

# ENERGY SECURITY BOARD

## POST 2025 FUTURE MARKET PROGRAM

ESSENTIAL SYSTEM SERVICES WORKING GROUP

PRESENTATION SLIDES

16 JULY 2020





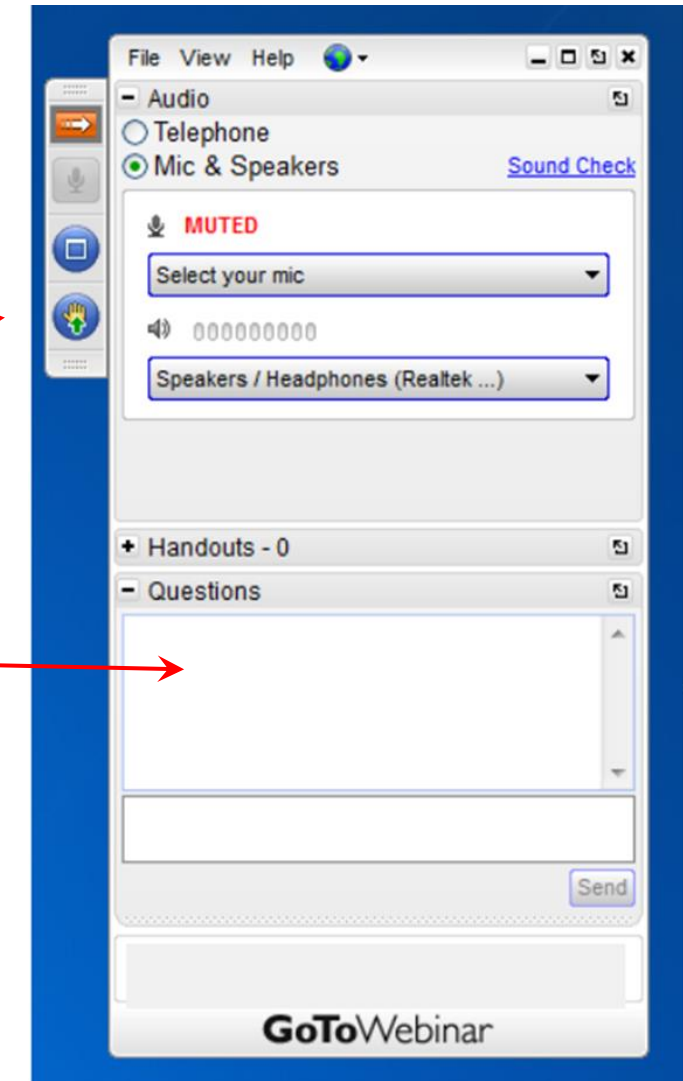
## IMPORTANT NOTES

- These slides are solely for workshop purposes only. The content provides general information to support informed stakeholder engagement and feedback.
- The presentation does not represent the official position of the Energy Security Board or any related body.
- The webinar is being recorded and a link to the recording will be provided after the webinar.



## WEBINAR-WORKSHOP LOGISTICS

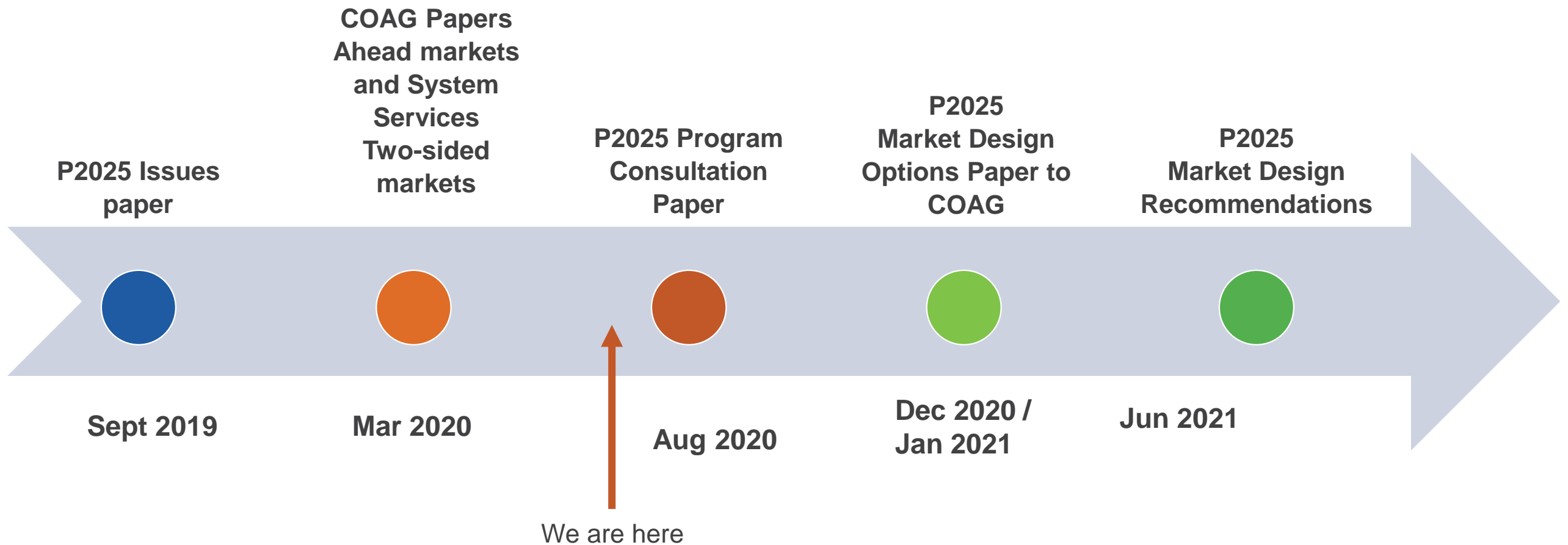
- All participants are currently in listen-only mode
- We will pause periodically for discussion. Please use the **Raised Hand** to signal that you would like to speak.
- If you would like to record a comment without discussion, feel free to type it into this field.



The webinar is being recorded and a link to the recording will be provided after the webinar.



