

The Roadmap to Renewable Energy in WA

State of Energy Research Conference

Perth, February 2024

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About AEMO

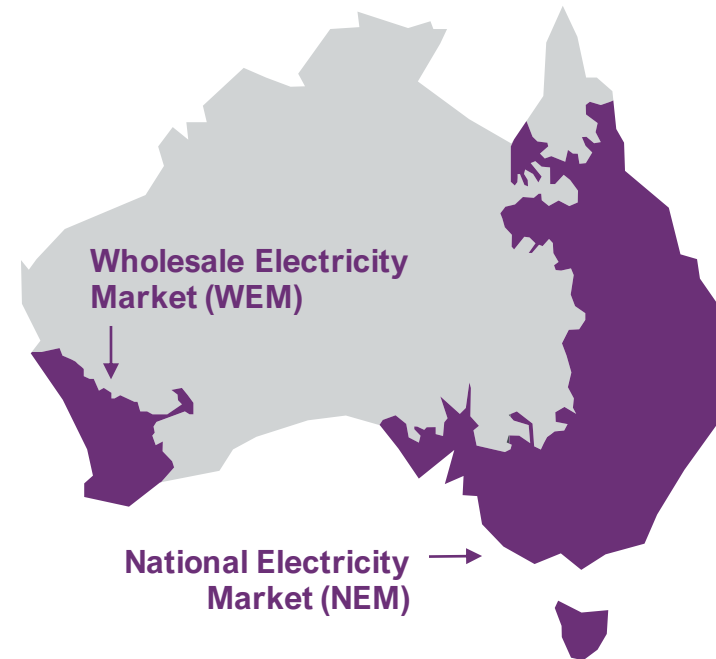
- AEMO is a member-based, not-for-profit organisation.
- We are the independent energy market and system operator and system planner for the National Electricity Market (NEM) and the WA Wholesale Electricity Market (WEM).
- We also operate retail and wholesale gas markets across south-eastern Australia and Victoria's gas pipeline grid.



AEMO Services is an independent subsidiary of AEMO, established in 2021 to enable the transparent provision of advisory and energy services to National Electricity Market jurisdictions.



Electricity



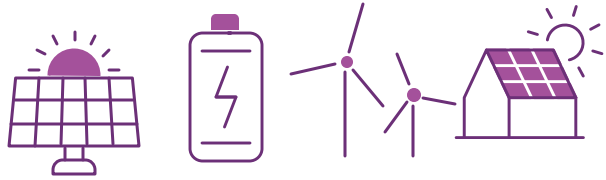
Gas



Declared Wholesale Gas Market (DWGM)

Short Term Trading Market (STTM) and Gas Supply Hub (GSH)

On the way to Renewable Energy, why do we need to collaborate?



Australian power systems are continuously integrating high levels of renewable energy to reach the stated goal of Net Zero.

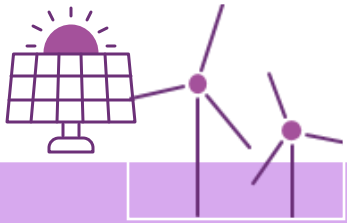


We are moving away from synchronous fossil fuel generators to cleaner alternatives, and this has created challenges for the power system.



We increasingly need to work with research institutions and academia to resolve these challenges

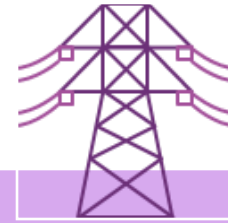
How energy transition future unfolds?



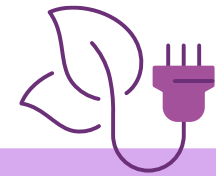
Low-cost renewable energy, taking advantage of the abundant wind and solar resources.



Firming technology like batteries, and gas generation, to smooth out the peaks and fill in the gaps.

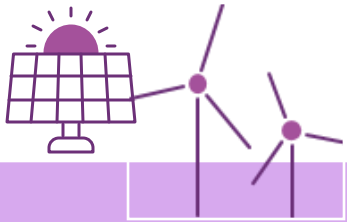
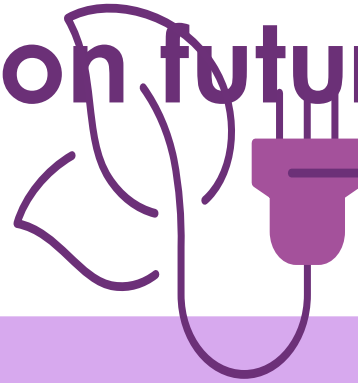


New transmission & modernised distribution networks to connect low-cost renewable sources.



A power system capable of running, at times, entirely on renewable energy.

How energy transition future unfolds?



Low-cost renewable energy, taking advantage of the abundant wind and solar resources.



