OPERATIONAL SECURITY MECHANISM

PUBLIC FORUM

THURSDAY 6 OCTOBER 2022
2:00PM - 4:00PM

AEMC

Acknowledgement of Country

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

1.	Introduction	14:00
2.	The problem we're trying to solve	14:05
3.	AEMO's technical advice	14:10
4.	How the OSM would work for the long-term interest of consumers *Including time for questions*	14:20
5.	How the OSM would work for market participants *Including time for questions*	14:40
6.	Next steps for the rule change process	15:50
7.	Close	15:55

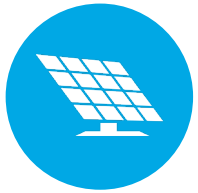
Meeting protocols

- 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, members 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.

Summary of the ESB's final post-2025 advice on essential system services

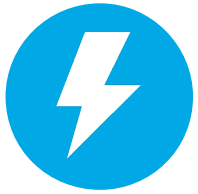
The objective of the essential system services pathway is to deliver:

ENERGY SECURITY BOARD



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

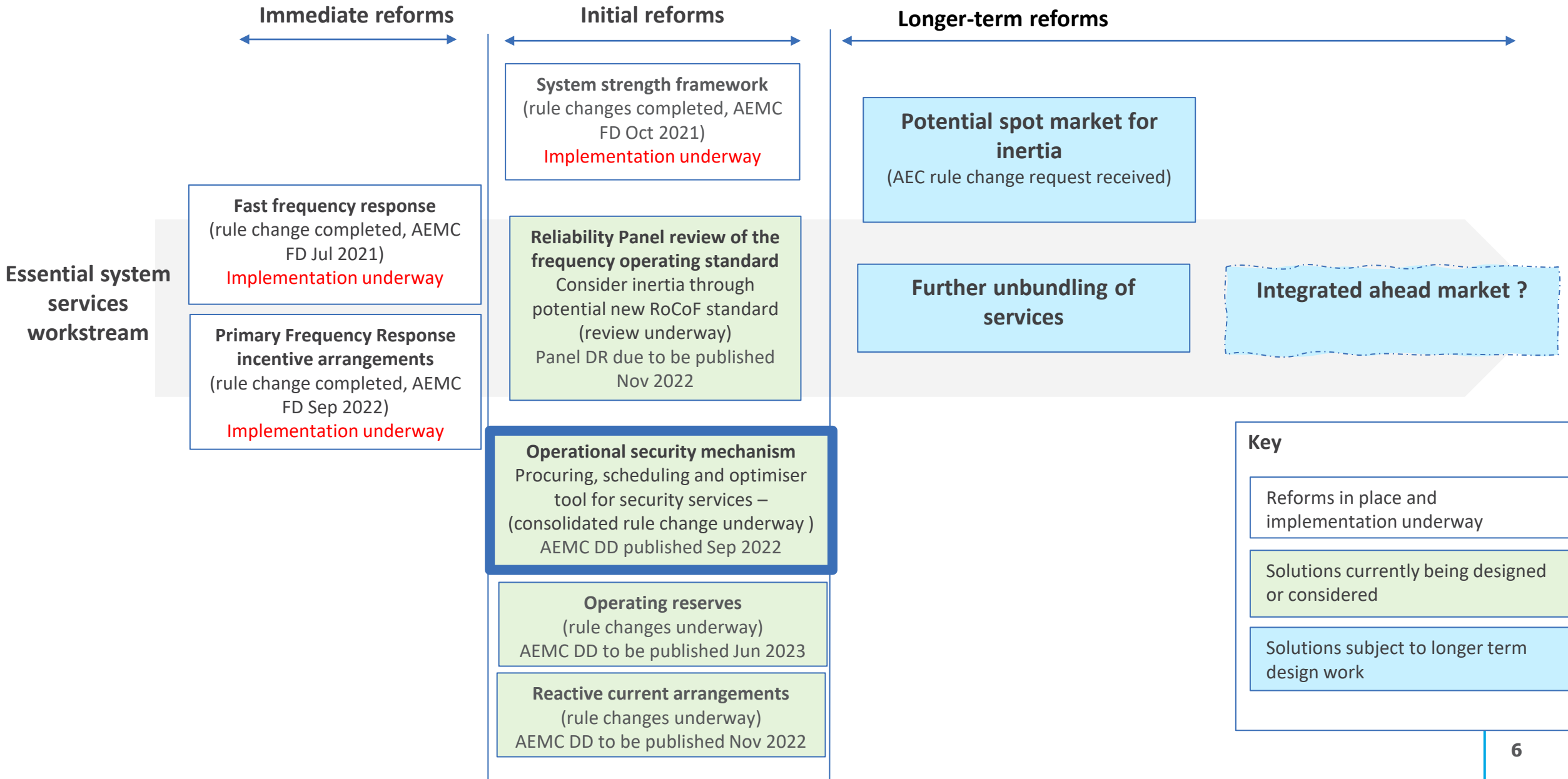
New market mechanisms to support efficient scheduling and dispatch by AEMO