## P2025 PROGRAM – KEY DELIVERABLES



# CONTEXT

**Scope and objectives for this meeting**

**FTI to present their work on Essential  
System Services**

**Seek feedback from TWG**



## ROLE OF THE TECHNICAL WORKING GROUP ON THIS WORKSTREAM

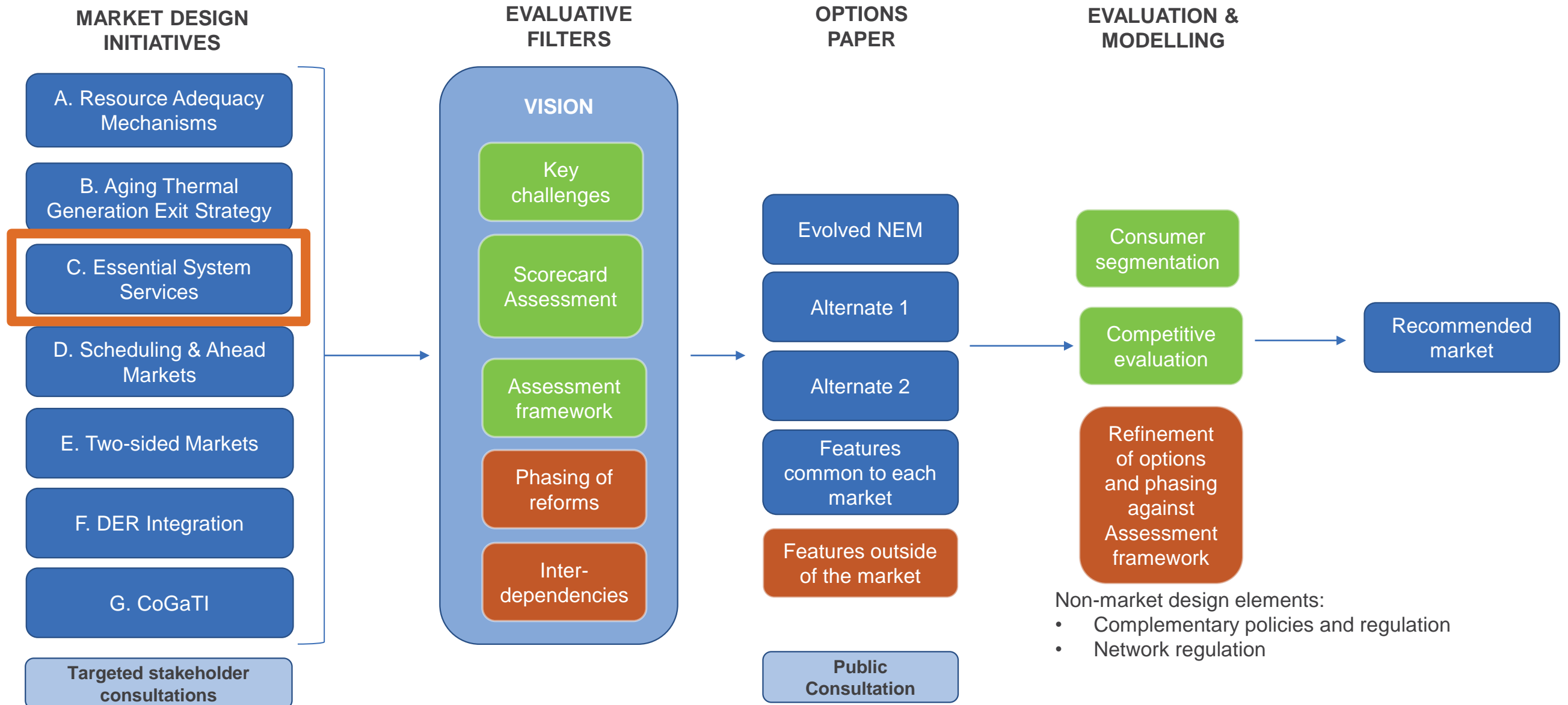
- COAG Energy Council has tasked the ESB with:  
*the concurrent development of the market design for a two-sided market and **a new framework for system services** and ahead market arrangements to identify a recommended design by the end of 2020.*
- We would like to engage with the TWG to help develop the designs

## OBJECTIVE OF THIS MEETING

- Update TWG on the development of the Essential System Services MDI.
- Present the high-level findings of FTI's Draft Report
- Seek initial feedback on FTI's characterisation of:
  - Options for procuring and scheduling ESS
  - A straw-man roadmap for each service
  - Considerations for regulatory flexibility and a future framework

