

# OPERATIONAL SECURITY MECHANISM

DEEP DIVE 2: TECHNICAL ELEMENTS

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THURSDAY 3 NOVEMBER 2022  
3:00PM - 5:00PM

AEMC

## Acknowledgement of Country

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We acknowledge that we are hosting this meeting from the lands traditionally owned by the Gadigal people of the Eora nation.

We also acknowledge the Traditional Custodians of the various lands on which you all work today and the Aboriginal and Torres Strait Islander people participating in this meeting.

We pay our respects to Elders past, present and emerging and celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to the lands and waters of Australia.

# Agenda

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|----|--|--|
| 1. | Introduction   | Commissioner Shepherd                        |
| 2. | Recap: How the OSM would work  | Clare Stark                                  |
| 3. | Introduction of the case studies   | Victor Stollmann                             |
| 4. | Theme 1: Eligibility and accreditation<br><i>Time for discussion</i>   | Victor Stollmann                             |
| 5. | Theme 2: Timing, scheduling & revenue<br>Including AEMO planned prototyping work<br><i>Time for discussion</i> | Emily Banks, Haven Roche,<br>and James Banks |
| 7. | Theme 3: Unbundling<br><i>Time for discussion</i>  | Shannon Culic                                |
| 8. | Next steps for the rule change process   | Clare Stark                                  |
| 9. | Close  | Commissioner Shepherd                        |
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## Meeting protocols

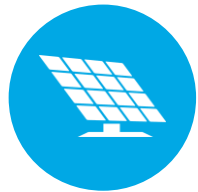
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- Please remain on mute and raise your hand or use the chat to ask questions.
- Please be respectful of the views of others.
- Attendees at this meeting must not enter into any discussion, activity or conduct that may infringe, on their part or on the part of other members, any applicable competition laws.
- For example, attendees must not discuss, communicate or exchange any commercially sensitive information, including information relating to prices, marketing and advertising strategy, costs and revenues, terms and conditions with third parties, terms of supply or access.

## Recap: Objectives for development of essential system services

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The ESB's final post-2025 advice on essential system services:



New market based arrangements to value the services needed to support the changing mix of resources



New market mechanisms to support efficient scheduling and dispatch by AEMO

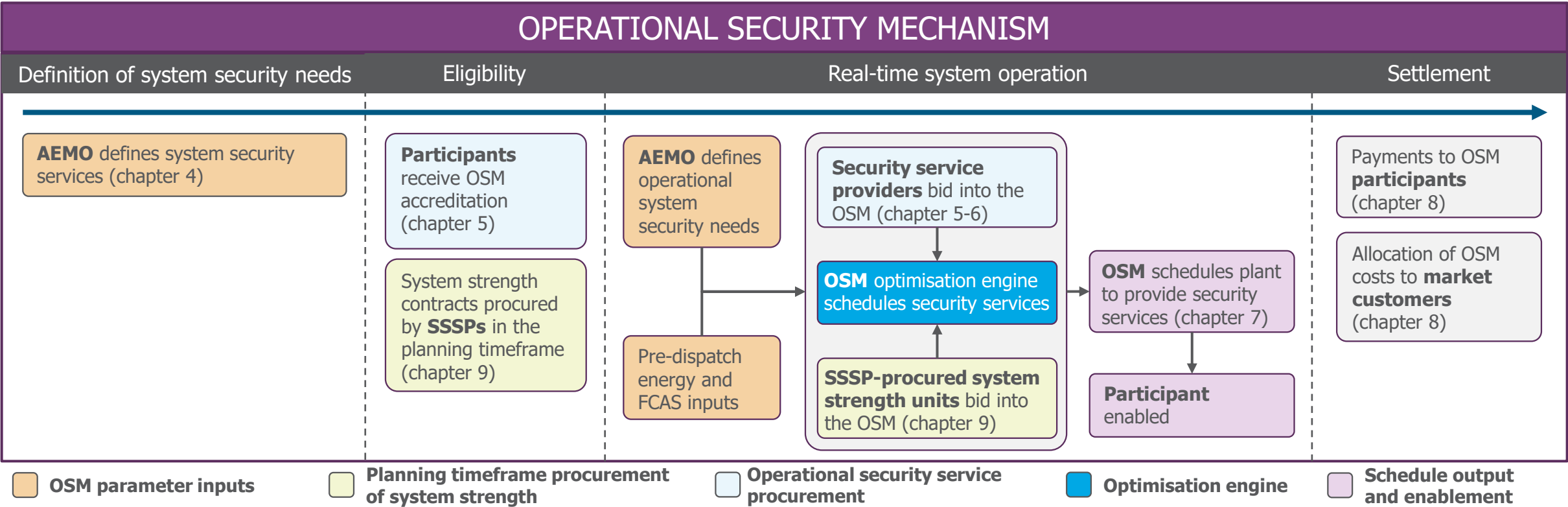


A range of supply & demand-based technologies and resources to deliver these essential services


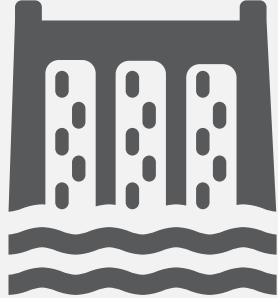



Ideally spot markets combined with co-optimisation should be used, and the market should move progressively towards spot market provision. There are some services that may be better suited to structured procurement where spot market arrangements may not be appropriate