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

Our essential system services work program progresses ESB recommendations



The problem we're trying to solve

We received two rule change requests that proposed different approaches to scheduling and provision of system services

Hydro Tas

- The current market design does not explicitly value system services because they have historically been provided by synchronous generators.
- With the increase of VRE, Hydro Tas notes that this has resulted in AEMO implementing constraints or issuing directions to maintain system security, which is neither a long-term solution nor consistent with the NEO.
- Proposed an approach where system services would be procured *within* the spot market.

Delta Electricity

- The changing generation mix means fewer system services are being provided as there are scarce operational, or investment, signals to provide them.
- Delta notes while AEMO can intervene to direct scheduled generators to address these shortfalls, the NEM will benefit from a market-based alternative.
- Proposed an approach where system services would be scheduled ahead of time *outside* of the spot market.

Our considerations in these rule changes allow for progression towards the ESB's post-2025 vision for how essential system services should be provided as the system transitions i.e. moving towards a system where essential system services are unbundled and individually procured, priced and scheduled

Develop a solution to better manage power system security both today and in the future.

How the preferable draft rule better meets the NEO and assessment criteria

	NATIONAL ELECTRICITY OBJECTIVE						
BROAD POLICY QUESTIONS	**Is the system need met through market mechanisms?**	**Are the principles of market efficiency met?**				**Is implementation timely and fit for purpose?**	
Assessment principles	System security	Incentives and risk allocation	Timely and appropriate mechanism for security	Transparent, predictable and simple	Technology neutrality	Flexibility and consistency with broader reform	Implementation considerations
Specific questions considered	Is security maintained? What are the risks to security?	How efficient is the approach in the operational timeframe, with regard to incentives, risk allocation and other relevant features?	Will security measures be suitable for the pace of change in the power system in the right timeframes?	Does the approach allow participants to make informed operational and investment decisions?	Is the approach neutral between all technologies and solutions that are able to provide the service?	Is the approach able to accommodate and adapt to market, technological, policy and other changes?	What are the implementation complexity and cost?
		How well does the approach achieve both allocative and productive efficiencies in the planning timeframe?	Are power system needs met by market mechanisms?	Is the approach predictable and durable to provide investment certainty in both the short and long term?		Does the approach move the system towards the intended future in a path-efficient manner?	What are the ongoing costs?

Unbundling services for operations

6 October 2022

AEMC Public Forum on the Operational Security Mechanism Draft Determination

Topics

- Experience in South Australia
- Assessing stable configurations
- Towards 100% instantaneous renewable energy operation

Experience in South Australia

- With 4 synchronous condensers in operation, the minimum synchronous generator requirement in SA has been reduced from 4 to 2.
- Recent addition of fast start synchronous generators in SA + contracted FFR services, provides an opportunity to explore reducing minimum requirement to single unit.
- For a stable operating configuration the following technical requirements must be satisfied concurrently:
  - Grid reference
  - Adequate voltage control (including compliance with S5.1.8 and AS61000.3.7)
  - Ramping and reserve
  - Frequency control including emergency frequency control schemes (UFLS, OFGS, SIPS)
  - Transmission and distribution protection adequacy, as per S5.1.9(c)
  - Other requirements relating to limits advice
- These cannot be viewed in isolation.
  - Trying to address individually can create gaps
  - Interactions between plant is important

- Current requirement for 2 units may be relaxed further once updated limits advice is received from ElectraNet.
- Below highlights a summary of the current status of the requirements associated with the known secure operation configurations in SA.
- Similar assessments will be required in other regions as they move towards new operating conditions.