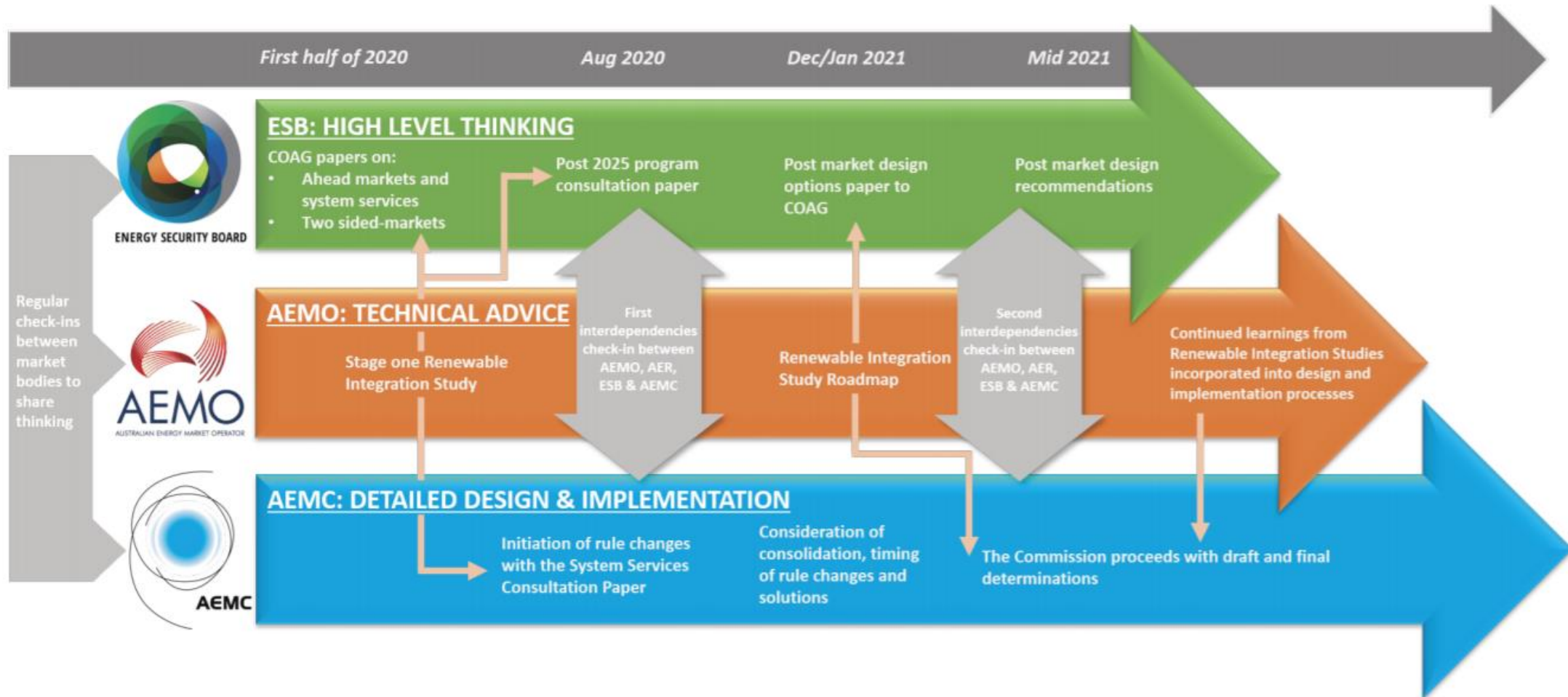


## P2025 PROGRAM ARCHITECTURE





# ONGOING INTERACTION BETWEEN TECHNICAL ADVICE AND MARKET DESIGN



## 2020 Integrated System Plan

Final publication: Expected mid-2020

<https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp>

## Renewable Integration Study

Email distribution list for updates: [FutureEnergy@aemo.com.au](mailto:FutureEnergy@aemo.com.au)

<https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/system-operations/future-grid/renewable-integration-study>



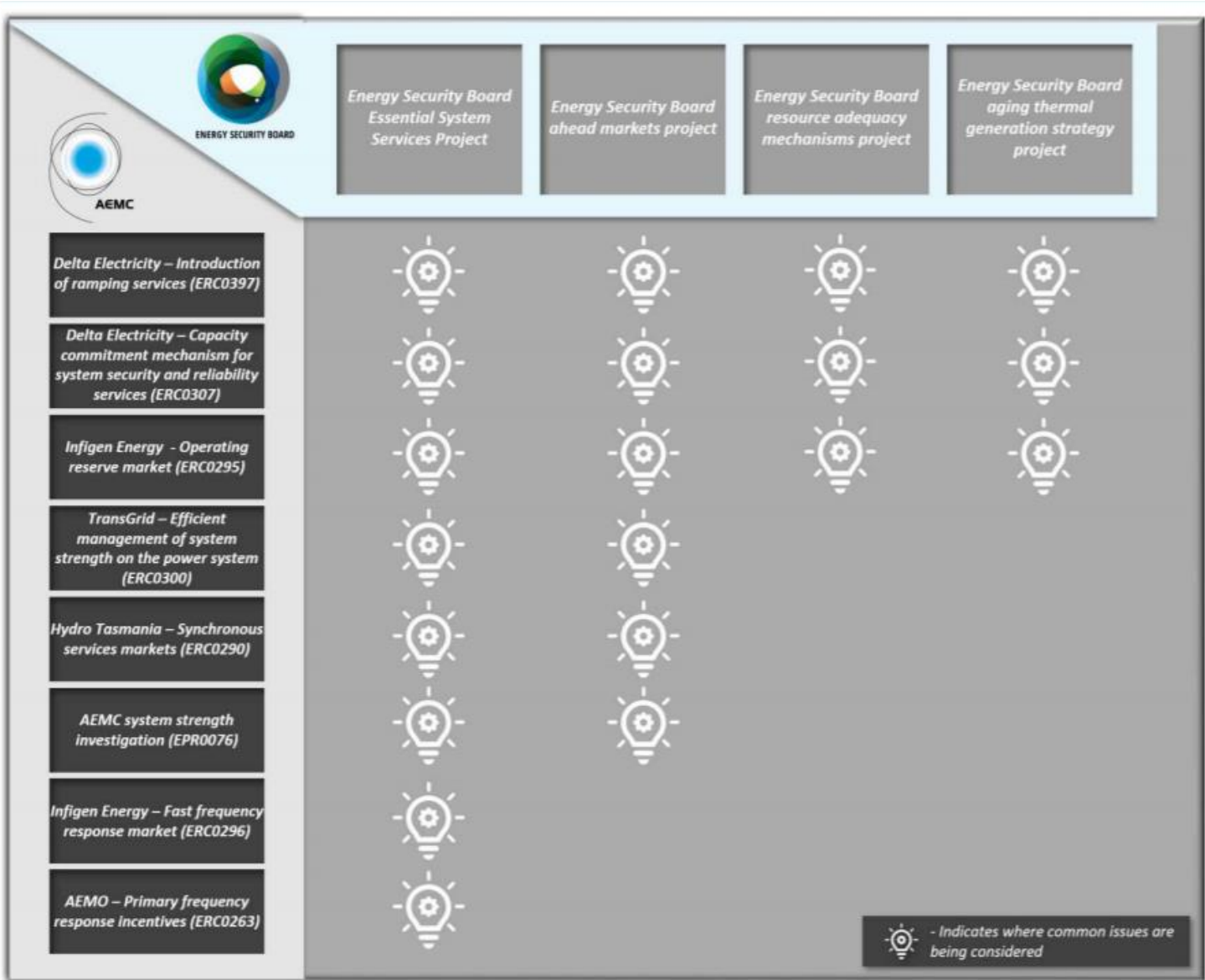


# AEMC SYSTEM SERVICES PROJECTS

The AEMC as statutory rule maker is currently progressing a number of projects relating to system services. These projects are being coordinated with the work undertaken by the ESB, including the FTI work on system services.