# Recap: How the OSM would work



# The following case studies will help illustrate how to participate in the OSM

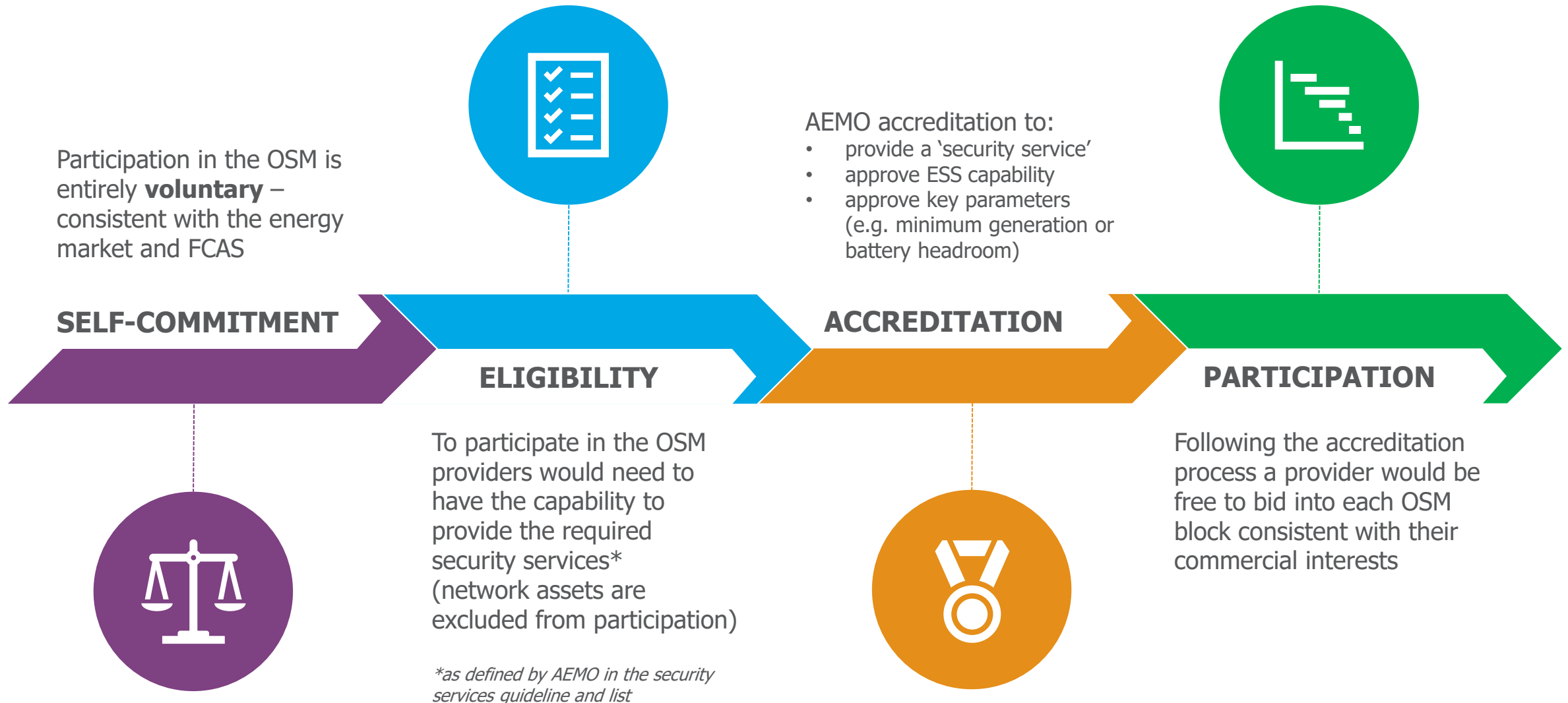
<p><b>A</b> BLACKWOOD BESS – GRID FORMING ENABLED</p>  <p><i>100 MW / 130 MWh grid-connected battery</i></p>	<p><b>B</b> RED GUM SYNCHRONOUS POWER STATION</p>  <p><i>250 MW synchronous unit</i></p>	<p><b>C</b> JACARANDA SYNCHRONOUS CONDENSER – CONTRACT with SSSP</p>  <p><i>200 MVAR synchronous condenser</i></p>
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To illustrate how each participant would interact with the OSM we will use the case studies to show:

- THEME 1 The eligibility & accreditation process to participate in the OSM
- THEME 2 Timing, scheduling and revenue
- THEME 3 The long term objective of unbundled security services

Note: Wind farms or other VRE resources with grid forming capabilities would be able to participate in the OSM if able to fulfil the requirements outlined in the OSM guideline and procedures.

# The draft rule creates a process by which providers are accredited to bid into the OSM

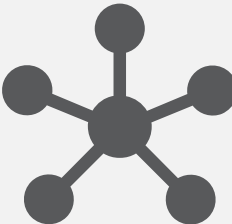




## The OSM includes a process by which security services are defined by AEMO

The rule would introduce a **transparent** and **flexible** process for AEMO to define security services. Advice from AEMO indicates, that based on current knowledge, at inception these security services would include:


**Secure configurations**



The OSM would ensure a secure configuration of units dispatched to maintain system security

*MAXIMISING THE  
VALUE OF TRADE*

**System strength**



The OSM would operationalise contracts as intended under the system strength framework

\*Other services may be included if more work to unbundle services has occurred by the OSM start date

AEMO is required to set out service descriptions in a *Security service guideline* using the *Rules consultation procedure* and provide specific detail on configurations in a *Security services list*

- AEMO would be required to consult on the Guideline when it is created and when updated as engineering knowledge develops
- AEMO would be required to consider updates to the Guideline if requested by stakeholders
- Service definitions would be informed by consultations with TNSPs, including provision of limit advice
- The Security services list would provide participants with visibility over precisely what is being procured and in what circumstance. AEMO would **not** be required to consult on the list given it would be compiled based on the Guideline

The guideline and annual AEMO reporting would **provide market signals** to participants to inform investments in equipment capable of delivering the required security services

# Eligibility and accreditation of the case study examples

A

## BLACKWOOD BESS



Provider **voluntarily decides** to participate in the OSM



Provider identifies security services it is capable of offering based on AEMO guideline and list



AEMO provides OSM accreditation, including:

- *In grid-forming mode, capable of being part of a **secure configuration** and providing **system strength** without needing to dispatch electricity.*
- **Headroom requirement** of 30 MW.