Requirement	Responsibility	Status
Adequate voltage control	ElectraNet	Need to confirm short-term adequacy of voltage control with a minimum one synchronous generator requirement
Grid reference	AEMO	Possible to maintain grid formation in South Australia under system normal conditions, in at least some circumstances and pending system testing, with no synchronous generating units online
Ramping	AEMO	Possible to manage power system ramping in South Australia under system normal conditions, in at least some circumstances, with no synchronous generating units online
Frequency control	AEMO	Possible to manage power system frequency control in South Australia under system normal conditions, in at least some circumstances, with no synchronous generating units online
Protection adequacy	ElectraNet	Protection adequacy assessment underway for interconnected (with one synchronous condenser out of service) and islanded operation
Updated limits advice	ElectraNet	Relevant limits advice needs to be updated for operation with a single synchronous generator

More info: https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/congestion-information-resource/related-resources/operation-of-davenport-and-robertstown-synchronous-condensers

Assessing stable configurations

- Everything in the power system is designed and tuned to work together in secure configurations. When this is disrupted, stable configurations need to be reassessed.
- Network service providers provide limit advice to AEMO to support stable configuration assessments.
- When considering a reduction in synchronous generator requirements, an assessment is made as to whether having less units causes the remaining power system to exceed *any* technical limits and become insecure.
- Depending on the limit that is exceeded, different solutions can be implemented, with the end goal of getting the new configuration into a secure operating point.
- This is why, for example, with some of the system strength gaps previously declared, resolutions could be achieved through tuning of control systems. Other times, synchronous condensers have been found to be the best solution.
- Similarly, this is why some level of FFR can be substituted for synchronous inertia in SA to achieve an acceptable frequency outcome.
- This means, rather than replacing the quantities of inherent properties from synchronous machines, we aim to make sure the collective response from the remaining power system equipment results in acceptable system outcomes – and we determine **secure system configurations**.

Towards 100% Instantaneous Renewable Energy Operation

- AEMO has set an ambitious goal of being ready to operate the power system at 100% instantaneous renewable generation by 2025.
- In June 2022, AEMO published a priority list of actions for FY23 to support the energy transition in the NEM. Some of those relevant to 100% instantaneous renewable operation in secure system configurations include:
  - A2: Undertake a program of power system studies to assess power system security in the NEM at time of 100% renewable generation and assess future system requirements with fewer larger synchronous generators.
  - A5: Establish a market-based approach to dispatch resources for system security to operate throughout the transitional period of the power system
  - A9: Trial sub-sections/regions of the NEM at 100% inverter-based resources (IBR) operation.
- In December 2022, AEMO intends to publish the additional technical, engineering, and operational steps required to prepare the NEM to securely and reliability operate at 100% instantaneous penetration of renewables for the first time.
- This will support unpacking and unbundling the requirements of the system for the future.

AEMO

AUSTRALIAN ENERGY MARKET OPERATOR

For more information visit

aemo.com.au

What does the draft rule do for consumers *from implementation*?

The OSM would provide the following benefits to consumers from implementation

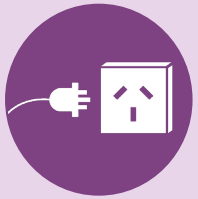
1

Improve efficiency

The OSM would provide a more efficient tool to manage system security than current arrangements allow, such as directions and constraints.

2

Operational tool



The OSM would be an operational tool and would enable directions to return to being used as a last resort mechanism.

3

Maximise trade

The OSM's objective function would ensure security services are procured at the lowest cost and maximise the value of trade alongside energy and FCAS markets.

4

Be prepared

The OSM would ensure AEMO is prepared should rapid change require significant changes in management of power system security, e.g. avoid repeating reliance on directions as recently experienced in South Australia.

What does the draft rule do for consumers *as the system evolves*?

The OSM would provide the following benefits to consumers as the system evolves

1

Transparency

AEMO would report on its efforts to better understand the needs of the power system and efforts to unbundle.

2

Flexibility

The OSM would be both flexible and fit-for-purpose to adapt the services procured as security challenges evolve.

3

Incentives

The OSM would provide technology-neutral incentives for new and existing market participants and technologies to invest and operate to provide OSM services.