## System services rule changes consultation paper

Published July 2020  
Submissions due 13 August 2020



Source: AEMC

# FTI SLIDES

# Essential System Services Webinar #2

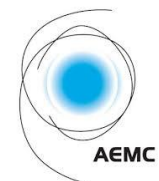
*Presentation to Technical Working Group and Advisory Group*

*16 July 2020*

*Presented to:*



ENERGY  
SECURITY  
BOARD



**CONFIDENTIAL**

## Introduction

## FTI team presenting this webinar

## Project Director

**Jason Mann**

Jason is a Senior Managing Director, based in FTI Consulting's London office.



Jason has been a leading global advisor to regulators and market participants on the design of different electricity markets and regulatory models since the mid-1990s. Throughout his career, Jason has worked on the design, implementation and operation of wholesale energy markets, and the regulation of energy networks.

## Project Manger

**Martina Lindovska**

Martina is a Senior Director, based in FTI Consulting's London office.



Martina is an energy economist and has worked as a consultant for over ten years across the energy and wider utilities sector. She has extensive experience in global electricity markets, having worked for Ofgem, MISO and AEMO in recent years on various aspects of electricity market design.

## Subject matter expert – US specialist

**Dr Scott Harvey**

Scott is a Managing Director, based in FTI Consulting's Boston office, and is a member of FTI's US Expert Panel.



Scott is an expert on electricity market design issues, having been involved in the electric power industry design for the last 25 years. He has worked extensively on market design issues in the US, including with CAISO, PJM and NYISO, as well as in Australia with AEMO.

## Subject matter expert – NEM specialist / local lead

**Robert Prydon**

Robert is FTI Consulting's Australian energy lead, based in Sydney.



Robert has extensive experience in market design in Australia, gained over 25 years working for regulators, energy businesses and in consulting on energy market issues. Prior to joining FTI, Rob worked with the AEMC as Senior Economist advising on the strategic framework for energy market development

Recap: In the first ESS workshop in May, we validated the main focus of our work and set out the key dimensions of designing a framework for ESS

- FTI has been commissioned to **examine options for the procurement and scheduling of ESS** in the NEM that would be in the long-term consumer interest.
- A draft FTI report has been circulated to the Focus Group. The FTI report:
  - Identifies ESS where the case for change appears to be the strongest;
  - Presents options for changing the procurement and scheduling of ESS;
  - Considers how the wider regulatory framework may need to adapt to deliver those changes; and
  - Present a potential roadmap towards the Post 2025 Market Design in the NEM.



### Objectives of today's workshop:

1

Present the refined spectrum of options for ESS procurement and scheduling

2

Discuss the merits of different options (including spot markets & the concept of demand curves)

3

Discuss regulatory regime options and their merits

## Section 2

## Overview of ESS in the NEM and their key features

**Key focus 2: Inertia**

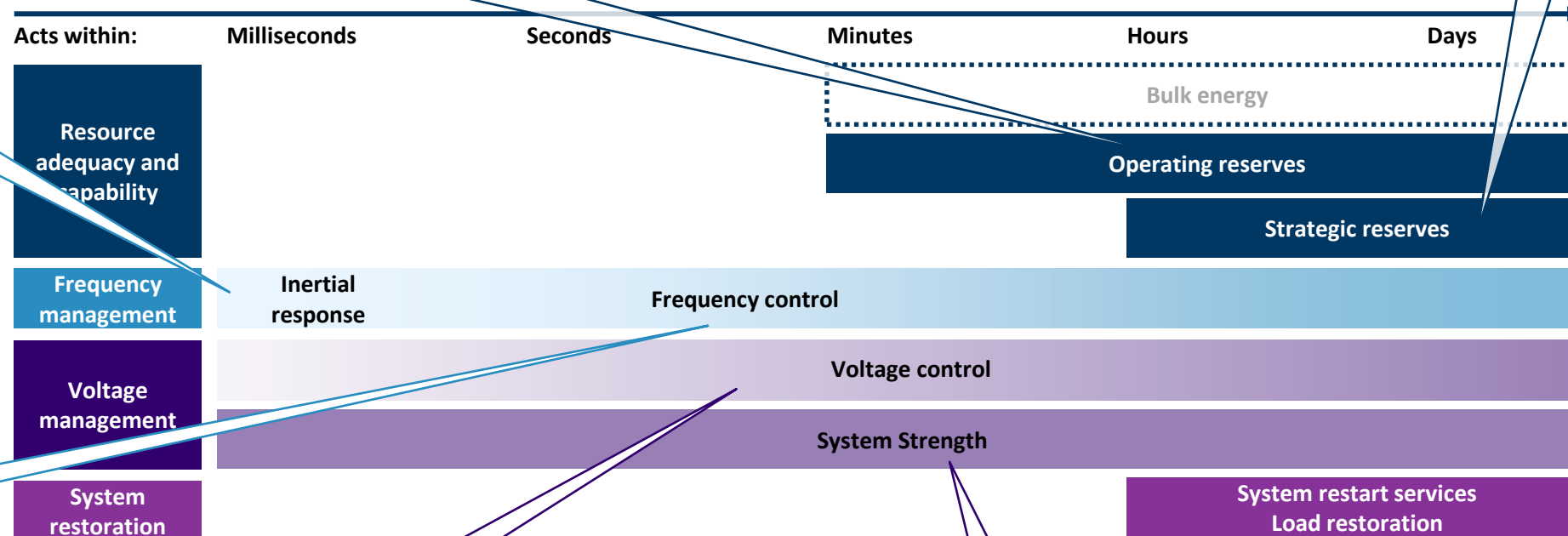
- Mostly system-wide service
- Historical oversupply from synch gens but growing shortfalls
- Uncharted technical minimum