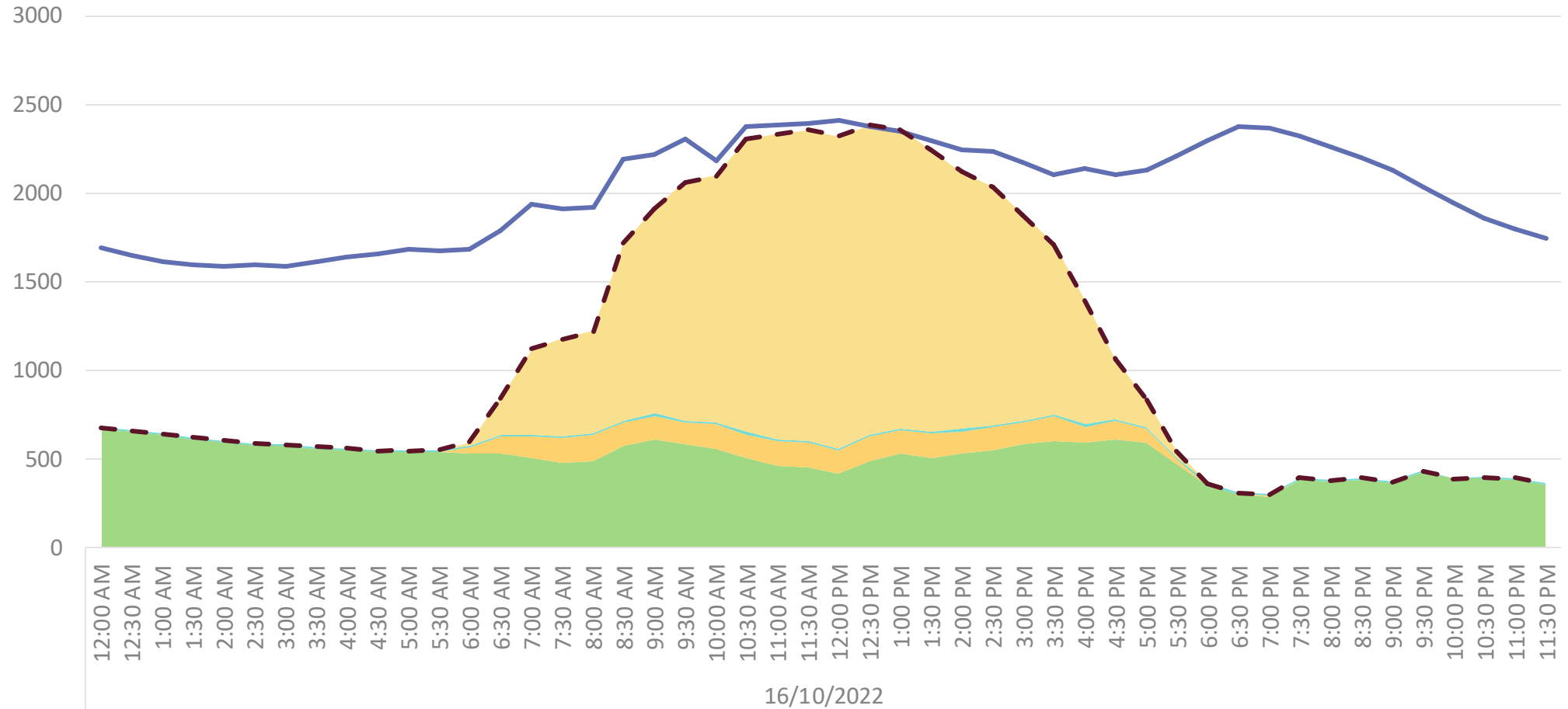
tec
ba
gas
to
th
fill

A power system capable of running, at times, entirely on renewable energy.

