

# Allowable Revenue and Forecast Expenditure (AR6) - July 2022-June 2025

Industry engagement session – 13 October 2021

# Introduction

- Ground Rules & Protocols

- Please place your microphone on mute unless you are asking a question or making a comment.
- Please keep questions relevant to the agenda item being discussed.
- If there is not a break in discussion and you would like to say something, you can 'raise your hand' by typing your 'question' or 'comment' in the meeting chat. Questions and comments can also be emailed to [WAelectricityforum@aemo.com.au](mailto:WAelectricityforum@aemo.com.au) after the meeting.
- Please state your name and organisation when asking a question or making a comment.

- Recording

- Please note that this meeting will be recorded to support further engagement and AEMO's preparation of its submission.

# Acknowledgement of Country - Perth

I would like to acknowledge that this meeting is being held on Aboriginal land, the land of the **Whadjuk** people of the Noongar Nation. I pay my respects to their Elders past, present and future.

# Agenda

1. Introduction
    - i. Background and Objectives
    - ii. AR5 Review
  2. Expenditure Drivers for AR6
  3. AR6 Expenditure Forecast
    - i. AR6 Opex
    - ii. AR6 Capex
    - iii. Market Fees Impact
  4. Next steps
- Appendices. Capex Project Summaries

# Introduction

## Background and objectives

### AR6 proposal due by 30 November 2021

The purpose of today's session is to:

- Provide an overview of our proposal
- Share our forecasting approach
- Validate and seek feedback on the drivers of AEMO's expenditure
- Seek your support in delivering the reform program

*Note: The information in this presentation is preliminary and subject to further refinement and internal governance approval.*

# Introduction

Look back at AR5 so far

## Focus and achievements during AR5

### 1 Keeping the lights on and the market running

- Maintained system security despite operational challenges
- Further sculpting of LFAS requirements and lower costs
- Registered three new Rule Participants and four new Facilities
- Certified 5 new Facilities and 6 new Facilities commenced their Reserve Capacity obligations
- 12 WEM rule changes commenced
- Business continuity investment
- PASA process improvements

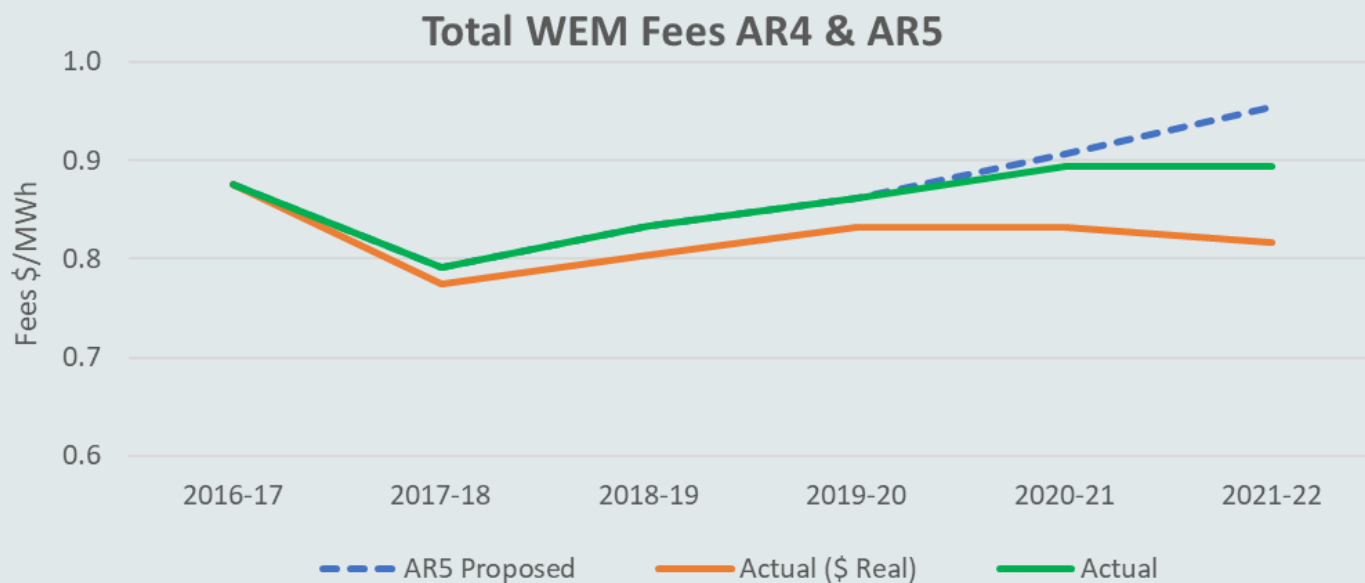
### 2 Upgrading existing systems to maintain operations

- Established systems to enable AEMO to perform System Management Functions (SMST and PSO incl EMS upgrade)
- Ended dependency on Western Power for the provision of IT systems
- Reduction of Prudential Exposure (Phase 2)
- STEM, metering and settlement system upgrades
- Digital roadmap implementation (e.g. Cloud and Cyber)

### 3 Facilitating Govt's Energy Transformation Strategy

- RCP changes implemented
- Supported development of DER Roadmap and initial WOSP
- Implemented DER Roadmap (e.g. DER register and Project Symphony)
- Supported and/or developed new market Rules and WEM Procedures
- Developing new systems to implement reforms (e.g. WEMDE, constraints, GPS)
- Commenced implementation of new Energy and ESS markets
- Implemented NAQ and RCM reforms
- Operating new generator performance standards