Provider free to voluntarily bid into the OSM for each OSM block

B

## RED GUM SYNCHRONOUS POWER STATION



Provider **voluntarily decides** to participate in the OSM



Provider identifies security services it is capable of offering based on AEMO guideline and list



AEMO provides OSM accreditation, including:

- *Capable of being part of a **secure configuration** and providing **system strength** when dispatching electricity.*
- **Minimum generation** of 80 MW.



Provider free to voluntarily bid into the OSM for each OSM block

C

## JACARANDA SYNCHRONOUS CONDENSER - CONTRACT WITH SSSP



Provider **voluntarily signs** a system strength contracts with an SSSP – as such **is required to** participate in the OSM



AEMO provides OSM accreditation, including:

- *Capable of being part of a **secure configuration** and providing **system strength** without dispatching electricity*



Provider bids into the OSM for each OSM block based on SSSP contract conditions



# THEME 1 - DISCUSSION

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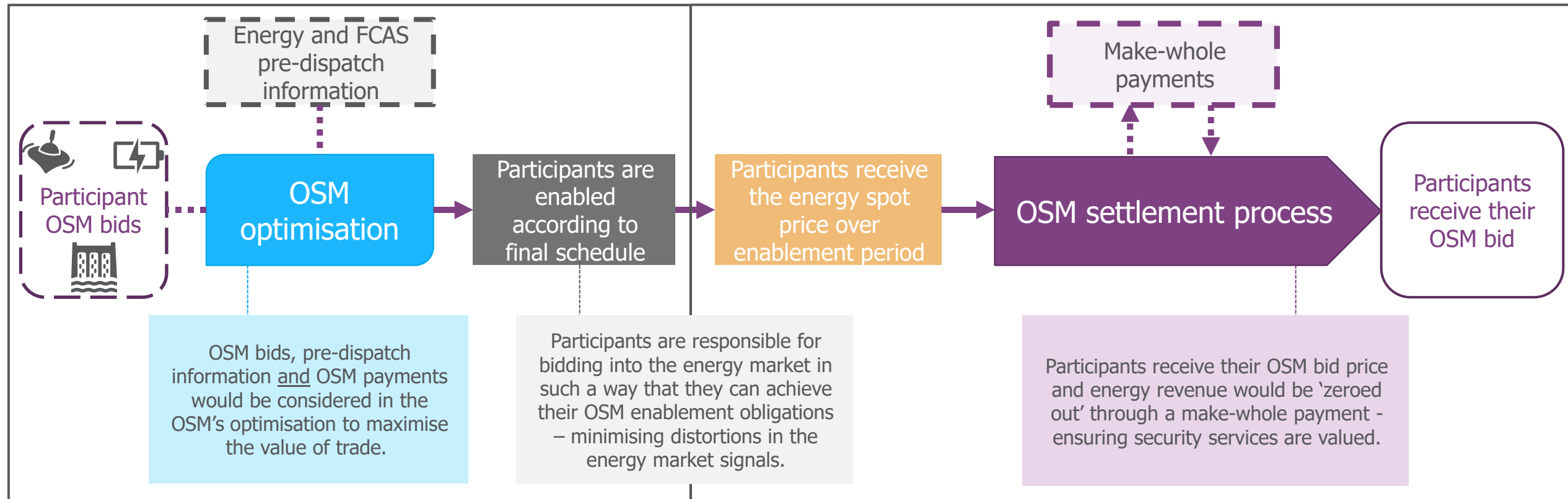
## Theme 2 – Timing, scheduling and revenue

### Objectives of the OSM's timing, scheduling and revenue arrangements

Incentivise participants to provide security services irrespective of the energy price

