Allowable Revenue and Forecast Expenditure (AR5) - July 2019-June 2022

Presented to WA Electricity Consultative Forum

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Introduction
Background and Objectives

It has now been almost 12 months since the commencement of the AR5 period. Over this time AEMO has continued to focus on our obligations and commitments:

- Market Operator and System Management functions:
  - Core BAU activities
  - Capital projects to ensure ongoing operations (e.g. time critical IT system replacement/renewal, new capabilities required for a changing power system)
  - Rule and procedure change implementation
- Obligation to prepare for and implement constrained access and WEM reform; and having input into WA DER Roadmap development and implementation planning
- Propose and support Rule Change modifications

AEMO is seeking to provide an update on how we are tracking against the ERA AR5 approved Allowable Revenue and Capital Allowance.

AR5 Expenditure Forecast

WEM OPEX overview

- The approved WEM AR5 Allowable Revenue was $99.8m.
- The current AR5 OPEX spend is forecast to be $3.3m lower at $96.5m, due to:
  - Lower D&A expenses from delayed completion of the following projects:
    - Power System Operations (PSO)
    - System Management Systems Transition (SMST)
    - Reduction of Prudential Exposure (RoPE)
    - Cyber Identity and Access Management
  - Delay in project completion resulting in IT license savings (IT Digital, PSO Software license and Java license).
  - Lower than expected Legal, Consulting, Travel and Training spend, partially due to deliberate costs savings to offset potential COVID19 revenue declines, COVID19 priorities requiring ramp down of activities

This is offset by

- Higher IT costs due to extension of Western Power Services agreement due to delays in project completion
- Commencement of WA DER roadmap activities (Note: At time of AR5 no allowance for DER Roadmap was included as scope/timeframes were unclear)