# WEM Market Fees overview



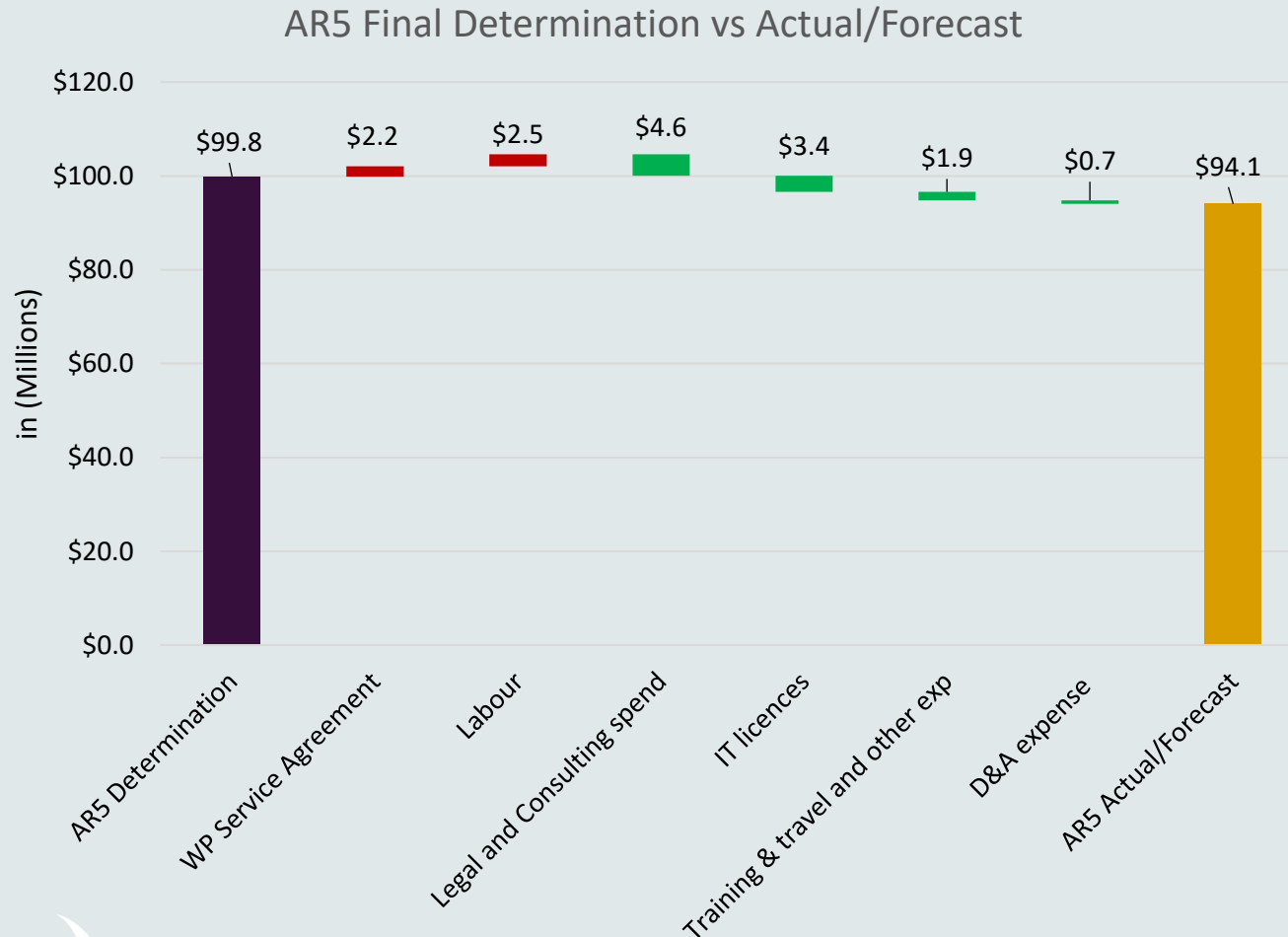
- From FY17 to FY22, WEM fees have declined 1.4% p.a. in real terms (nominal increase of 0.4%)
- Lower operating expenses in AR5 have contributed to these price outcomes
- For FY22, AEMO kept the fee rate at FY21 level, which represents a reduction in real terms

\$/ MWh	AR4			AR5			Average change
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	
AR4 Actual / AR5 Proposed	0.876	0.791	0.834	0.861	0.906	0.954	1.7%
Actual / Proposed (\$ Real)	0.876	0.775	0.804	0.833	0.844	0.871	-0.1%
Actual AR4 & AR5	0.876	0.791	0.834	0.861	0.894	0.894	0.4%
Actual (\$ Real)	0.876	0.775	0.804	0.833	0.833	0.816	-1.4%



# Introduction

## AR5 Financial Review – OPEX (preliminary draft)



Current AR5 OPEX spend is forecast to be \$5.8m lower (5.8%) at \$94.1m

Influencing factors:

- COVID-19 cost savings
  - Prioritisation and deliberate cost savings to offset potential revenue declines
  - Lower legal/consulting and travel/training
- Delays in project completion (PSO, SMST, RoPE Phase 2)
  - Lower IT license costs
  - Lower D&A expenses
  - Higher IT costs from extension of Western Power Services Agreement