Minimise distortions in the energy and FCAS spot markets

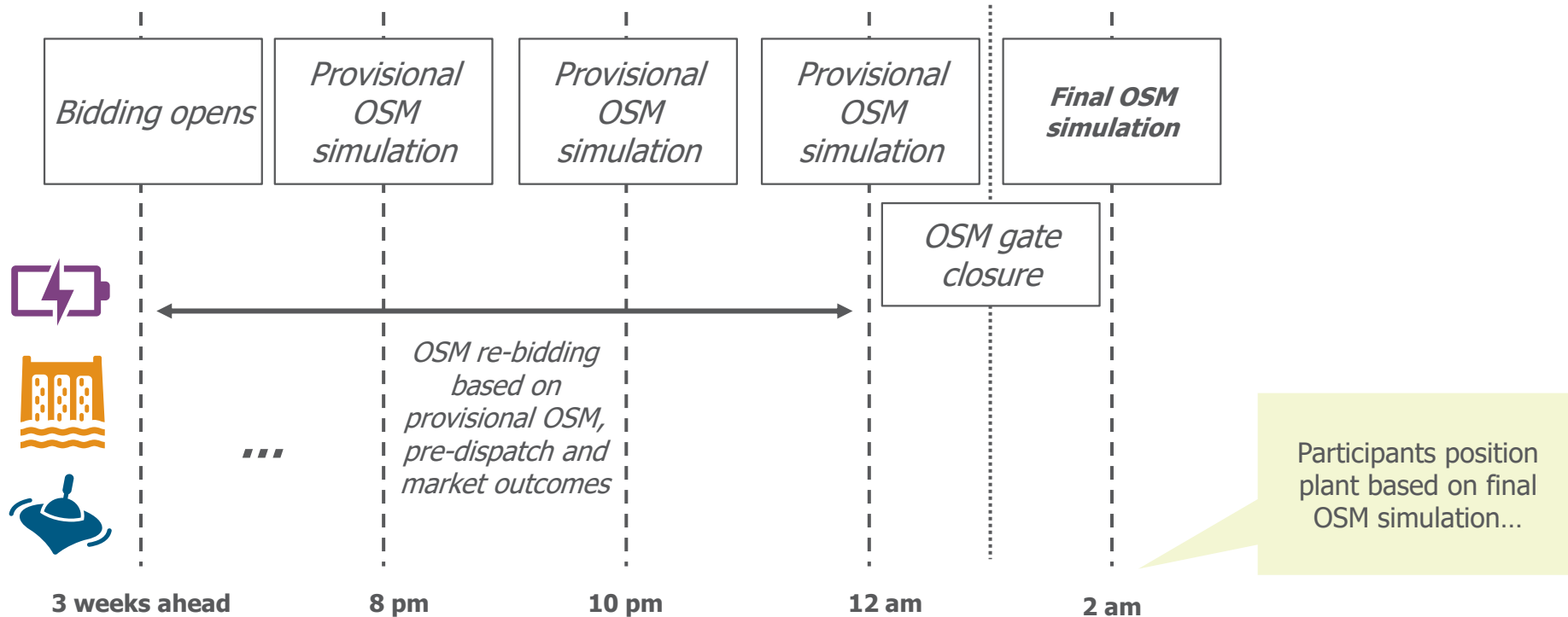
Allow for price discovery across the energy, FCAS and OSM markets -> operational and investment signals





# The OSM schedules units based on security needs and pre-dispatch information

*Iterated OSM simulations for OSM horizon (next slide)*



## OSM objective

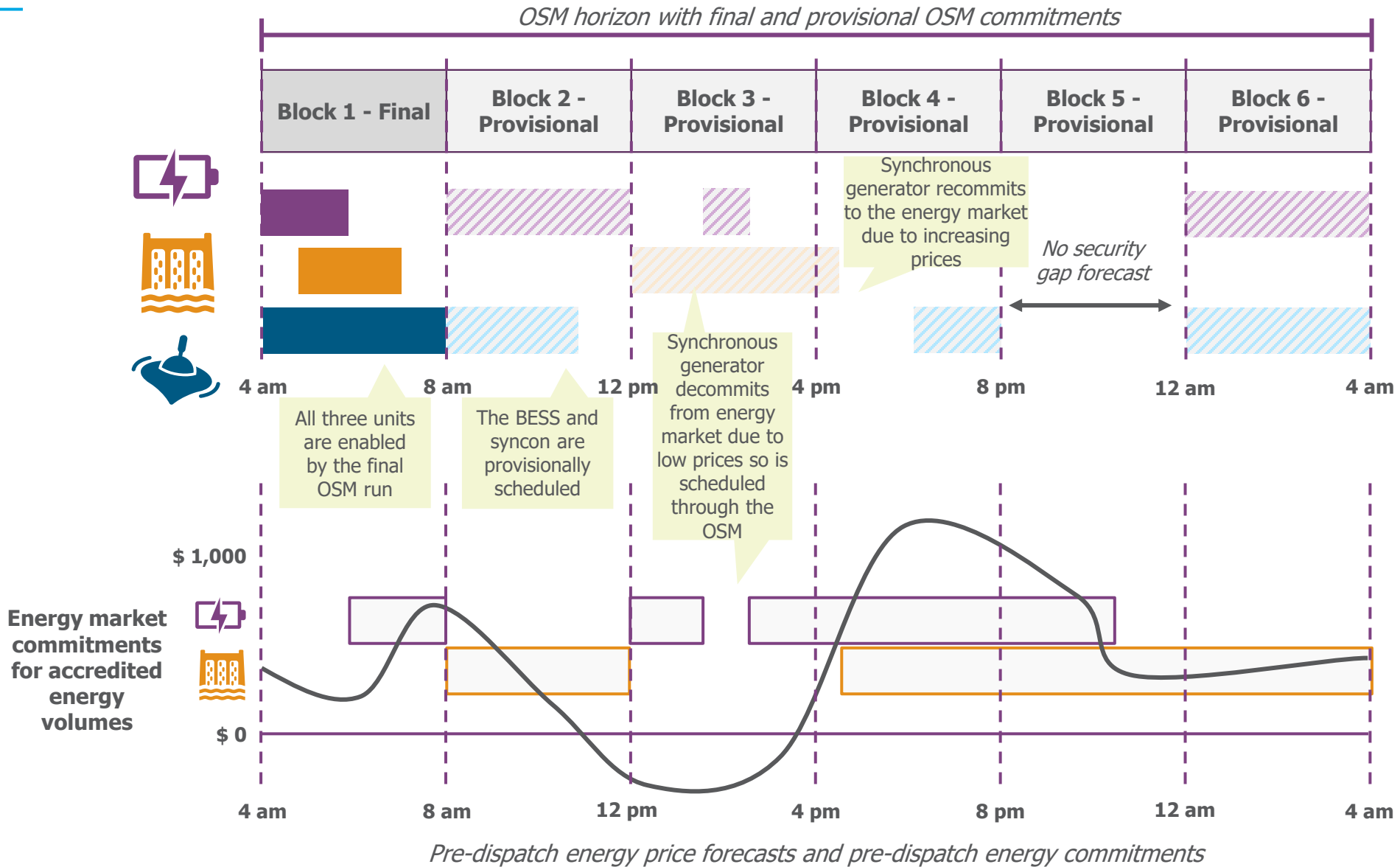
1

Achieve and maintain power system security

2

Maximise the expected value of spot market trading

# The OSM schedules units based on security needs and pre-dispatch information



Note: In practice, under the draft determination, the timing elements would be at AEMO's discretion.