**Key focus 1: Reserves**

- Provided by market participants
- No operating reserve procurement mechanism
- Regional, with some locational flexibility

- RERT
- Intervention pricing used
- Regional, with some locational flexibility

Interaction between OR and Resource Adequacy Mechanisms



Interdependency between inertia and RoCoF

- Existing 8 FCAS products, co-optimised with energy
- Growing degradation of frequency stability
- Potential for wide participation

**Key focus 4: Frequency management**

- Mostly local...
- ...with risk of abuse of market power

Interaction between voltage support and system strength (the latter also linked to inertia)

**Key focus 3: System strength**

- General “system service”
- No unit of measure
- Not an explicit “product” (e.g. cannot buy “waveform maintenance”)
- Historical oversupply from sync gens but growing shortfalls

- Well known
- Variety of international procurement approaches

**Legend**

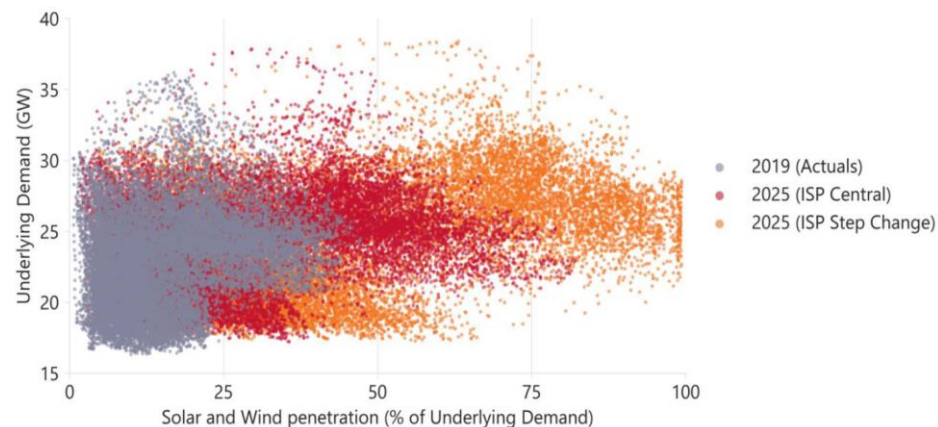
Out of scope  
Within scope



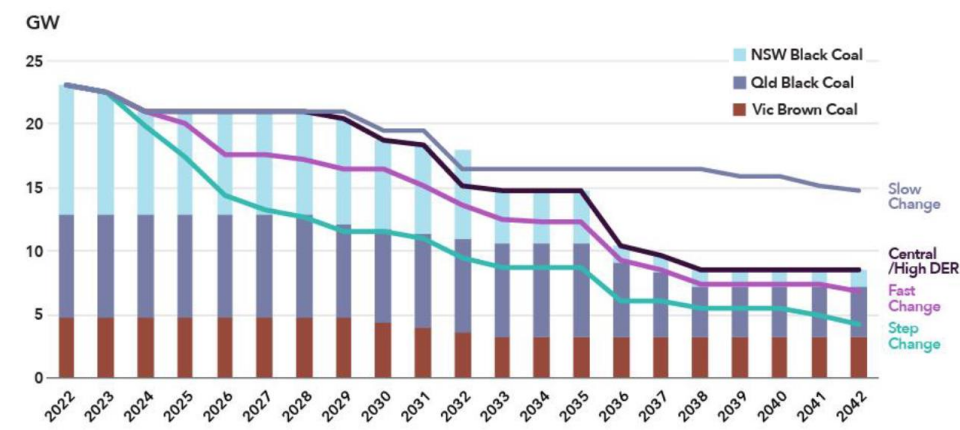
# Evolving NEM system service needs indicate a strong case for change to ESS arrangements for **inertia** and **system strength**, as well as **reserves**