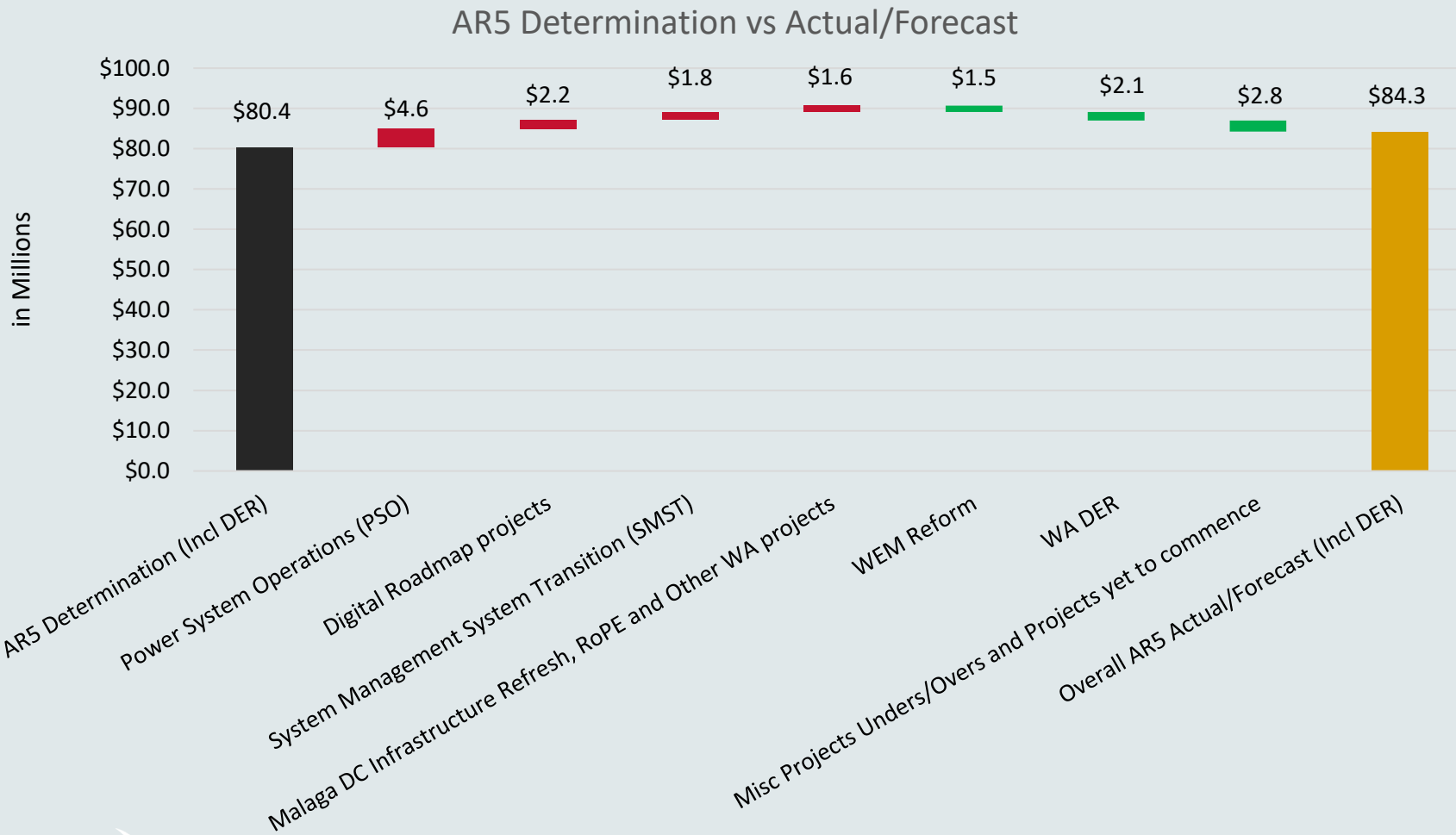
Partly offset by higher labour costs:

- Capex project go-live earlier than anticipated (e.g. GPS, Constraint Management)
- e-terra training effort required under-forecast.
- Overtime coverage due to COVID-19



# Introduction

## AR5 Financial Review – CAPEX (preliminary draft)



AR5 completed and in-flight CAPEX (including WA DER) is forecast to be \$3.9m higher (4.8%) than the AR5 Determination at \$84.3m

- See Appendix for discussion of influencing factors

Note that AR4 actual spend came in at \$27.6m, \$4.5m (14%) lower than AR4 Determination of \$32.1m.

- Reductions mainly from PSO, SMST and RoPE projects that flowed into AR5.