Energy transition is well underway

Close to 100% renewables in 2022

Potential Renewable Generation vs Underlying Demand on 16/10/2022



Potential Wind
Rooftop PV

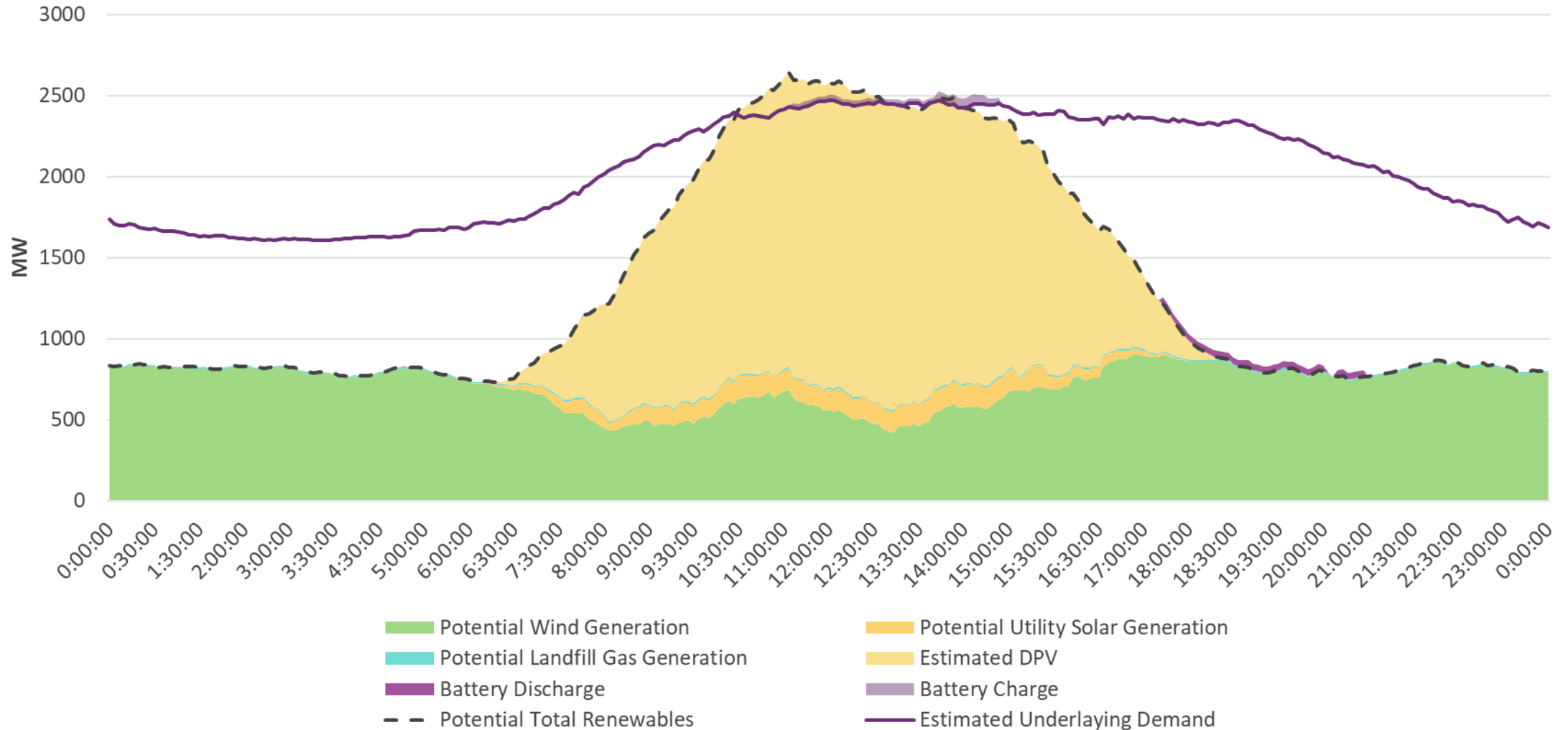
Potential Solar
Underlying Demand

Potential Landfill Gas
Potential Tot Renewable

Energy transition is well underway

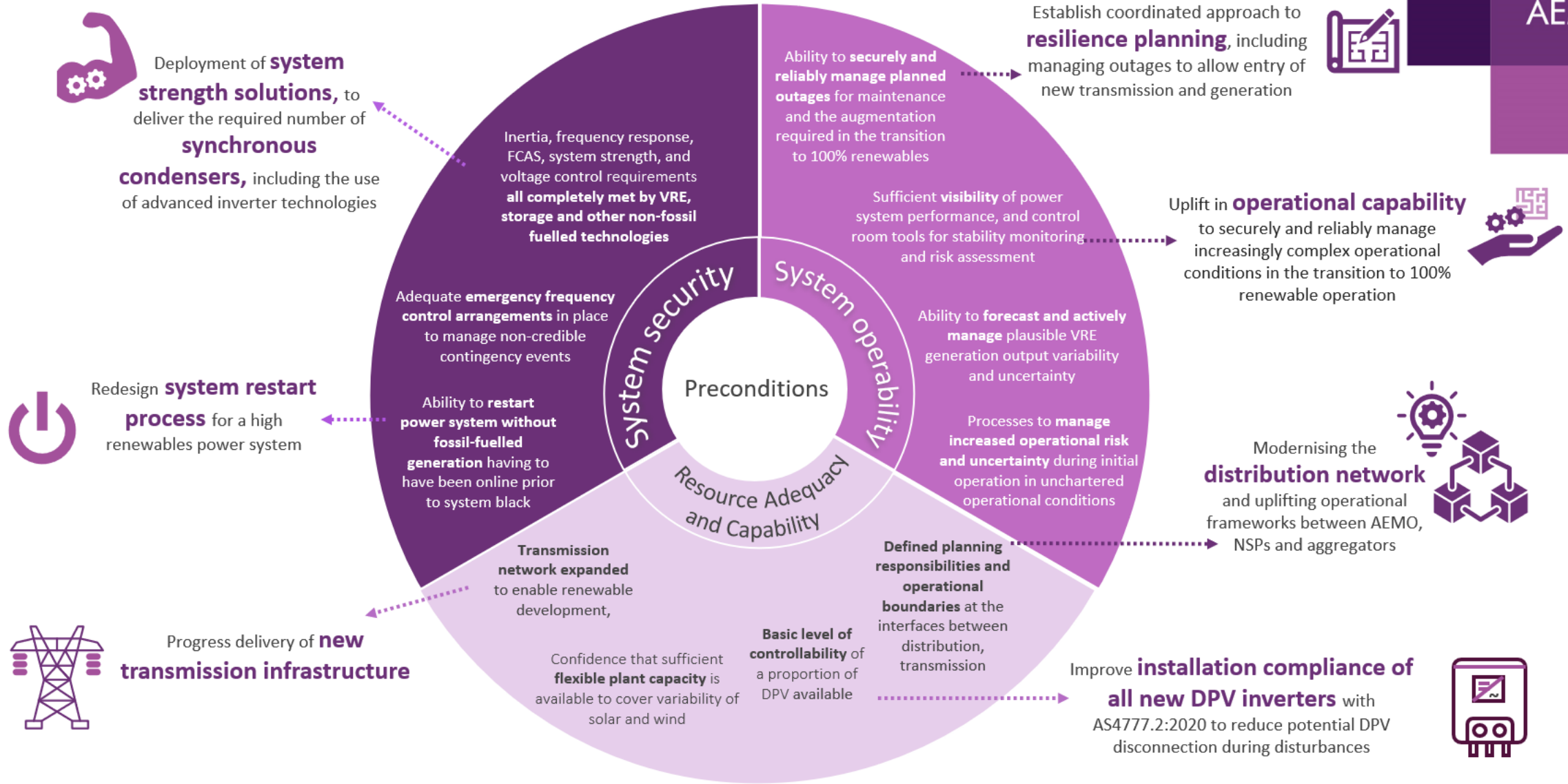
Potential for 100% renewables at times in 2023