## Recent trends and expected future trends

### Penetration of variable IBR is expected to continue increasing...

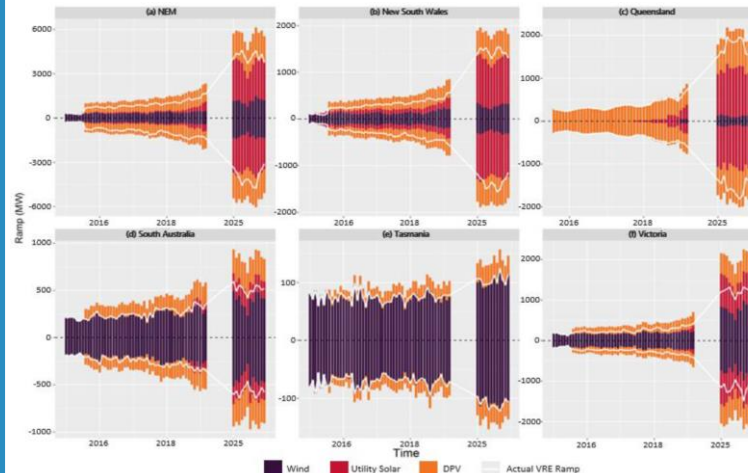


### ... while synchronous generation is displaced and retired

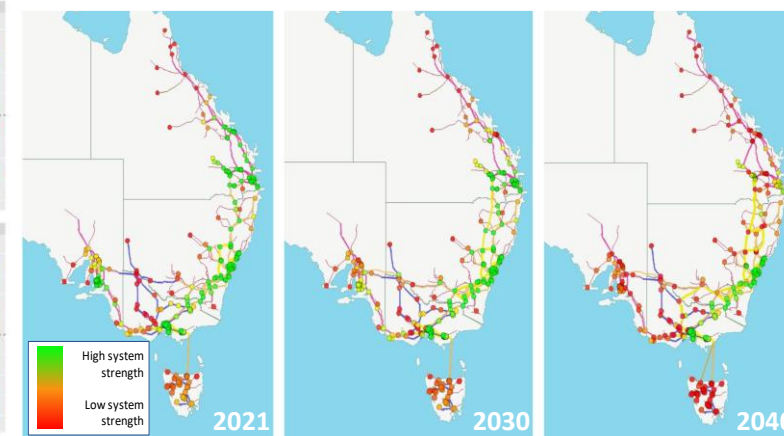


## Impacts on the NEM

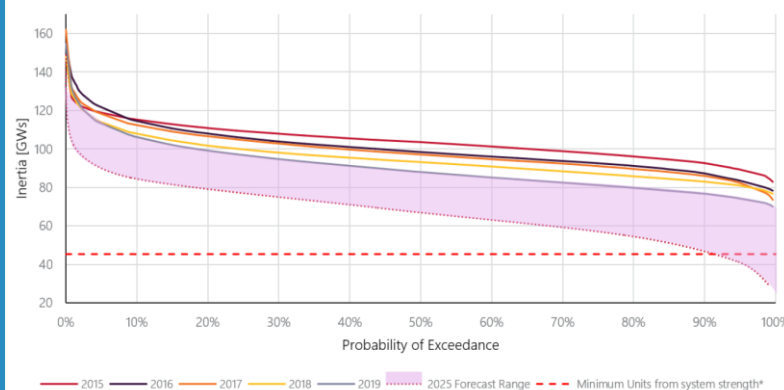
### Increasing magnitude of net load ramps...



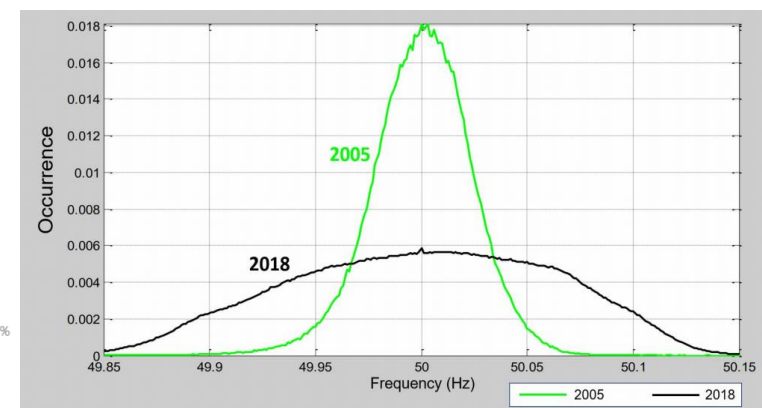
### ... with weakening system strength



### Inertia levels falling to uncharted levels...



### ... with deteriorating frequency performance





## Section 6

We have considered three high-level options for procuring and scheduling ESS

1

### Directed ESS / self-provision

*No formal process for procuring ESS*

- Directions / interventions by AEMO / investments by NSPs / standards and technical requirements (**Inertia, System strength, Voltage control**)
- Market participants self-procurement (**Operating reserves**)

2

### Structured procurement of ESS

*ESS procured via structured non-spot-market mechanisms*

- Bilateral contract with AEMO (**RERT**) ahead time (with RT optimisation)
- Structured NSP provision
- Technical standards (**MPFR**)

3

### Spot market-based ESS

*ESS procured through spot market-based mechanisms*

- Nested, co-optimised design (**FCAS & energy**)
- “Demand curve” concept range from vertical to sloped (explored in the next slide)
- Potential ESS **Contracts-for-Difference** (relative to real-time spot energy prices)

*NEM status quo:*

Operating reserves

System Strength

Inertia

Mandatory Primary Frequency Response

FCAS

## Spot-market-based procurement of ESS (Option 3) relies on the concept of demand curves, i.e. AEMO's willingness to pay for different levels of service

