AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Transition Plan for System Security

Operational Transition Planning

Agenda

- Foundation of Transition Plan
- Transition Planning - Horizon 1
- SA Transition Points
- Q&A Panel

Improving Security Frameworks

Objectives

Reduce the regular and inefficient use of directions

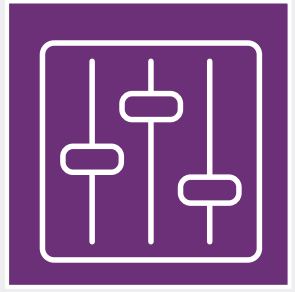
Provide better incentives for participants to invest in delivering system security services

Increase transparency on current system security needs and understanding

Outcomes

Transitional NMAS Framework

Empowering AEMO for operational enablement of security contracts



Annual Transition Plan for System Security

Transition Plan per Clause 5.20.8

Purpose

- How AEMO is planning to maintain power system security throughout the transition.
- AEMO's current technical understanding of what is needed to achieve power system security and the actions being undertaken to improve this understanding.

Strategic Direction	Technical Understanding and Priorities	Metrics and Operational Tools	Capabilities and Learnings
• AEMO's plan for system security through the energy transition. • Phasing out transitional services and planning future service needs.	• Current insights into evolving specs for system security. • Focus areas for technical research and development.	• KPIs used to manage power system security. • Statistics on direction use and other operational tools.	• Trials and their results. • Resource and tech capabilities that support system security.

Minimum Requirements per NER 5.20.8

Transition Planning - Horizon 1

Operational Transition Points

- Events and milestones that require material changes in the operational approach to managing power system security (e.g. major change to asset mix due to retirement of large synchronous generators, minimum operational demand dropping below thresholds).

Horizon 1 Overview – 2024 TPSS

SA Transition Points

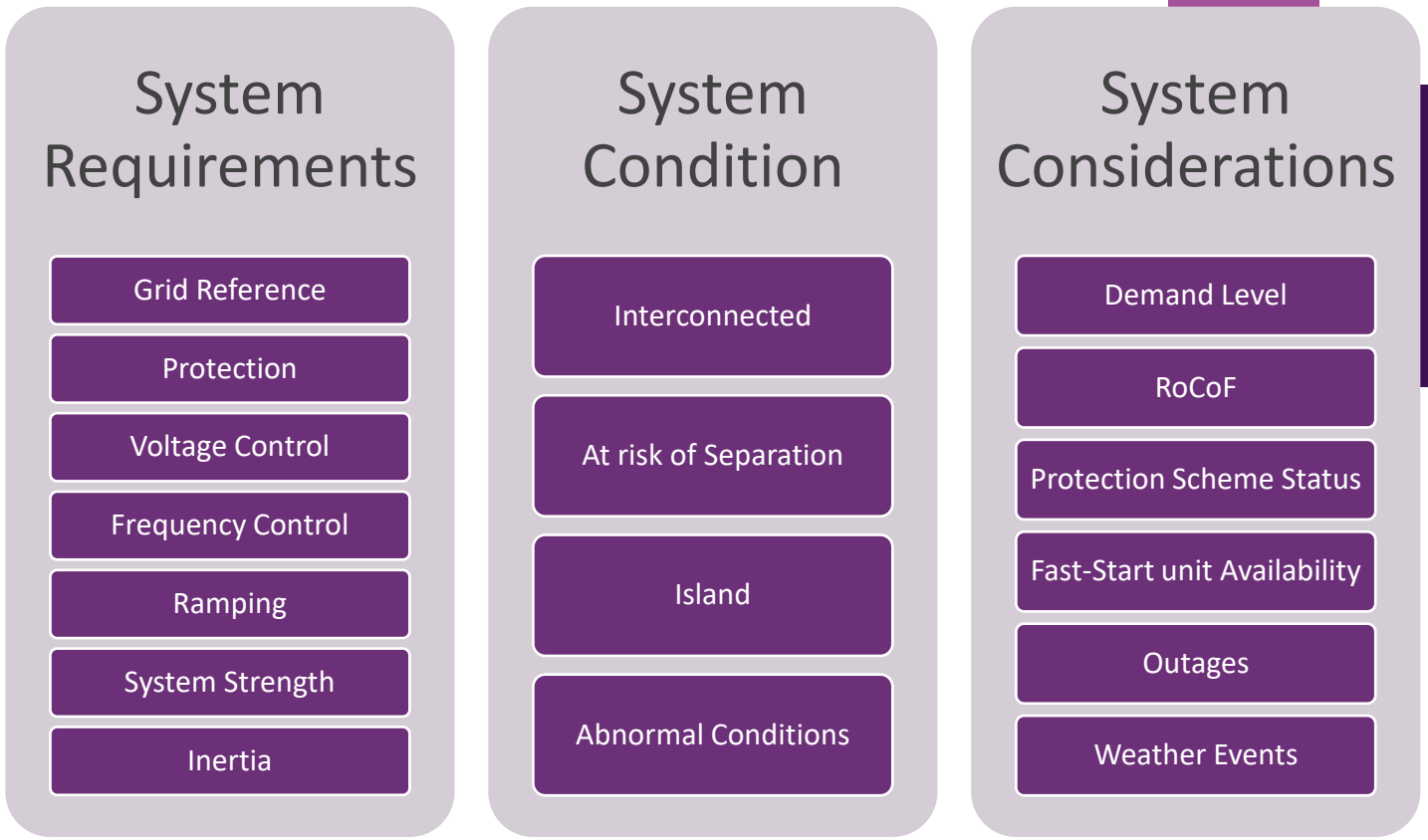
1. 2-to-1 minimum synchronous units.
2. Minimum system load.
3. SSM: AEMO enablement of security services.