## Revenue arrangements would help preserve market incentives

**Case study:** All units bid to provide security services and the final OSM schedule has determined all three units are required to provide security services and system strength during a 4-hour period.



A

### BLACKWOOD BESS

Scheduled to provide security services for 2 hours at base dispatch of 0MW, but headroom requirement of 30MW.

Enablement bid	\$0
Variable bid	\$1000/hour

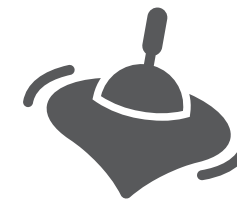


B

### RED GUM SYNCHRONOUS POWER STATION

Scheduled to provide security services for 2.5 hours with accredited energy volume of 80MW.

Enablement bid	\$87,500
Variable bid	\$100/MWh



C

### JACARANDA SYNCHRONOUS CONDENSER

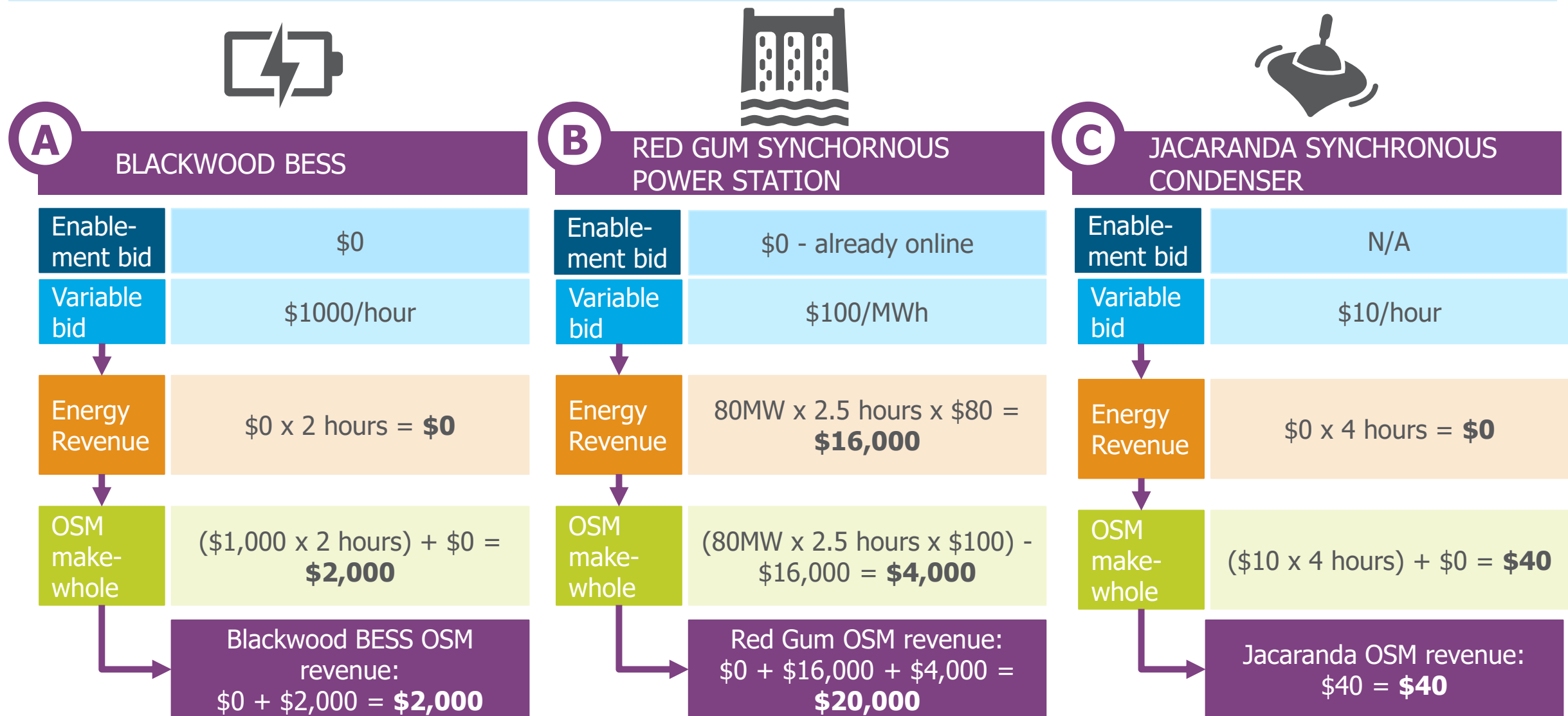
Scheduled to provide system strength for 4 hours with 0MW dispatch.

Enablement bid	\$0
Variable bid	\$10/hour
Availability payment	\$4000

Note: Units would only get enablement payments if enabled through the final OSM schedule. Units that come online based on a provisional schedule and are not included in the final OSM schedule would not be entitled to any enablement payments as market participants are expected to manage their own risk.

