



CONNECTIONS REFORM INITIATIVE

Connections Reform Initiative (CRI)

Connections Reform Roadmap: Version 2

May 2023

*The Connections Reform Initiative acknowledges the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture.
We pay our respects to Elders past, present and emerging.*

Executive summary

The Connections Reform Initiative (CRI) continues to play an important role in accelerating the energy transformation in the NEM.

Collaboration remains fundamental to the CRI's success. We thank the members of the CRI Leadership Group and the CRI Working Groups; the endeavours of the CRI take energy from the support of the wider energy community.

The Roadmap V2 illustrates the clear evolution of the CRI from the planning to the implementation phase.

A major recent deliverable has been the submission of the 'Investment Certainty for R1' rule change in May 2023, a reform focussing on improving investor certainty for assets passing through the registration stage of the connection process.

Another important deliverable has been the 'Changes to S5.2.5.5 Minimum Access Standards' reform submission to the 'Efficient reactive current access standards for inverter-based resources' rule change process. A supportive rule change reflecting the CRI's recommendations was released by the AEMC in April 2023.

The 'Streamlined Connections Process' reform launched the Connections Process Trials Program which captures and tests ideas from across the industry on ways to improve the entire connections process. A range of trials are ongoing, with results expected in the immediate months ahead.

The Roadmap also covers the introduction of new reforms developed in response to the evolving needs of the industry, including for example a review of the 5.3.9 rule. It also now embraces AEMO's Connections Scorecard, which provides both data and a visualization of the participation across the stages of the connections process.

The need to significantly improve the connections process remains a constant driver, given the pace of the energy transition. AEMO and the CEC remain committed to the success of the CRI.

The Connections Reform Initiative (CRI): A cross-industry collaboration



CONNECTIONS REFORM INITIATIVE

The Connections Reform Initiative (CRI) is jointly sponsored by the Australian Energy Market Operator (AEMO) and the Clean Energy Council (CEC), and we express deep gratitude for the leadership and commitment they have shown.

The CRI brings together stakeholders from across the industry to jointly solve complex connections challenges, including generators and developers, AEMO, Network Service Providers (NSPs), Original Equipment Manufacturers (OEMs), consultants/advisors and industry bodies. We acknowledge the invaluable contributions of these businesses in allowing their people to volunteer to contribute to the CRI.



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Introduction

Section 1



A joint update from CRI leaders

The Connections Reform Initiative (CRI) continues to play an important role in accelerating the energy transformation in the NEM which is now well underway.

This version 2 of the Connections Reform Roadmap (CRR) illustrates the evolving dynamics of this initiative: A clear pivot from ideas and planning to implementation, the introduction of new areas of focus and changes in response to the evolving needs of the industry. The CRR also explores the delivery progress against many of the reforms identified in the original roadmap.

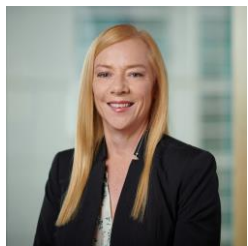
AEMO has built on the original Roadmap by bringing forward its own focus areas for change. The industry has also sustained its commitment, in particular by progressing the large 'Investment Certainty for R1' reform to submission of a rule change proposal, though there remains the potential for enhanced NSP engagement.

The CRI sits alongside other changes in the NEM, notably jurisdictional programs to advance the deployment of renewable technologies. The CRI informs aspects of these programs and is informed by them - a healthy symbiosis.

Collaboration remains fundamental to the CRI's success and, as initiatives have progressed from ideas to the real world, the nature of that collaboration has evolved.

We would like to thank the members of the CRI Leadership Group, who have played a critical role in setting the direction and providing the support needed for the CRI.

We look forward to the next stages of the CRI and encourage the ongoing support of the wider energy community.



Merryn York
Executive General
Manager System
Design
AEMO



Kane Thornton
Chief Executive
*Clean Energy
Council*



Neil Gibbs
Independent
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CRI Leadership Group:

AEMC - Charles Pople
 AEMO - Margarida Pimentel
 AEMO - Merryn York
 CEC - Christiaan Zuur
 CEC - Kane Thornton
 Edify Energy - John Cole
 ElectraNet - Rainer Korte
 ENA - Dominic Adams
 ENEL Green Power - Werther Esposito
 Goldwind - John Titchen
 Mint Renewables - Peter Cowling
 Tesla - Josef Tadich
 Tilt Renewables - Damien Sanford

The catalyst for change: The CRI was created to help overcome challenges in connecting new generators to the grid during the fastest clean energy system transition in the world.