Available Renewables 25 September 2023



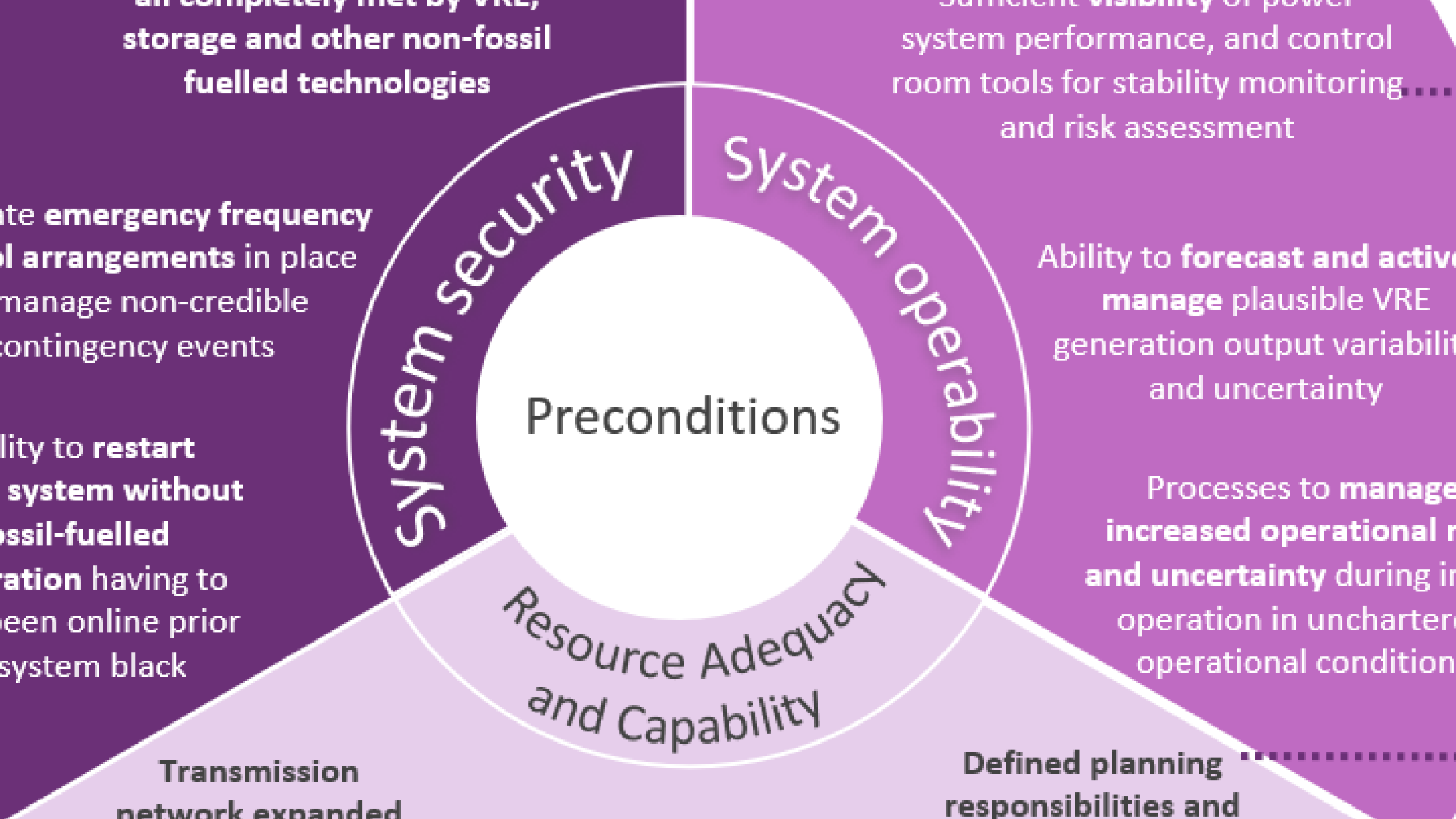
AEMO's Roadmap to Renewable Energy

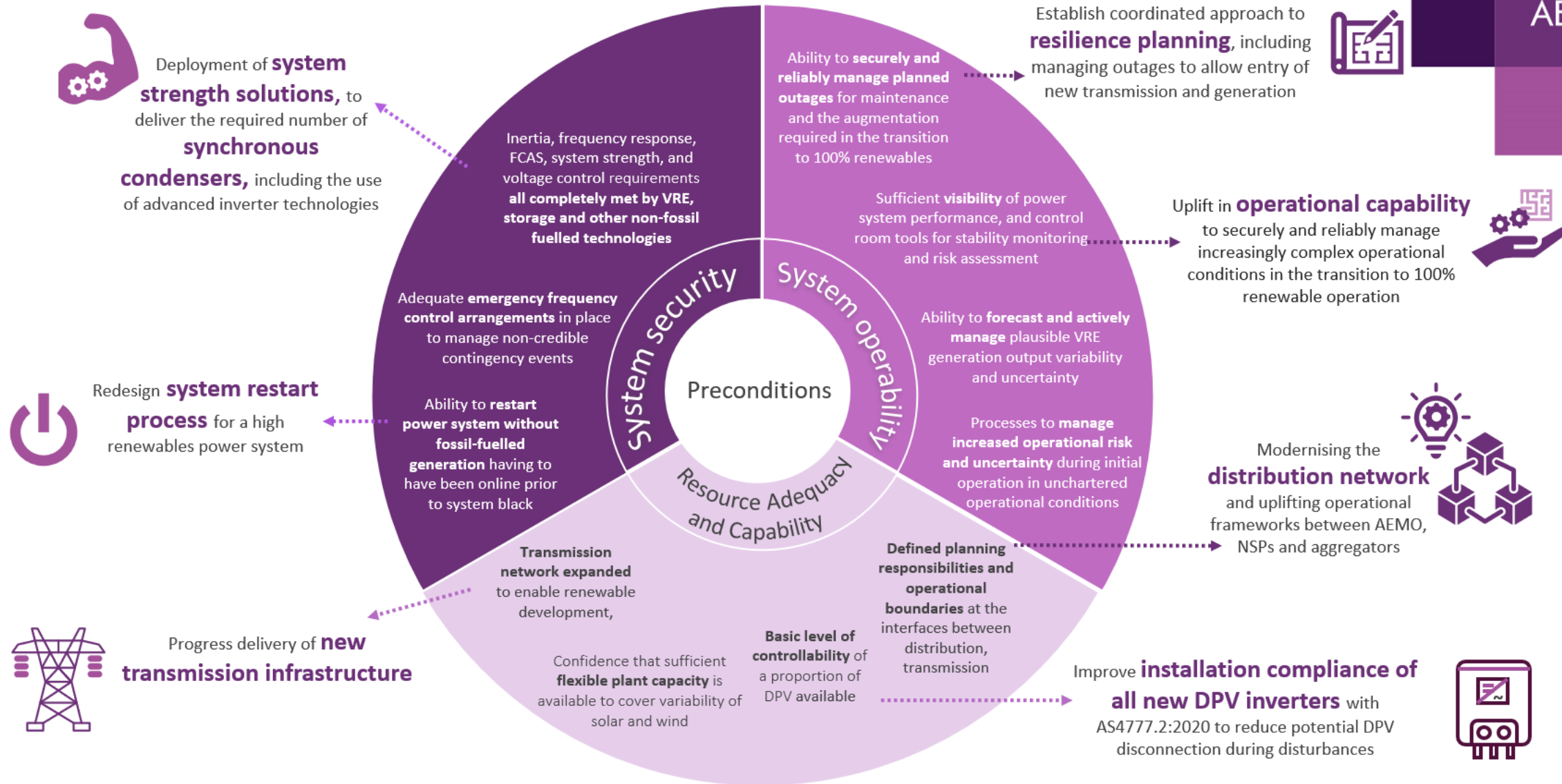
The image is a composite background for a presentation slide. In the foreground, there are several rows of dark blue solar panels with a grid pattern of silver lines. In the background, several white wind turbines with three blades each are visible against a bright blue sky with scattered white clouds. The overall scene represents renewable energy sources.