4

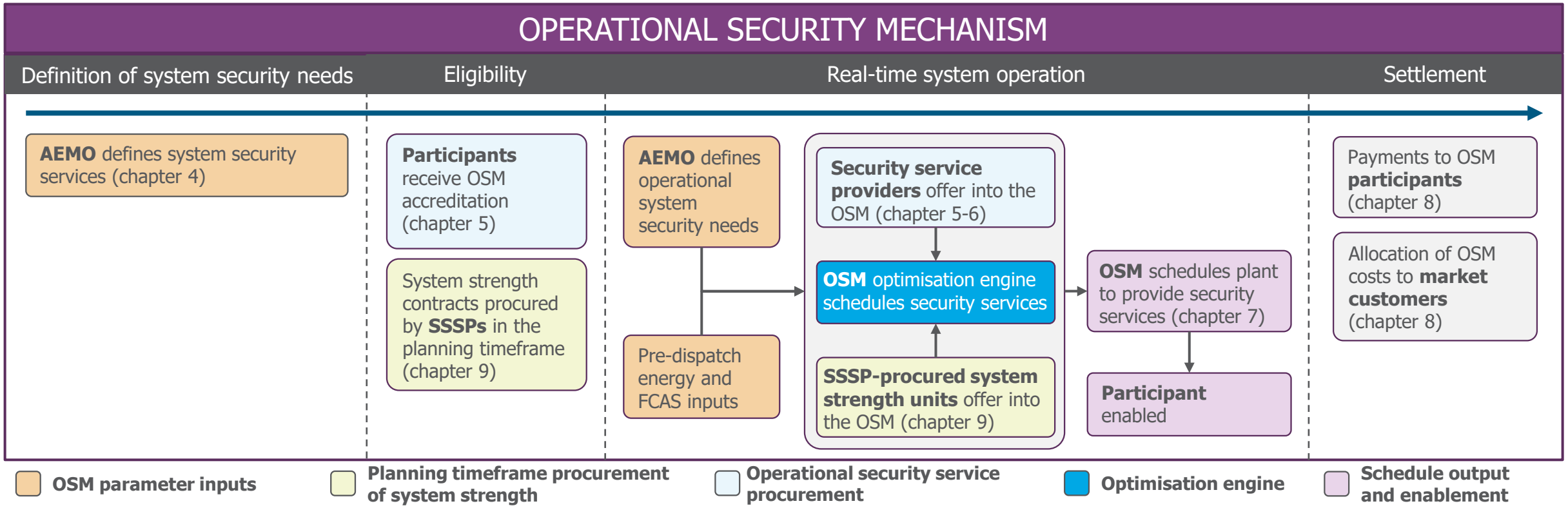
Learn from today

The OSM would facilitate the transition to unbundled services by improving our understanding of the services required to secure power system.

