AEMO Responses to Market Participant Feedback:

Alinta Energy

1) Gradual transition of WEM systems to NEM.

AEMO is seeking the "Market Solutions Design" component of the AR4 submission to allow IT Expertise to be assigned to the Program Team to support further development and refinement of the IT solutions. This will help ensure that both the overall Architecture and the timing of any transition of systems (WEM to NEM) are undertaken in the most efficient and risk averse manner.

This will include exploring feasibility of options to introduce new solutions that don't undermine the philosophy of leveraging national AEMO NEM expertise and support arrangements. It also allows various options of exact transition timelines to be explored such that a robust roadmap of IT solutions can be prepared, shared with the Market Participants in 2017 and enable an early design and build activity to commence in 2018.

2) Prudent Spending

Alinta discusses supporting the Market Development and Market Solution Design activities targeted at a 2019 market go-live. Given the uncertainty in relation to the new labour government and the potential impact on the reform, AEMO commits to ensuring only necessary spend that is line with market reforms and prudent in terms of timing will be undertaken.

Synergy

1) ERA review of prudency and efficiency of expenditure incurred for RCM3, particularly consultancy fees.

A summary of the information provided to Synergy by AEMO in response to this query, in relation to both external consulting and internal AEMO costs is included below.

The main two cost components in the RCM3 project are internal AEMO labour costs and external consulting fees. Further details in relation to this are included below:

i) Consulting $1.9M:

- The $1.89M consultancy (and third party contractor firm) cost breaks down as follows:
- The major cost item is $1.2M for the main RCM bespoke development work such as User Interfaces and API. This was more than was originally anticipated (still within the original cost range) but was the result of a comprehensive external tender process and the most competitive bid from the five shortlisted vendors.
- $240K for changes to the core metering and settlement engine for WEMS.
- $50K for changes by Western Power to systems leveraged by System Management. We have worked with Western Power and System Management to significantly reduce the effort in this area compared to the initial estimates.
- $146K for certification of the system calculations. This includes test case development, certification test analysis, three rounds of end-to-end software certification testing, regression testing of settlements and associated management and expenses. The capacity market is worth approximately $570M per annum and this independent certification is regarded as essential to ensuring Market Participant confidence in the calculations.
- The remainder is use of external consultants / contractors in delivery of miscellaneous specialist services such as installing hardware and software, and elements of integration to the existing WEM systems.

ii) Internal Labour $1.1M:

- A significant amount of subject matter expertise has been dedicated to the project to ensure that the complex RCM rules are clearly understood and systemised by the external consultants, and that the ultimate solution meets the needs of the market and market participants. Broad expertise has been provided in the following areas, with all internal labour being charged to the project via timesheets:
  1) Technical oversight of the consultancy activity - design, build and test of the solution.
  2) Specific technical testing of each component.
  3) Domain expertise in relation to the rules, and processes to ensure full compliance.
  4) Review and design input into replacement of existing manual processes into the new solution.

AEMO is of the view that the above expenditure is prudent, and in line with the broad and complex scope of the Reserve Capacity project and market conditions. The team has worked extremely hard to obtain the right mix of resources and skill sets to ensure a cost effective, quality outcome.

2) Data Centre:

Synergy notes that AEMO's communication infrastructure has been upgraded twice in two years, noting expenditure in November 2015.

The November 2015 expenditure included a range of items, not all related to communications. The treatment of this is as follows:

- Adoption of AEMO cybersecurity standards for the WEMS. This was the single most expensive item. This equipment remains in service until the WEMS systems are replaced by new Market Systems. This is not expected to occur for several years and the equipment may then be repurposed if it is has not fully depreciated. Therefore it is not impacted by this submission.
- Some minor upgrades to the infrastructure supporting the market systems. Again this infrastructure remains in service until the deployment of new market systems. Therefore this is not impacted by this submission.
- A communications link was put in place between the Perth Office and wider AEMO. This was a temporary solution until the office move could be completed and the term of the contract was limited. There was no capital cost since AEMO repurposed surplus hardware from storage in the east coast to support the link. This equipment will be repurposed elsewhere in AEMO. Therefore this is not impacted by this submission.
- Upgrade of the videoconferencing system to interface with AEMO. This is intended to be reused at the new office. This reuse is reflected in the office move costings approved in the last submission.
- Purchase of user firewalls at a cost of $35,340.20. This hardware could nominally have been reused but did not meet the more stringent specification required for the new office, given additional system management staff and changing assumptions. This equipment will be repurposed elsewhere in AEMO.

Duplication of costs

Synergy asks if there is overlap between the proposals around the data link costs between the amounts already approved and the current submission:

- In October, the System Transfer costs included the data links with the office as end point, excluding data centre traffic. I.e. the link between WP and the AEMO office for voice traffic and connections from the office to WP to allow the controllers to use WP systems.
- In our current submission, the data links referred to have the data centre as the endpoint. I.e. between the DC and office, DC and other AEMO offices, DC to internet, voice and backup link from the DC to WP (to ensure connectivity in the event the office is out of commission).

As such, AEMO can confirm that there is no double counting between the two submissions.

