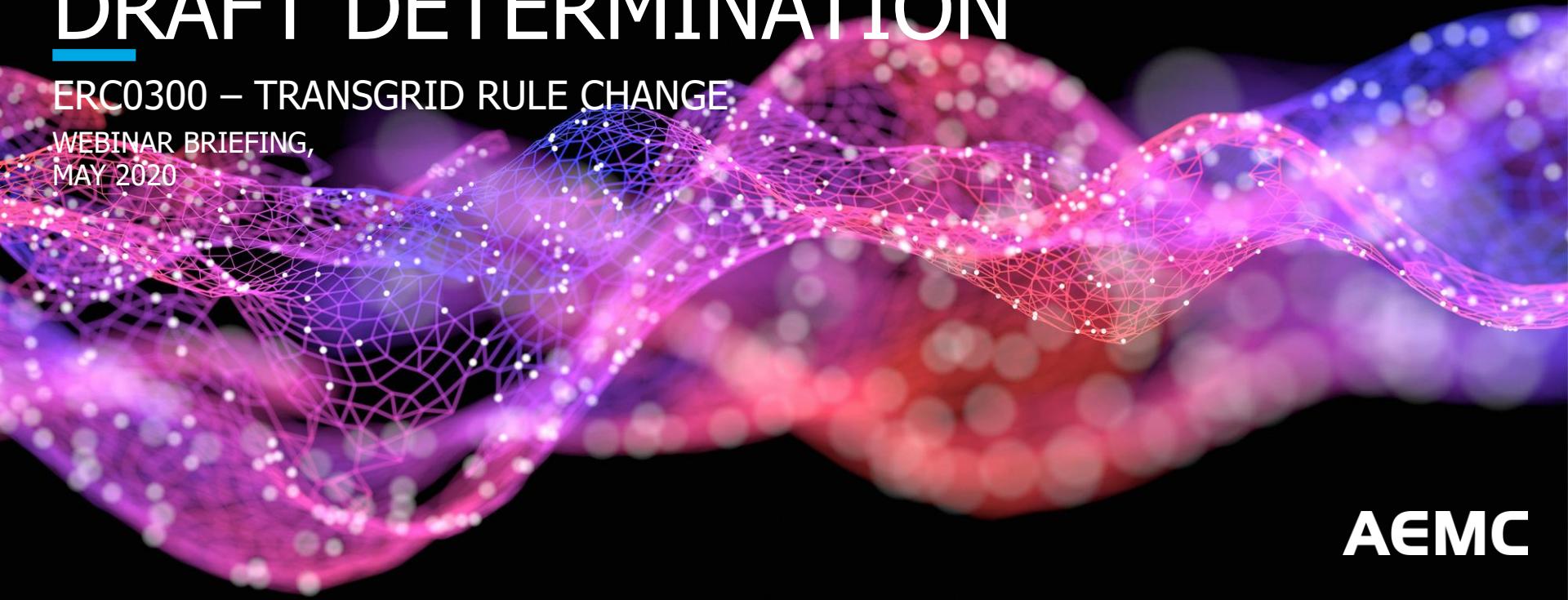


EFFICIENT MANAGEMENT OF SYSTEM STRENGTH ON THE POWER SYSTEM DRAFT DETERMINATION

ERC0300 – TRANSGRID RULE CHANGE

WEBINAR BRIEFING,
MAY 2020

A dynamic, abstract graphic at the bottom of the slide features several overlapping, undulating waveforms. These waves are composed of a network of blue and purple lines connecting small, glowing white dots. The colors transition from deep blue/purple on the left to bright magenta/pink on the right, creating a sense of motion and depth against a dark, solid black background.

AEMC

Purpose of this presentation

The purpose of this presentation is to:



Provide stakeholders with an overview of the AEMC's draft determination on TransGrid's *Efficient management of system strength on the power system* rule change rule change proposal.



Provide stakeholders with the opportunity to gain clarity on our proposal such they better understand and provide feedback through submissions to the draft rule determination.

Submissions to the draft rule determination are due by 17 June 2021. Prior to this date, the AEMC will be engaging with interested stakeholders to gain feedback, including through peak body briefings.

Agenda

| Item | Approximate item length |
|--|-------------------------|
| Welcome and housekeeping | 5 mins |
| Introductory remarks from Merryn York | 10 mins |
| Context and overview of rule change | 10 mins |
| Overview of Supply side with Q&A | 20 mins |
| Overview of Demand side with Q&A | 10 mins |
| Overview of coordination – system strength mitigation requirement with Q&A | 20 mins |
| Transitional arrangements with Q&A | 10 mins |
| Concluding remarks from Charles Popple | 5 mins |

Format for the webinar

- You will have the option to make comments or ask questions via the Q and A function on your screen.
- When asking questions or presenting comments, please relate them to the purpose and scope of the meeting.
- In the Q and A area please first indicate whether you are asking a question or making a comment, then add your remarks, and then finally please include your name and organisation at the end.
- We will attempt to answer all questions during the scheduled Q and A sessions - if we don't get to your question during the forum, we will follow up after the event.
- Comments can also be raised during the Q and A sessions. Where possible, and time permitting, participants may be invited to present their comments - if this happens, your mic will be taken off mute, and you will be asked to make your comment.

WELCOME & INTRODUCTORY REMARKS

A complex network graph composed of numerous small, glowing blue and orange nodes connected by thin lines, forming a dense web-like structure against a dark background.

BACKGROUND AND CONTEXT

What is system strength?

- System strength is an **essential system service** needed to support a secure and stable power system.
- The provision of system strength is becoming **more important** given the rapid connection of large numbers of new, non-synchronous generation as we transition to a low emissions future.
- System strength was first considered in 2017 when two new frameworks were introduced:
 1. **'do no harm'** obligation
 2. **minimum system strength** framework
- However, in practice these were shown to be **reactive** and **slow** to provide system strength, resulting in a lack of this essential system service, which **increased costs to consumers**
- The Commission first looked at these issues in its **Investigation into the system strength frameworks**, a final report was published on 15 October 2020