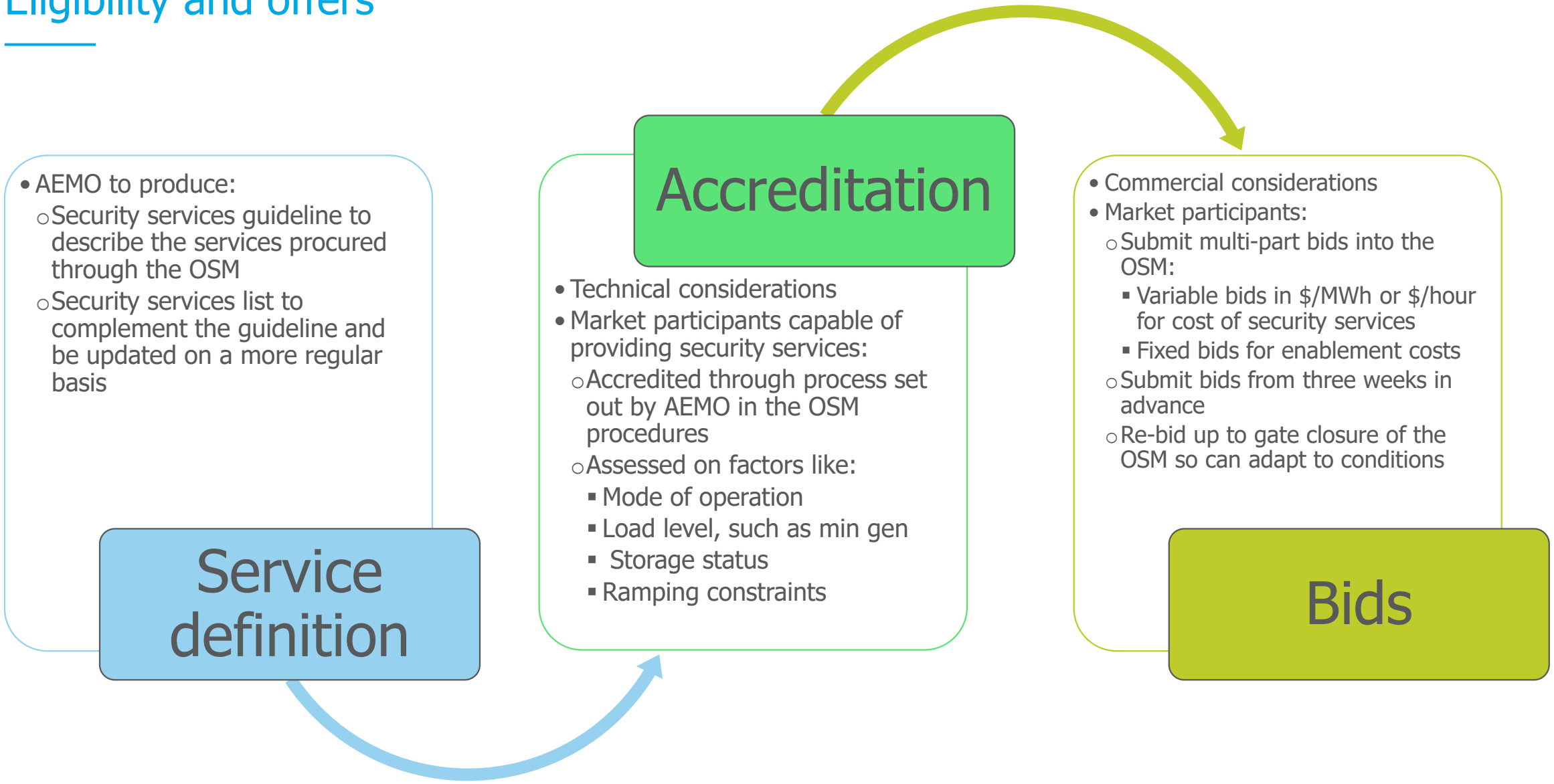
QUESTIONS?

Please remain on mute and raise your hand or use the chat to ask questions.

