management costs, and rent for the two and a half floors currently occupied.

Rental costs are escalated by the fixed annual review rate included in the rental agreement. The remaining accommodation costs are escalated by the CPI. Overall, the ERA is satisfied that the proposed accommodation costs are reasonable for the current location. AEMO has demonstrated that it selected the least cost accommodation option, of the options considered, when it moved to its Central Park office. AEMO has confirmed that it expects this space to be sufficient to undertake all its functions during AR5. AEMO's accommodation strategy now includes options such as requiring consultants to work from their own premises and hot desking to minimise the need for additional office space. This demonstrates that AEMO has sought to restrict its accommodation costs.

However, should AEMO need to consider its accommodation needs in the future, it could extend the range of options considered to include lower cost accommodation options outside the central business district.

5.1.3 Supplies and services

AEMO's proposed supplies and services expenditure for AR5 is 29 per cent lower than its forecast actual expenditure for AR4. This is mostly driven by the cessation of AEMO's service level agreement with Western Power in the first year of AR5.

Following completion of the system management system transition project,[46] which will bring all remaining system management systems and functions in-house in the first AR5 year, the service level agreement with Western Power will cease. While there will still be some cost incurred from the agreement in 2019/20, over the full AR5 period, the contribution of the service level agreement to overall supplies and services costs reduces substantially.

Software and hardware upgrades and support contracts are another cost driver within the supplies and services expense category. These IT upgrade and support costs are forecast to grow from an average of 18 per cent of the total supplies and services expenses during AR4 to 30 per cent in AR5.

AEMO becomes responsible for more technology once system management IT functions transfer out of Western Power. From January 2020, AEMO will take full operational control and responsibility to manage, upgrade and support all system management systems and functions. In addition, following completion of the power system operations project (when AEMO's new e-terra energy management system goes live), AEMO will begin to incur upgrade and support costs for e-terra.

The supplies and services expenditure is escalated by CPI of 2.1 per cent per year. Taking into account these additional IT systems AEMO will fully own from AR5 onwards, the ERA considers that the proposed supplies and services expenditure is reasonable. Bringing systems in-house has resulted in an overall reduction in supplies and services expenditure, consistent with AEMO seeking least cost solutions.

[46] This project was approved by the ERA in its December 2018 determination, PP16 (online)

5.1.4 Borrowing costs

AEMO has advised that in AR5 it will not recover borrowing costs through its allowable revenue, but will include these directly into the costs of each capital project. The ERA still has to investigate the treatment of borrowing costs.

5.1.5 Depreciation

The total proposed depreciation for the WEM is 68 per cent higher than the actual deprecation for AR4. The two main factors contributing to this are the low level of actual depreciation in AR4 and the high forecast depreciation for AR5.

Actual depreciation charges in AR4 were low because many of the systems AEMO inherited from the Independent Market Operator were old and fully depreciated. Also, most of the capital expenditure in AR4 was for IT systems that will either be installed towards the end of the AR4 period or will be completed in AR5. Therefore, the depreciation charges for these assets did not fall in AR4.

Instead, depreciation charges for the assets installed at the end of AR4 and in the first and second years of AR5 will be incurred in AR5. These systems have useful lives of between three and five years, which the ERA has confirmed is consistent with commonly accepted useful lives of software and hardware. In specific cases AEMO has accelerated system depreciation where systems will be replaced as part of the WEM reform implementation. This is also considered a reasonable approach.

The expenditure proposed for the WEM reform and for the digital roadmap will not be depreciated before AR6, as the projects will not be completed in AR5.

The ERA is satisfied that the depreciation expenditure forecast by AEMO for AR5 is consistent with standard business accounting practise.

5.1.6 Conclusion

The ERA's draft decision is to approve AEMO's WEM allowable revenue in principle. However, this approval is subject to adjustments for capital projects not approved and clarification on final resource estimates and the treatment of borrowing costs. AEMO will need to calculate the revised allowable revenue estimates through its corporate accounting systems to ensure all adjustments are appropriately captured. For this draft decision, the ERA has calculated a depreciation-only adjustment of approximately $1.7 million over the AR5 period.

5.2 WEM forecast capital expenditure

This section summarises the ERA's draft decision on WEM forecast capital expenditure for AR5. There is a summary of the draft decision by project groups below, with a comparison of WEM forecast capital proposed and the ERA's draft decision by project in Table 6. Commentary on individual projects is provided in Appendix 1.

5.2.1 Treatment of contingencies

In previous determinations, the ERA has accepted the inclusion of contingencies for capital projects, where the reason for the contingencies are clearly defined and based on identified risks and proposed risk mitigation measures.

AEMO's submission outlined its approach to calculating project contingencies. However, the information provided does not clearly demonstrate that contingencies have been applied to individual projects based on identified tangible risks, but rather they have been applied as a standard additional cost component (30 per cent) and, for a small number of projects, varied up or down.

In many cases this appears to be because projects included in the submission are in a very early stage of development and not yet defined fully. The project contingency has been added to acknowledge uncertainty. However, there is an alternative mechanism available to AEMO.

WEM rules 2.22A.8 and 2.22A.9[47] enable AEMO to incur higher allowable revenue and forecast capital expenditure, up to 15 per cent and 10 per cent respectively, over a full allowable revenue period, before it needs to come back to the ERA for an in-period adjustment. This mechanism could be used as an alternative means of recognising uncertainty in AEMO's total capital program. The allowances could be a means of providing project contingency without requiring explicit identification of project risks.

AEMO has advised that it prefers to reserve the allowances provided by WEM rules 2.22A.8 and 2.22A.9 for unbudgeted rule changes approved during an allowable revenue period, or for other unforeseen expenses. At public forums,[48] stakeholders have expressed the view that AEMO should have a minimum provision in its allowable revenue and/or forecast capital expenditure for the development and implementation of business-as-usual rule changes. Under WEM rule 2.1A.2(IA) AEMO has market development and support functions, and the ERA is of the view that funding for these functions should be included in its allowable revenue forecast.

The draft decision is:

- To approve forecast capital expenditure where it meets the funding requirements in the WEM rules, but without any specific project contingency expenditure.
- To request that AEMO uses the mechanism present in the WEM rules to accommodate cases where the actual costs are above the approved amount for each project, unless it can provide clear, risk-based justifications why individual project contingencies are required and should be separately funded.
- For AEMO to estimate and propose an amount to be included in its AR5 funding for its market development (where appropriate) and implementation functions for business-as-usual rule changes under WEM rule 2.1A.2(IA) during the AR5 period. This estimate should be based on currently expected or known rule changes (outside the WEM reform program).

5.2.2 Existing projects initiated and partially funded in AR4

There are three projects identified as initiated and partially funded in AR4: the power system operations projects (e-terra), system management system transition (SMST) project and the reduction in prudential exposure (RoPE) project Phase 2. In AR4, the ERA reviewed the justification and the cost estimates for all three projects and approved additional funding where necessary.

In its December 2018 determination, the ERA approved forecast capital expenditure for AEMO to continue the implementation of its energy management system, e-terra (version 2.5).

47 Rule Change Panel, 2018, *Wholesale Electricity Market Rules (11 January 2019)*. Clauses 2.22A.8 and 2.22A.9, (online)

48 AEMO, 2019, *WA Electricity Forum – meeting notes January 2019*, (online)

AEMO's proposal for AR5 was to complete implementation of e-terra ($0.5 million) and then upgrade to version 3.2 ($0.7 million). Since making its submission, AEMO has decided to install version 3.2 directly within the original project estimate of ($0.5 million).

The requirement for the e-terra system has already been established in previous ERA determinations. By comparing different install and upgrade options, AEMO has demonstrated prudent cost management and so the ERA's draft determination is to approve forecast capital expenditure of $0.418 million for AR5.