Relevant acronyms

DPV: Distributed photovoltaics; EF: Engineering Framework; FCAS: Frequency control ancillary service; VRE: Variable Renewable Energy

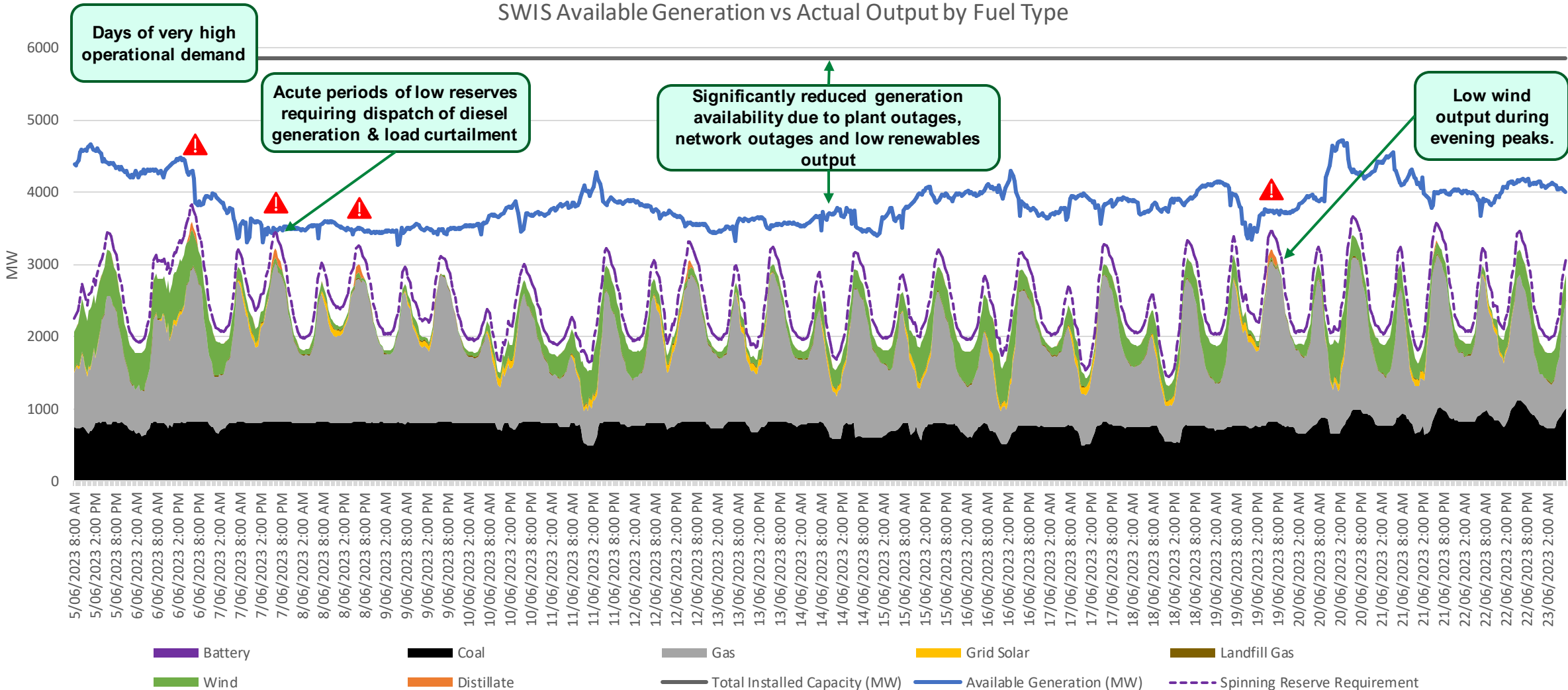




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Managing the power system | June 2023