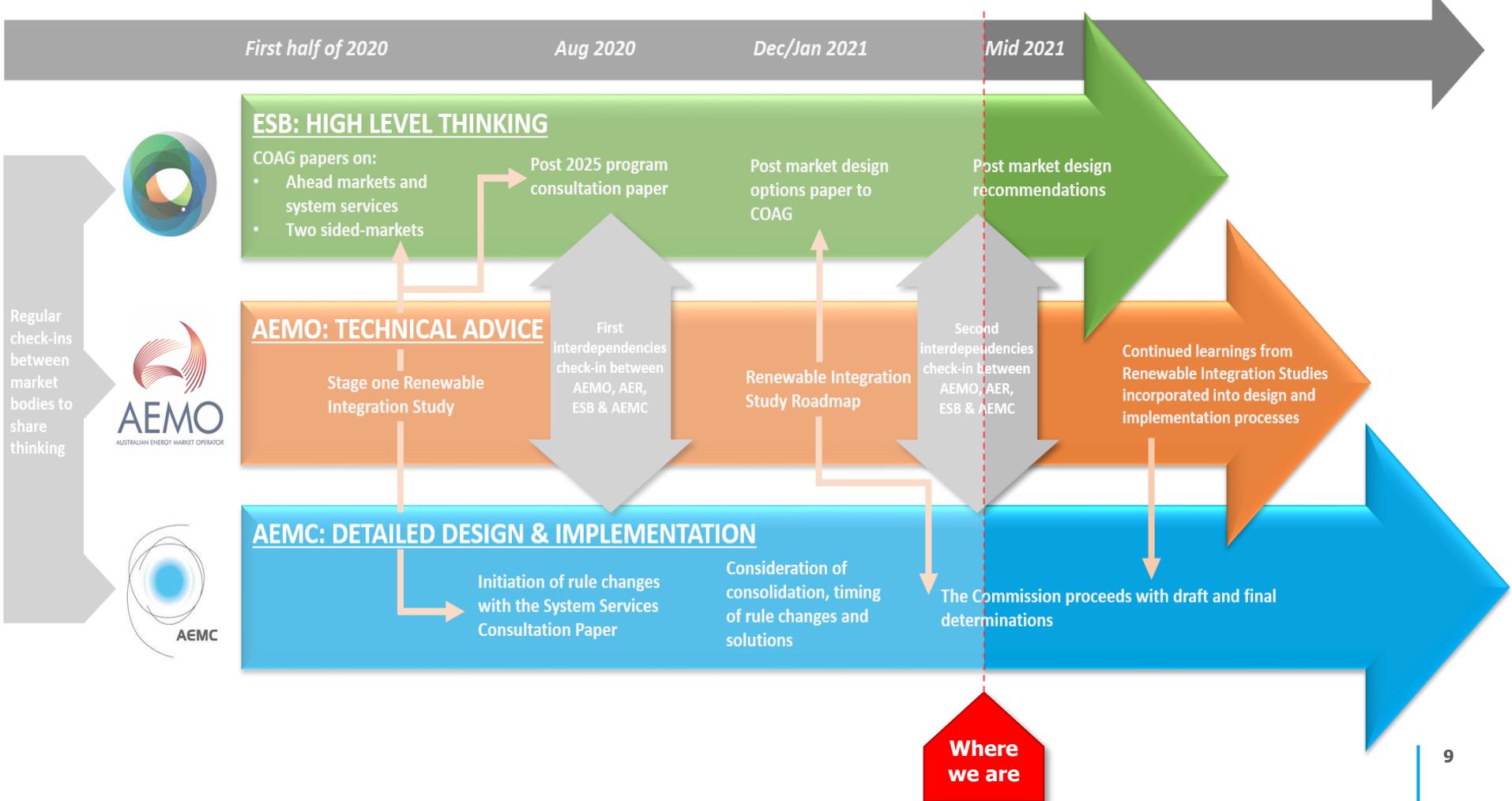
Overview of final report conclusions and recommendations

- System strength should be thought of as the stability of the voltage waveform, made of three components:
 - Two which demand the service, being plant and network protection systems, and inverter driven stability; and
 - One being the provision of a stable voltage waveform.

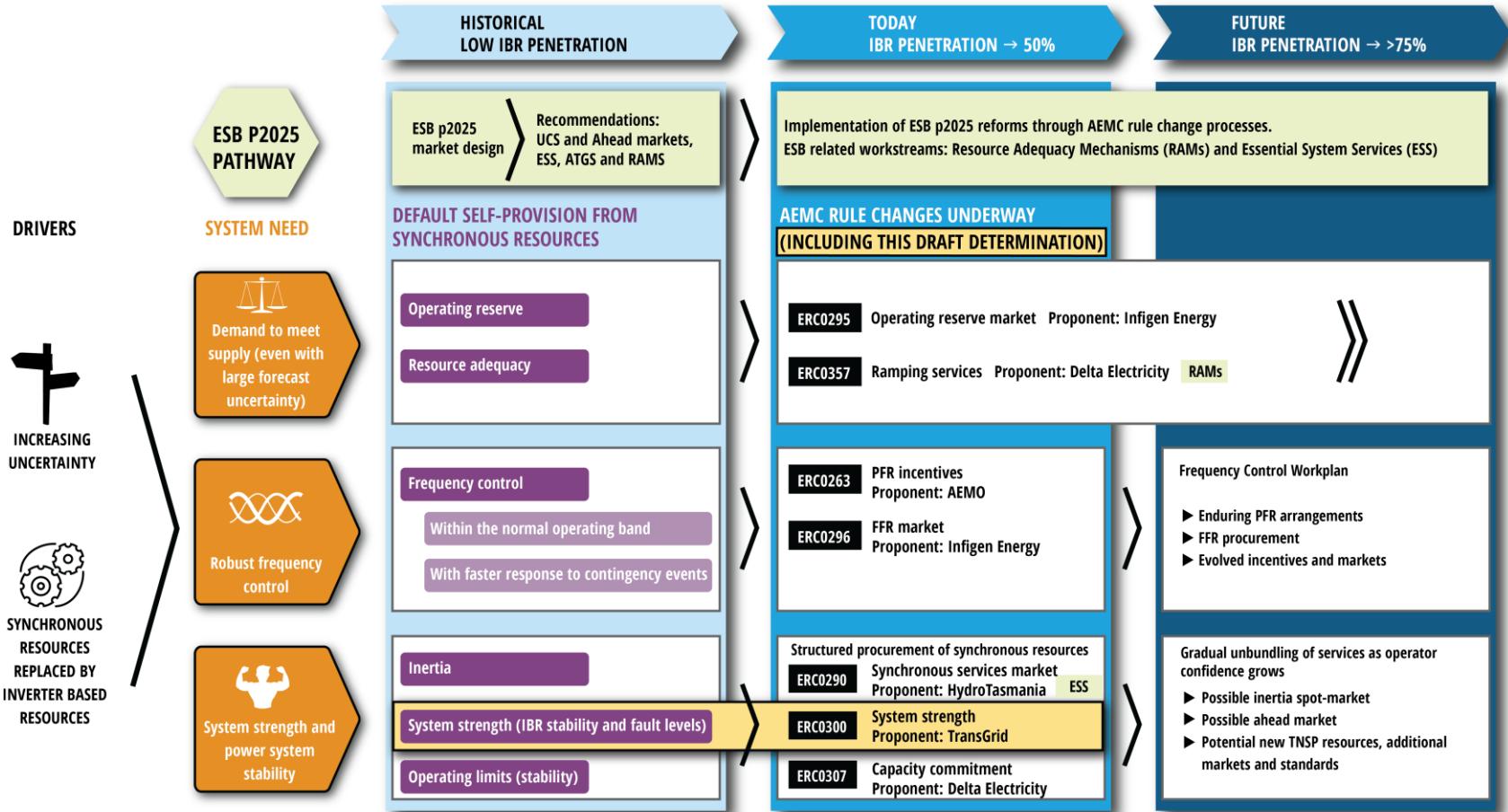
We then recommended a three component approach to evolving the existing frameworks for providing system strength in the NEM:

- 1. Supply side:** introducing a new system strength planning standard to provide a forward looking and structured procurement of the service.
- 2. Demand side:** introducing new system strength specific access standards.
- 3. Coordination:** introducing a charging mechanism so new connections have an alternative to having to provide their own system strength.

These recommendations informed our consideration of the rule change request from TransGrid.



Interaction between AEMC & ESB work

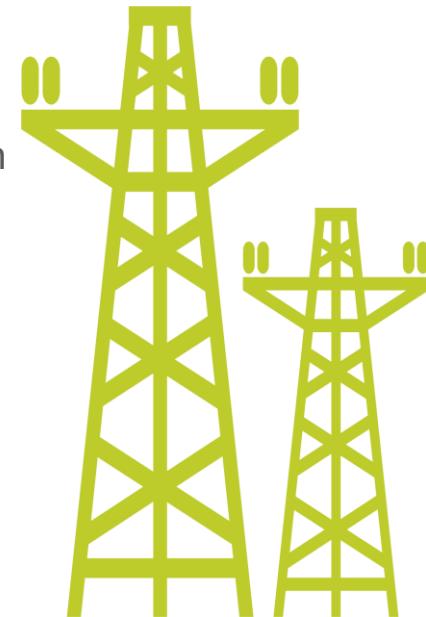


OVERVIEW OF THE DRAFT RULE

Overview of draft rule determination

Consistent with our recommendations from the *Investigation* there are three elements:

- 1. Supply side:** A TNSP led procurement of system strength. TNSPs working closely with AEMO, would be responsible for providing efficient levels of system strength on a forward looking basis over the given timeframe. This would be a prescribed transmission service, with the TNSP required to meet a system strength standard at certain locations on its transmission network.
- 2. Demand side:** New access standards, to ensure that connecting parties with IBR would only use the efficient volumes of this valuable common pool resource.
- 3. Coordination:** The system strength mitigation requirement, which would provide connecting parties with IBR a choice between paying to use the system strength provided by the TNSP, or providing their own system strength by remediating their impact. This means that connecting parties will pay for some of the provision of system strength



Benefits expected from the proposed draft rule

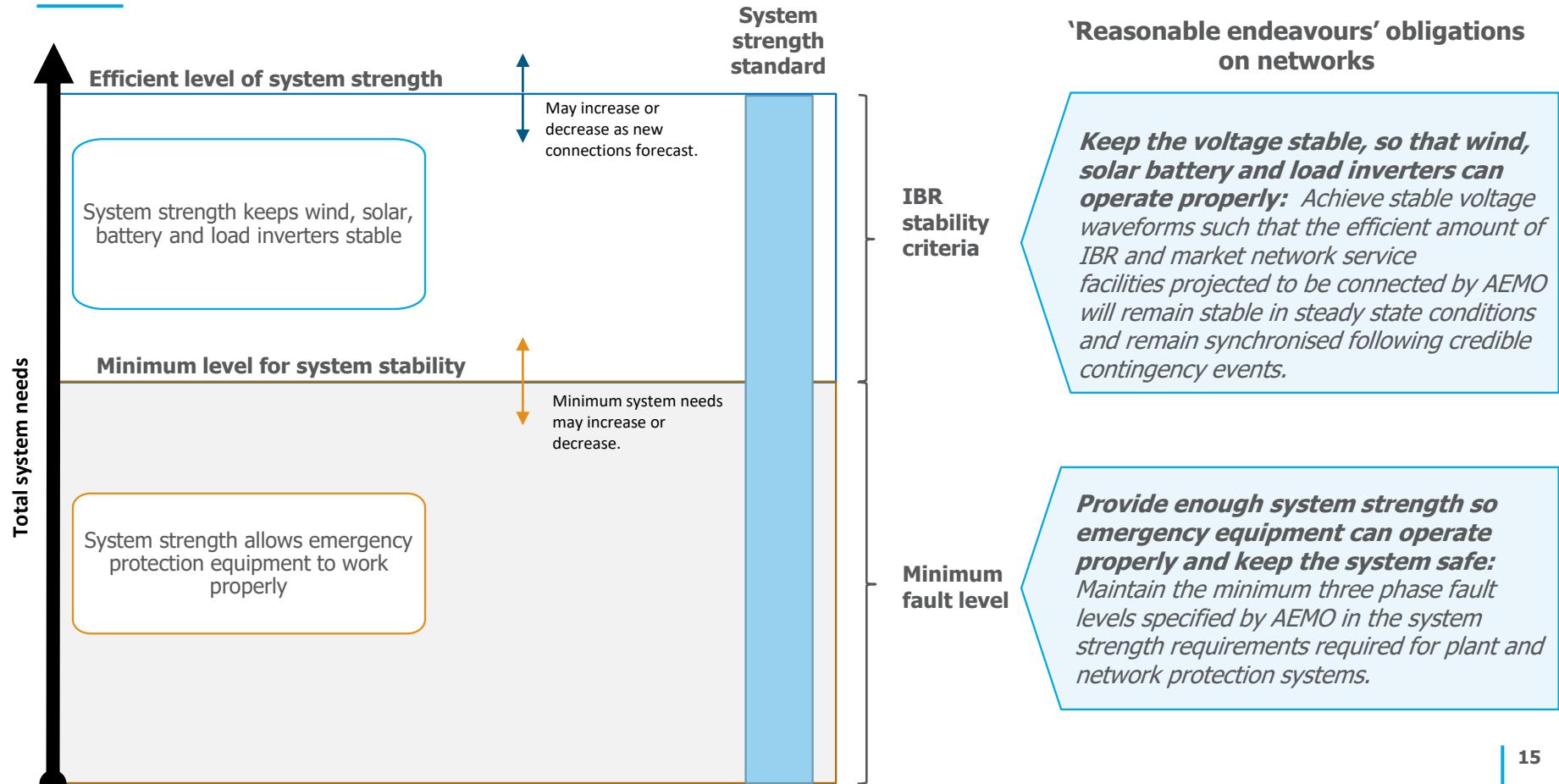
We consider that the proposed framework would address the key issues with the current frameworks and promote the long-term interests of consumers:

- **Reduce investment and connection costs, which flow through to consumers:**
 - Connecting parties can choose between paying the charge or undertaking own remediation
 - Connecting parties would have greater certainty over the connection process – reducing investment costs and making the connection process faster
- **Enhance scale, scope and operational efficiencies,** by making TNSPs responsible for delivery of the efficient amount of system strength.
 - TNSPs can leverage significant economies of scale and scope to deliver system strength at lowest cost – coordinating with their other responsibilities
- **Address the reactivity of the current frameworks,** by requiring AEMO and TNSPs to actively plan ahead for the provision of the efficient volumes of system strength; and making clear standards required for connecting parties.
 - System strength would be provided when and where it is needed, which would help to address the bottlenecks in new connections, and curtailment of existing generation

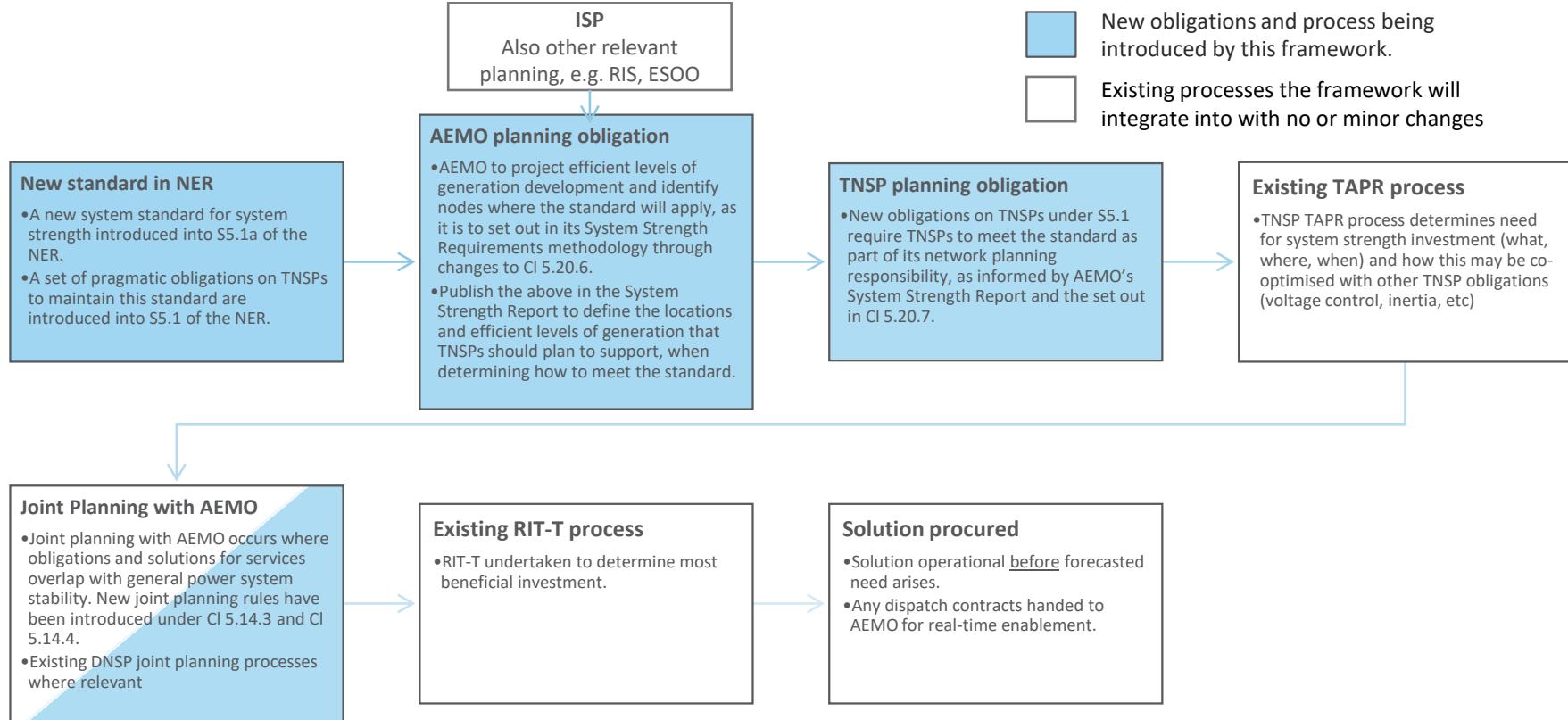
SUPPLY SIDE

ESTABLISHING A NETWORK PLANNING STANDARD TO PROVIDE
EFFICIENT LEVELS OF SYSTEM STRENGTH

The new system strength planning standard

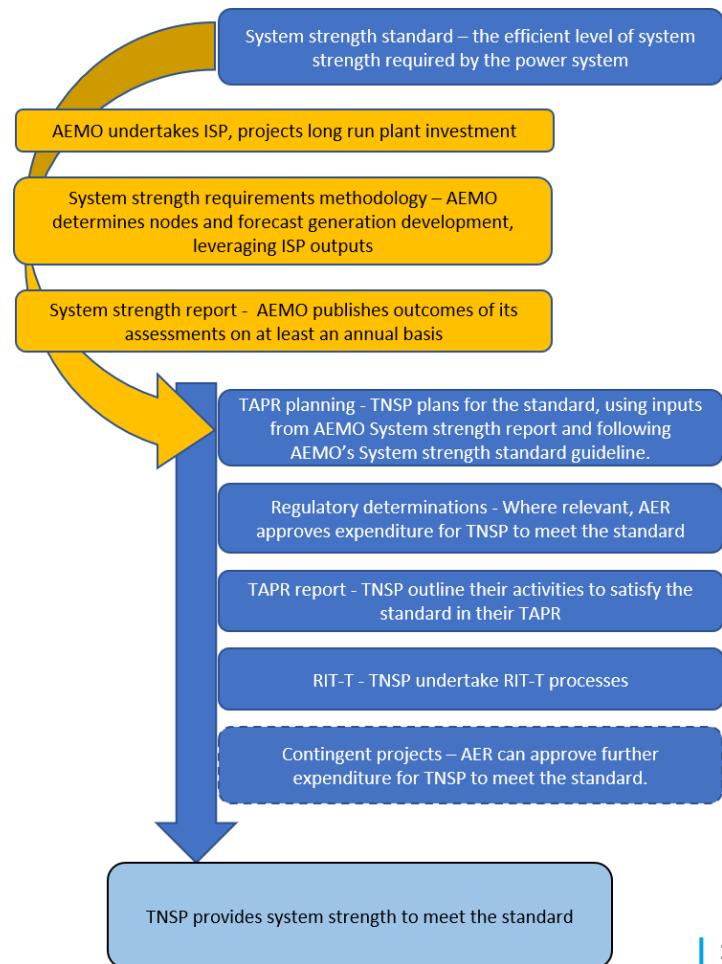


Overview of the supply side process



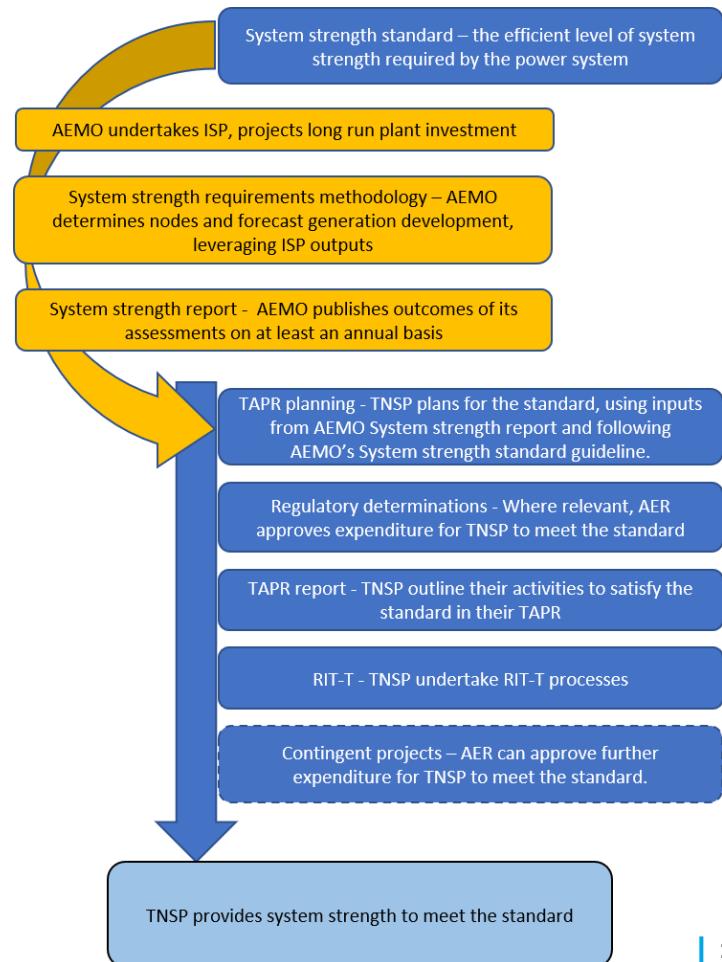
AEMO obligations and processes

- AEMO would:
 - be responsible for declaring system strength nodes and projecting both minimum fault levels and forecast new connections over the next 10 years at these nodes.
 - leverage the ISP and other relevant planning processes to make such projects on at least an annual basis
 - publish the system strength nodes and projections
- AEMO would no longer be required to identify and declare shortfalls that an SSS Provider must meet, as this would be superseded by the ability to define minimum required levels as described above.



TNSP obligations and processes

- The TNSP that is the jurisdictional planning body for the region would be the SSS Provider for the nodes in its region.
 - The joint planning arrangements would allow for collaboration with others – DNSPs, other TNSPs, AEMO
- The SSS Provider would:
 - be informed by AEMO's system strength report
 - determine how it should meet its obligations under the system strength standard as part of its annual planning review process
 - be required to publish how it would meet the standard at each node in its annual planning report, including a timeline of projected investments in system strength solutions, as well as forecasts of the available fault level at each node.
 - would use the existing RIT-T process to determine the net-beneficial option to meet the proposed system strength standard