In its December 2018 determination, the ERA acknowledged that the SMST project was the least cost option in the circumstances. However, there was sufficient funding approved but unspent and so available for AEMO to progress the project in AR4.[49] The ERA did not need to approve additional funding at the time.

AEMO has advised that the total project cost has reduced to $5.0 million, of which $2.2 million will be incurred in AR5 including project contingency. The ERA has already confirmed that the SMST project is the least cost option and AEMO has managed costs prudently during the project. Therefore, the draft decision is to approve forecast capital expenditure of $1.703 million for AR5.

In its December 2018 determination, the ERA approved $2.7 million of additional forecast capital expenditure in AR4, to deliver Phase 1 of the RoPE project. Due to an underspend on internal costs and no requirement to call on the 30 per cent project contingency, AEMO has advised the ERA that the RoPE Phase 1 project will be completed at a forecast capital cost of $1.6 million. AEMO has estimated that capital expenditure of $2.3 million will be required to complete Phase 2 of the RoPE project in AR5.

The rule change proposal demonstrated the anticipated $69 million reduction in credit support payments by market participants that would be delivered by the RoPE rule and procedure changes. AEMO has continued to engage with market participants through the WA Rule Change Projects Working Group meetings and has consulted on different options for delivery and implied costs. The sizeable benefits anticipated by delivering the project, and AEMO's demonstrated cost control have informed the ERA's draft decision to approve $1.872 million in forecast capital expenditure for AR5.

5.2.3 New small-scale projects

There are 13 small-scale projects with a total forecast capital expenditure of $7.7 million. Some of these projects are driven by the need to update systems or from software reaching end-of-life, others are externally driven such as to implement an accepted rule change. Other projects are driven by recommendations from AEMO's annual audit.

The ERA's draft decision is to not approve funding where there is insufficient detail to:

- justify the need for the project
- explain how the project costs have been determined
- demonstrate that the forecast is lowest practicably sustainable cost.[50]

[49] ERA, 2018, *Australian Energy Market Operator - Allowable Revenue and Forecast Capital Expenditure for 2016/17 to 2018/19 - Forecast Capital Expenditure Adjustment Final Determination*, pp. 16-19. (online)

[50] Rule Change Panel, 2018, *Wholesale Electricity Market Rules (11 January 2019)*. Clause 2.22A.11(b), (online)

AEMO is invited to provide additional or enhanced information in support of those projects without approved funding as part of its response to the draft decision.

The ERA has approved forecast capital expenditure where AEMO has provided a clear project scope, has considered alternative options where appropriate and has demonstrated that forecast costs meet the funding requirements in the WEM rules. Where the draft decision is to approve forecast capital expenditure, no funding has been approved for project contingencies consistent with commentary in section 5.2.1 of this draft decision.

The draft decision is to approve forecast capital expenditure of $3.069 million for this group of small-scale capital projects. Information on individual projects is provided in Appendix 1.

5.2.4 Large-scale, early stage projects

The ERA has reviewed AEMO's standard approach to cost estimation for AR5 and acknowledges the approach is reasonable and that AEMO has demonstrated project governance and accountability for internal funding approvals. However, a reasonable approach to cost estimation is no guarantee that the costs meet the funding approval requirements in the WEM rules and that the estimates provided are the 'lowest practicably sustainable costs' of undertaking the functions.

The application of WEM rule funding approval obligations is more challenging where:

- There is uncertainty around how a project is to be delivered. For example, when the options for delivering a business solution or outcome are still to be identified, costed and compared.
- Projects are still in the early stages of design, and cost estimates are by nature high-level and top-down.

These points apply to the digital roadmap and WEM reform projects, which comprise 83 per cent of AEMO's total forecast capital expenditure for AR5. AEMO acknowledged[51] that "top-down estimation has been used to build the implementation costs given current program timing and lack of rules and therefore detailed business requirements".

When approving AEMO's allowable revenue and forecast capital expenditure, the ERA must apply the funding approval requirements in the WEM rules, otherwise it does not meet its obligations under the WEM rules. Application of the funding requirements is challenging for AEMO's two large-scale, early stage projects, where scope and delivery are still uncertain, particularly in the later years of AR5. Therefore, for the draft decision, the ERA has considered staged funding approval for these projects.

A partial, or staged, approach to funding approval for the WEM reform project was supported in most stakeholder submissions to the ERA's issues paper as summarised in chapter 4. However, at a stakeholder meeting early in 2019,[52] AEMO expressed the concern that the staged funding approach may result in additional costs to AEMO, the ERA and market participants in preparing and reviewing a subsequent funding proposal, as well as in reduced contracting efficiency. Also, in the introduction to its AR5 submission, AEMO preferred a single determination for the three-year allowable revenue period on the basis that this provided "greater certainty both in terms of access to funding," and that it "enables contracts to be

51 AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 83. (online)

52 AEMO, 2019, *WA Electricity forum – meeting notes February 2019*, (online)

entered with greater confidence".[53] This concern was repeated in the Minister for Energy's submission in response to the ERA's issues paper.

However, approving a three-year allowable revenue and forecast capital expenditure does not provide certainty that AEMO will not request additional funding during AR5, and the WEM rules make provision for this, as they provide for in-period funding submissions.

On the 6 March 2019,[54] the Minister for Energy launched the Western Australian Energy Transformation Strategy and announced that the Government will develop a whole of system plan and a distributed energy resources roadmap. AEMO expects that it will have a role in the whole of system plan to develop a more coordinated future power system, and distributed energy resources roadmap to integrate household rooftop solar and battery storage into the electricity system. However, there was insufficient detail on these developments at the time for AEMO to include expenditure in its AR5 submission.

Despite its preference for a single, three-year funding determination, AEMO has acknowledged this may not be possible and that an alternative option could be to:

> Approve a forecast capital amount sufficient to enable AEMO to update key systems and perform activities during the first year of AR5, with a view to making a separate determination mid 2019-20 to adjust for the remainder of the AR5 period.[55]

WEM reform

Over 60 per cent of total WEM reform capital expenditure is for resources, or staffing. Based on the information provided on staffing numbers, AEMO expects to enter AR5 having already recruited most of its WEM reform internal project team. At the start of AR5, there will be 23 internal FTEs (including permanent employees and fixed-term contractors) working on the WEM reform. Five and a half additional FTEs are expected to be recruited in the second half of 2019/20 and around two more in 2020/21. Most of these FTEs will remain until the end of AR5 and around two thirds are expected to remain in the first year of AR6, the year of completion of the WEM reform. Of these FTEs, AEMO has identified a 'core WEM reform team' of around 14 FTEs, which is responsible for delivering WEM reform by 1 October 2022. These staff are already in place.

Most of the resource costs in the second and third years of AR5 are for consultants ('external'), procured through competitive tender. There are around five full time consultants at the start of AR5, sharply increasing in the second AR5 year (by an additional 18) for the implementation phase, and gradually reducing over the final year.

The number of internal and external staff working on WEM reform at the beginning of AR6 is expected to be higher that at the beginning of AR5. This is reasonable, given WEM reforms are not expected to be completed until the first year of AR6. Peak staffing levels will occur in the second and third years of AR5.

The ERA understands that the 'core WEM reform team' will be involved in the WEM reform project until its completion in AR6. These individuals will manage market reform activities through the different project stages. In the first AR5 year, the core WEM reform team will be engaged with developing and designing the new market characteristics, culminating in new

53 AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 17. (online)

54 Minister for Energy, 2019, *McGowan Government launches Energy Transformation Strategy*, (online)

55 AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 11. (online)

WEM rules. These rules will then inform the system requirement design and implementation phases of the project in years two and three of AR5.

AEMO has identified the WEM reform core team members, the skills and knowledge they bring to the project and the allocation of their time to project activities. The ERA is satisfied that this team represents the minimum FTEs required. AEMO has demonstrated the core team is actively working on the individual activity areas identified in tranche 1 (and undertaking some early tranche 2 work), as evidenced by information shared through the two Market Advisory Committee Working Groups.