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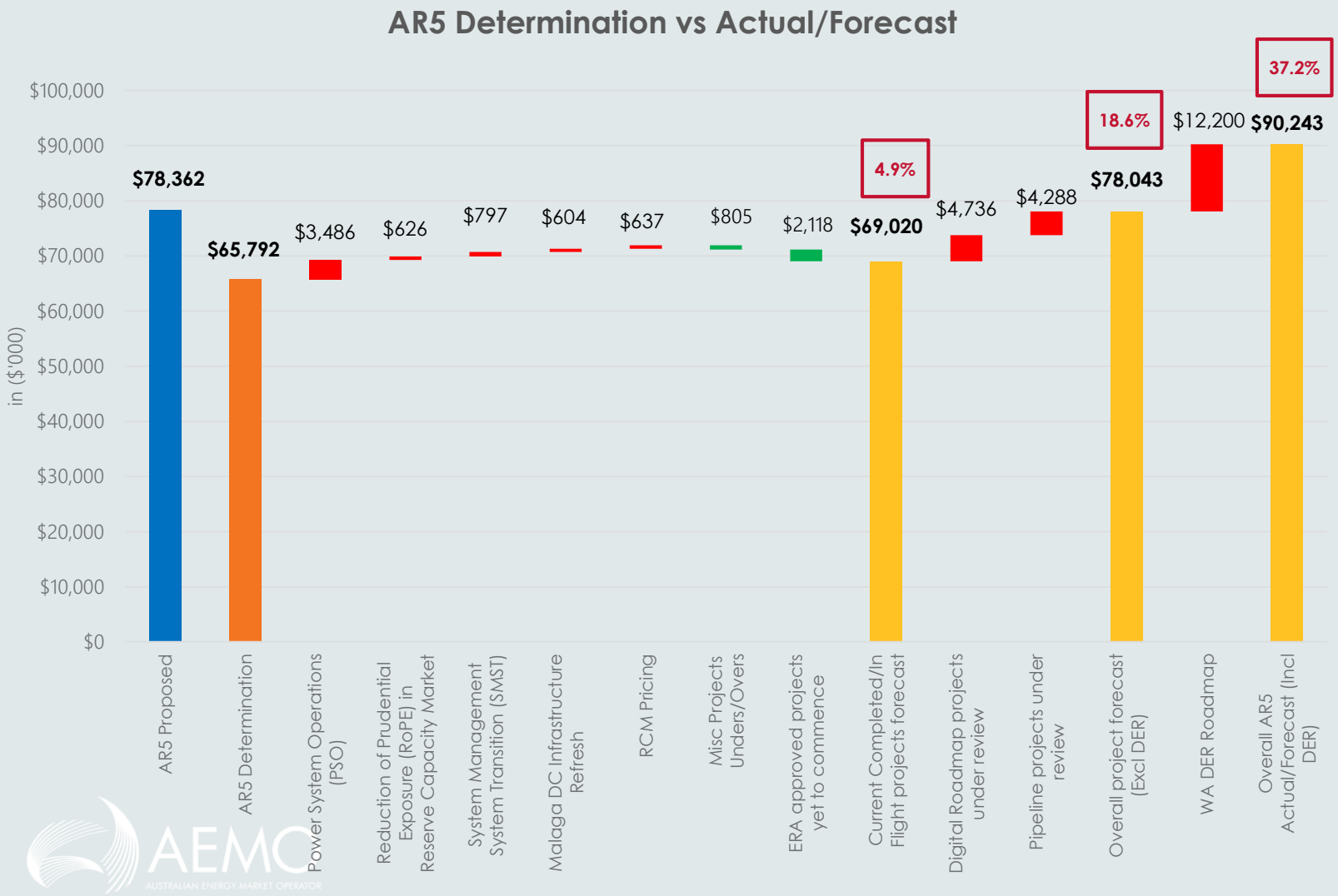
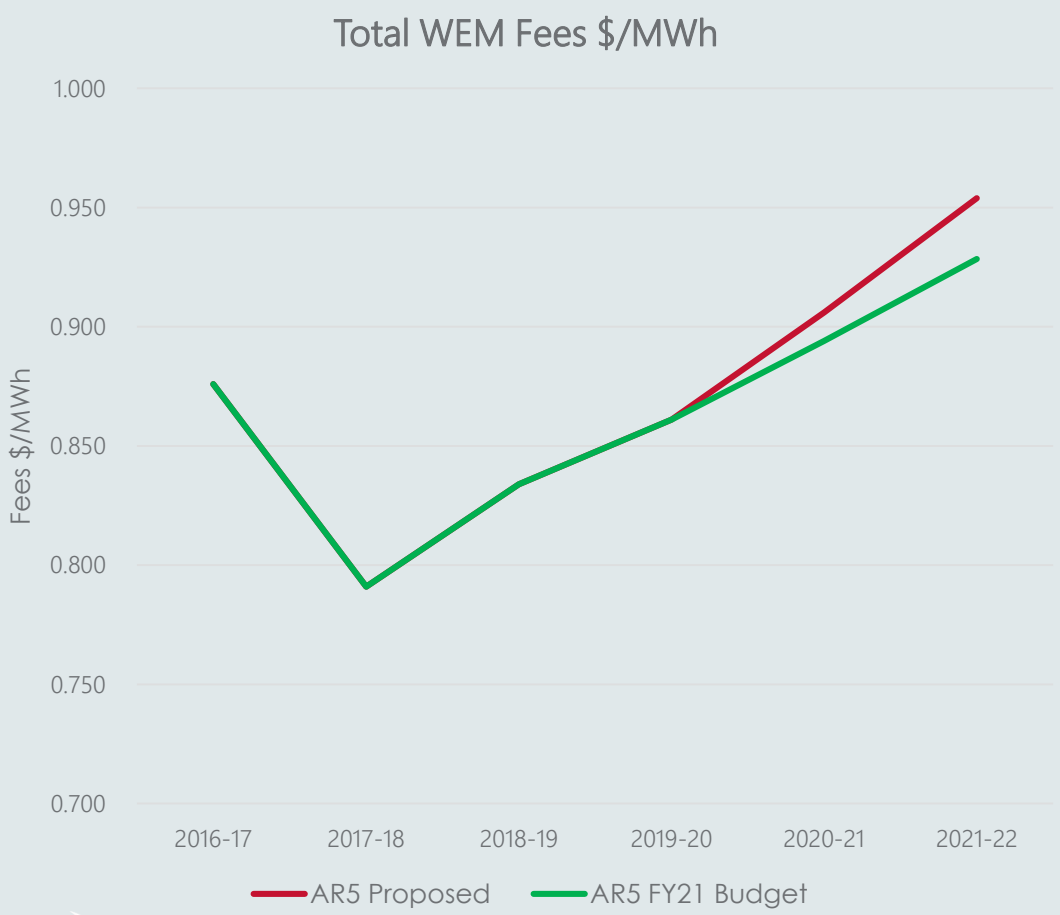
AR5 Expenditure Forecast