18% Increase in the operating costs of the data links between 2017/18 and 2018/19

Regarding the Transfer Costs and the 18% increase between 20178/19 and 2018/19 for telco costs. This escalation was not simply inflation on a like for like basis. The detailed supporting information shows a planned infrastructure spend in the execution stage during July 2019 of between $266,000 and $766,000, accounting for the majority of the cost difference between financial years. It should also be noted that the 2017/18 costs covered a period of only 10 months.

$2.2M communications links more expensive than other options. (Incremental cost of Dark Fibre links and other options considered).

Synergy asks the ERA to consider AEMOS's proposed "$2.2M communication links" which is stated to be "more expensive than other options". The $2.2M cost appears to refer to the sum of Hardware ($1.96M) and Program Cost Allocation ($334k) on page 15 of AEMO's submission. The "more expensive than other options" comment referenced was from a section that specifically addressed AEMO's use of dark fibre communication technology and did not refer to the overall cost of the data centre.

- Dark fibre links are the most secure way of linking the new office to the data centre. The alternative is to use a standard leased line. The difference is that the leased line may pass through multiple pieces of infrastructure some of which may rely on mains power and be disrupted in the event of a total power loss. Dark fibre technology does not require any electrical power and so is unaffected in the event of a total loss of power in the area. There is nominally a premium for dark fibre compared to a standard leased line (hence the comment), but the premium is of the order of at most a few thousand dollars per link over the lifetime of the service and may be minimal when purchased through a competitive procurement process leveraging AEMO national purchasing power.
- The $1.96M of capital expenditure on hardware in the data centre is not just the cost of the communications links infrastructure but the entire networking, compute and storage hardware for the data centre, as listed in table 5 of section 2.2.2. All equipment and external services are purchased in accordance with AEMO's purchasing policy through a competitive process ensuring value for money. The choice of dark fibre links or standard leased lines does not make a material difference to the overall cost.

3) Overhead costs (20%) seem high compared to other regulated business (10% to 15%).

- It appears that Synergy is basing this percentage on the total $1.9M Program Costs against the overall $11M Capital cost forecast. The Program Overhead costs within the revised submission consist of two components as follows:

i) Actual costs to date (approximately $560K), including Planning phase incurred up to the end of December 2016, which were incurred on the basis of a fully scoped WAMR Program, of which the original budget was approximately $40M. So this included a fully staffed Program team which has now been significantly reduced to align with the 2017 work scope.

ii) Forecast capital costs for 2017 of approximately $900K, which on a basis of $11.6M total Program costs equates to less than **10%**. AEMO believes that these program costs are significantly reduced and now very much prudent in terms of the activities and deliverables for 2017. The small core team remaining will provide the necessary direction, governance and risk management for both the fully in-flight projects (RCM3, Data Centre) and the Market Development and Market Solution Design activities.

Program Overhead (Indirect) Costs covers dedicated WA Market Reform program management activities, not a general management cost allocation. There are many different methods that can be used to capture this type of costs. Rather than initially apportion costs to projects, key Program Level resources (including IT Infrastructure and IT Architecture, Change Management, and Stakeholder Engagement) have been kept at a Program level and managed accordingly. For the 2017 calendar year these resources and corresponding costs have been significantly reduced from the original work plan and AR4 submission.

More specifically, WAMRP Program Overhead resources and costs will focus on the following four core components in 2017;

• Planning, Governance, Reporting, Risk and Issue Management and Quality Assurance (as outlined, and consistent with the Program Management Plan submitted to the ERA in 2016).
• Regulatory Preparation (Developing Policy positions and Rules with PUO and accompanying support)
• Engagement with Market Participants (including prototyping of new solutions to help readiness)
• Preliminary IT planning (includes development of prototypes as proof of concepts) and capturing of WEM market requirements thus ensuring any future design is based on robust and agreed business needs.

Again, AEMO welcomes further scrutiny from the ERA in relation to these overhead costs should they see that requirement as being necessary.

4) **20% Capitalisation prudent and efficient.**
   - AEMO suggests that the ERA refer to information already provided in relation to capitalisation of costs and the practise that is in line with AEMO's corporate policy in this regard. General implementation costs (labour, consulting etc) are

5) **Consider AEMO's costs to ensure no internal fixed costs are being allocated to WA (i.e. BAU roles).**
   - ERA can be assured that absolutely no internal fixed costs are being assigned to the WAMRP Program Overhead costs. The financial information that AEMO has provided the ERA clearly articulates exactly which resources (role and name) are included in the Program overhead component, the duration and the daily rate which make up the overall cost.
   - Wherever AEMO staff (BAU for example) provide input to the WAMR Program, their costs are captured via our internal time control system and allocated to the particular project that they are working on.