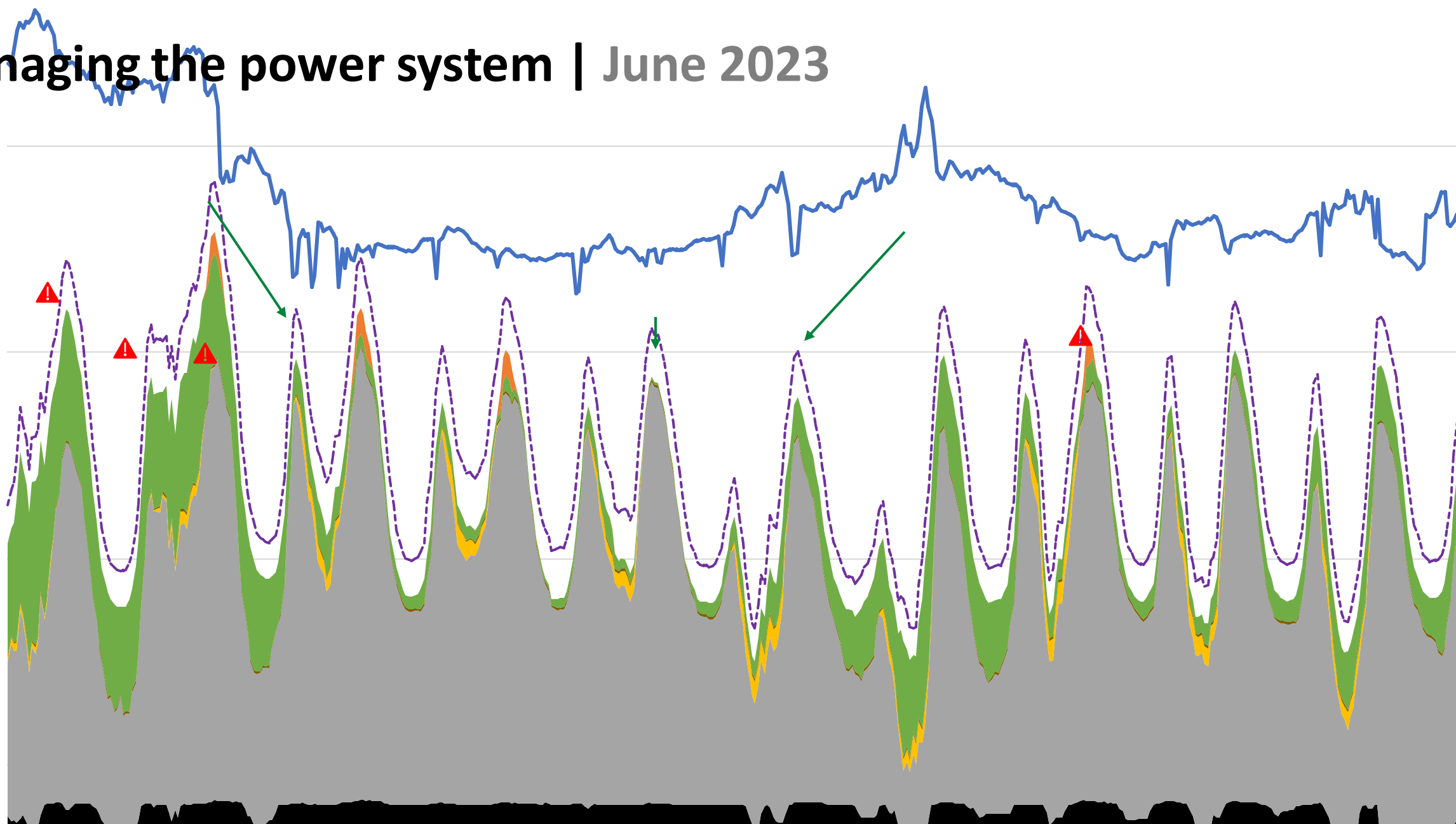


⚠️ Forecast LOR 2 Conditions: This condition exists when reserve levels are forecast to be lower than the single largest supply resource.

Available Generation (MW) = Total Scheduled Generation – Scheduled Generation Outages + Wind Generation + Grid Scale Solar Generation – Network Constraints (110 MW).

Managing the power system | June 2023

MW
4000
3000
2000
1000

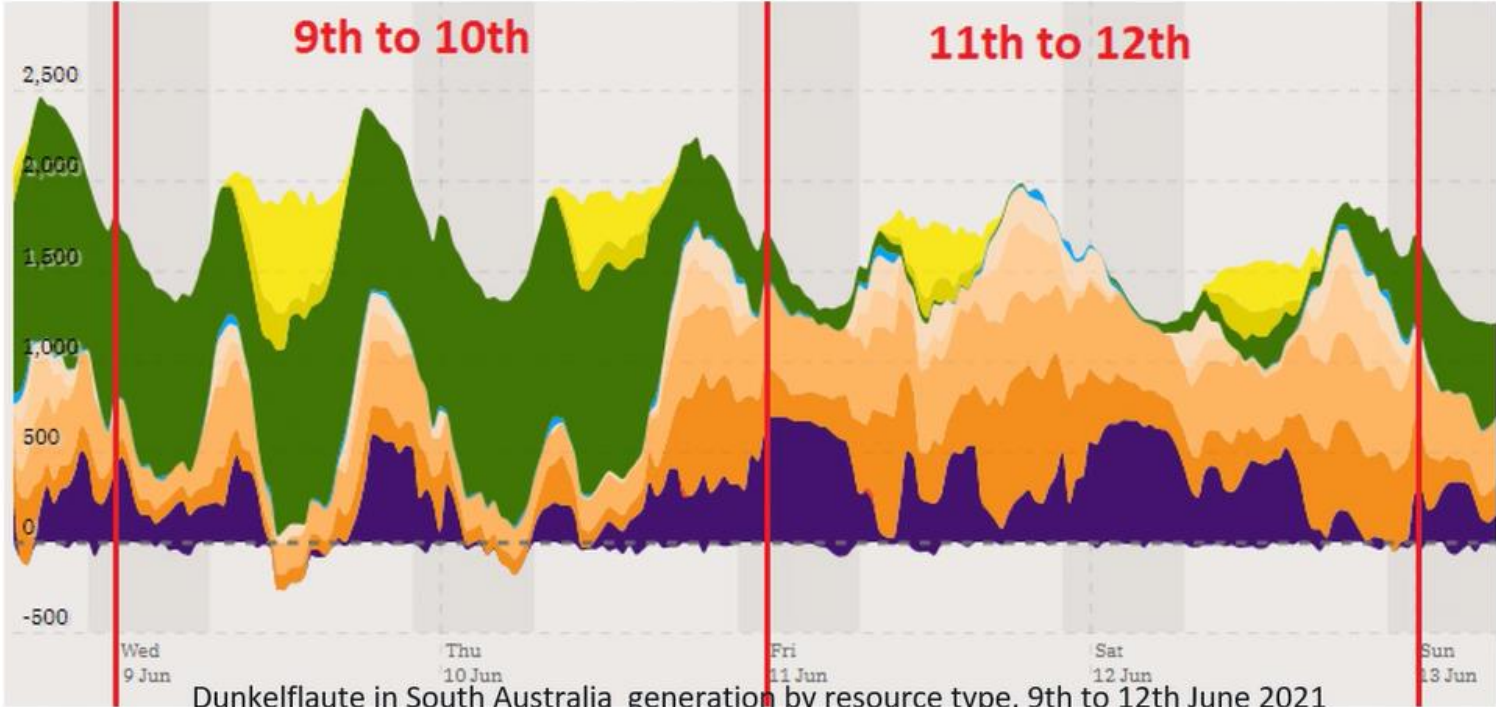


! Forecast LOR 2 Conditions: This condition exists when reserve levels are forecast to be lower than the single largest supply resource.