## Positive energy price

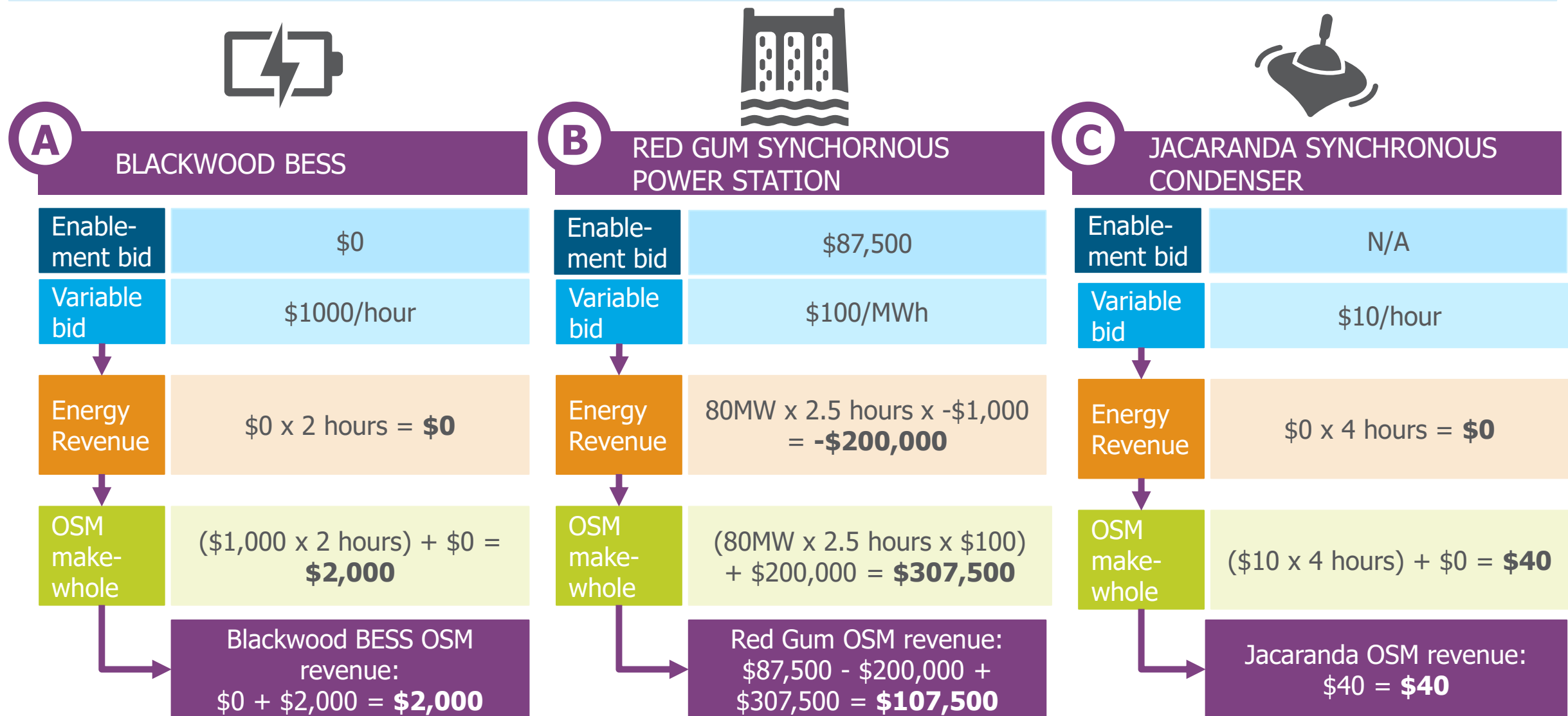
**Scenario 1:** The energy spot price remains positive at an average of \$80/MWh.





## Negative energy price

**Scenario 2:** The energy spot price is negative at  $-\$1000/\text{MWh}$ .



## Expected revenue of each unit

All three participants would be paid as bid for security services in the operational timeframe and may earn additional revenue from other frameworks.