2-to-1 Transition

Minimum synchronous units for system security

Power System Operations

- AEMO is required to operate the system in a secure operating state.
- Following a credible contingency, AEMO is required to re-secure the power system within 30 minutes.
- Varying levels of system requirements are needed in SA depending on the system condition and specific system considerations at the time.



Power System Operations Specifications – SA

SA System Security Requirements

System Requirement	Description	Current SA Requirement
Grid reference	Ability to maintain a balanced three-phase rotating grid voltage phasor across the AC power system.	One large 275kV-connected synchronous generator.
Protection	Ability to maintain fault-current within acceptable ranges defined by network service providers.	One large 275kV-connected synchronous generator and four synchronous condensers.
Voltage control	Ability to maintain voltage within acceptable ranges defined by network service providers.	Two large 275kV-connected synchronous generators.
Frequency control	Ability to maintain frequency at or near the nominal value of 50Hz.	Adequate with an interconnected system.
Ramping	Ability to adjust flows or generation output over time to maintain system security without violating voltage limits.	Adequate with an interconnected system. If islanding credible, multiple generators may be required.
System Strength	Ability to maintain and control voltage waveform at a node of the power system – measured in MVA.	Four synchronous condensers.
Inertia	Ability of power system to resist changes in frequency – measured in Hz/s.	Four synchronous condensers with flywheels, complimented by 1-second FCAS.

Summary of Current SA System Security Requirements

Operating Limits

Several system conditions must be met for allowing a minimum of one large 275kV-connected synchronous generator.

Operational Demand	SA not at risk of Islanding	No Severe Weather Warnings	Network Service Availability
• System is not in a low demand condition, e.g. is greater than 600MW.	• Ramping from weather dependent DPV generation remains a risk.	• Risk of islanding. • The need to re-secure the power system.	• Fast-Start Units. • Reactive Power Services.

SA Operating Limits – Possible One Synchronous Unit

Given these restrictions, AEMO operates SA with a minimum of two large synchronous generators. AEMO is currently in the process of facilitating the minimum requirement to be reduced from 2 to 1 under certain system conditions.