Three year planning deadline

- AEMO would determine the system strength standard specification, as part of its forecast system strength requirements, *three-years in advance* of when the SSS Provider must actually meet the specification
 - The SSS Provider can act early or modify its investment process to take into account changes to AEMO's forecast requirements.
- SSS Providers are therefore expected to make investments in line with investments expected of a prudent transmission business, given the information they have available, such as:
 - AEMO's forecast system strength requirements beyond the 3-year deadline of the system strength standard specification,
 - their own information, and
 - the ability to provide more services than strictly required under the standard such that they may realise economies of scope and scale.

| Year (starting 1 September) | 2021/2 | 2022/3 | 2023/4 | 2024/5 | 2025/6 | 2026/7 | 2027/8 | 2028/29 |
|--|--------|--------|--------|--------|--------|--------|--------|---------|
| Binding requirement for the standard for that year (System strength standard specification) | NA | NA | NA | 1500 | 2000 | 2000 | 2500 | 2500 |
| 2021 Forecast requirements | 1000 | 1000 | 1000 | 1500 | 1500 | 1500 | 2000 | 2000 |
| 2022 Forecast requirements | | 1000 | 1000 | 1500 | 1500 | 1500 | 2000 | 2000 |
| 2023 Forecast requirements | | | 1500 | 2000 | 2000 | 2000 | 2500 | 2500 |
| 2024 Forecast requirements | | | | 2000 | 2000 | 2000 | 2500 | 2500 |
| 2025 Forecast requirements | | | | | 2000 | 2000 | 2500 | 2500 |

Q&A on Supply side



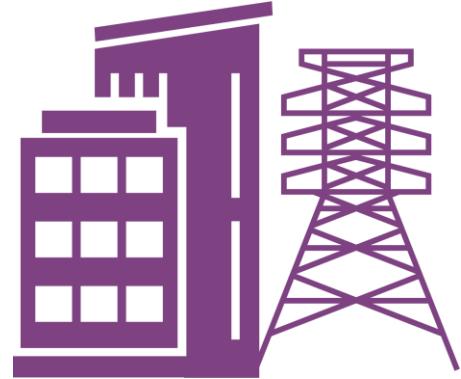
Ask your questions on the Supply side now in the chat section

DEMAND SIDE

ACCESS STANDARDS TO MANAGE DEMAND FOR
SYSTEM STRENGTH

Access standards to manage new demand

- The draft rule introduces two new technical standards that would apply to relevant new generators, loads or MNSPs connecting to the power system, such that they efficiently manage their demand of system strength.
- These standards:
 - form the **basis of the system strength charge**, as it is a key input into determining the 'demand', or quantity, for system strength services of various connecting parties.
 - Include **provides a backstop** level of performance that places a cap on the amount of system strength services used by newly connecting IBR plant, by mandating that they can operate at a minimum capability.
- These standards **would not apply** to plant that has already connected to the grid, but only to those that apply once it has commenced (subject to some transitional arrangements for those who have submitted a connection application).