# Expenditure Drivers for AR6

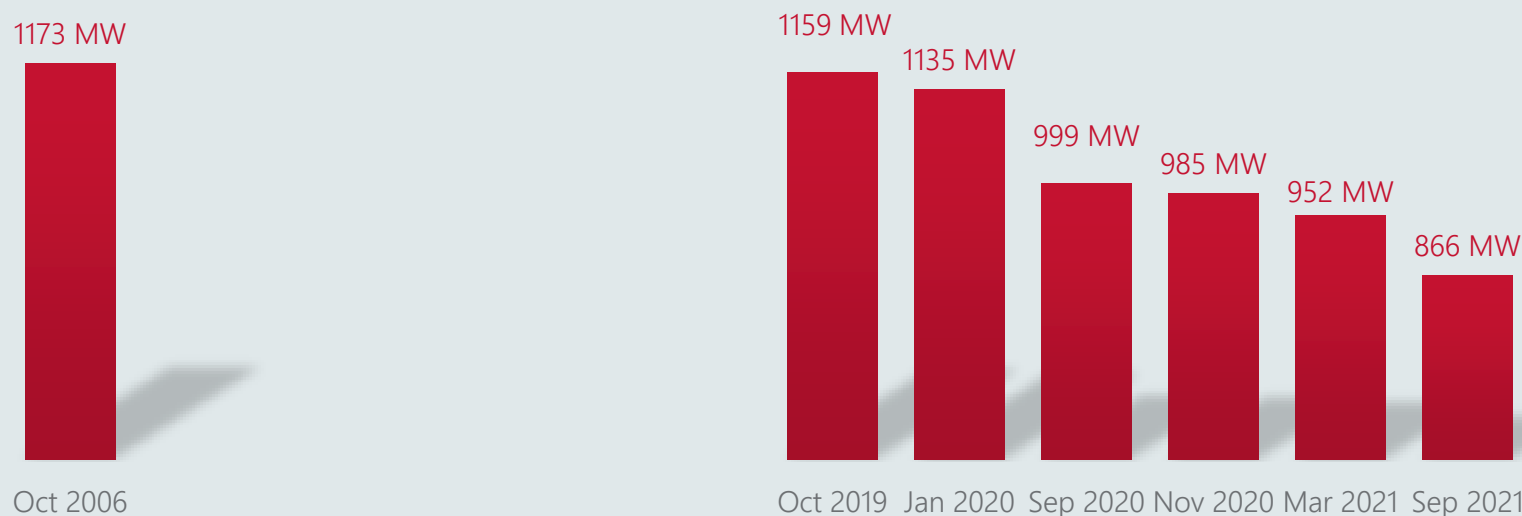
## Major themes

### Priority 1: Operating today's systems and markets

- Low load, increasing variability and associated challenges
- Measures to support resilience of power system and AEMO's systems (e.g. cyber security), enable 100% instantaneous renewables by 2025



SWIS record minimum demand (market load)

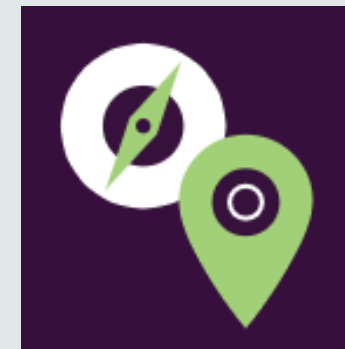


# Expenditure Drivers for AR6

## Major themes

### Priority 2: Navigating the energy future

- Commencement of new Real-Time & ESS Markets – automation and improved data (via WEM Reform Program) delivering improved dispatch and market efficiency; enabling connections and ongoing system security
- DER integration and DER Roadmap deliverables to enable the full benefits of DER investments to be achieved for all consumers
- Energy Transformation Strategy (ETS) Stage 2 reforms announced



# Expenditure Drivers for AR6

## Major themes

### Priority 3: Engaging our stakeholders

- Engagement, collaboration and transparency across all functions
- Advice to support policy/regulatory development



### Priority 4: Evolving the way we work

- Reviewing governance, upgrading systems, improved financial reporting

Are there any other key themes that should be factored into the AR6 submission?

# AR6 Expenditure Forecast

## OPEX overview

WEM Operating Expenditure AR5 to AR6



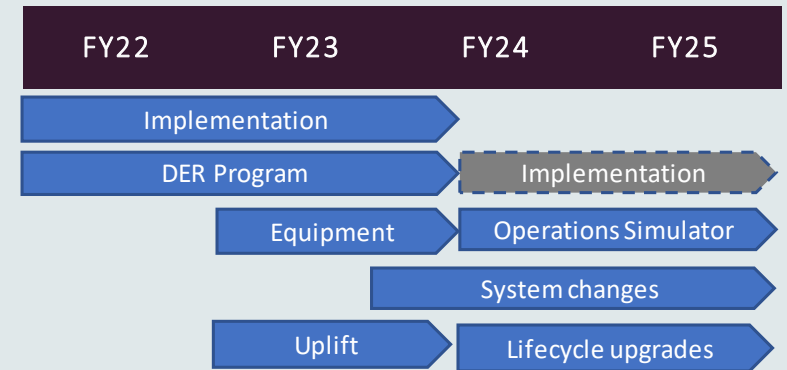
Increase in operating expenditure from AR5 to AR6 is driven by:

- Labour: 1) Uplift in FTE driven by ETS (Reform, New Obligations); 2) Market Development (5MS, ETS Stage 2) 3) Power System Requirements (getting more complex); 4) Underlying (EBA/Super etc.).
- Other Exp.: 1) WEM Reform Training; 2) Staged ramp up in Travel Exp.
- Project Opex: Reform Decommissioning; WA DER.
- IT&T: Transition to Cloud Services & Ongoing WEM Reform.
- Depreciation & Amortisation: Completion of WEM Reform Program, WA DER projects, AR5 projects.

# AR6 Expenditure Forecast

## CAPEX overview

Capital Expenditure (\$Million)	AR5 Approved	AR5 Forecast	AR6 Forecast
WEM Reform Program	47.2	46.2	44.1
WA DER Program	14.6	12.5	10.9
Control room tools and equipment	0.1	0.3	1.3
Rule changes	0.7	1.1	1.0
WA Technology	13.3	16.5	8.7
Enterprise systems	5.0	8.1	5.2
<b>Total</b>	<b>80.9</b>	<b>84.7</b>	<b>71.2</b>



### Major drivers of capital expenditure for AR6:

- Continued implementation of the WA Government's Energy Transformation Strategy (e.g. WEM Reform Program and DER Program)
- Technology capability uplift, cyber security and lifecycle replacement for IT systems and physical hardware

Is putting in an allowance for unknown rule changes the right approach?

# AR6 Expenditure Forecast

## WEM Reform Program

### AR5 Submission

- The initial WEM Reform Program forecast was built at an early stage of policy design (e.g. pre-ETS, no formal market design or draft rules)
- A number of changes have occurred since this time including timeline assumptions and regulatory/legislative approach
- AR5 proposal included estimates for AR5 period and initial estimates for AR6 – however we noted that forecasts for the AR6 period were less robust, and that overall contingency estimates may not be large enough (e.g. did not include any 'management reserve' for broader uncertainty/risk).