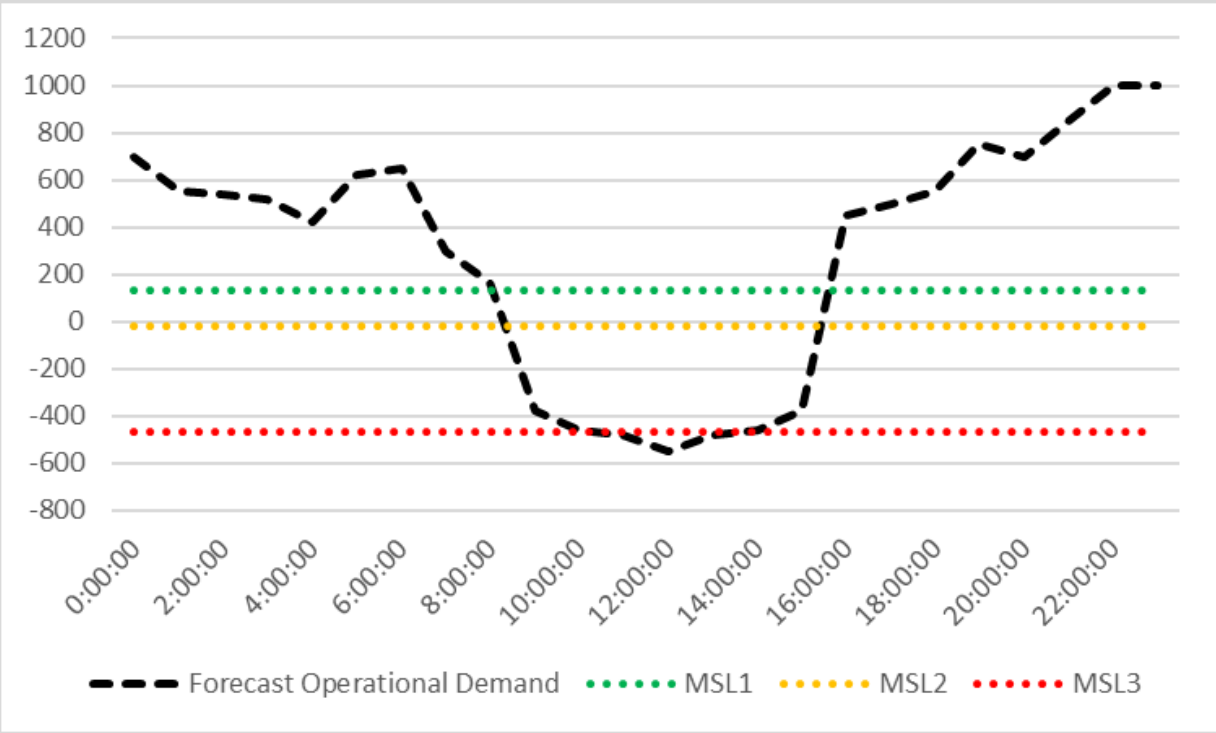
NSCAS Contracts

Securing Reactive Power Service Availability	Contracts vs. Directions	NSCAS Reporting
• NSCAS contract procurement. • RPAS Voltage Control.	• Reduced need for market intervention. • Increased certainty of availability. • Increased notice and transparency (ISF).	• Report published upon finalisation of procurement. • Operational usage within annual NSCAS report.

NSCAS Contracts – RPAS Voltage Control

Minimum System Load (MSL)

MSL Framework



SA1 Minimum System Load Event – Forecast MSL3

Operational Demand - Demand met by centrally visible and controllable resources.

MSL Thresholds – The minimum demand that could cause a regional system security issue.

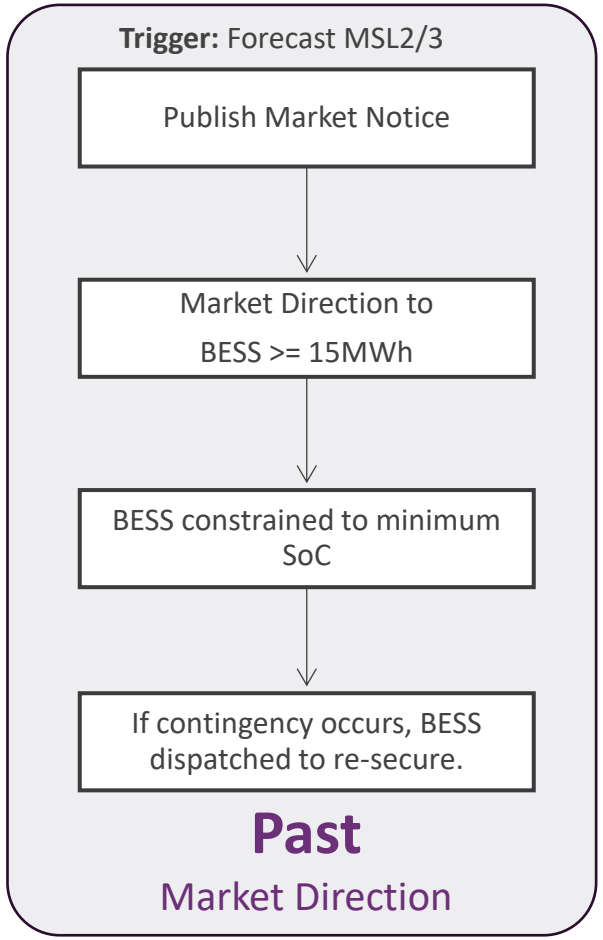
	Definition	AEMO actions
MSL1	Demand is two credible contingencies away from MSL3.	Monitor the situation. Publish MSL market notice with MSL thresholds when forecast up to 1 week ahead.
MSL2	Demand is one credible contingency away from MSL3.	Take actions required to land satisfactory and return to remain secure within 30 minutes following a credible contingency.
MSL3	Forecast demand is insufficient to maintain a secure operating state.	Instruct NSPs to maintain demand above MSL3 threshold.