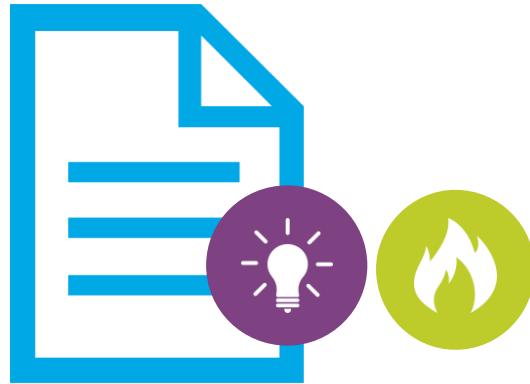
These access standards minimise the overall demand for system strength, and therefore the total cost of providing these services

The draft access standards

These new access standards are:

1. Minimum short circuit ratio (SCR), requiring new connecting inverter based resources (asynchronous generating units and inverter based loads) and market network service providers (MNSPs) to be capable of meeting all of their agreed performance standards at a SCR level of 3.0.
 - Forms basis of system strength charge
 - To allow parties to reduce their exposure to the system strength charge over time, the draft rule allows relevant inverter based plants to renegotiate technical performance in respect of SCR if they alter their plant in future
2. Generating systems comprising partly or fully of asynchronous generating units to not include a vector shift or similar protection relay that would operate for a voltage phase angle shift less than or equal to 20 degrees, as measured at the connection point. **(Only applies to asynchronous generators)**
 - Note that these standards only place obligations to have equipment with capabilities sufficient to allow them to perform to set standard(s), but not to be tuned to those settings at the time of connection. Rather, the connection will still have to have setting required to meet its performance standards suitable for the network conditions at its connection point.

Q&A on Demand side



Ask your questions on the
Demand side now in the
chat section

COORDINATION

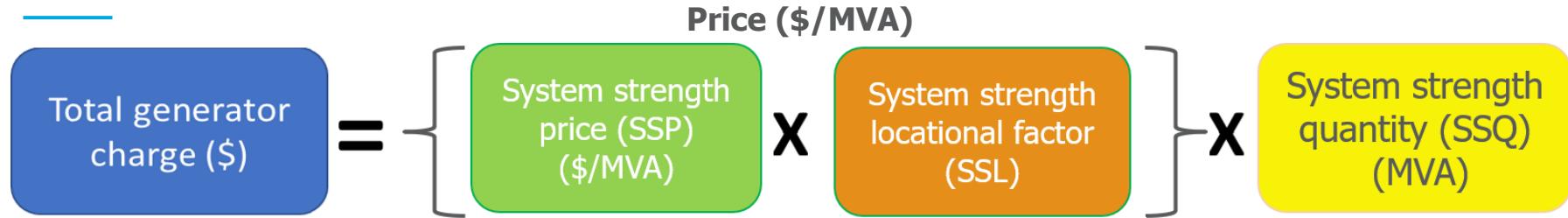
EVOLVING THE DO NO HARM
OBLIGATION TO INTRODUCE THE
SYSTEM STRENGTH MITIGATION
REQUIREMENT (SSMR)



Overview of the SSMR

- The system strength mitigation requirement (SSMR) would coordinate the supply and demand sides of system strength by:
 1. **promoting the efficient use of the service** by connecting parties, and
 2. **sharing the costs of service** between connections that require the service and consumers.
- The SSMR provides **connecting parties with a choice** of:
 - a. SSS Providers providing efficient levels of system strength (given forecasts of new resources connecting) to provide connecting party hosting capability, with connecting parties charged in proportion to their system strength requirements.
 - b. The connecting party undertaking remediation itself because of its general system strength impact, as determined by the relevant NSP using EMT type modelling as per the existing full impact assessment (FIA) process.
- In practice, connecting parties that consume system strength would pay for most of the service used, while consumers would only bear the residual costs of providing system strength on a forward looking basis.