The magnitude and pace of Australia’s energy transition means getting connections right is critical.

Australia is already undergoing the fastest transition of any energy system in the world¹. In 2022, almost 2.1 GW of new renewable energy capacity was installed with 15 projects connected.

While this performance to date is impressive, it needs to accelerate further still - and by a lot. In the most likely Step Change scenario of its 2022 ISP, AEMO forecasts the need for over 125 GW of additional VRE by 2050, an increase of nine times today’s utility-scale variable renewables².

The magnitude and pace of the transition means it is critical to get connections right.

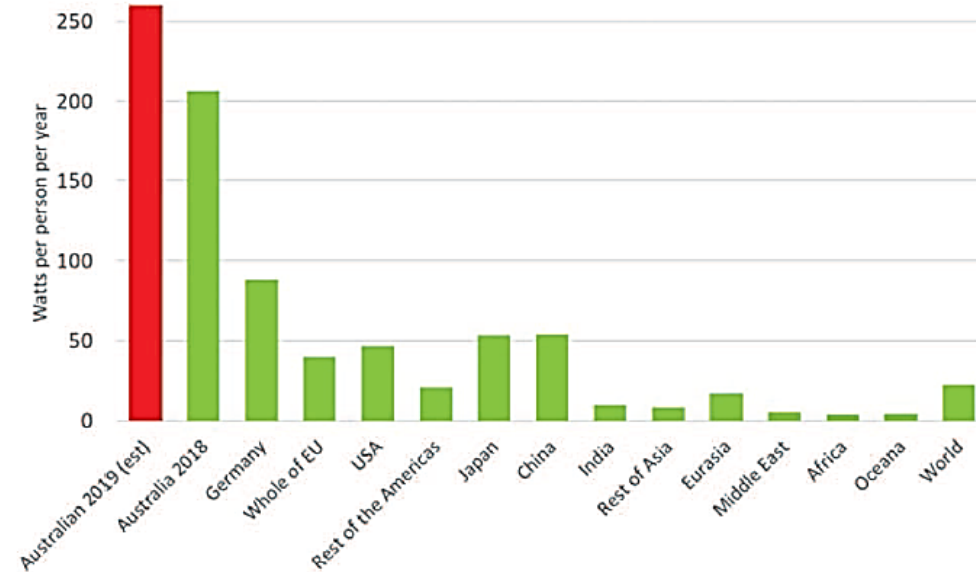
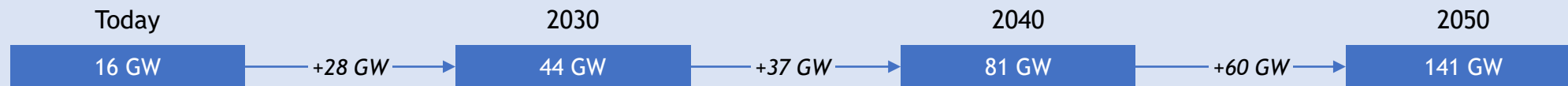


Figure: Annual per capita renewables deployment rate ¹

Grid scale wind and solar installs (today to 2050):



¹ Blakers et al. Pathway To 100% Renewable Electricity, IEEE Journal Of Photovoltaics, Vol. 9, No. 6, November 2019 (via A. Wonhas presentation to Australian Energy Week, 25/5/2021): <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8836526>

² AEMO, 2022 Integrated System Plan (p. 39): <https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en>

The vision for the connections process is one that is consistent, predictable, efficient and collaborative - and “*the best place in the world to connect new generators*” - Daniel Westerman (CEO and Managing Director, AEMO)

A strong connections process is critical to unlocking the 100% instantaneous renewable energy future.

Australia is rapidly approaching 100% instantaneous renewable energy penetration. Indeed, AEMO is preparing the grid for this outcome to arrive as soon as 2025¹.

The speed at which this future is arriving is both exciting and daunting.

While small-scale generation and storage is contributing significantly to this future (with around 30% of detached homes in the NEM already having rooftop PV totaling ~15 GW of capacity²), the 100% instantaneous renewable energy future is dependent on successfully installing large-scale generation and storage assets to the grid.

The CRI vision for the connections process:

- 1 A connections process which is **consistent, predictable** and which delivers repeatable outcomes.
- 2 To improve **efficiency**, including by reducing (eliminating) re-work, improving the quality coming into the process and addressing information asymmetry.
- 3 A **collaborative** working model between industry, AEMO and the NSPs.