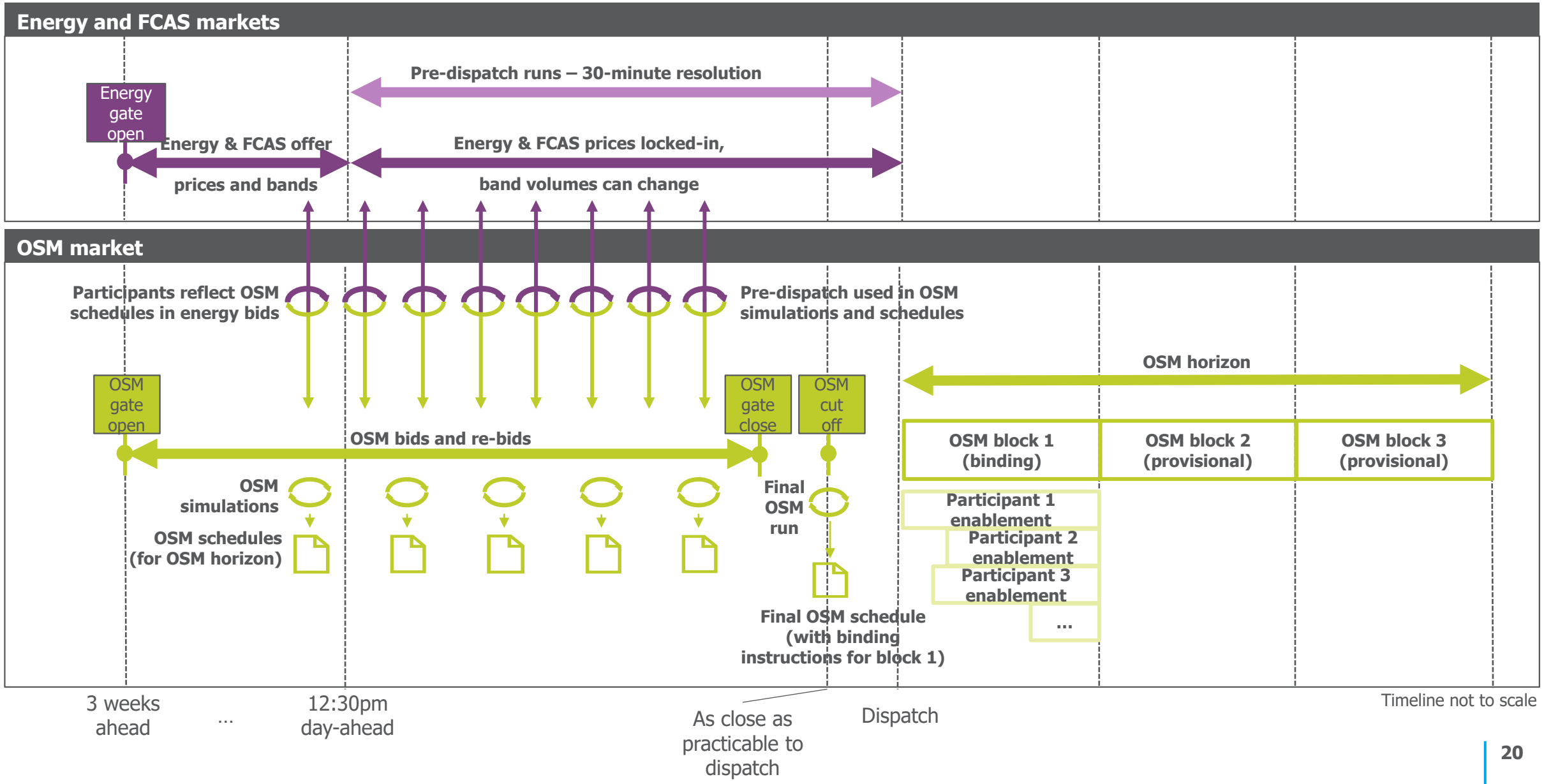
How the OSM would work



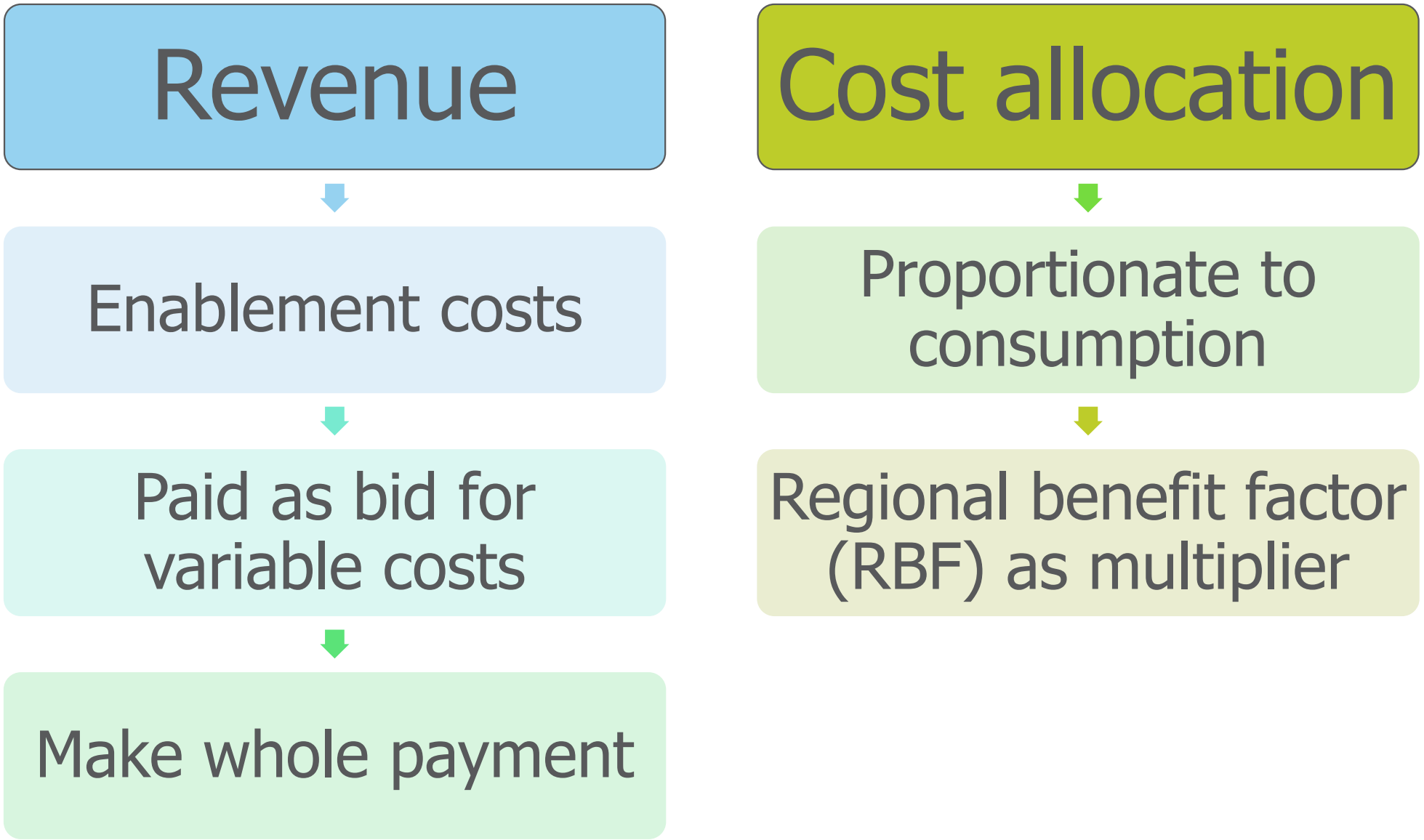
Eligibility and offers



OSM timing and scheduling arrangements



Revenue and cost allocation



Interactions with energy prices (bidding in $/MWh)

Scenario 1 - Positive energy price	-	+
OSM bid (variable + startup costs)		
Energy settlement revenue		
OSM settlement revenue		
Net revenue		

Scenario 2 - Negative energy price	-	+
OSM bid (variable + startup costs)		
Energy settlement revenue		
OSM settlement revenue		
Net revenue		

Scenario 3 - Energy price greater than forecast	-	+
OSM bid (variable + startup costs)		
Energy settlement revenue		
OSM settlement revenue		
Net revenue		

Operationalising planning frameworks

- The OSM is focussed on improving the efficiency of how system services are managed in **operational timeframes**
- Existing planning timeframe frameworks relating to essential system services are not changed (e.g. NSCAS, system strength contracts under our recent system strength rule)
- However, the OSM can help to better manage the **interactions** between the two timeframes, better aligning signals and incentives
- There is necessarily a difference between what is expected at a planning timeframe and what happens in real-time, reflecting updated information and system conditions