There is also a clear deliverable mid-2020 for the team to produce draft rule changes and framework documents to enable implementation of the new market design by 1 October 2022. Given that delivery of the WEM reforms continues beyond the end of the AR5 period, there is a requirement to have a minimum core WEM reform team in place for the duration of AR5. Therefore, the draft decision is to approve capital expenditure funding for the WEM reform core team for the three years of AR5.

The Minister for Energy has endorsed the WEM reform program, and the date for the new market design remains unchanged at 1 October 2022. This provides some certainty that the WEM reform project will continue as planned through AR5. AEMO has also provided additional detail on tranches 1 and 2 WEM reform activities in the first year of AR5, and how these activities have been costed. The ERA is comfortable that the activities are well scoped, cost estimates are prudent and contribute to a clear deliverable by mid-2020. The draft decision is to approve all of the funding for the first year of the WEM reform project, excluding contingency.

In total, the draft decision approves $13.8 million for AR5.

From conversations with AEMO during the review process, AEMO has advised that it prefers having access to specified business or IT system requirements, as can be provided by draft market rule changes, before it can competitively tender for external consultants to deliver the project. At the current stage of the WEM reform, such details are not yet available and will not be available until mid-2020.

The draft decision is to not approve forecast capital expenditure required in later years, over and above the forecast costs for the core WEM reform team. There is insufficient information available on these costs for the ERA to establish that they meet the funding requirements in the WEM rules. This is not a criticism of AEMO's approach, but rather acknowledgement that it is too early in the WEM reform process for AEMO to estimate costs that meet the funding approval requirements.

AEMO will need to provide a revised funding proposal for the last two years of AR5, where most expenditure is for the implementation of the new systems. The ERA recommends AEMO does not make a further funding proposal until more certainty on WEM reforms is available.

AEMO has commented that a staged funding approach may incur additional costs and lock resources to develop in-period submissions.[56] AEMO's funding proposal and the Minister for Energy's response to the issues paper both suggest the WEM reform program may cost more if there is less certainty on funding. With the decision to allow core WEM reform team costs for the three-year AR5 period, the ERA is not aware of other costs that would result from a staged funding approach. However, AEMO is invited provide information in its response to the

[56] AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 11 (online)

draft decision that clearly demonstrates and provides evidence that the overall cost of the WEM program will increase as a result of having staged funding.

Once the ERA has information on any anticipated additional costs it can assess these against the benefits from having staged funding for WEM reform. The main benefits are outlined below.

When considering an in-period submission, the ERA must review funding for the whole review period. The ERA can assess AEMO's actual costs against approved funding. Where projects have come in under budget or where projects are delayed, these saving can be reflected in adjustments to any additional funding approved.

Once draft market rules are available, AEMO has indicated that it can better assess business requirements to be met by IT capital projects and can consider different options to deliver these requirements, including leveraging off new platforms delivered by the digital roadmap project. AEMO is also able to process individually and discretely scoped projects through its project lifecycle and governance process, including preparation of business cases and project concepts.

A staged funding approach will therefore allow AEMO to provide better information on the expected costs by following its own internal governance processes. It will also allow the ERA to undertake a thorough assessment of the information provided to ensure that it only approves costs that meet the 'lowest practicably sustainable costs' approval criteria in the WEM rules.

Digital roadmap

In previous allowable revenue determinations, the ERA has approved funding for digital roadmaps proposed by the Independent Market Operator. However, applying the funding approval criteria for the proposed digital roadmap project is challenging because the project:

- Was introduced late in AEMO's public AR5 preparation and stakeholder communication process.
- Is described at a high level, with costs and benefits focussed on the National Electricity Market.
- Does not clearly identify that the costs applied to the WEM are the lowest practically sustainable costs.

Given the above matters, stakeholders have expressed concern about the ERA approving funding for the project. In reviewing AEMO's submission, the ERA requested additional information on the digital roadmap project. At this early stage, AEMO was unable to identify what resources will be engaged on the project. It is also unclear how and when some of the relatively new IT systems in the WEM[57] will be rolled into the new centralised infrastructure platform to be delivered by the roadmap project, nor how this aligns with the proposed capital expenditure profile. AEMO has not costed alternative options, such as developing Western Australian systems in isolation from the National Electricity Market, to understand the scale of the benefits for the WEM.

The draft decision is to not approve any digital roadmap funding at this stage. AEMO is invited to determine and cost the resources that are required to establish a project that can fully scope the cost and benefits that would accrue to the WEM from the design and implementation of the digital roadmap and submit these project scoping costs to the ERA in advance of the final

[57] These new Western Australian systems include the Reserve Capacity Mechanism system, the three new systems delivered through the power system operations project, and the new settlements system.

determination. If AEMO cannot manage this in the timeframe the ERA will ask its technical consultant to provide an estimate.

5.2.5 Summary of WEM forecast capital expenditure by project

Table 6 provides a comparison, at the capital project level, of AEMO's proposed capital expenditure and the ERA's draft decision. The ERA is proposing to approve funding of $20.8 million, or 27 per cent of the WEM forecast capital expenditure proposed by AEMO for AR5. Detail on individual projects is provided in Appendix 1.

Table 6: Proposed and draft decision funding by WEM capital project ($'000 nominal)

WEM capital project	AEMO proposed	Draft decision	Variance
Existing projects			
Power System Operation	473	418	(55)
E-terra upgrade	687	-	(687)
System Management System Transition	2,209	1,703	(506)
Reduction of Prudential Exposure Phase 2	2,324	1,872	(452)
Sub-total existing projects	**5,693**	**3,993**	**(1,700)**
New, small-scale projects			
POMAX Database and Metering	1,036	946	(90)
POMAX Settlements Replacement	1,597	1,132	(465)
Business continuity capability	498	-	(498)
STEM Fortran replacement	469	-	(469)
Hardware and software lifecycle support	904	696	(208)
Enhanced control room tools	304	-	(304)
Demand and renewable energy forecasting	90	69	(21)
Market operator interface	420	-	(420)
PASA process improvement	216	-	(216)
System Management application remediation	406	-	(406)
Spinning reserve cost allocation rule change	176	114	(62)
Administrative improvements to outage process rule change	408	-	(408)
Identity and access management	1,045	112	(933)
Sub-total new small-scale projects	**7,569**	**3,069**	**(4,500)**
Large-scale, early stage projects			
Digital roadmap	12,692	-	(12,692)
WEM reform	51,249	13,751	(37,498)
Sub-total large-scale early stage projects	**63,941**	**13,751**	**(50,190)**
Total WEM forecast capital expenditure	**77,203**	**20,813**	**(56,390)**

5.3 GSI allowable revenue and forecast capital expenditure

For AR5, AEMO has proposed allowable revenue 7.9 per cent higher than it spent in AR4. AEMO has estimated an allowable revenue requirement of $5.9 million for its GSI functions, allocated over the same expense categories as the WEM allowable revenue.

The proposed employee benefits expenses are 40 per cent above the actual forecast position for the AR4 period. This is because during AR4, AEMO increased the number of FTEs allocated to GSI functions from three to six to accommodate in-house production of the annual Gas Statement of Opportunities report. It expects to retain the six FTEs during AR5.

The ERA has undertaken per FTE and year-on-year analysis of the employee benefits expenditure and is satisfied that the forecast growth is in line with FTE numbers and annual salary increases, as outlined in AEMO's 2018 Enterprise Agreement.

Following the move to the new AEMO office, AEMO has reviewed the way it allocates costs between business units, specifically between the two units that were transitioned from the Independent Market Operator: market operations and GSI. Subsequently, the accommodation costs allocated to the GSI function have dropped by around a third in the final AR4 year and are forecast to be 18 per cent lower over the full AR5 period.