Available Genera

Daunkelflaute

<https://www.energynetworks.com.au/news/energy-insider/2021-energy-insider/its-dark-its-still-its-dunkelflaute/>



Dunkelflaute in South Australia generation by resource type, 9th to 12th June 2021

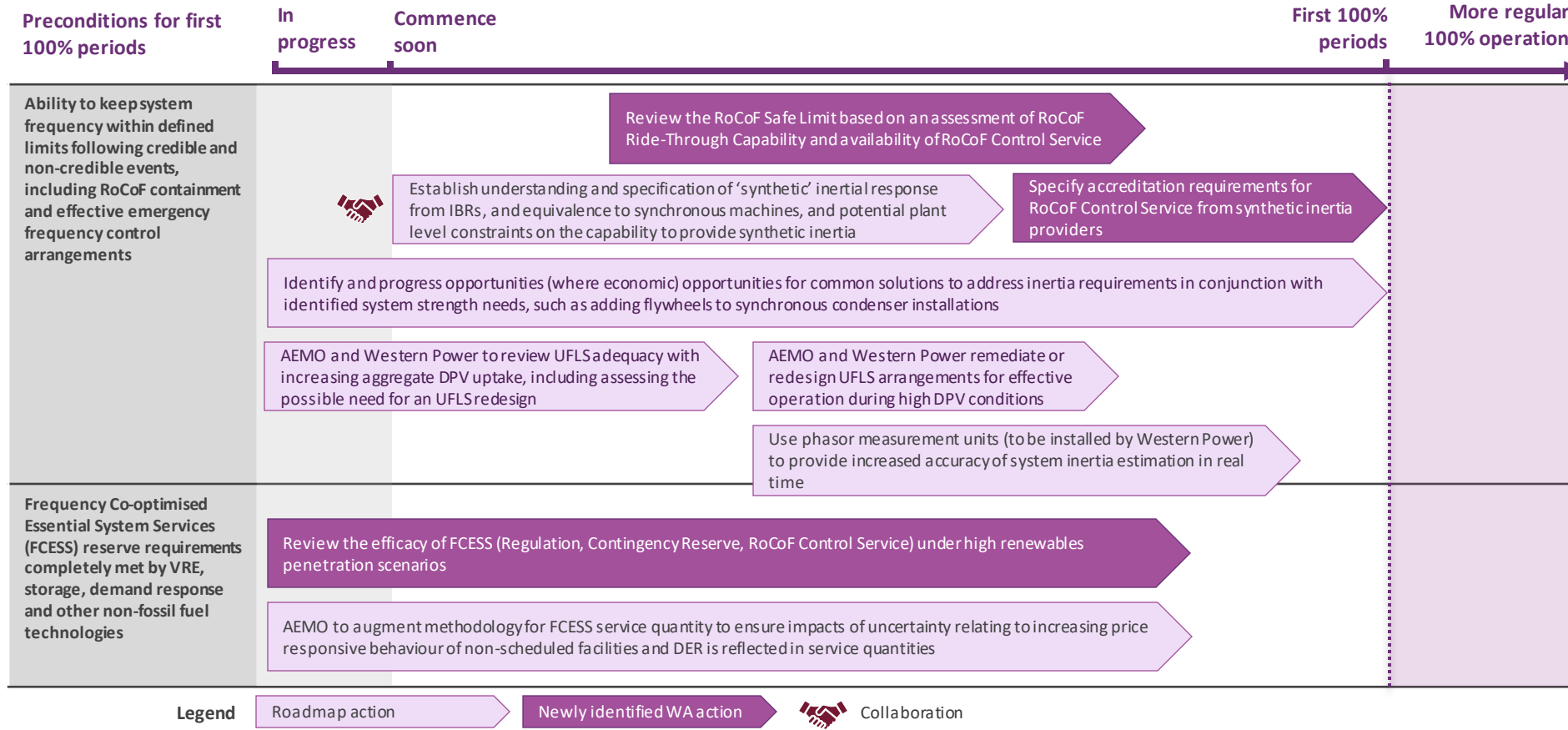
SWIS Roadmap to Renewable Energy

Areas of potential collaboration
with universities

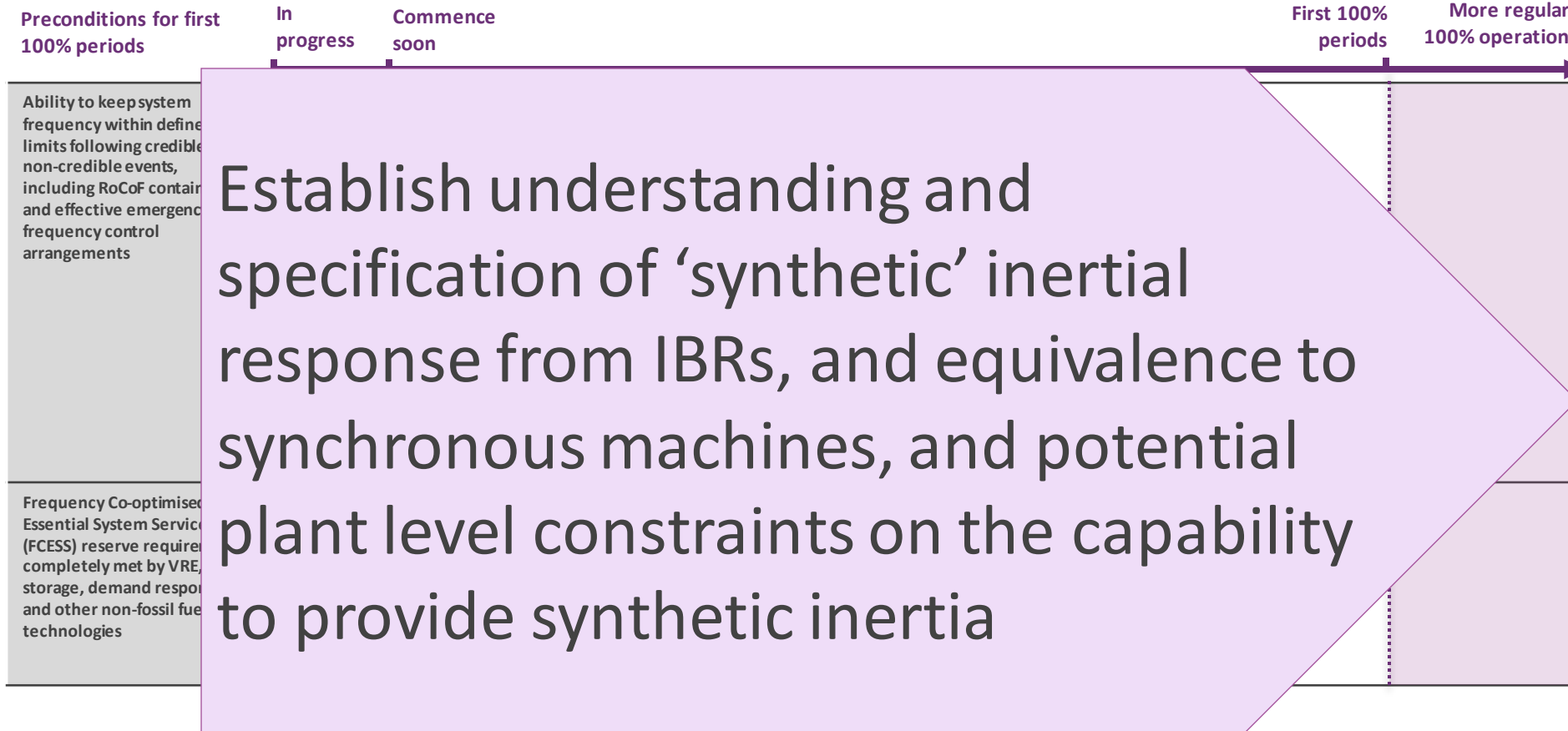
A decorative graphic consisting of several overlapping purple rectangular blocks of varying sizes and shades, arranged in a stepped pattern on the right side of the slide.