### Market equilibrium

- The market clears where the supply and demand curves intersect

Real-Time  
price of service

AEMO  
maximum  
willingness to  
pay

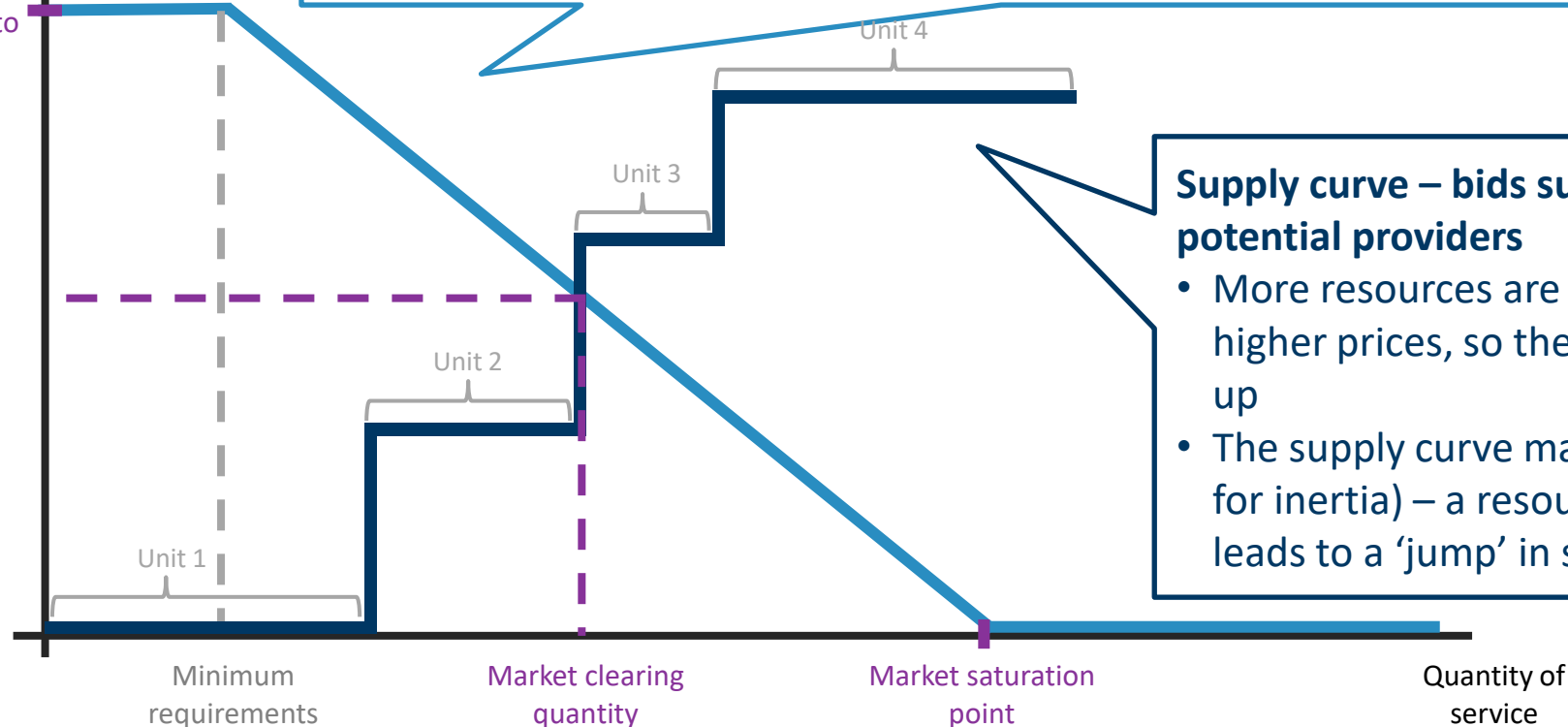
Market  
clearing  
price

### Demand curve – AEMO's willingness to pay

- AEMO willingness to pay for a service increases as supply approaches minimum requirements...
- ...reaching a maximum (capped) amount when supply falls below minimum requirements
- When supply is very abundant price = 0
- Slope of demand curve is the most complex element, driven by contingency needs, perhaps formulated through Forecast Uncertainty Measure or Loss of Load Probability

### Supply curve – bids submitted by potential providers

- More resources are willing to provide at higher prices, so the supply curve slopes up
- The supply curve may be 'lumpy' (e.g. for inertia) – a resource coming online leads to a 'jump' in supply



There is no single "target" model suitable for all services in all circumstances, as each option has its merits and risks

1

### Directed ESS / self-provision

- ✓ Limited change relative to status quo
- ✓ Low implementation effort and costs
- ✗ Continued ad-hoc (and reactive) procurement of services
- ✗ No price signals to market participants (for investment or commitment)
- ✗ Consumer costs likely to be unnecessarily high

2

### Structured procurement of ESS

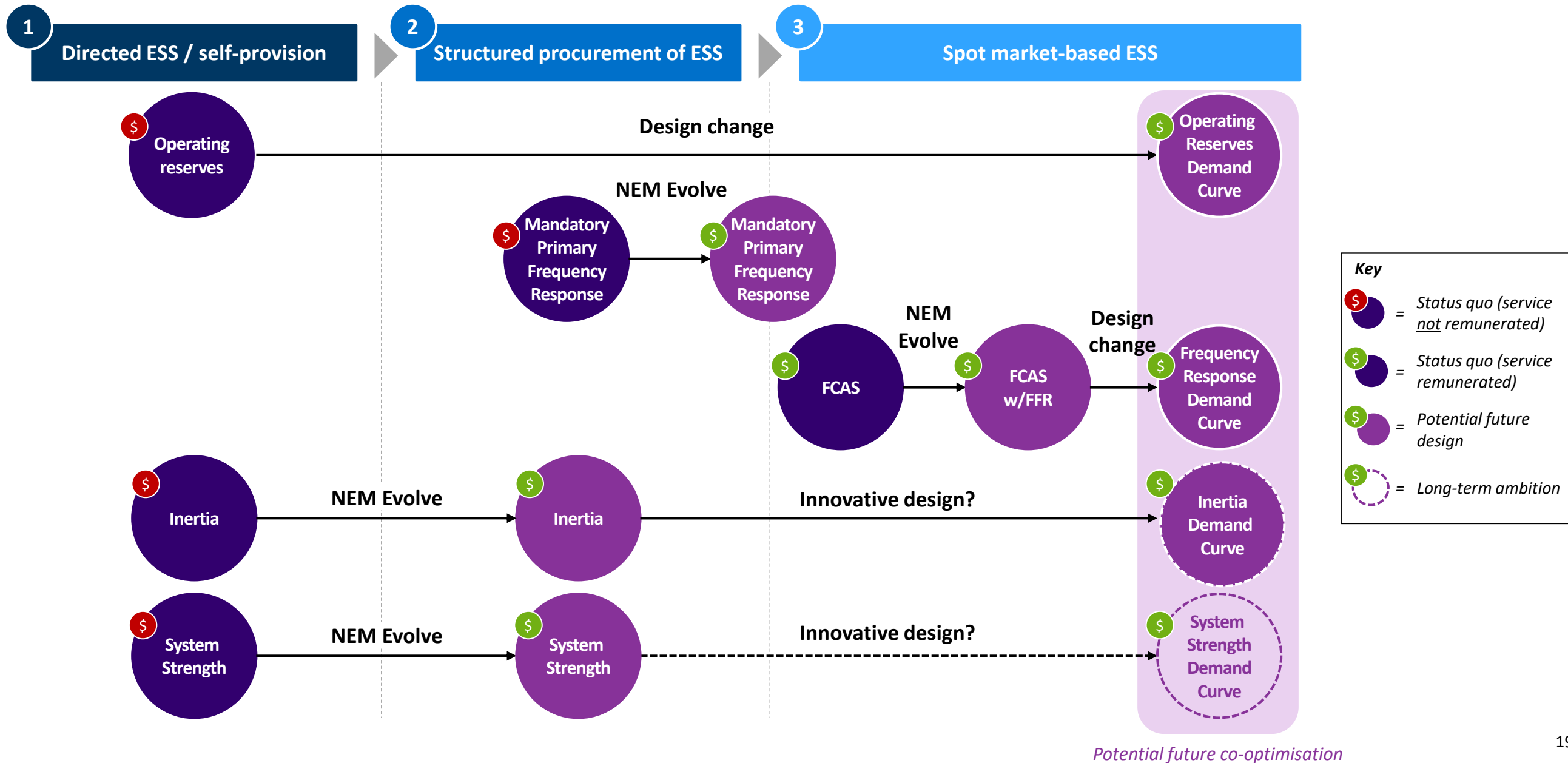
- ✓ High AEMO confidence to operate a secure a system as sufficient resources are contracted or built
- ✓ Services not provided "for free"
- ✓ Alternative way to attract investment / ensure commitment if spot prices perceived too volatile
- ✗ AEMO/NSPs to specify the "need" for service and select resources ahead time
- ✗ Weak price signals as only a subset of resources is compensated
- ✗ Challenging for regulated and market ESS providers to co-exist