AEMO's actual forecast expenditure for supplies and services in AR4 is 13 per cent below the approved level for this period, but the proposed AR5 allowable revenue is 32 per cent above actual AR4 expenditure. One of the drivers for this is that AEMO has proposed retaining consultancy support while it is bringing forecasting and production of the Gas Statement of Opportunities report in-house. The ERA continues to work with AEMO to understand the requirement for this expenditure.

The total deprecation cost for AR5 is expected to be over 50 per cent below both the actual and the approved depreciation in AR4. AEMO underspent forecast capital expenditure for AR4 by 38 per cent, which results in a lower depreciation for AR5. Most forecast capital expenditure that will be incurred in AR5 for GSI functions, namely the digital roadmap project, will attract depreciation in AR6.

AEMO allocated eight per cent of the forecast capital expenditure for three capital projects in AR5 to the GSI business unit, these are:

- Lifecycle support investment for hardware and software to cover system growth and application upgrades: GSI allocation is $79,000 of the total expenditure of $983,000.
- Identity and access management: GSI allocation is $91,000 out of the total project cost of $1.1 million
- Digital roadmap: GSI allocation is $1.1 million of the full expenditure of $13.8 million.

At the stage of the draft decision, the ERA considers that AEMO's proposed allowable revenue for its GSI functions is reasonable. The draft decision is to approve $5.9 million allowable revenue for GSI functions for AR5 in principle, subject to adjustments for any capital projects not approved.

The ERA has adjusted the proposed forecast capital expenditure for GSI functions as follows:

- Lifecycle support investment for hardware and software to cover system growth and application upgrades: The proposed expenditure for this project includes 30 per cent contingency, applied in the final year of AR5. As stated in AEMO's submission, this project involves "occasional, and relatively minor, uplift to accommodate capacity demand for disk space, CPU or network bandwidth."[58] The ERA recognises AEMO must procure hardware and software to update and upgrade its existing systems and so the draft decision approves forecast capital expenditure of $60,000 in AR5.

[58] AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 66. (online)

- Identity and access management: During the determination process, AEMO advised that this project commenced early (in AR4) and most of the funding will be incurred in AR4. AEMO provided an updated total cost for this project in AR5 that excludes contingencies. The draft decision is to approve forecast capital expenditure of $56,000 for AR5. While the full amount has reduced materially compared to AEMO's submission, the updated expenditure information has also allocated a higher portion of expenditure to the GSI function. This is because AEMO has undertaken more planning and scoping work and now has better understanding of how to allocate the costs between the WEM and GSI functions.
- The ERA's draft decision is not to approve funding for the digital roadmap. This is explained in chapter 5.2.4 and in Appendix 1.

Appendix 1 Detailed capital project information

The ERA's draft decision on forecast capital expenditure for AR5 is provided by individual project below. Consistent with section 5.2.1, the funding levels outlined below do not include any project contingency.

Power System Operations project

In the final AR4 year, AEMO sought and received funding approval to commence a project to implement a new energy management system (e-terra v. 2.5) in the WEM. AEMO expected that the project would cost $4.2 million[59] and would be completed in the 2018/19 financial year. Following completion, AEMO intended to upgrade the energy management system from version 2.5 to 3.2 almost immediately.

Due to delays, AEMO now expects to spend $3.5 million on this project in AR4 and seeks to transfer $0.473 million capital expenditure from AR4 into AR5 to complete the project in the first half of 2019/20. AEMO also advised the ERA that it will implement e-terra version 3.2 directly. Therefore, the cost for the e-terra 3.2 upgrade project, $0.687 million in the AR5 submission, is no longer required.

The funding requested to finalise the implementation of e-terra version 3.2 represents the least cost option for the WEM. By implementing version 3.2 and taking advantage of internal resources and lessons learned[60] from the upgrade in the National Electricity Market, AEMO has demonstrated that it has taken a prudent approach to minimising costs for this project. For these reasons the ERA approves $0.418 million in forecast capital expenditure for AR5.

System Management Systems Transition (SMST) project

During AR4, AEMO requested, and the ERA approved, funding for the transfer of system management from Western Power to AEMO. Part of this transfer is the SMST project, which aimed to 'copy and paste' several Western Power systems to AEMO IT platforms. As part of the approval process in 2018, AEMO provided justification and information on the options considered and selected. AEMO expected to incur $4.9 million in 2018/19 and flagged that it will require around $0.5 million to complete the project in late 2019, taking the total project cost to $5.4 million. The ERA had already approved funding for system management transfer, recognising that this was the least cost option in the circumstances. There was a $4.8 million underspend available to AEMO to complete the SMST project as so no additional funding was approved in AR4.

Following delays to the project in 2018/19, AEMO expects an actual spend of $2.8 million by the end of AR4. AEMO's submission sought approval for $2.209 million in funding in 2019/20 to complete the project. Based on AEMO's current estimates the total estimated cost of the project has reduced to $5.0 million.

The ERA acknowledged the justification for and estimated cost of the SMST project in its December 2018 determination paper. By demonstrating a reduction in the total project estimate AEMO has demonstrated that it is actively seeking to reduce costs in line with a

[59] The $4.2 million is only for the implementation of e-terra ($0.5 million approved in 2017 and $3.74 million approved in 2018). The PSO project included two other systems, a short-term demand forecasting system and a SWIS power model. These were completed on time and within the funding originally approved in 2017.

[60] AEMO expects to complete the upgrade of e-terra to version 3.2 in the National Electricity Market by May 2019. This will free internal resources for the WEM.

lowest practicably sustainable cost approach. For these reasons, the ERA approves forecast capital expenditure of $1.703 million for AR5.

Reduction of Prudential Exposure (ROPE) Phase 2 project

In May 2018, the Rule Change Panel approved rule change RC_2017_06 – Reduction of the prudential exposure (RoPE) in the Reserve Capacity Mechanism. This rule change was to mitigate a prudential risk in the WEM relating to market customers' Individual Reserve Capacity Requirement obligations. Implementation of the rule change was expected to reduce the credit support provided by market participants by $69 million, a clear market benefit.[61]

In July 2018, AEMO proposed that the RoPE project would be delivered in two phases:

- Phase 1 (Rule Change) – make the software changes required to implement the reduction of prudential exposure rule change in the AR4 period by May 2019.

- Phase 2 (Procedure Change) - develop a procedure change and new WEMS[62] sub-system to improve the responsiveness of the outstanding amount calculation and the efficiency and effectiveness of the prudential framework to be completed in the AR5 period.

In July 2018, AEMO requested and the ERA later approved $2.7 million of additional forecast capital expenditure in AR4, equivalent to the cost estimate for delivering Phase 1 of the RoPE project. Due to an underspend on internal costs and no requirement to call on the 30 per cent project contingency, AEMO has advised that RoPE Phase 1 will be completed at a forecast capital cost of $1.6 million.

The RoPE Phase 2 project will address inefficiencies in the WEM prudential framework and deliver a dynamic daily outstanding amount calculation. For the AR5 period, AEMO has estimated that $2.324 million forecast capital expenditure, including a 24 per cent project contingency, is required to complete Phase 2 of the RoPE project.

AEMO has engaged with market participants throughout the delivery of the RoPE project. The ERA's December 2018 determination report recommended that AEMO communicates the likely costs of Phase 2 of the project with stakeholders as well as its benefits and delivery.[63] AEMO has discussed Phase 2 of the RoPE project in detail at the WA Rule Change Projects Working Group meetings. The notes of these meetings have not recorded any stakeholder concerns about AEMO proceeding with the changes proposed in Phase 2 of the project.