Frequency related knowledge objectives

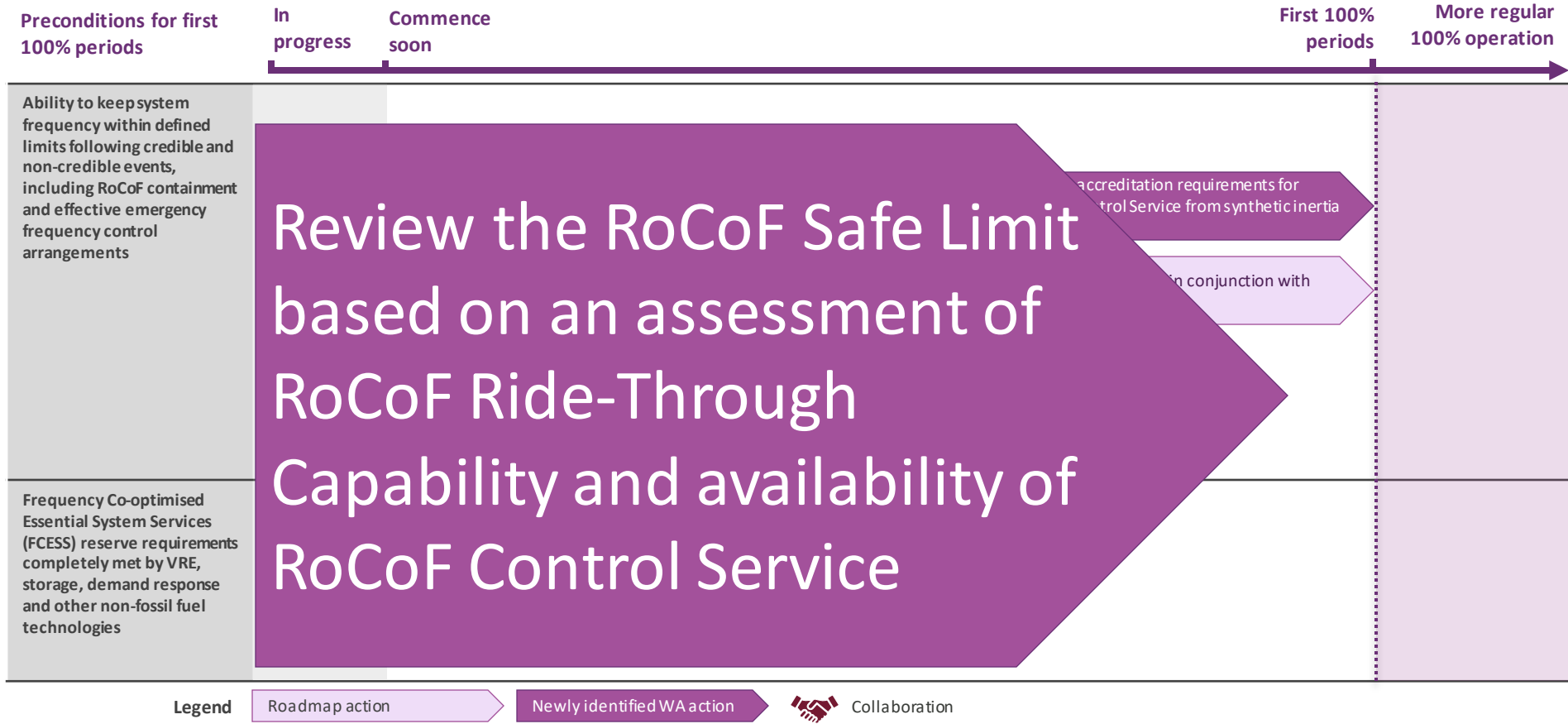
Example



Frequency related knowledge objectives



Frequency related knowledge objectives



Frequency Management
Transient & oscillatory stability
System strength and converter driven stability
Voltage control
system restoration
Monitoring & situational awareness
Power system modelling
...



We are already engaging



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MELBC



MONASH
University



THE UNIVERSITY
of ADELAIDE

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