WEM CAPEX overview



- AEMO current completed and in-flight CAPEX forecast (excluding DER) for AR5 is **$69.0m (4.9%** over ERA Final Determination of $65.8m).
- Key drivers are:
  - PSO ($3.5m additional spend in AR5 due to project delays from implementation complexities, new requirements and resourcing challenges)
  - RoPE ($0.6m additional spend due to under forecast in Phase 2)
  - SMST ($0.8m additional spend due to PSO project delay)
  - Malaga DC Infrastructure refresh ($0.6m unexpected spend in AR5. Overall project spend is however $0.5m lower than budget.)
  - RCM pricing ($0.6m additional spend due to new requirements)
  - It is worth noting that AR4 actual spend came in at $27.6m, $4.5m lower than AR4 Determination of $32.1m. Savings were mainly from PSO, SMST and RoPE projects.
- Further projects pending review and approvals
  - FY20 Digital Roadmap (ERA approved $4.7m of the $13.1m proposed. Digital Program is on track with full year forecast of $10.3m coming in lower than original proposed budget of $13.1m)
  - Please see Appendix for more details on pipeline projects
- WEM Reform is currently still on track, and expected to be in line with budget.
- WA DER Roadmap is expected to require $12.2m of Capital Expenditure not in AR5 determination, taking overall CAPEX forecast to be 37.3% over the AR5 determination. Planning for WA DER In-Period submission is currently underway.

AR5 WEM Market Fees overview



Total WEM Fees * $/ MWh	2016-17	2017-18	2018-19	3 Year Average	
AR4 Actual	0.876	0.791	0.834	0.834	
	2019-20	**2020-21**	**2021-22**	**3 Year Average**	**Var to AR4 Average**
AR5 Proposed	0.861	0.906	0.954	0.907	8.8%
AR5 FY21 Budget	0.861	0.894	0.929	0.895	7.3%
Variance	-	0.012	0.026	0.012	1.5%

* Excludes ERA fees

- AEMO's WEM Fee was proposed to move from $0.834/MWh over the AR4 period to $0.907/MWh in the AR5 period (8.8% over 3 years).
- In the current F21 Budget, AEMO is proposing a 7.3% increase (1.5% saving from AR5 proposal) due to lower operating expenses expected in the AR5 period (as shown on slide 3).
- Current consumption forecast, incorporating COVID impacts is 4% lower than AR5 forecast. This has been incorporated into the AR5 FY21 Budget fees calculation.

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Next steps

- AEMO is planning for an in-period submission for the WA DER Roadmap Capital Expenditure
  - Engage with ERA ahead of submission
  - Broader industry and Government stakeholder engagement
  - Seeking AEMO Board Approval in September 2020
  - WA DER Roadmap In Period submission to ERA in September 2020

- AEMO will continue to review Capital Expenditure to determine if a further in-period submission is required, noting there were a number of items not approved by the ERA in AR5 due to greater substantiation required at that time.

- Further detail by projects can be found in the appendix.

- For even more details on AR5 proposed projects, please refer to
  - AEMO AR5 Submission to ERA - Mar 2019
  - AEMO AR5 Submission to ERA - May 2019

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Conclusions

- AEMO is forecasting to come marginally under the ERA AR5 approved allowable revenue and fees:
  - This is predominantly due to reduced depreciation as a result of delays in some project delivery coupled with some COVID-19 driven changes (both reactive and proactive reduced spending).
  - For the fees, these cost reductions are greater than the negative impact of the latest consumption forecast now reducing more than the consumption forecast at the time of the AR5 submission.

- For CAPEX, AEMO is forecasting that:
  - For AEMO committed projects (i.e. projects completed or in-flight), an overspend of 4.9% will occur
    - majority of this is due to AR4 expenditure that flowed into AR5 due to a few key projects completed later than forecast (vast majority of these projects have, or will, be completed within original total approved budget)
  - The addition of a function to support delivery of the DER Roadmap will require an in-period submission to be undertaken to cover the significant capex costs.
  - An additional in-period submission may be required in the future although this is uncertain at this time as AEMO is continuing to review its in-flight projects and is continuing to refine its pipeline projects in terms of scope, timeline and cost; conscious of factors such as flow on impacts to fees, resource capacity and cost to develop an in-period submission.