### AR5 Progress and Future Activity

In AR5 to date AEMO has:

- Made significant contribution to market/regulatory design activity
- Commenced implementation activities including core team recruitment; solution design/architecture; completed a number of implementation projects (e.g. GPS, Constraints) and commenced others (e.g. WEMDE, RCM, RTMS)
- Supported and/or initiated stakeholder forums (WRIG, WRIG-IT, Readiness Working Group)

Looking forward the focus is on:

- Completing system development and testing of all solutions
- Market readiness & transition: comms, training, market trials, Go Live decision
- Post Go Live: support for new changes, delivery of any deferred non-critical scope

### Revised forecast

- With conclusion of core market design and rule modifications in late 2020, AEMO has assessed what is needed to successfully implement the WEM Reform Program
- In addition, AEMO has a greater understanding of industry needs, technical challenges and lessons learned from early implementation activities and other AEMO implementation projects
- The scale and complexity of the required changes is now clearer, and this is reflected in the need for the revised implementation plan, Go Live date (October 2023) and CAPEX/OPEX forecast
- Key drivers of the revised forecast include
  - market design complexity requiring significant and extended support from AEMO – which also flows through to system changes and implementation efforts (e.g. NAQ)
  - longer overall program timeframes (e.g. impacts on fixed resources)
  - extent of 'central' program coordination role and need to support wider business change, education and readiness activities



# AR6 Expenditure Forecast

## WEM Reform Program – Actuals and Revised Forecast

AEMO's initial AR5 submission for the WEM Reform Program included a total program forecast of c. \$61m (incl. c. \$14m contingency). For the AR5 period the ERA 'approved' c \$48.5m CAPEX (incl. \$9.3m contingency and \$0.5m OPEX).

AEMO's revised total forecast for the program is c. \$74.9m CAPEX and \$1.7m OPEX.

These forecasts have been determined following a detailed elaboration and estimation process and AEMO has much higher levels of confidence in accuracy as compared to AR5 submission.

A further c. \$16.4m CAPEX contingency and \$0.3m OPEX contingency is forecast recognising there remains material risks given the scale of the Program; external dependencies and broader conditions (e.g. more competitive labour market)

Project	Actuals (\$m)	ETC (\$m)	Contingency (\$m)	Total (\$m)
Constraints Management	1.3	0.1	-	1.4
WEMDE	2.2	10.7	2.7	15.6
Integration & Market Trial	-	3.9	1.5	5.4
Hypercare & Support	-	1.4	0.6	2.0
Generator Performance Standards	0.9	-	-	0.9
Digital Platform	1.8	7.8	2.7	12.3
System Planning Reform	0.7	6.8	1.9	9.4
Settlements Enhancements	2.5	0.0	-	2.5
Settlements Reform	0.1	3.8	0.7	4.5
Registrations Reform	0.0	1.8	0.4	2.2
RCM Reform	1.1	6.5	1.6	9.2
STEM Reform	0.0	0.6	0.6	1.2
Compliance Reporting	-	2.0	0.6	2.6
<i>Sub-total</i>	<i>10.7</i>	<i>45.3</i>	<i>13.2</i>	<i>69.2</i>
Core (e.g. Program Management, Assurance)	3.6	8.3	3.1	15.0
Market and Regulatory Design	5.1	0.3	-	5.4
Technical & Process Design	1.6	0.0	-	1.6
<b>TOTAL CAPEX</b>	<b>21.0</b>	<b>53.9</b>	<b>16.4</b>	<b>91.2</b>

### Notes

- 1) WEMDE Project includes Dispatch Engine, User Interface, Real Time Market Submissions and DTS Integration
- 2) System Planning Project includes Outage Planning, Commissioning Test, ST and MT PASA, Forecast Integration and Planning Tools
- 3) Actuals are to end Sep-21

# AR6 Expenditure Forecast

## Planning for uncertain requirements



The rapid pace of the energy transition and developing nature of Government Reforms means there are different levels of certainty for expenditure in the AR6 period.

AEMO is keen to strike the right balance of providing transparency on potential costs while only submitting forecasts that we feel can confidently pass the regulatory test.



For AR6, AEMO plans to rely on the in-period submission process for a number of projects where we are less certain on specific requirements. AEMO will include estimates of any known spending (e.g. planning) and where possible, early estimates of potential expenditure in its initial submission to support Market Participants with investment planning as well as support broader decision making on next steps.

# AR6 Expenditure Forecast

## Uncertain requirements – current assessment

The following projects are currently subject to varying degrees of (un)certainty with AEMO planning to return with an in-period submission at an appropriate time.