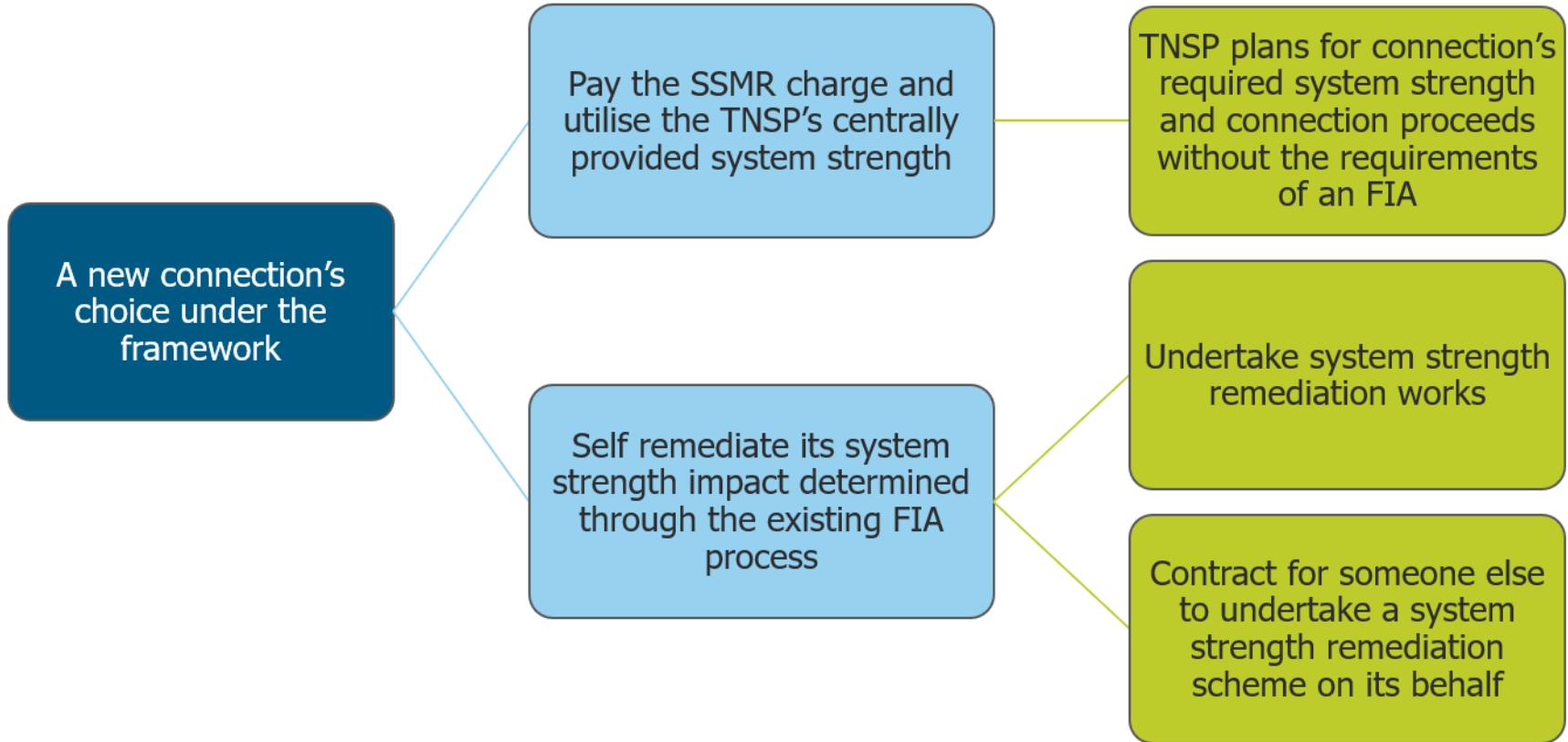
The system strength charge



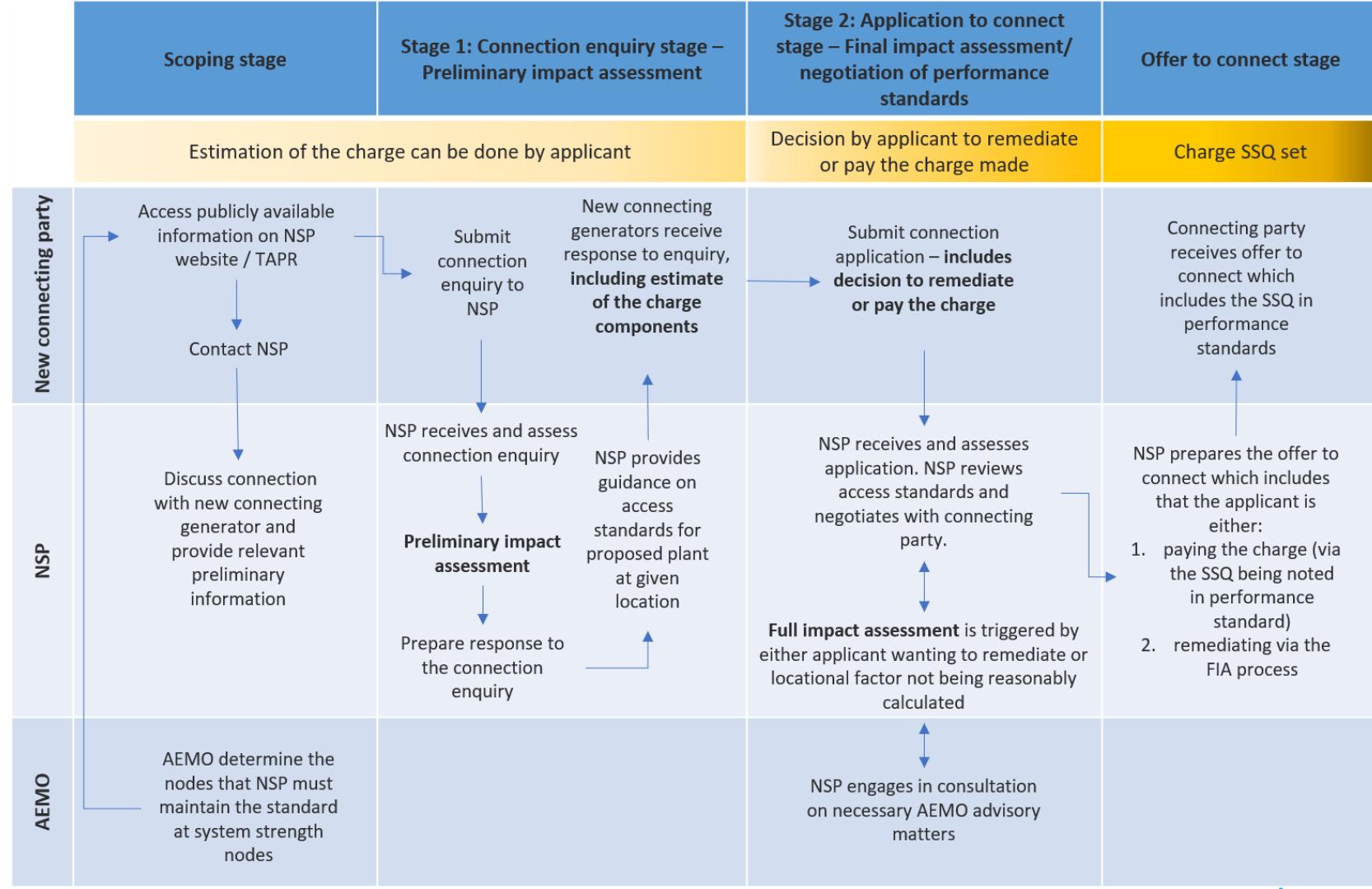
The charge is made up of three components, which, when multiplied together, equal the charge a connecting party would pay:

1. **The system strength unit price** component of the system strength charge reflects the change in **forward-looking** cost of the SSS Provider supplying system strength at each system strength node as a result of a change in demand for the service. **Fixed (indexed) for each 5 year period, recalculated by SSSPs.**
2. **The system strength locational factor** component reflects the localised nature of system strength. This component changes the magnitude of the charge a particular connection would face depending on its approximate electrical distance (or impedance) from the closest system strength node. **Fixed (indexed) for each 5 year period, recalculated by SSSPs.**
3. **The system strength quantity** component of the charge reflects the amount of the service used by the connection. The component is estimated from: the size of the connecting party's plant in megawatts (MW) and its short circuit ratio (SCR) (MVA/MW) requirements. **Fixed at time of connection, can be updated by plant through alterations.**