- The OSM can be used to *schedule* resources that have been procured through either NSCAS or system strength contracts in the planning timeframe:
  - cost recovery and revenue arrangements for those resources will be unchanged from existing frameworks
  - there will be no hierarchy associated with those contracts vs other resources procured through the OSM

QUESTIONS?

Please remain on mute and raise your hand or use the chat to ask questions.

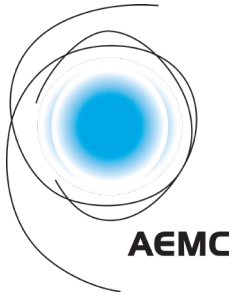
How you can stay involved

- 20 October 2022 - deep dive on the potential for market power and the proposed mitigation measures.
- 3 November 2022 - deep dive on the technical elements such as bidding and scheduling, as well as AEMO's prototype initiative.
- 17 November 2022 - submissions close.

Visit the project page to register for the deep dives. Submissions can also be provided here. We are also happy to meet individually with stakeholders – reach out to the Project Leader Clare – clare.stark@aemc.gov.au

THANK YOU FOR YOUR TIME

AEMC



Office address
Level 15, 60 Castlereagh Street
Sydney NSW 2000

ABN: 49 236 270 144

Postal address
GPO Box 2603
Sydney NSW 2001

T (02) 8296 7800