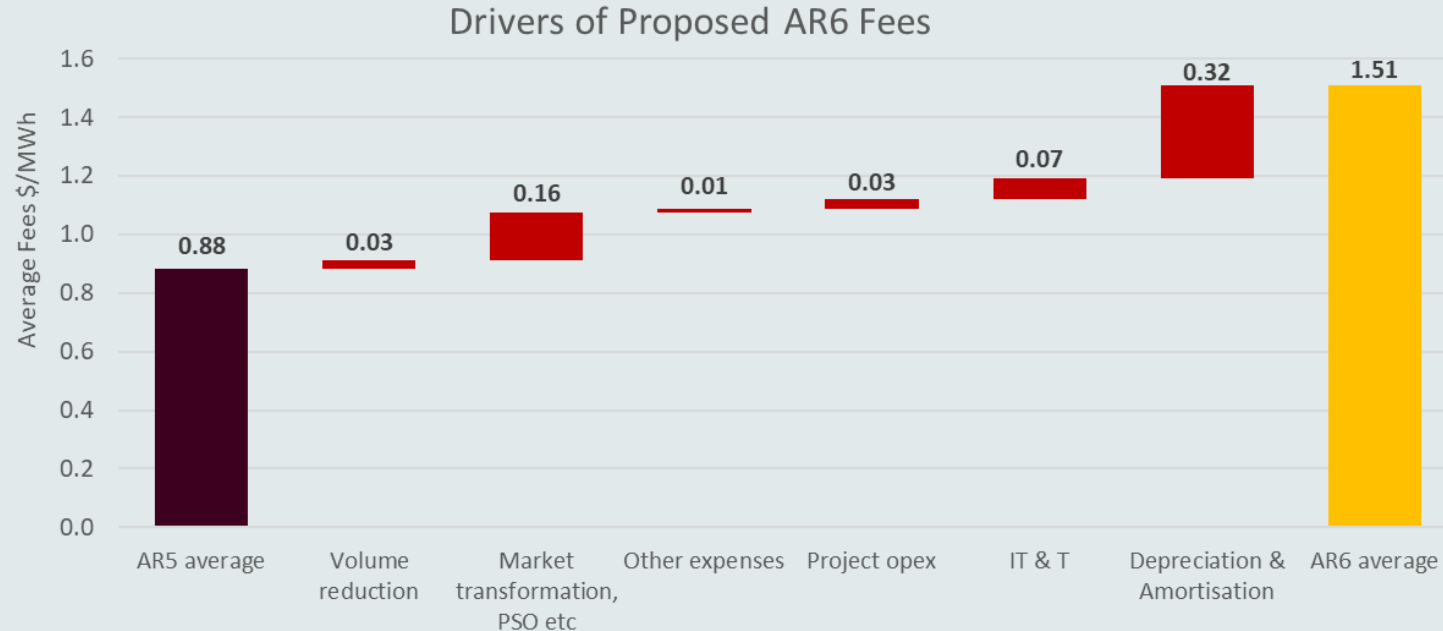
Project	Current Status & Commentary
DER Roadmap (Market Participation Actions)	<ul style="list-style-type: none"><li>AEMO's 2020 DER Roadmap in-period submission did not include implementation of arrangements for WEM participation of DER Aggregators in AR5</li><li>AEMO has undertaken initial cost estimation, but the detail of key policy positions and rules is not expected to be landed prior to the AR6 submission. AEMO has included c. \$2m in AR6 for 'Regulatory Planning' activities</li></ul>
5-minute Settlement (5MS)	<ul style="list-style-type: none"><li>In December 2019, the WA Government announced a policy intention to introduce 5MS from October 2025.</li><li>AEMO has undertaken initial cost estimation, but the detailed market design is yet to commence</li><li>AEMO is also considering its broader meter data strategy (e.g. transition to AMI)</li><li>AEMO has included c. \$1m in AR6 for Initiation and Planning activities.</li></ul>
Energy Transformation Strategy (ETS) Stage 2	<ul style="list-style-type: none"><li>WA Government announced ETS Stage 2 on 16 July 2021.</li><li>This strategy includes a range of activities and workstreams that will require AEMO to undertake support and/or implementation activities</li><li>The majority of workstreams within Stage 2 are at an early level of policy design and it is not possible for AEMO to develop reasonable expenditure estimates at this stage.</li><li>An allowance to support the development of these activities is included in the OPEX estimates and will be included in AEMO's submission.</li></ul>

AEMO's current high-level estimates for the DER and 5MS activities in the AR6 period are \$35 – \$60m (for clarity, these estimates are potential additional amounts and will not be formally included in the initial AR6 proposal).

Is this the right approach for reforms with uncertain requirements?

# AR6 Expenditure Forecast

## Market fees overview (preliminary draft)



\$/ MWh	AR5			AR6		
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
AR5 Actual & AR6 Proposed	0.861	0.894	0.894	1.217	1.477	1.830
Real	0.861	0.861	0.844	1.127	1.341	1.629

- Energy consumption is forecast to decline 1.0% p.a. over AR6, which adversely impacts prices
- WEM Fees are proposed to increase from AR5 to AR6 reflecting
  - Uplift in resourcing to service the new Real time and Essential Services Market, new market obligations and development
  - Increasing demands on Power System Operations
  - New market, DER and Metering and Settlement projects
  - Depreciation on Reform and DER Roadmap assets
  - Once-off and ongoing IT licencing, support and hosting services

# Next steps

- Engagement ahead of submission
  - EPWA/ERA – potential rule changes related to treatment of uncertain projects, updating transitional functions
  - EPWA – policy priorities
  - ERA – planning and early provision of methodologies
  - **Offer of one-on-one meetings with Market Participants**
- Board approval of AR6 submission November 2021
- AR6 submission due to ERA by 30 November 2021

# Appendix

# Appendix 1

## AR5 Capital Expenditure Summary

Project Status	AEMO Proposed	AR5 Final Determination	AR5 Actual/ Forecast	Actual/Forecast Variance to Final Determination	Actual/Forecast Variance to AEMO Proposed
Completed	7,012	6,983	15,138 -	8,155 -	8,126
In flight	82,118	69,238	68,736	502	13,382
Pipeline	4,211	2,118	407	1,711	3,804
Accommodation	3,870	2,054	-	2,054	3,870
<b>TOTAL</b>	<b>97,211</b>	<b>80,392</b>	<b>84,282 -</b>	<b>3,890</b>	<b>12,929</b>

### Variance to the Final Determination key influencing factors

- Power System Operations (PSO) required \$4.6m additional spend in AR5 due to upgrade to a new EMS version, underestimation of implementation complexities and, WEM specific requirements
- System Management Systems Transition (SMST) - \$1.8m additional spend in AR5 due mainly to delayed spending from AR4 and changed sequencing to bring in before the PSO project
- Digital Roadmap – The ERA approved \$4.7m of the \$13.1m proposed. Digital Program is progressing with revised scope and full AR5 forecast of \$7.6m
- WA DER is expected to be \$2m lower due to reforecast of contingency and to align with partner and EPWA delivery plan.
- The WEM Reform Program is currently \$1.5m below AR5 budget with implementation activities starting later than forecast with greater focus on market and regulatory design in AR5