As part of the RoPE initial workshop on the 26 October 2017[64], AEMO presented two options for improving the outstanding amount calculation methodology. AEMO stated that it had a

61 Rule Change Panel, 2018, *RC_17_06: Final Rule Change report*, P. 101 (online)

62 The Wholesale Electricity Market System (WEMS) is a collection of sub systems run by AEMO to operate the Wholesale Electricity Market operations and system management functions. The WEMS Market Participant Interface (MPI) is a medium between the market participant and AEMO to exchange and submit registration information, trading submissions, settlement information and facilitate the extraction of market reports.

63 ERA, 2018, *The Australian Energy Market Operator Allowable Revenue and Forecast Capital Expenditure for 2016/17 to 2018/19 – Forecast capital expenditure adjustment – Final determination*, P. 14 (online)

64 AEMO, 2018, RC_2017_06 Reduction of the Prudential Exposure in the Reserve Capacity Mechanism AEMO Workshop (online)

preference for a full dynamic outstanding amount methodology[65] instead of the light touch approach that considered dynamic STEM costs, but estimated non-STEM costs using only available data[66]. Market participants agreed with the proposed approach.

AEMO undertook a competitive tendering process for consultants to support the project and has used the same consultants for both phases. It has also communicated costs to stakeholders.

For these reasons the ERA approves $1.872 million in forecast capital expenditure for AR5.

POMAX Oracle Database and Metering Upgrade project

AEMO currently uses POMAX Energy Data Management (EDM) software that is provided and supported by Brady PLC. This software monitors, maintains and collates the information on interval meters that is provided by Western Power metering for settlement purposes.

The POMAX EDM system relies on Oracle version 11c to provide database services, with the database currently using a Windows Server 2008 R2 operating system. In January 2015 and October 2015 both Microsoft and Oracle announced that the Windows Microsoft Server 2008 R2 will reach end of life in January 2020 and Oracle version 11c will no longer be supported after December 2020.

AEMO advised that, as part of software asset lifecycle management, it must ensure the currency of software used to support WEM market systems. Maintaining an unsupported operating system and database for one of the WEM's most critical systems carries significant risk. AEMO's submission provided information on alternative metering system options considered and provided appropriate justification for upgrading to a newer, version 12c of the Oracle database, which will be supported by Oracle until 2025, and the latest supported operating system.

The ERA agrees that the funding requested to upgrade the POMAX EDM application and database to supported versions represents the most secure and efficient cost option for the WEM. For these reasons the ERA approves $946,000 in forecast capital expenditure for AR5.

POMAX Settlements Replacement

AEMO is currently the sole user of the POMAX settlements system owned by Brady PLC and relies on Brady vendor support to address any problems with the POMAX application. Brady's support team consists of two specialist subject matter experts based in Scotland. This can lead to issues taking longer to resolve, given the support team is based in a different time zone. AEMO has proposed to extend the systems delivered in the RoPE Phase 2 project and the existing WEMS systems and bring all WEM settlement services in-house. This will ultimately cease reliance on the Brady PLC POMAX settlement system.

AEMO has outlined the additional benefits of the proposed POMAX replacement, including

- the elimination of ongoing Brady vendor support payments
- access to and timeliness of in-house technical support

65 AEMO's preferred full dynamic outstanding amount methodology will provide an estimation of the non-STEM exposure to market participants using settlement calculations with all available data and comprehensive meter data estimation.

66 Does not include meter data, but rather uses estimation of parameters based on previous invoice values.

- full control over any changes or improvements that may be required to the settlement system.

AEMO forecasts it will require $1.597 million in capital expenditure to plan and implement the POMAX settlements replacement project. This forecast includes a $465,000 (41 per cent) project contingency.

The ERA's draft decision is to approve forecast capital expenditure of $1.132 million for AR5, as this represents the lowest practicably sustainable cost. AEMO considered three alternative options[67] and provided clear justification for its recommended approach. Bringing the settlement system in-house reduces system development and support risks and reduces ongoing system support costs.

Business continuity capability project

Currently, AEMO relies on Western Power's East Perth control room as a backup facility to provide real-time operation of the WEM should AEMO need to evacuate its Perth CBD office.

System Management's IT and operational technology systems are being brought in-house through AEMO's SMST and PSO projects. The current service level agreement with Western Power ceases in January 2020, after which Western Power's backup facility will no longer be available to AEMO. Therefore, AEMO must provide its own business continuity capability and backup facility from January 2020 onwards.

AEMO considered several alternative arrangements for business continuity capability in the event the current control room facility is unavailable. AEMO's preference is to lease a small secure section of an existing commercial facility in Western Australia. This facility will be equipped with the necessary work stations, systems, IT equipment and facilities to continue operation of the WEM power systems and market operational support systems.

AEMO's AR5 submission forecasts capital expenditure of $498,000 for the business continuity capability project with a 30 per cent project contingency. AEMO's submission advises that a final decision on the location of the backup facility is yet to be made, and therefore, detailed project costs are not available.

AEMO's preferred option to lease a commercial facility in Western Australia, poses the lowest risk to maintaining system security when a business continuity event happens. AEMO has provided commercial-in-confidence estimated cost information to the ERA on different locations under consideration.

The draft decision is not to approve forecast capital expenditure of $498,000 as the ERA cannot determine that this is the lowest practicably sustainable cost option while commercial negotiations are ongoing.

STEM Fortran replacement project

The Short-Term Energy Market (STEM) is currently supported by applications that have been developed using the Fortran programming language. Support for these STEM applications requires knowledge of Fortran, which is old and AEMO's staff have limited knowledge of the language.

[67] AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 54-55. (online)

In AR5, AEMO proposes to re-write the STEM applications. This will update the applications such that they will be able to interface with proposed WEM reform systems. AEMO will have in-house capability to support the STEM and will be able to modify these systems efficiently in the future. However, the Public Utilities Office has indicated that the design of the STEM will remain unchanged through the WEM reform program.[68]

The STEM Fortran replacement project is costed at $469,000 and is scheduled to be completed in the first year of AR5 and includes a 30 per cent contingency.

The draft decision is to not approve forecast expenditure of $469,000 for AR5, although the ERA recognises AEMO's proposal to update STEM applications and to mitigate the risks that may exist from running outdated systems for real-time market operations. However, AEMO has not provided information on why the STEM Fortran programming language needs to be updated in the AR5 period, as it was also 'old' in AR4, but no replacement project was identified. AEMO's annual market audits have not identified any risks linked to the Fortran language and not made any recommendations to replace the STEM Fortran code.

Hardware and software lifecycle support project

As stated in AEMO's submission, the hardware and software lifecycle support project involves the "occasional, and relatively minor, uplift to accommodate capacity demand for disk space, CPU or network bandwidth".[69] Systems running on legacy operating system and software versions require maintenance and upgrades to mitigate risks.

AEMO has considered alternatives to upgrading existing systems such as implementing new computing platform infrastructure as part of the digital roadmap project. However, there was expenditure on new and existing IT infrastructure in AR4 period. AEMO has demonstrated that making upgrades to existing hardware and software is the least cost approach until any new infrastructure platform is well established.

AEMO's AR5 submission forecasted capital expenditure of $904,000 for the WEM portion of this project, which included a 30 per cent contingency.

Maximising use of existing systems before transferring to new infrastructure installed through the digital roadmap project demonstrates a prudent approach to IT system utilisation and the ERA's draft decision is to approve forecast capital expenditure of $696,000 for the WEM component of this project.

Enhanced control room tools project

AEMO has proposed a project to develop several control room tools and has provided examples of the types of tools that it may develop for its control room, including: a new event logging tool, inertia monitoring, and managing system voltage during low load periods. The project is costed at $304,000 in capitalised resource costs, and includes a 30 per cent contingency.

Controllers are currently required to log events. There are several audit findings that recommend the electronic logbook guidelines should be consistently followed.[70] AEMO has

68 AEMO, 2019, Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority, PP. 65. (online)

69 Ibid, P. 66

70 Robinson Bowmaker Paul, 2018, *Australian Energy Market Operator Independent Assurance Report on AEMO's Compliance with the WEM Rules and Market Procedures*, PP. 15,17,74-77. (online)

proposed introducing a new electronic logging tool (MIAMI), but has not provided information on alternative options such as implementing procedural changes to encourage controllers to correctly use the existing electronic logbook.