3

### Spot market-based ESS

- ✓ Reflects AEMO's willingness to pay for different levels of service
- ✓ Price graduation can reflect the need for ESS to support IBR deployment and grid resilience
- ✓ Transparent price (investment & commitment) signal
- ✓ May be combined with Contract-for-Difference settlement against real-time spot prices
- ✗ AEMO to specify the "demand curve" parameters (but this is no more complicated than Option 2)
- ✗ Implementation costs and timeline

The optimal pathway may be different for each service, but the initial changes could focus on providing remuneration to services where currently lacking



ESS should be able to adjust as the need for services changes or technology evolves, but there are risks associated with both “too much” and “too little” flexibility

Key challenge of **asymmetry of information**:  
It is obvious when security of supply is not delivered...  
...but not when excessive costs have been incurred.

This encourages **overly-conservative** actions  
by the SO and/or TNSPs  
(e.g. excessive procurement of services or  
investment in network assets)...

...which may be mitigated through strict rules  
to limit overspend...  
...but that risks creating a '**straitjacket**',  
preventing the arrangements from adapting to  
changing environment

1

### Rigid regulatory framework

*Detailed set of rules on decision makers,  
constraining potential ESS overspend*

- |  |  |
|--|--|
| ✓ Mitigates information asymmetry issues | ✗ Fails to stimulate innovation                    |
| ✓ Constrains potential overspend         | ✗ Not adaptable to evolving system needs           |
|  | ✗ Rule setters unable to identify optimal spending |

3

### Flexible regulatory framework

*Decision makers afforded significant  
flexibility and are able to exercise  
discretion in an unfettered manner*

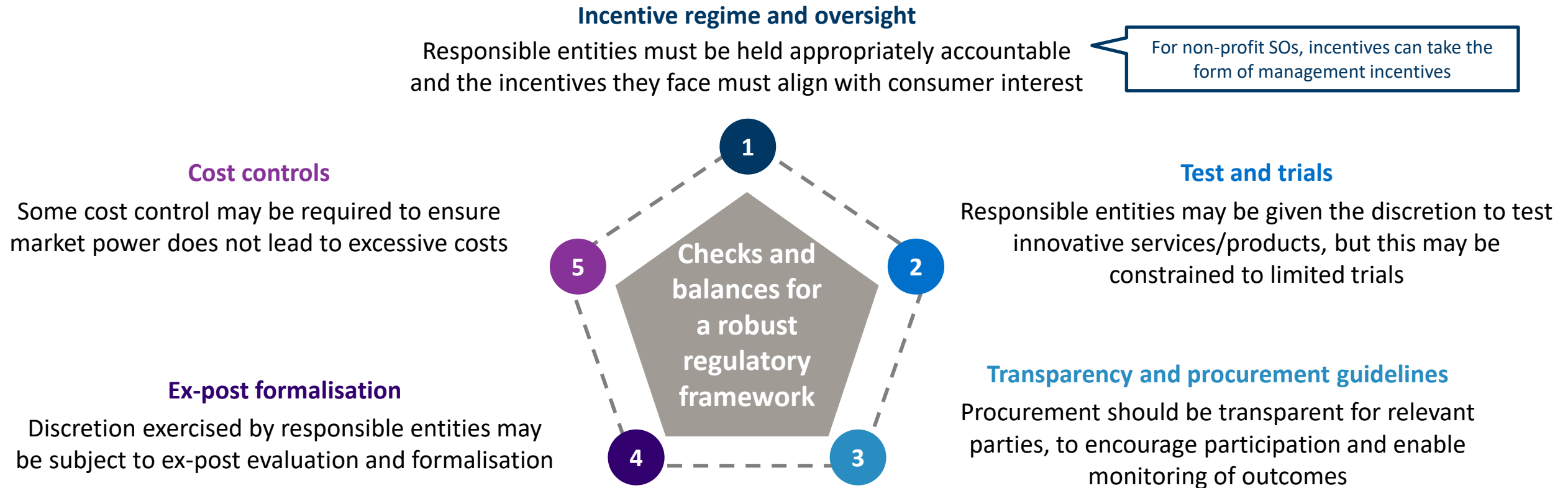
- |                                      |  |
|--------------------------------------|--|
| ✓ Facilitates innovation             | ✗ Difficult for monitor and police       |
| ✓ Adaptable to evolving system needs | ✗ Risk of overspend                      |
|                                      | ✗ Risk of unduly conservative investment |

2

### Balanced regulatory framework

- The appropriate **regulatory framework needs a balance** between “too much” and “too little” flexibility
- Decision makers afforded flexibility, subject to a range of checks and balances (see next slide)

## Checks and balances may need to be incorporated into the regulatory framework, to ensure AEMO and NSPs are held accountable for their decisions



### Key takeaways:

- In light of the need to adapt ESS arrangements, it is unlikely to be in the consumer interest to over-constrain decision makers...
- ...but affording flexibility and discretion should be conditional on the implementation of checks and balances.
- The most efficient outcome for consumers is likely to be achieved through the development of spot-markets...
- ... recognising that, despite the associated complexity, it may be very costly for consumers not to introduce spot markets.



EXPERTS WITH **IMPACT**



# ENGAGING IN THE TWG

Next steps



## SEEKING YOUR INPUT

### Some issues we specifically want feedback on

FTI's characterisation of:

- Options for procuring and scheduling ESS
- A straw-man roadmap for each service
- Considerations for regulatory flexibility and a future framework

### How you can provide feedback

Please provide feedback to [info@esb.org.au](mailto:info@esb.org.au) with email subject heading titled '*TWG essential system services briefing*' by **Friday 24 July**.

Please get in contact if you have further questions.



**END OF PRESENTATION**