¹ AEMO, Corporate Plan FY2022 (p. 10): https://aemo.com.au/-/media/files/about_aemo/corporate-plan/2021/fy22-aemo-corporate-plan.pdf?la=en&hash=031377CA8B769A28E705235EFE428633

² AEMO, 2022 Integrated System Plan (p. 10): <https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en>

Overview of CRI reforms and current status



CONNECTIONS REFORM INITIATIVE

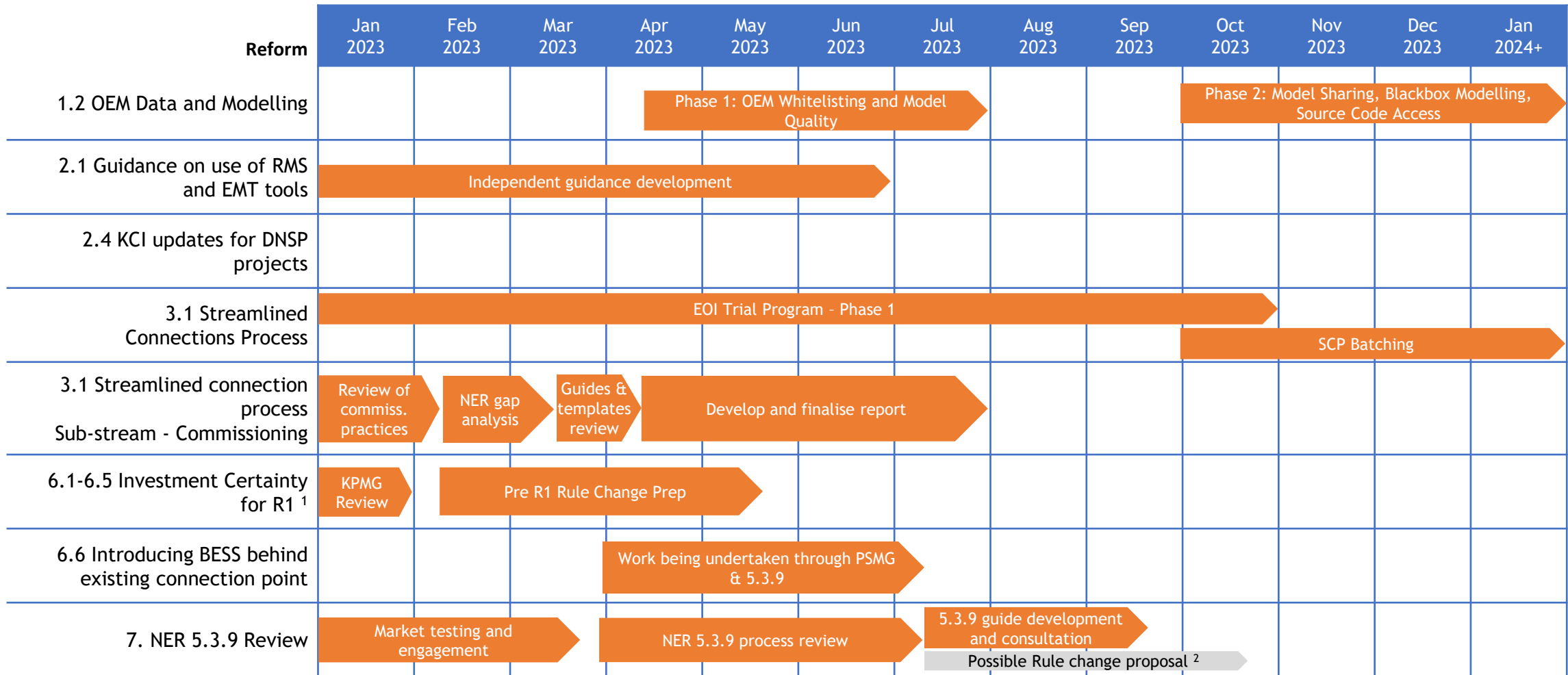
Reform	Reform Sponsor	Status	Progress
1.1 Network Access: Changes to S5.2.5.5 MAS	AEMO	✓	Technical subgroup proposed wording changes and accompanying technical brief developed and submitted to AEMC 'Efficient reactive current access standards for inverter-based resources' rule change process. Final supportive rule change released April 20 th 2023.
1.2 OEM Data and Modelling ¹	AEMO	●	New reform to integrate previous reforms 1.2, 2.2, 2.3 and enhanced OEM source code sharing. Updated scope developed and mobilised Q2 2023.
1.3 Forums and Initiatives to Drive Collaboration	CEC	✓	Collaboration award developed and announced at the Clean Energy Council's flagship Australian Clean Energy Summit. To employ a 'continual improvement' approach to industry collaboration from here.
2.1 Guidance on use of RMS and EMT tools	AEMO	●	Independent draft guidance developed. Next step: Industry consultation and input to further refine draft guidance.
2.4 KCI updates for DNSP projects	CEC	○	Discussions with AEMC held to understand why 'Transparency of New Projects' rule (2019) was not extended to DNSPs. Mobilisation paused to prioritise work on reform 6.1-6.5.
3.1 Streamlined Connections Process ²	AEMO	●	Reform broadened beyond 'Batching', while still including this. Consultation undertaken on high-level 'streamlined' process with strong industry input. To progress into detailed design as part of CRI Connections Process Trials Program currently underway. [See additional detail in Section 3.1]
6.1-6.5 Investment Certainty for R1	CEC	●	Reform stage 1 focussed on improving investor certainty for assets passing through the registration stage of connection. Initial rule change drafted and followed by collaboration with industry to refine. Proposed rule change submitted to the AEMC on May 17, 2023. [See additional detail in Section 3.2]
6.6 Introducing BESS behind existing generation	Transitioned from CEC to AEMO	●	CEC work on this reform is complete. The question relating to legacy plant modelling more broadly is being addressed as part of the current AEMO Power System Modelling Guidelines (PSMG) Review Consultation. Other issues relevant to BESS retrofit (e.g. uncertainty and inconsistencies associated with application of clause 5.3.9) are being investigated by 'Review of the 5.3.9 rule' (reform 8).
6.7 Process to Introduce Changes to AEMO Guidelines	AEMO	✓	New process finalised and deployed during 2021.
8. NER 5.3.9 Review	AEMO	●	New reform mobilised Q2 2023 with industry consultation to inform the development of improvements in applying National Electricity Rules (NER) 5.3.9 for generating system alterations.