A

BLACKWOOD BESS



B

RED GUM SYNCHRONOUS  
POWER STATION

C

JACARANDA SYNCHRONOUS  
CONDENSER

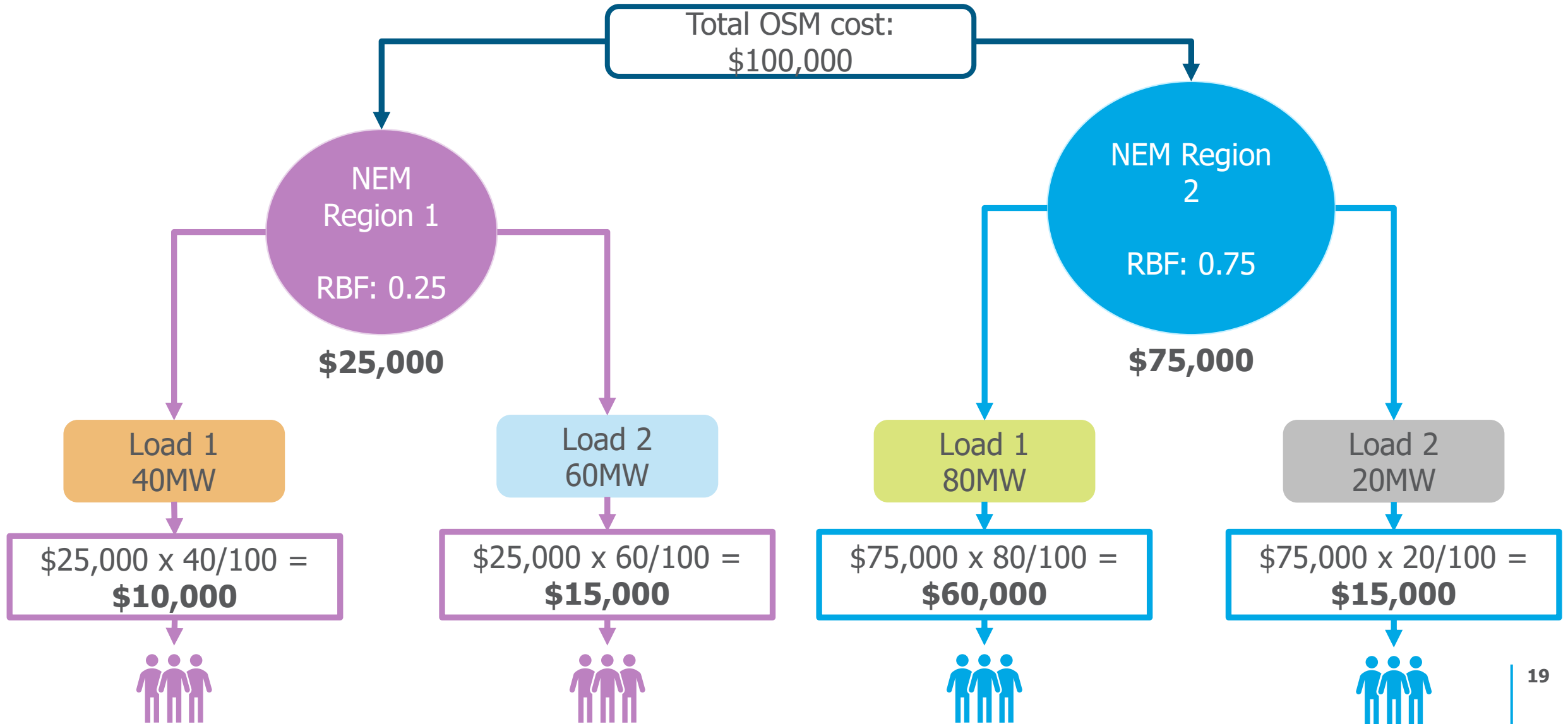
Scenario	BLACKWOOD BESS	RED GUM SYNCHRONOUS POWER STATION	JACARANDA SYNCHRONOUS CONDENSER	Other Revenue
Scenario 1	\$2,000	\$20,000	\$40	\$4,000
Scenario 2	\$2,000	\$107,500	\$40	\$4,000

Through the settlements process, participants earn their OSM variable and enablement bid (if eligible) for providing security services in the operational timeframe. Participants would only be eligible to earn enablement bids if they have incurred start-up costs as a result of being brought online solely for the OSM.

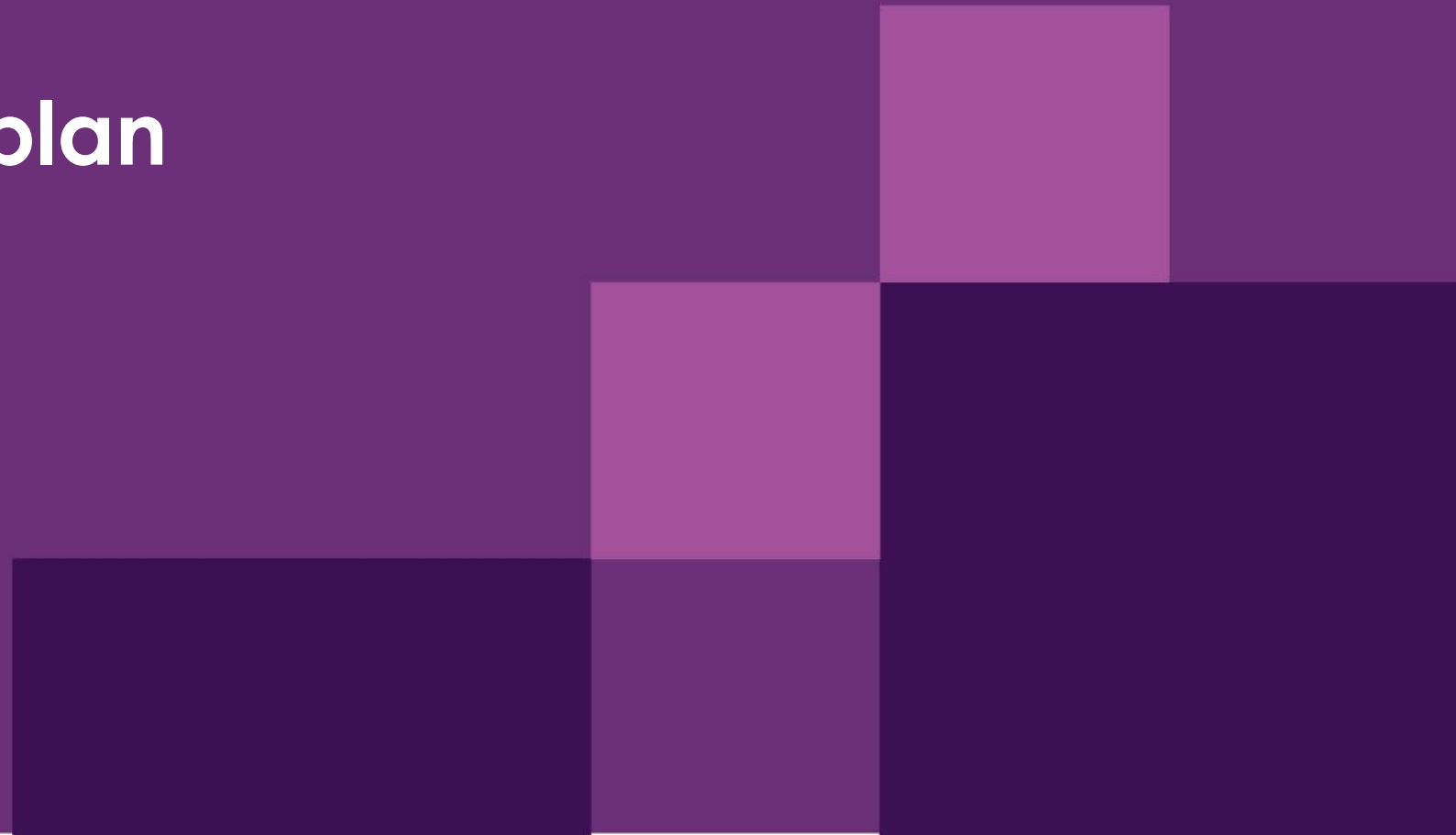
Participants with system strength contracts would earn their OSM variable bid for the provision of these services in the operational timeframe. Other system strength revenue streams, such as availability payments, would be managed and settled outside of the OSM.