# Appendix 2

## AR5 Capital Expenditure Detail

Project Status	WEM Projects	AEMO Proposed	AR5 Final Determination	AR5 Actual/ Forecast	Actual/Fcast Variance to Final Determination	Actual/Fcast 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	-	-	633 -	633 -	633
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	-	-	80 -	80 -	80
Completed	PSO Project	516	516	5,130 -	4,614 -	4,614
Completed	POMAX - Oracle Database and Metering Upgrade	997	968	857	111	140
Completed	RoPE (Phase 2)	2,478	2,478	3,069 -	591 -	591
Completed	System Management System Transition	2,215	2,215	4,051 -	1,837 -	1,836
Completed	STEM Fortran Replacement	448	448	438	10	10
Completed	WEM Market Modelling – Phase 1	-	-	566 -	566 -	566
Completed	RC_2014_03 (Admin Improvements to Outage Process)	759	553	-	553	759

# Appendix 2 continued

## AR5 Capital Expenditure Detail

Project Status	WEM Projects	AEMO Proposed	AR5 Final Determination	AR5 Actual/ Forecast	Actual/Fcast Variance to Final Determination	Actual/Fcast Variance to AEMO Proposed
In flight	PASA Process Improvement (ST and MT)	<b>A</b> 209	-	124 -	124	85
In flight	Reserve Capacity Mechanism (RCM) Pricing *	2,750	2,750	2,151	599	599
In flight	Digital Roadmap - AR5 FY20 Approved Projects**	13,080	4,660	5,315 -	655	7,765
In flight	Digital Roadmap - Additional FY20 Projects pending review			2,215 -	2,215 -	2,215
Pipeline	Rule Change Allowance	1,420	-	-	-	1,420
Pipeline	Enhanced Control Room Tools	314	69	102 -	33	212
Pipeline	Improved Demand and RE Forecasting	<b>B</b> 89	89	95 -	6 -	6
Pipeline	Market Operator Interface in the WEM	363	363	-	363	363
Pipeline	BMO Tie-Break	-	-	94 -	94 -	94
Pipeline	Governance Risk Compliance Audit System	-	-	15 -	15 -	15
Pipeline	SM Ops Application Remediation	402	179	-	179	402
Pipeline	Life cycle support for H/W & S/W	864	864	101	763	763
Accommodation	Accommodation	3,870	2,054	-	2,054	3,870
	<b>Total (Including WA DER Roadmap)</b>	<b>97,213</b>	<b>80,392</b>	<b>84,282 -</b>	<b>3,890</b>	<b>12,929</b>

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** 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.