¹ Incorporates previous Whitelisting (1.2), Model Quality (2.2) and OEM Provision of Black-box Models (2.3).

² Incorporates previous Batching (3.1), Approach (1.1b) and Base cases (1.1c) reforms.

Reform delivered	Meeting deliverables on time	Schedule or deliverables at risk	Schedule or deliverables not on track	Not started
✓	●	●	●	○

High level timeline



¹ Investment Certainty for R1: Timing on future phases of this workstream is to be confirmed.

² NER 5.3.9 Review: AEMO would consider the need for a Rule change subject to recommendations made during the process review phase.

Delivered Reforms

Section 2



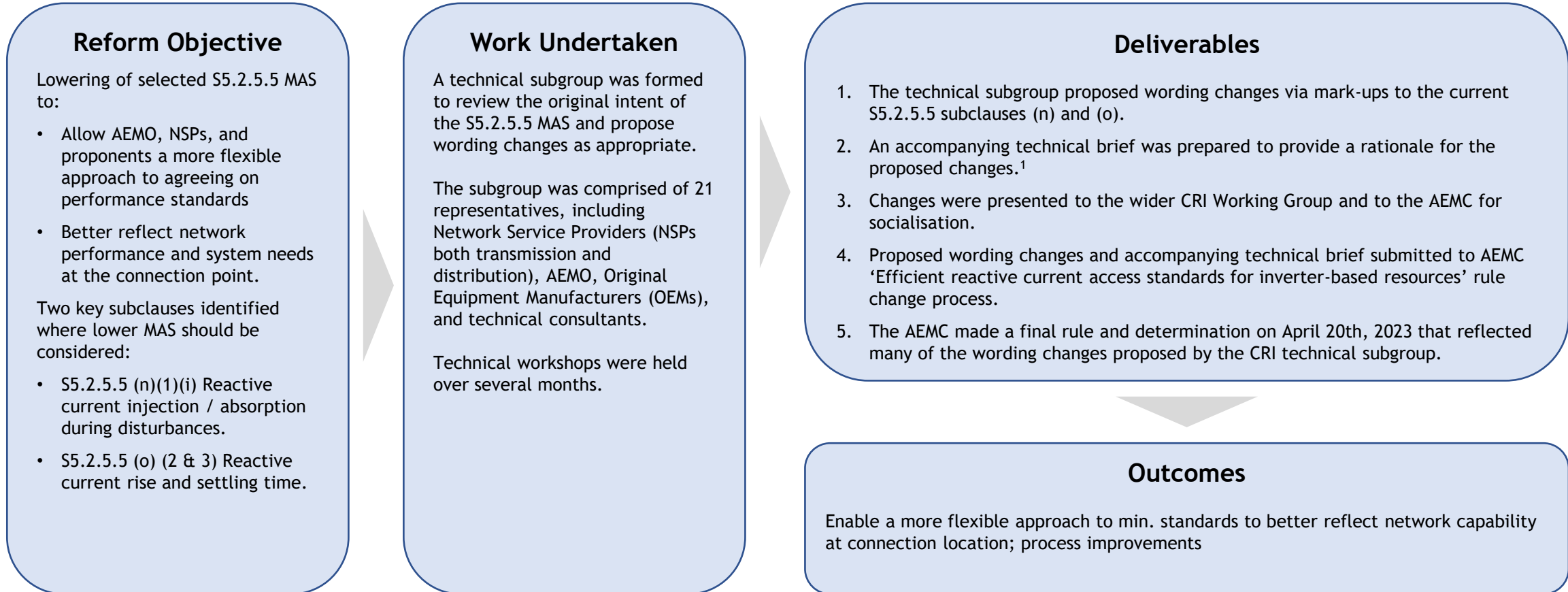
Changes to S5.2.5.5 Minimum Access Standards