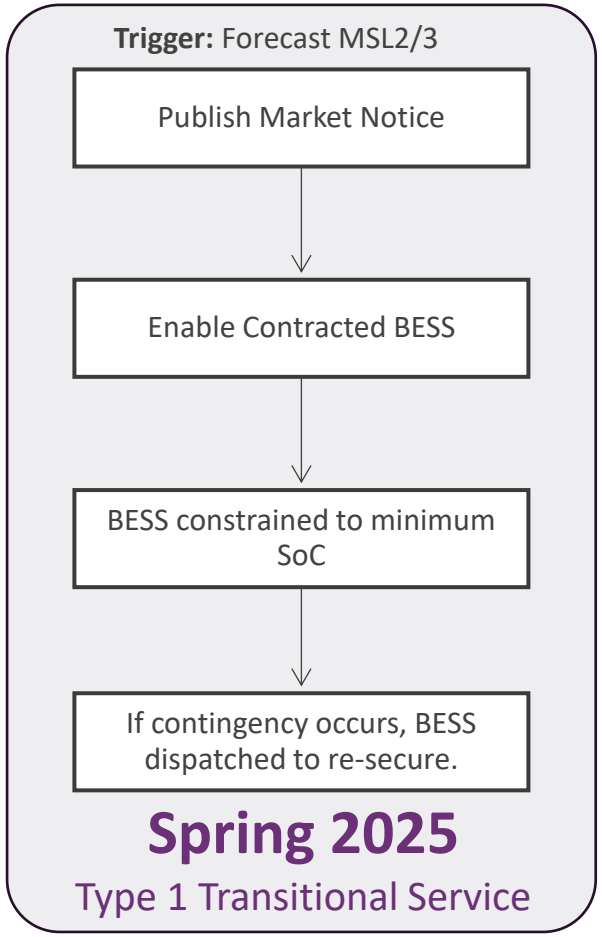
MSL framework – VIC and SA System Normal MSL procedure, soon to be rolled out NEM wide

BESS for MSL Management

NER Clause 4.8.9

- AEMO may direct a Registered Participant to take any action necessary to maintain or re-establish the power system in a secure, satisfactory, or reliable operating state.





NER Clause 4.4A

- AEMO must aim to enable the *lowest cost combination* of system security services that meets minimum system security requirements.
- AEMO should only enable a service if, in its reasonable opinion, those requirements would not be met without it.

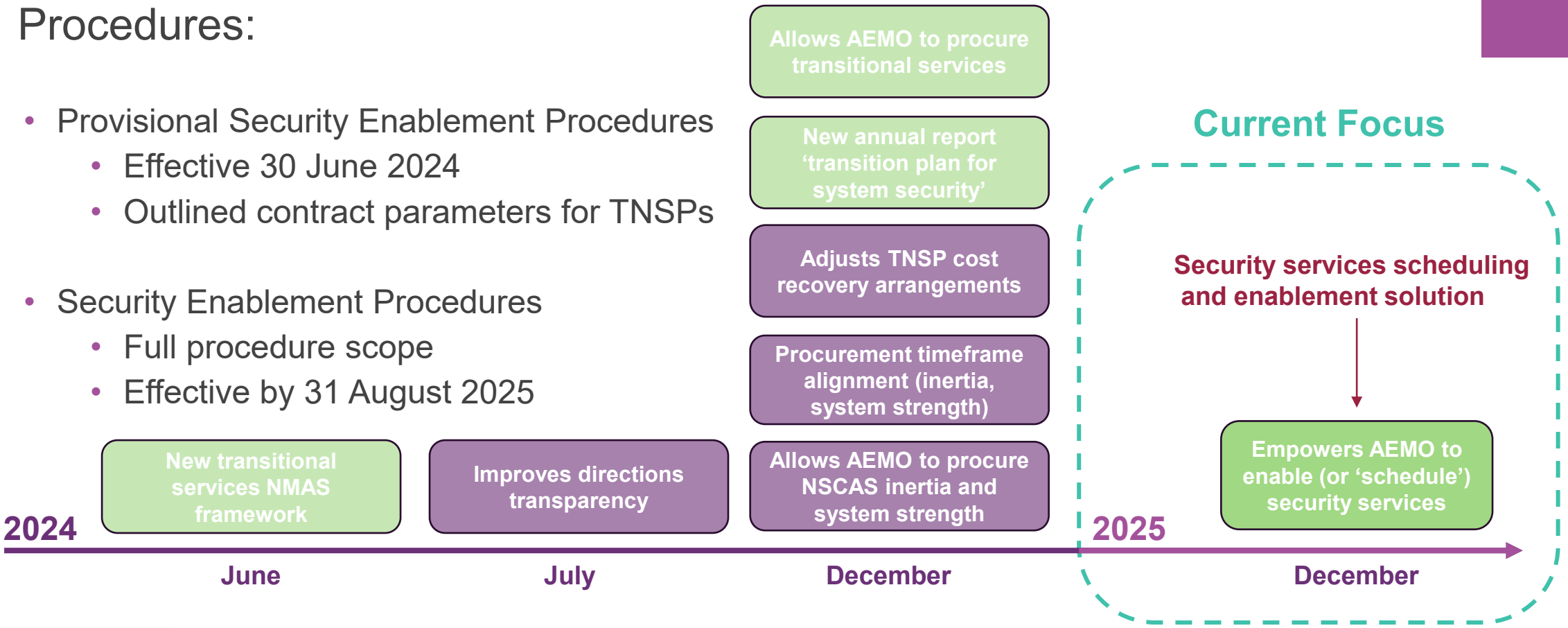
System Security Management (SSM)