The ERA is aware of the changing nature of the electricity system and that the electricity system is becoming increasingly challenging to manage.[71] However, the enhanced control room tools project does not identify the tools that would be developed, nor why they are needed over and above changes that will form part of the WEM reform and the digital roadmap projects.

The draft decision is to not approve forecast capital expenditure of $304,000 for AR5. This project appears too early in its lifecycle to have a clear scope and robust costings to meet identified business needs and therefore does not meet the funding approval criteria of "lowest practicable sustainable costs".

The ERA recommends that AEMO identifies any situational awareness tools need that may not be enabled through the WEM reform and the digital roadmap projects, considers options to address those needs and then defines a capital project or projects to deliver the required tools for the control room.

Demand and renewable energy forecasting project

There is over 1,000 MW of rooftop solar currently installed in the South West Interconnected System (SWIS) and this is forecast to grow at 8.7 per cent a year. The output from rooftop solar varies with the weather. Improving information on distributed energy resources such as rooftop solar was a recommendation from the Federal Governments.[72] The ERA supported this recommendation in its 2016/17 WEM report to the Minister for Energy.[73] Improved forecasting accuracy will:

- Enable system operators to make better informed generator dispatch and ancillary service decisions.
- Inform market participants bidding decisions.

Currently, AEMO regularly receives one solar photovoltaic forecast and two solar irradiance forecasts and then manually incorporates this information into its demand forecasting process. AEMO is also running a pilot project in the National Energy Market and the WEM, "which aims to capture and visualise a range of data sources that can be used to improve DER and renewable energy forecasting."[74]

This project will determine how best to integrate more than one possible source of distributed energy resources information, and historical data into the SWIS forecasting tools. AEMO has costed its resource requirement plus a 30 per cent contingency. There is also an annual charge for data from a third-party provider. In preparation for the final determination, the ERA will review the ongoing data provision costs.

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71 ERA, 2019, *Report to the Minister for Energy on the Effectiveness of the Wholesale Electricity Market 2018 Final Report*, PP. ii-iii. (online)

72 Finkel, A, 2017, *Independent Review into the Future Security of the National Electricity Market Blueprint for the Future*, PP. 25 (online)

73 ERA, 2019, *Report to the Minister for Energy on the Effectiveness of the Wholesale Electricity Market 2018 Final Report*, PP. 32-37. (online)

74 AEMO, 2019, *Submission 2019-22 allowable revenue and forecast capital expenditure submission to the Economic Regulation Authority*, PP. 60-61. (online)

The ERA's draft decision is to approve forecast capital expenditure of $69,000 for AR5, equivalent to the capitalised resource cost for the project. AEMO has demonstrated a prudent least cost approach by utilising an internal resource, the demand forecasting system (implemented through the Power System Operation project) and the benefits from running the pilot project.

Market Operator interface project

AEMO's market operator interface (MOI) provides the following four functions:

- Wholesale Electricity Market System (WEMS) event management
- Updates of global market parameters
- Message log and participant activity monitoring
- Outage monitoring.

The MOI is a legacy system that is written using Java applet technology, which is no longer supported by major browsers. AEMO uses workarounds to mitigate its security concerns.

AEMO proposed rewriting the MOI front-end application to add screens to existing applications in the WEMS system that use secure and contemporary web technologies to increase the security and reliability of the MOI.

This project is costed at $420,000 using in-house resources and includes a 56 per cent project contingency. AEMO has considered alternative options before proposing this project.

The draft decision is not to approve forecast capital expenditure of $420,000 for AR5. This is because AEMO has not fully justified why this project is necessary in the AR5 period. The WEM reform project is expected to replace this MOI system in three to five years. There is insufficient explanation of the frequency and consequence of risks that may arise from maintaining existing arrangements for the next few years that justifies the project expenditure as being least practicable sustainable cost.

PASA process improvement project

AEMO has initiated a project to improve the content and timely reporting of short-term and medium-term Projected Assessment of System Adequacy (PASA) forecasting.[75] This initiative is a response to audit findings and feedback from market participants.

AEMO advised that four audit findings have driven the development of this project:[76]

- Excluding the availability of demand-side management capacity when assessing outage levels.
- The risk of errors from manually incorporating transmission outage information in PASA forecasts.

[75] Projected Assessment of System Adequacy (PASA) is a forecasting study. It is divided into Long, Medium, and Short Term PASA. The Short and Medium Term PASAs (ST PASA and MT PASA) are undertaken by System Management. The MT PASA details the system adequacy and generation requirements on a weekly basis for the three-year horizon, and is published monthly. The ST PASA details the system adequacy and generation requirements on a six-hourly basis for the three-week horizon, and is published weekly.

[76] Robinson Bowmaker Paul, 2018, *Australian Energy Market Operator Independent Assurance Report on AEMO's Compliance with the WEM Rules and Market Procedures*, PP. 53-55. (online)

- Not publishing updates to short-term PASA when material changes occur.
- Not including transmission constraint information in PASA forecasts.

The ERA agrees with AEMO's audit findings, which rate these matters as low risk. These issues have also existed for some time with no evidence of any material consequences for market participants.

This project is to design an application to replace the current MS Excel-based reporting tool. The estimated capital cost is based on internal resources. A 30 per cent contingency has been applied to the project.

Market participants' support for improved short-term and medium-term PASA forecasting is clear from the notes of AEMO's procedure change workshop. However, market participants do not appear to have been advised of the options to deliver improvements, nor the likely costs of these improvements.

Some of the issues identified by the audit could also be addressed by improving internal AEMO processes with adequate oversight to ensure the quality and completeness of forecasts prior to publishing short-term and medium-term PASA forecasts. However, AEMO does not appear to have considered alternative approaches to managing these low risk audit findings. The draft decision is to not approve forecast capital expenditure of $216,000 for AR5.

System Management application remediation project

The System Management System Transition project is to 'cut and paste' functionality from systems currently housed within Western Power onto AEMO's IT infrastructure by December 2019. AEMO proposed to follow this project with the System Management application remediation project. This seeks to address security enhancements, poor performance, capacity issues, system consolidation and automation after the system management systems have transferred and before the same systems will be replaced, or upgraded as part of the WEM reform program.

The estimated capital cost is for in-house resources, $406,000 and include a 29 per cent project contingency applied.

AEMO lists the audit findings[77] driving this project as:

- Currency of and support for control room tools needs more focus.
- Not using the latest balancing merit order due to IT system issues.
- Market operations data preparation processes are heavily manual.

The ERA has carried out its own investigations of some of these audit findings, such as non-compliances resulting from not using the latest balancing merit order. The ERA did not identify any material consequences from these non-compliances and noted that there has been a reduction in the frequency of these types of events occurring.

There is a lack of detail on what changes or enhancements AEMO wants to undertake on these short-lived systems, which is why the first task has been identified as producing a remediation roadmap. There is insufficient detail to identify these capital cost estimates as

[77] Robinson Bowmaker Paul, 2018, *Australian Energy Market Operator Independent Assurance Report on AEMO's Compliance with the WEM Rules and Market Procedures*, PP. 10-11. (online)

meeting the funding requirements in the WEM rules and so the draft decision is not to approve forecast expenditure of $406,000 for AR5.

Spinning reserve cost allocation rule change

The spinning reserve cost allocation rule change is to allocate spinning reserve costs to generators in a more granular way, on a causer-pays-principle. The current method is to allocate 'blocks' of spinning reserve costs which can distort generators' bidding behaviour in the balancing market as they seek to restrict output to avoid triggering the allocation of a new block of spinning reserve costs.