# OSM costs would be allocated to customers in the regions who benefit from them

OSM costs would be allocated to market customers according to regional benefits and customer load.



# OSM prototyping plan



# Context and purpose

- AEMO is commencing work on developing and testing the OSM algorithm and systems
- A key part of this work is prototyping the OSM scheduler i.e. building a simplified model of the OSM algorithm, inputs and outputs
- As well as preparing for implementation, the results of prototyping can be a useful input to regulatory discussions:
  - For example, a prototype is a helpful vehicle for working through examples and testing different combinations of scheduling parameters (block size, horizon etc.). These parameters will be set in the OSM Procedures. AEMO will be obliged to consult with industry about this under draft rule clause 3.7G.11.
  - AEMO intends to progress with prototyping activities in stages to (a) inform these discussions and (b) provide transparency to industry on the pathway of the OSM towards implementation
- AEMO intends to utilise the AEMC's OSM TWG as the forum to engage with stakeholders in the initial stages of this work

# Questions to be investigated

Prototyping activities can be grouped into 3 key tasks

## 1) Solver formulation task

- Formulate and build a working model of the OSM as described in the AEMC's draft determination on the OSM
- Note the following specific questions this exercise should answer:
  - How does the OSM calculation interact with predispatch?
    - Sequencing of the OSM intaking PD bids
    - Consideration of resources that are valuable to a security configuration but also wish to self-commit in energy markets
  - How do OSM solutions converge?

## 2) Design parameter analysis

- Determine the mix of detailed design settings that support a practicable approach to implementing a solver
- Design settings include:
  - Scheduling parameters (block size, horizon, granularity of enablements etc.)
  - Constraint types
- Assess settings against the following (preliminary) criteria
  - Solver performance (e.g. runtime, software footprint)
  - Economic efficiency
  - Risk of service shortfalls (e.g. due to forecast uncertainty)
  - Simplicity
  - Predictability
  - Commitment certainty

## 3) Case studies

- Develop and report on examples to apply to the working prototype that address the following questions:
  - Should the OSM mechanism use bidding at the price floor in PD as an approach to ensure resources cleared in the OSM are scheduled in dispatch?
  - What are the mechanics of the OSM relieving IBR constraints for net market benefit?
  - What are the mechanics of the OSM unbundling system services from configurations?
  - How does the OSM treat units that can operate in multiple modes?



# THEME 2 - DISCUSSION



# Unbundling of services



## LONG-TERM VISION

Individual services separately defined, valued, procured and scheduled, where possible.

### Supporting unbundling

- Unbundling is not possible at this time given current engineering knowledge and the need to consider the system holistically.
- The OSM would therefore likely commence with bundled services initially, unless knowledge has developed prior to implementation.
- The OSM has been designed to enable unbundling over time.

### Developing a flexible design

- New services could be incorporated into the OSM as technical knowledge improves which would allow new technologies to be accredited and strengthen competition.
- Participants can request AEMO consult on updating the service guidelines and list if they see knowledge allows for advancement.
- There is a focus on information transparency to encourage new entrants – service definition, annual reporting and schedules.

### Collaborating with industry

- Achieving this long-term vision requires industry collaboration.
- AEMO's Engineering Framework and 100% instantaneous renewable penetration work will contribute to an understanding of security services.
- Collaboration with networks, including on limit advice, is also key to system configurations and unbundling.



## Case study: including an unbundled system service in the OSM

### Reporting

1.



AEMO would outline its work to identify and define an individual service in its **OSM annual report**.

AEMO would then update the **system security guidelines, list and procedures** to show how they would procure this service through the OSM, in consultation with stakeholders.

### Scheduling

3.



The OSM would then start **scheduling** this service. This would give AEMO the opportunity to see how it works and give participants the opportunity to respond to operational and investment signals for this service. **Day-to-day reporting** would then include this service.

At any time, stakeholders can propose changes to the NER to propose new or different ways of procuring system services e.g. markets

### Consulting and defining

2.



### Proposing

4.



# THEME 3 - DISCUSSION

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## How you can stay involved

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- 17 November 2022 - submissions close. Please visit the project page to make your submission.



- We are also happy to meet individually with stakeholders – reach out to the Project Leader Clare – [clare.stark@aemc.gov.au](mailto:clare.stark@aemc.gov.au)

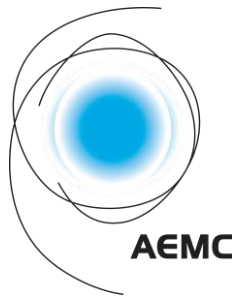
Thank you to everyone for your feedback and engagement on the draft determination and rule.



THANK YOU FOR  
YOUR TIME



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