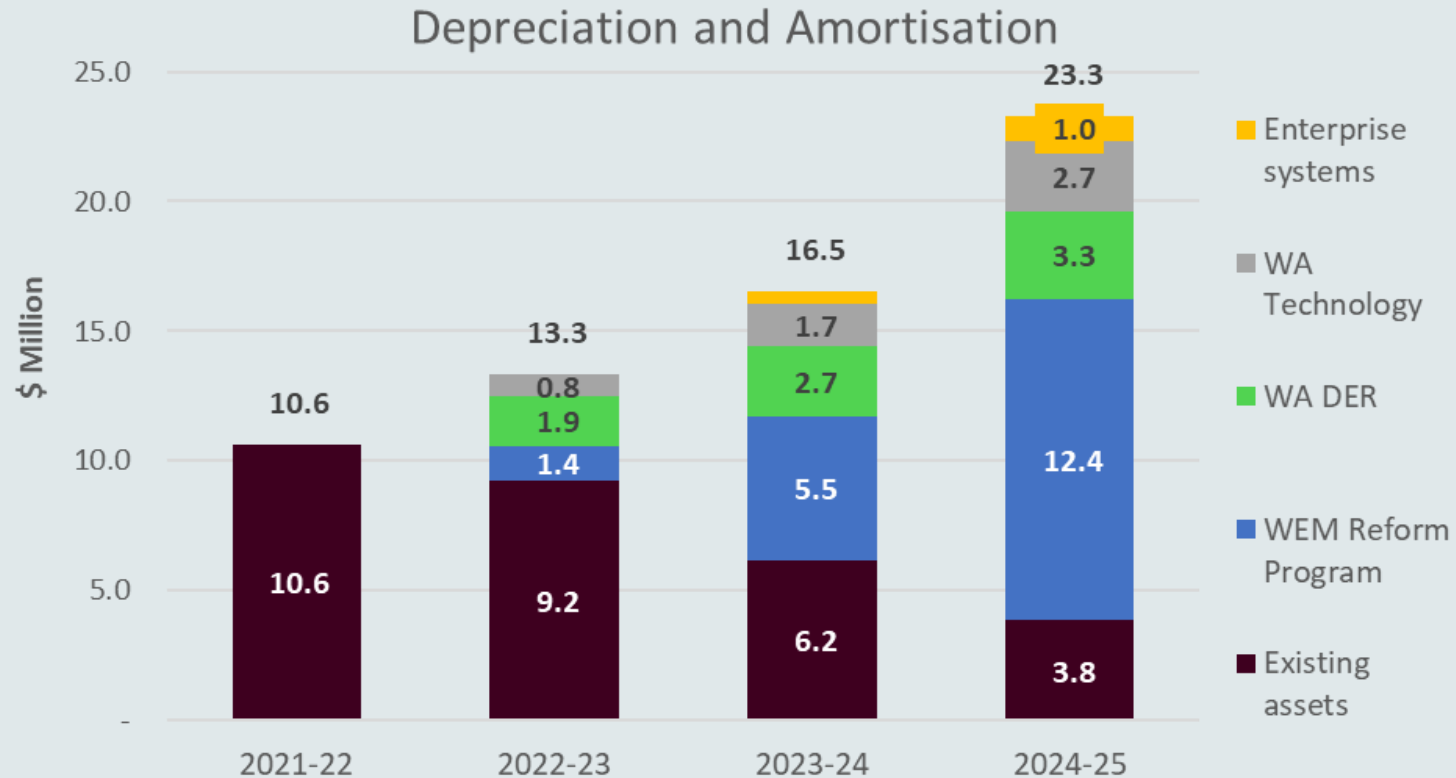
# Appendix 3

## WEM Reform Program Breakdown

WEM Reform Program (\$Million)	FY19 Actual	FY20 Actual	FY21 Actual	FY22	FY23	FY24	Total
LABOUR	1.5	3.0	11.0	24.1	20.8	7.7	68.2
HARDWARE	-	0.0	-	0.9	0.2	0.1	1.2
SOFTWARE	-	0.0	0.2	0.6	1.9	0.9	3.5
TRAVEL & ACCOMMODATION	0.0	0.0	-	0.0	0.1	0.0	0.1
TRAINING	-	-	0.0	0.1	0.4	-	0.6
OTHER EXPENDITURE	0.0	0.2	0.5	0.3	0.5	1.4	3.0
CONTINGENCY				4.3	8.3	4.0	16.7
TOTAL EXPENDITURE	1.5	3.2	11.8	30.3	32.3	14.2	93.3
CAPITAL	1.5	3.2	11.7	30.2	31.8	12.7	91.2
OPERATING	0.0	-	0.0	0.1	0.4	1.5	2.0

# Appendix 4

## Depreciation and Amortisation Profile



Delivery of Energy Transformation Strategy is a key driver of the depreciation and amortisation profile.

- During AR6 \$91m of investment in the WEM Reform Program enters service and become depreciable. Useful lives of WEM Reform Program assets are generally assessed at 10 years, with some components 3-5 years
- DER Roadmap assets have 5yr-7yr useful lives and progressively go live over AR6
- WA Technology. Useful lives generally 3yr-5yr. in line with AEMO accounting policies
- Past investments in existing assets progressively depreciated over AR6

# AR6 Submission Projects

# AR6 Capital Expenditure Detail

Programs	TOTAL (\$million)	DESCRIPTION
WEM Reform Program	\$44.1	New market rules developed by the Energy Transformation Taskforce will require more than 60 market procedures to be developed or substantially re-written by AEMO.
WA DER Program	\$10.9	The WA DER Program supports the effective integration of DER into the WEM and SWIS as per the WA govt DER Roadmap.
Control Room Tools and Equipment	\$1.3	Includes the Operations Simulator, WAMS, WEM Backup Control Room Uplift and Transient Stability Tool (see slide 3)
Rule Changes	\$1.0	Includes medium sized rule change for FY23 and three rule changes (small, large and XX large) for FY25
WA Technology	\$8.7	Includes Itron upgrade, Lifecycle EDP, Integration and Legacy Market Systems, infrastructure upgrades, Relevant Level Methodology and Certificate Authority. (see slide 4)
Enterprise Systems (NEM and WEM)	\$5.2	Includes EMS upgrade, cyber, operations forecasting and infrastructure NORWEST (see slide 5)
TOTAL	\$71.2	

# AR6 Capital Expenditure Detail

## Control Room Tools and Equipment

### PROJECTS

### TOTAL (\$million)

### DESCRIPTION

Operations Simulator

\$0.9

Costs associated with provision of licenses to WEM, dedicated hardware and resources to on-board the WEM power models to the Australian Operations Simulator

WAMS

\$0.2

Wide Area Monitoring Systems will bring the data output from Western Power PMUs into the AEMO control room environment and to enable offline analysis.

Transient Stability Tool

\$0.2

This project will develop a Transient Stability Tool to enable AEMO WA to provide enhanced situational awareness to the Control Room through the use of real-time results from the transient stability tool.

TOTAL

\$1.3



# AR6 Capital Expenditure Detail

## WA Technology

PROJECTS	TOTAL (\$million)	DESCRIPTION
Itron Upgrade	\$0.4	Lifecycle upgrade to the existing ITRON MetrixIDR load forecasting software.
Certificate Authority	\$0.3	Security certificate migration to the new Certificate Authority Platform and revoking of existing security certificates, to mitigate critical cyber security risk
Relevant Level Methodology	\$1.2	Modification of calculations in the RLM tool, update to UI to enable users to upload data required for the calculations, develop WEM and internal procedures to support the new RLM
Infrastructure – Perth Computer Room	\$2.0	Hardware upgrade to the Perth Computer Room in line with AEMO planned lifecycle hardware upgrade program.
Lifecycle - Legacy Market Systems	\$1.8	Upgrade a number of WA applications to align remediating the critical risks identified and align with strategic architecture direction
Lifecycle - EDP	\$1.9	Upgrade a number of WA Systems applications with enterprise data platform architecture that aligns with AEMO's strategic direction, remediating the risks identified
Lifecycle - Integration	\$1.1	Upgrade a number of WA applications to align remediating the critical risks identified and align with strategic architecture direction
Total	\$8.7	

# AR6 Capital Expenditure Detail

## Enterprise Systems

PROJECTS	TOTAL (\$million)	WA TOTAL (\$million)	DESCRIPTION
EMS Upgrade	\$7.6	\$0.8	In order to mitigate risk of non support fort a critical capability, WA portion of costs of the national EMS upgrade, including specific WA customisations
Cyber	\$24.6	\$2.7	In order to manage the Cyber risks, WA portion of costs of maintaining cyber security for AEMO nationally
Operations Forecasting	\$13.5	\$1.5	Penetration of variable renewable technology requires an uplift in forecasting capability, WA portion of costs associated with the national implementation of Operations Forecasting
Infrastructure NORWEST	\$2.0	\$0.2	In order to mitigate risks associated with end of Life hardware, WA portion of the lifecycle upgrades to NORWEST computing centre
TOTAL	\$47.7	\$5.2	