This rule change[78] was initiated in November 2018. AEMO provided cost information to inform the draft rule change report that was published 27 February 2019. This information compared the cost ($176,000) of making changes to the current settlement system to accommodate the rule change start date of 1 September 2019. The zero-cost alternative was to include the new spinning reserve cost allocation into the new settlement system[79] due to be delivered between July and September 2020. The independent Rule Change Panel's determination was that the additional benefit ($1 million) to the market of delivering the rule change on the existing settlement system was sufficient to justify the expenditure.

AEMO has brought forward the start of this project into the 2018/19 financial year and reduced the project contingency in response to increased confidence in the scope of the rule change. The rule change was broadly supported by the market and there were no material changes adopted in the draft rule change report following the first consultation period. These changes have reduced the forecast capital cost to $137,000 for AR5.

AEMO has provided sufficient detail on this capital project for the ERA to approve funding of $114,000 in the draft decision.

Administrative improvements to outage process rule change

The principle of the Administrative improvement to outage process rule change is to improve transparency on generator outages for market participants to consider when preparing their market bids and to simplify the outage logging process. The proposed rule change includes multiple changes that will:

- improve the processes for managing outages
- improve the process for recording outage quantities
- improve the calculation of adjusted outage quantities in the Reserve Capacity Mechanism
- clarify the use of outage quantities for different purposes under the Market Rules.

The rule change was initiated at the end of 2014 and then put on hold during the previous market reform program. The Rule Change Panel is now progressing this rule change after receiving support from the Market Advisory Committee.

The scope of the original rule change is being reconsidered. AEMO's submissions stated that the systems affected by the rule change have also changed since the original proposal and that any modifications required by this rule change would be made to the WEMS systems to minimise the effect on the SMST project that is currently under way. However, the ERA

78 Rule Change Panel, 2019, *RC_2018_06 Full Runway Allocation of Spinning Reserve Costs* (online)

79 This is the POMAX Settlements Replacement project.

understands that this approach is currently being reassessed due to the delays in progressing the rule change proposal.

AEMO has estimated the cost of this capital project as $408,000, including a project contingency of 30 per cent.

The draft decision is to not approve forecast capital expenditure of $408,000 for AR5 because AEMO will be submitting updated costings to the Rule Change Panel Support team in May 2019. The final determination will consider whether or not the updated costings meet the funding requirements in the WEM rules.

Identity and access management project

AEMO has identified the need to increase the resilience of its systems in order to cope with more sophisticated cyber-attacks. A core component of AEMO's digital roadmap cyber security work stream is the identity and access management project that commenced during the final year of the AR4 period. Work on this project will continue in the AR5 period.

AEMO's AR5 submission forecasted capital expenditure of $1.045 million for this project which included a 29 per cent project contingency.

The ERA's draft decision is to approve forecast capital expenditure of $112,000 for AR5. This is because AEMO has since provided a revised project costing of $168, 000 for the work to be undertaken in AR5. The project's costs as revised by AEMO exclude contingencies and are shared between AEMO's WEM and GSI functions. The WEM share is calculated to be $112,000. The cost reduction is attributed to

- the project being ahead of schedule in AR4
- removal of costs incorrectly attributed to Western Australia.

Digital roadmap

AEMO currently has multiple standalone systems in the WEM, some of which are end-of-life, or are inflexible and cannot be easily scaled or adapted to meet the changes under way in the electricity market. AEMO has identified several risks or problems with current arrangements:

- There is growing complexity in the underlying systems due to systems and processes being developed on a standalone basis. This complexity is an issue when major changes to systems and sub-systems are needed, as every change involves more time, effort and resources.
- Multiple systems on different platforms are costlier to maintain than if the same systems were on a single consolidated platform. Also, different platforms may depend on specialist external support if knowledge is not available in-house.
- Data may be collected separately by multiple standalone systems, which can lead to data duplication and governance issues. Standalone systems may not easily communicate with each other and require bespoke 'workarounds' or interfaces to be created.
- Multiple standalone systems can expose AEMO to multiple points at risk from cyber security attacks. This requires multiple security protections for each standalone system.

The risks would be lower and easier to manage if all WEM systems operated on one secure platform. AEMO has recognised that, with these known challenges and an increasing

complexity of power systems, it needs to rationalise how it develops technical capability to deliver its functions and services in the National Electricity Market and in the WEM.

AEMO's plan is to have a common centralised platform upon which to build all future IT infrastructure. Moving from standalone systems to a common infrastructure platform means AEMO can use the same tools and processes, and in-house knowledge for developing systems. There would be more efficient resource sharing for data centres and network. One secure environment would house all AEMO's systems to increase cyber security and there would be a single co-ordinated strategy for collection, manipulation, authentication and then multiple use of data.

AEMO has subdivided its digital roadmap into four work streams:

- 'Cyber security' is to create more secure environment for AEMO's people, processes, technologies and IT infrastructure.
- 'Compute' is the central component of AEMO's digital future and will deliver a centralised technology infrastructure platform. All existing and future IT systems will be transferred to or built upon this platform.
- 'Data' is AEMO's strategy for collecting, authenticating, storing and utilising data.
- 'Solutions' deals with the other systems that are not directly required for market operation and system management, but are needed to service the organisation, such as corporate systems and project delivery.

Conclusion

AEMO has committed to delivering its digital roadmap over the next five years. Most of the cost is allocated to the National Electricity Market (NEM). The Western Australian allocation is $13.8 million: $12.7 million is allocated to the WEM, and $1.1 million to GSI.

Stakeholders have expressed concerns that the digital roadmap is driven by requirements in the NEM. AEMO has estimated the benefits of the digital roadmap for the NEM, but has not specifically identified the benefits to the WEM. AEMO has also not compared the cost of the digital roadmap against continuing with a separate collection of WEM systems. Also, AEMO has costed the $51.3 million WEM reform program assuming existing WEM IT systems and infrastructure and has anticipated, but not yet calculated, cost savings in the WEM reform program by leveraging off digital roadmap developments.

AEMO stated it would prefer Western Australia's IT requirements to be considered as part of the design and scoping process of the digital roadmap, because WEM systems would migrate onto the new platform at some point in the future. This is reasonable.

The draft decision is to not approve capital expenditure of $13.8 million for AR5. This is because some of the Western Australian market systems are, or will shortly be, new systems: the reserve capacity mechanism, three power system operation systems, and the settlement system. These systems may need to be amended but not replaced with the introduction of WEM reforms and may not fully benefit from the digital roadmap for several years. Even so, the profiling of the digital roadmap expenditure is front-loaded, with $6.0 million or 44 per cent of the project cost in 2019/20. Also, the costs and benefits of the digital roadmap for Western Australia need to be more clearly defined before funding for the digital roadmap can be demonstrated to meet the funding requirements in the WEM rules.

The ERA's recommendation is for AEMO to:

- Estimate the resources required to undertake more detailed scoping and planning for incorporating WEM and GSI requirements into the Australia-wide digital roadmap. This should enable:
  - Identification of the costs and benefits of the digital roadmap for the WEM and GSI, compared to developing a Western Australian specific digital roadmap, as was proposed and delivered by the former Independent Market Operator.
  - Clarification of the timing, and therefore the profiling of the costs and benefits of transitioning the standalone WEM and GSI systems onto the common infrastructure platform, 'cyber security', 'data' and 'solutions' aspects of the digital roadmap.

WEM reform

AEMO's functions in the WEM reform program are listed in the Minister for Energy's letter to AEMO dated 13 March 2019 and included as part of AEMO's submission. WEM rule 1.20 confers these additional functions until 1 October 2022.

The WEM reform program is divided in two tranches of activity:

- tranche 1 covering constrained access and frameworks
- tranche 2 covering security constrained economic dispatch.