Appendix 1
AR5 Capital Expenditure Detail

Project Status	WEM Projects	AEMO Proposed	AR5 Final Determination	AR5 Actual/ Forecast	Actual/Forecast Variance to Final Determination	Actual/Forecast Variance to AEMO Proposed	
Completed	RC_2018_06 (Spinning Reserve Cost Allocation)	129	129	201	-72	-72	
Completed	Business Continuity Capability	229	229	90	139	139	
Completed	Malaga DC Infrastructure Refresh	-	-	604	-604	-604	
Completed	RC_2018_07 Removal of Constrained Off Compensation	-	-	12	-12	-12	
Completed	Removal of Resource Plans and Dispatchable Loads Rule Change	-	-	10	-10	-10	
Completed	WA Electricity Demand Forecasting	-	-	79	-79	-79	
In Flight	PSO Project	516	516	4,003	-3,486	-3,487	
In Flight	POMAX - Oracle Database and Metering Upgrade	997	968	870	98	127	
In Flight	RoPE (Phase 2)	2,478	2,478	3,104	-626	-626	
In Flight	System Management System Transition	2,215	2,215	3,012	-797	-797	
In Flight	WEM Reform Tranche 1 and 2	46,457	46,457	46,482	-25	-25	
In Flight	PASA Process Improvement (ST and MT)	209	-	195	-195	14	A
In Flight	STEM Fortran Replacement	448	448	455	-7	-7	
In Flight	POMAX - Settlements Replacement	1,521	1,521	1,118	403	403	
In Flight	Reserve Capacity Mechanism (RCM) Pricing *	2,000	2,000	2,637	-637	-637	
In Flight	WEM Market Modelling – Phase 1	-	-	386	-386	-386	
In Flight	Digital Roadmap - AR5 FY20 Approved Projects**	13,080	4,658	5,562	-904	7,518	
In Flight	Digital Roadmap - Additional FY20 Projects pending review			4,736	-4,736	-4,736	
Pipeline	Rule Change Allowance	1,420	-	1,653	-1,653	-233	B
Pipeline	RC_2014_03 (Admin Improvements to Outage Process)	759	553	670	-117	89	C
Pipeline	Enhanced Control Room Tools	314	69	302	-233	12	D
Pipeline	Improved Demand and RE Forecasting	89	89	90	-1	-1	
Pipeline	Market Operator Interface in the WEM	363	363	361	3	2	
Pipeline	Market Trial Availability Enhancements (WEM)	-	-	120	-120	-120	
Pipeline	Real Time Data in Market Trial Environment	-	-	61	-61	-61	
Pipeline	BMO Tie-Break	-	-	133	-133	-133	
Pipeline	SM Ops Application Remediation	402	179	432	-253	-30	E
Pipeline	Life cycle support for H/W & S/W	864	864	467	397	397	
Pipeline	Small Scale Operational Improvements	-	-	202	-202	-202	
	Accomodation	3,870	2,054	-	2,054	3,870	
	Total (Excluding WA DER Roadmap)	**78,362**	**65,791**	**78,043**	**-12,252**	**319**	
	WA DER Roadmap	-	-	12,200	-12,200	-12,200	
	Total (Including WA DER Roadmap)	**78,362**	**65,791**	**90,243**	**-24,452**	**-11,881**	

* Extracted from WEM Reform Budget

** Includes Identity and Access Management

Despite the cost overruns in AR5, these projects were completed with actual spend below overall budget.

WEM Projects	Overall Budget	Overall Actuals	Savings
RC_2018_06 (Spinning Reserve Cost Allocation)	228	224	4
Business Continuity Capability	229	90	139
Malaga DC Infrastructure Refresh	2,334	1,858	476
RC_2018_07 Removal of Constrained Off Compensation	63	50	13
Removal of Resource Plans and Dispatchable Loads Rule Change	447	251	196
WA Electricity Demand Forecasting	329	324	5

A number of these projects were partially or not approved in the AR5 Final Determination:

A Expenditure not approved in AR5 period as AEMO does not appear to have considered alternative approaches to managing the low risk audit findings to ensure quality and completeness of forecasts prior to publishing.
B Expenditure not approved as ERA deemed that the 10% overspend allowance will cover any in-period rule changes and minor capex requirements.
C Due to the well-defined scope of the changes in outage quantities for the WEMS component of this rule change, the ERA approves the 75 per cent forecast capital expenditure which is allocated to Market Operations. The ERA does not approve the procedural changes for ex-ante consequential outages in the system management portal of this rule change because is it not prudent to approve these high-level cost estimates till a more defined scope is agreed upon. This rule change process is also still ongoing with final costings not yet finalised.
D The ERA agrees that AEMO requires a better system to enable controllers to log real time operational events that occur during each shift, and recognises the benefits this new logging tool will have. The ERA views the implementation of the MIAMI logging tool represents both an efficient and least cost solution given AEMO already uses this tool in the National Electricity Market. However the ERA does not approve forecast capital expenditure for the system inertia, Volt/VAr, and system strength tools as the operational needs and benefits of these tools were not clearly identified.
E ERA only approved the costs of the SOCCUI remediation project. The other components were deemed to have insufficient information to meet approval requirements in the market rules.

Appendix 2 WEM Pipeline Projects and Projects Progressed Outside of AR5 Approval

Project Status	WEM Projects	AR5 Actual/ Forecast	Description and Comments
Pipeline	Rule Change Allowance	1,653	
Pipeline	RC_2014_03 (Admin Improvements to Outage Process)	670	This Rule Change is yet to be approved by the Rule Change Panel, however, funds have been allocated to enable implementation.
Pipeline	Enhanced Control Room Tools	302	This project will develop several control room tools, including: a new event logging tool, inertia monitoring, and managing system voltage during low load periods.
Pipeline	Improved Demand and RE Forecasting	90	Considering the significantly high penetration of rooftop PV generation in the SWIS and increasingly wind and grid connected solar, there is a need for an improvement in forecasting of these technologies to ensure secure operation of the power system and optimum market outcome.
Pipeline	Market Operator Interface in the WEM	361	The market Operator Interface (MOI) in the WEM is web application written using Java applets. Java applets are legacy technology that require a plugin to execute a web application in a browser. Many modern browsers no longer support applets (the Java plugin) due to security concerns. AEMO works around the security concerns by providing a Citrix environment for the WA Markets and IT Dev teams to run the MOI, resulting in significant infrastructure costs to the business. The current user interface is complex and has on previous occasions resulted in erroneous actions being taken by users resulting in non-compliance issues and in serious cases, material issues in settlements.
Pipeline	Market Trial Availability Enhancements (WEM)	120	The current market trial environment is designed for participants to test functionality in AEMO system releases. The data used in this environment is refreshed as needed and often more than 2 months old. To ensure that testing is rigorous and fit-for-purpose, the ideal environment should be dynamic and closely mimic production. The lack of data which is close to real-time has impacted market participants ability to do complete end-to-end testing of their environments. The testing capabilities of AEMO's own projects are hindered by the lack of sufficient data to perform similar tests.
Pipeline	Real Time Data in Market Trial Environment	61	The current market trial environment is designed for participants to test functionality in AEMO system releases. In the event of the loss of availability to the environment, critical production releases may be delayed. Furthermore, the existing market trial environment is the only non-production environment which that fully replicates the capability of the production WEM. Internal development teams and projects have no opportunity to conduct full end-to-end testing without also potentially exposing defects to participants
Pipeline	BMO Tie-Break	133	There is a proposed new change in Market Procedure that will affect the Balancing Merit Order generation.
Pipeline	SM Ops Application Remediation	432	The System Management Systems Transition project is bringing systems in house with minimal change. This project will address the highest priority remediation work including application security enhancements, addressing performance and capacity issues, and changes to applications to ensure they are sustainable until replaced or enhanced with market reform.
Pipeline	Life cycle support for H/W & S/W	467	WA specific lifecycle updates
Pipeline	Small Scale Operational Improvements	202	Current System Management daily market management tasks are highly manual, utilising a range of spreadsheets to perform routine tasks. These systems are housed within WP IT infrastructure, however System Management Systems Transition project will deliver these systems into the AEMO IT environment. Once in house, there are opportunities to leverage existing systems and applications to improve operational efficiencies within System Management.
In Flight	PASA Process Improvement (ST and MT)	195	A fit for purpose interim application to address compliance issues and improve quality of data and reporting until market reform.
In Flight	WEM Market Modelling – Phase 1	386	AEMO has obligations under the WEM rules to deliver a number of regular reviews that rely on complex modelling of the WEM including Margin Values and Load Rejection Reserve (LR) cost. Currently AEMO outsources all market modelling in the WEM. Due to increased data requirements from the ERA, increasing market complexity and escalating external costs, bringing this work in-house will result in a more robust and cost effective delivery of these market rule obligations.

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