6) **EMS**
   - **Prudency of incurring expenditure on a new EMS and forecasting tool until complete understanding of future design of the energy market. Perhaps delaying EMS and use SCADA for some time?**

In June of 2016, AEMO assumed the System Management function from Western Power. Since that time, AEMO has leveraged Western Power personnel, and IT solutions. These solutions in particular (SCADA, Forecasting and modelling in particular) have reached the end of life and are creating a significant risk to the security of the electricity market. Whilst continuing to rely on these systems for the short to medium term, AEMO has been advised by Western Power that an upgrade is required at a significant cost to mitigate the risk. Given that Western Power has a strong desire to move off the XA21 SCADA system to another solution (Power on Fusion) they are not keen on undertaking an upgrade that is estimated to be between $6M and $10M.

The cost of this upgrade is likely to be well in excess of the proposed AEMO e-terra installation. A large majority of these upgrade costs are likely to be on-charged to AEMO for recovery via market fees as Western Power are looking at using their Distribution SCADA system (Power on Fusion) for Transmission control. AEMO will continue to use the Western Power provided XA/21 until it is able to transition to the AEMO e-Terra platform.

The Allowable Revenue submission is attempting to make the case that these core System Ops systems are required to meet the current obligations AEMO has under the market rules. These systems are not dependent specifically on the proposed EMOP rule changes however can be used to support alternative market designs in the future should this be a requirement of the new government. Further, delaying these projects may result in alternative investment being required to mitigate current version limitations in the Western Power systems AEMO currently have access to under the AEMO - Western Power Service Agreement.

The activity and financials requested in this submission for the EMS activity are for early works in 2017 that will enable AEMO to continue to leverage the Western Power Solution until a full e-Terra solution can be built in mid-2018. AEMO is of the view that this is the most prudent, cost neutral, risk averse and sensible approach, that will enable it to execute System Management functions with minimal risk and reliance on a third party.

Attached to this response is a further supporting document that AEMO provided to Bluewaters explaining cost / benefit / options analysis that has been undertaken and shaped our thinking in terms of approach, justification and costings. AEMO welcomes the opportunity to discuss this further with the ERA if so desired.

Finally, the solutions being developed are designed in such a way as to keep in mind potential changes to future markets. AEMO does not anticipate that any expenditure proposed will need to be discarded in the near future depending on outcomes of reforms. This approach and expenditure in our view very much mitigates the risk of reliance on outdated, third party software and support, whilst supporting the philosophy of fit-for-purpose to meet today's market needs and with an eye to overall Electricity Market Reform enhancements.

7) Review of actual spend by 30th June 2017 – meets WEM rules requirements, prudent, minimises costs.

AEMO has always undertaken a conservative approach to the cost of manning and running a program of this size and complexity. As such we are extremely confident that all expenditure, both Capital and Operating in nature that has been spent to date can be justified, supported and capable of withstanding any scrutiny that the ERA may wish to undertake.

To reiterate again, 100% of expenditure has been WAMRP focused with no cross pollination with other AEMO functions at any time. The approach has been to slowly ramp up the resources on the program to ensure they are fully utilised, and external consultants have only been utilised where necessary. As such, we believe our approach and the corresponding expenditure has been prudent, fit for purpose and appropriate for the activities undertaken and milestones achieved.

Bluewaters

1) IT Expenditure

As with the above feedback, AEMO believes all expenditures, both actual and forecast are prudent and in line with our approved functions and/or Electricity Market Reform direction.

2) EMR Development and Market Solutions Costs

The information below has been shared with Market Participants including Bluewaters, and sought to explain both Actual and Forecast costs against these two components of the submission.

Specific resources for **Market Development** are as follows:

- One full time project manager across Wholesale and Power System Operations.
- One part time Work stream Lead for Wholesale
- One part time Work stream Lead for Power System Operations
- One full time Business Analyst shared across the two Work Streams.
- A mix of SME's that are BAU but have a small percentage allocation (5% or 10%) of their time on an as-required basis.

These costs are apportioned over the entire 2017 calendar year.

In terms of the SME's, this accounts for approximately 12 FTE's across the Wholesale and Power System Operations Work streams, and approximately 10% of an FTE's time each. Note that this is on an 'as required' basis to support the Market Development activity with the PUO. Should this not be required then the individuals will not time write to the Program.

In addition to the above 2017 forecast there are:

1) Actual historical costs incurred to date, mainly across the Wholesale Projects.
2) Program Management cost allocation. This is predominantly the cost allocation from Program level – strategic advisor, program director, change manager, stakeholder engagement manager, IT Infrastructure and Architecture Manager and program support officers.
3) Travel and Training costs.

Specific resources for **Market Solutions Design** are as follows

- One full time Change Manager, dedicated to working with market participants on design, prototyping, issues and concerns management and readiness for the new markets
- One part time stakeholder manager to continue forums and broad engagement as needed.
- Three full time Business Analysts to cover documentation of requirements, conceptual designs, and prototype design etc.

A mix of IT resources (solution architect, enterprise architect, developers, testers etc) to support the business and solution requirements and the prototype build and deployment. These are a mix of internal AEMO staff and external consultants (circa $300K), depending on availability and specific skill sets required. The exact number of IT related resources is not confirmed at this time as the exact requirements need to be further developed during the first half of the year, based on Market Development activities.

- Costs for software licenses and support for prototyping purposes (Circa $100K).

These costs are apportioned over the second half of the 2017 calendar year as we obtain greater definition on the market design.