In the first year of AR5, most activity across both tranches is to produce market or technical frameworks for ancillary services, power system security and reliability, capacity pricing mechanism arrangements, development of a new constraints management and registration. Tranche 1 work will culminate in draft rule changes to enable the delivery of WEM reforms.

Tranche 2 partially overlaps with tranche 1 work, but is more focused on the final market design, including system design and implementation. While in some areas this work has commenced in parallel to tranche 1, the main portion of the funding required for tranche 2 is for IT system design and implementation. This work cannot fully start until there is more clarity around the market design and the draft rules (which is an expected outcome of tranche 1).

The ERA has requested information on the costs of individual sub-projects within the wider WEM reform project. AEMO has not allocated resources to projects in this way, although information on the individuals comprising the core reform team has been provided, as has the monthly capital expenditure profile.

Stakeholder feedback generally supported the need for market reform, but noted that capital expenditure should not be approved "for systems that have yet to be defined".[80] AEMO has advised the ERA that until business requirements are clear, such as is provided by a set of draft rule change proposals, it needed to use "top-down estimation techniques to build the implementation costs". As noted in section 3.1, such high-level estimates do not meet the lowest practicably sustainable costs funding requirements in the WEM rules.

The ERA understands that the 'core WEM reform team' will be involved in the WEM reform project until its completion in AR6. These individuals will manage reform activities through the different project stages. In the first AR5 year, the 'core WEM reform team' will be engaged with developing and designing the new market characteristics, culminating in new WEM rules.

[80] Perth Energy, 2019, *Australian Energy Market Operator's allowable revenue and forecast capital expenditure proposal for the period 2019/20 to 2021/22 Issues paper*, PP. 2. (online)

These rules will then inform the system requirement design and implementation phases of the project in years two and three of AR5.

The draft decision is to approve all of the funding for the first year of the WEM reform project, excluding contingency, and funding for the 'core WEM reform team' for the full AR5 period. In additional information provided to the ERA, AEMO has identified the minimum number of core team members, the skills and knowledge they bring to the project and the allocation of their time to project activities. AEMO has demonstrated the work of the core team that is under way on the individual activity areas identified in tranche 1 as evidenced by information shared through the two Market Advisory Committee Working Groups.

There is also a clear deliverable mid-2020 for the team to produce draft rule changes and framework documents to enable implementation of the new market design by 1 October 2022. Given that delivery of the WEM reforms continue beyond the end of the AR5 period, there is a requirement to have a minimum core WEM reform team in place for the duration of AR5.

The ERA recommends AEMO provides a second funding proposal for AR5, once it has sufficiently detailed business requirements against which to specify the functionality and implementation of IT systems and business processes to deliver reform by the deadline of 1 October 2022. This is unless AEMO can clearly demonstrate and provide evidence that the overall cost of the WEM program will increase as a result of having staged funding.

Appendix 2 Legislative requirements

For the Wholesale Electricity Market

The ERA is responsible for determining the allowable revenue and forecast capital expenditure AEMO can recover for the services it provides to the WEM; these are to:

- Operate the WEM and carry out system management functions, as defined in the WEM Rules.[81]
- Prepare and implement Wholesale Electricity Market and Constrained Network Access Reform.[82]

The approved allowable revenue is the basis for the annual budgets that AEMO uses to determine annual market fees and charges. AEMO must publish its annual budgets, market fees and charges on its website. Market fees and charges are based on the forecast volume of energy generated or consumed by market participants. Market fees and charges are adjusted annually for surpluses or deficits in collected revenue, arising from differences between forecast and actual expenditure.

The WEM rules require AEMO to apply to the ERA for a reassessment of its allowable revenue and forecast capital expenditure if AEMO's budget for a financial year is likely to result in:

- Revenue recovery being at least 15 per cent greater than the allowable revenue approved by the ERA for the relevant three-year review period.[83]
- Capital expenditure being at least ten per cent greater than the forecast capital expenditure approved by the ERA for the relevant three-year review period.[84]

The ERA must take the following factors into account when approving allowable revenue and forecast capital expenditure.

- The allowable revenue must be sufficient to cover the forward-looking costs of providing the relevant services in accordance with the following principles:
  - Recurring expenditure requirements and payments are recovered in the year of expenditure.
  - Capital expenditure is to be recovered through the depreciation and amortisation of the assets acquired by the capital expenditure in a manner consistent with good accounting principles.
- The allowable revenue and forecast capital expenditure must include only those costs that would be incurred by a prudent provider of the services, acting efficiently, seeking to

81 Clauses 2.1A and 2.2 of the WEM Rules provide a list of AEMO's functions and responsibilities.

82 Clause 1.20 applies until 1 October 2022. Wholesale Electricity Market and Constrained Network Access Reform is defined as any proposed change to the operation of the Wholesale Electricity Market or related network access arrangements, or the regulatory regime applying to the Wholesale Electricity Market (including the Electricity Industry Act, the Regulations and the WEM Rules) that has been endorsed by the Minister, whether or not legislations has been made to implement it and includes reform initiatives as set out on the Public Utilities Office's website.

83 Rule Change Panel, 2018, *Wholesale Electricity Market Rules (11 January 2019)*. Clause 2.22A.8, (online)

84 Ibid, Clause 2.22A.9

achieve the lowest practically sustainable cost of delivering the services in accordance with the WEM rules, whilst effectively promoting the wholesale market objectives.

- Where possible, the ERA should benchmark the allowable revenue and forecast capital expenditure against the costs of other market operators providing similar services in other jurisdictions.
- Where costs incurred by AEMO cover 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:
  - Costs recoverable as part of AEMO's allowable revenue and forecast capital expenditure.
  - Other costs not to be recovered under the WEM rules.

For Gas Service Information functions

The ERA is responsible for determining the allowable revenue and forecast capital expenditure AEMO can recover for the services it provides under the GSI rules; these are to:

- Establish, operate and maintain the Gas Bulletin Board;
- Register or deregister Registered Participants and Registered Facilities and to grant Exemptions;
- Prepare and publish the Gas Statement of Opportunities;
- Make procedures, manage information and any other functions conferred on AEMO under the GSI Act, the GSI Regulations or the GSI rules.[85]

Under the GSI rules,[86] AEMO to apply to the ERA for a reassessment of its allowable revenue and forecast capital expenditure if AEMO's budget for a financial year is likely to result in:

- Revenue recovery being at least 15 per cent greater than the allowable revenue approved by the ERA for the relevant three-year review period.
- Capital expenditure being at least ten per cent greater than the forecast capital expenditure approved by the ERA for the relevant three-year review period.

The ERA must take the following factors into account when approving allowable revenue and forecast capital expenditure.[87]

- The allowable revenue must be sufficient to cover the forward-looking costs of providing the relevant services in accordance with the following principles:
  - Recurring expenditure requirements and payments are recovered in the year of expenditure.

85 Rule Change Panel. 2019, *Gas Service Information Rules*, clause 107 (GSI Rules)

86 Ibid, clause 111A(4) and (5)

87 Ibid, clause 109

  - Capital expenditure is to be recovered through the depreciation and amortisation of the assets acquired by the capital expenditure in a manner consistent with good accounting principles.

- The allowable revenue and forecast capital expenditure must include only those costs that would be incurred by a prudent provider of the services, acting efficiently, seeking to achieve the lowest practically sustainable cost of delivering the services in accordance with the GSI rules, whilst effectively promoting the wholesale GSI objectives.

- Where possible, the ERA should benchmark the allowable revenue and forecast capital expenditure against the costs of providing similar services in other jurisdictions.

- Where costs incurred by AEMO cover both the performance of functions in connection with the GSI rules and the performance of AEMO's other functions, the costs must be allocated on a fair and reasonable basis between:

  - Costs recoverable as part of AEMO's allowable revenue and forecast capital expenditure.

  - Other costs not to be recovered under the GSI rules.

Appendix 3 List of Tables

Appendix 4 List of Figures