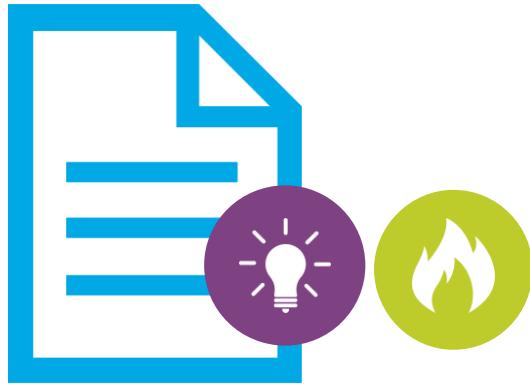
The system strength choice for connecting parties



SSMR and the connection process



Q&A on Coordination



Ask your questions on the
Coordination now in the
chat section

TRANSITIONAL ARRANGEMENTS FOR IMPLEMENTATION

A SEQUENCED INTRODUCTION OF THE
FRAMEWORKS

A sequential transition period

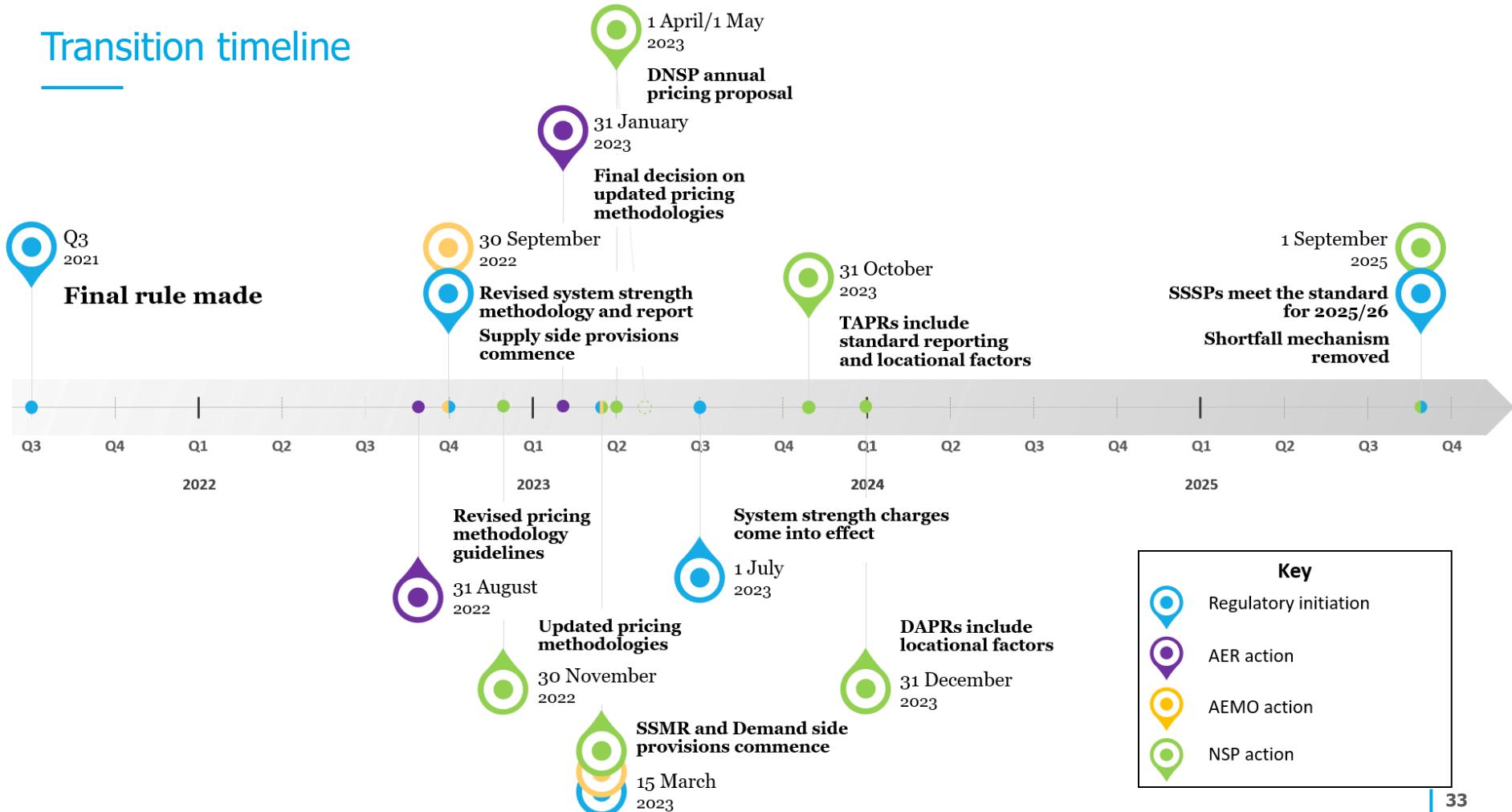
The Commission is proposing transitional arrangements that strike a balance between the:

- time needed for parties to prepare to meet their obligations under the evolved framework
- need to evolve the new system strength framework to be implemented as soon as possible to realise the benefits.

The sequence of events that is proposed to occur to implement the evolved framework can be grouped into three categories of transitional arrangements:

- 1. Supply side implementation** — which involves the preparation of the materials such that the new system strength planning would commence on **30 September 2022**. This also includes the **maintenance of the shortfall mechanism until 1 September 2025**.
- 2. Pricing and revenue arrangements for NSPs** prior to next regulatory determination, including the arrangements for SSS Providers, non-SSS Providers and DNSPs.
- 3. Demand side and system strength mitigation requirement implementation** — which involves the preparation of the materials such that these frameworks would commence on **15 March 2023**.

Transition timeline



Q&A on transitional arrangements



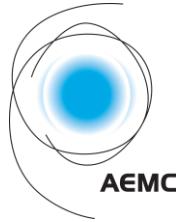
Ask your questions on the
transitional arrangements
now in the chat section

WRAP UP & CONCLUDING REMARKS

Next steps

- **Submissions to the draft determination are due 17 June 2021.**
- We welcome any interested stakeholders to contact us to discuss your thoughts on the proposal ahead of providing a submission.
- We will continue to work closely with the ESB, AEMO and AER on this rule change and its interaction with related work, given this work is being coordinated with the Post 2025 work.
- The final determination of the TransGrid's *Efficient management of system strength on the power system (ERC0300)* rule change is currently expected on 29 July 2021.



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