Enablement of security service contracts with a whole-of-NEM perspective.

SSM in the Context of ISF

Procedures:

- Provisional Security Enablement Procedures
  - Effective 30 June 2024
  - Outlined contract parameters for TNSPs
- Security Enablement Procedures
  - Full procedure scope
  - Effective by 31 August 2025



SSM Fundamentals

Whether or not a security action needs to be taken by AEMO RTO is determined by the power system conditions on the day

Depending on the contracts in place, these actions will be via:
security enablement instruction
or a
direction

Security enablement instruction

*If a system or service has **met the readiness criteria**, AEMO will need to **utilise that contract** ahead of directing where it solves the security gap*

May be done through:

Automated enablement

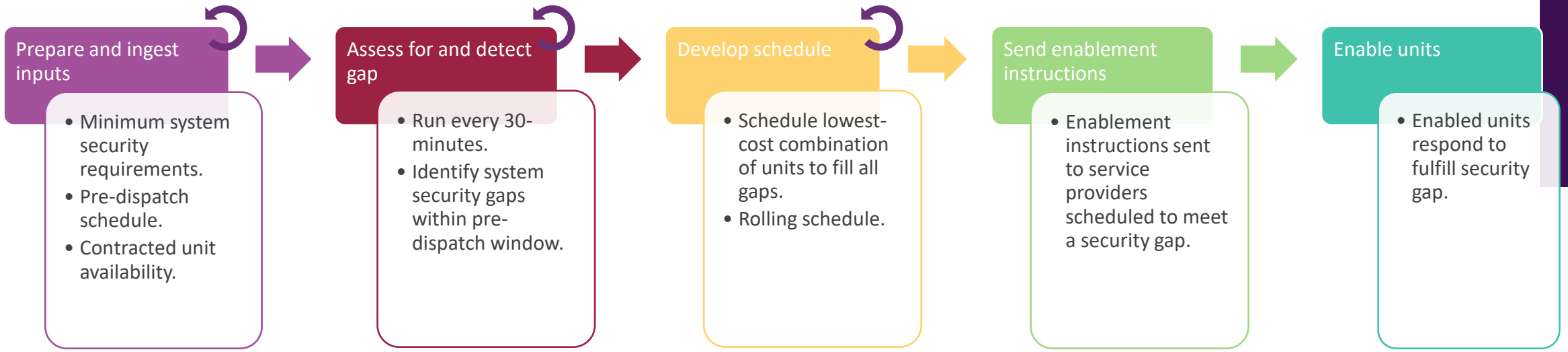
Manual enablement
Needs a procedure, etc

Where a contract is available to solve the security gap, AEMO should use best endeavours to utilise it instead of a direction (fall back to directions if things go wrong)

Direction

*If a system or service is **not available**, AEMO will not consider using the service → DIRECTION*

Overview of Scheduling Process



Approach to SSM Development

Dynamic delivery approach to manage complexity of ISF scope.

Building SSM Scheduler to schedule system strength and inertia contracts for Phase 1.

- NSCAS Voltage & MSL Type 1 services to be manually enabled.

Phase 1 solution is required in November 2025 for E2E market trials, go live 2 December 2025.

Phase 2 requirements expand MVP to include *efficient level* scheduling, intended for 2026.

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For more information visit

aemo.com.au

Q&A Panel

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