Benefits

- Speed**
Faster connection process speed
- Efficiency**
Lower cost of connection
- Grid outcomes**
Improved hosting capacity, system strength
- Timing certainty**
Firmier connection process timeframes







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¹ Vysus Technical Note: Proposed changes to NER S5.2.5.5 minimum access Standard. https://aemo.com.au/-/media/files/stakeholder_consultation/working_groups/other_meetings/connections-reform-initiative/technical-note-on-s5255-mas-changes.pdf?la=en

Process to Introduce Changes to AEMO Guidelines

Benefits

 Speed <i>Faster connection process speed</i>	 Efficiency <i>Lower cost of connection</i>	 Grid outcomes <i>Improved hosting capacity, system strength</i>	 Timing certainty <i>Firmer connection process timeframes</i>
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CONNECTIONS REFORM INITIATIVE

Reform Objective

- Implement a consistent and fit-for-purpose approach to collaborating, engaging and communicating with the energy industry on new documents, or changes/updates to documents currently published on the AEMO Network Connections webpages. These documents include guidelines, templates and checklists.
- To make it easier for stakeholders to understand when changes or updates are happening, and how to get involved and put forward their thoughts on the change or update.

Work Undertaken

- A new process to introduce changes to AEMO guidelines was developed that considered (i) the materiality of the document, and (ii) the materiality of the change.
- Developed list of AEMO documents categorised as a 'rules consultation document', 'material document' or 'administrative document'.
- Socialised with CRI Working Group for feedback.

Deliverables

- Developed a change process for a new document or a material change to a material document.
- Developed a change process for administrative changes or updates.

Outcomes

- Implementation of a new process to introduce changes to AEMO guidelines based on document type and materiality of the change.
- Categorisation of AEMO documents as either 'rules consultation document', 'material document' or 'administrative document'.

Forums and Initiatives to Drive Collaboration

Benefits

- Speed**
Faster connection process speed
- Efficiency**
Lower cost of connection
- Grid outcomes**
Improved hosting capacity, system strength
- Timing certainty**
Firmier connection process timeframes



CONNECTIONS REFORM INITIATIVE

Reform Objective

- To embody the spirit of the CRI collaboration as a whole and the importance of instilling a collaborative approach to connections across all involved.
- To develop initiatives to recognise the need for a shift in behaviour across all CRI stakeholders - emphasising respectful and genuine engagement.

Note: While a 'delivered' reform, pursuit of strong collaboration is of course never complete.

Work Undertaken

- The Australian Clean Energy Summit event highlighted the key theme of collaboration throughout industry (including the role of the CRI).
- The CEC launched the inaugural collaboration awards at the ACES in July 2022.
- The award was won by NSW EnergyCo, AEMO, and Transgrid for their collaboration on the development of the NSW REZ Access Standards within a 4-month period.



Annabel Crabb (ABC Journalist and ACES Gala Speaker), Margarida Pimentel (AEMO), John Howland (Transgrid), Catherine O'Neill (EnergyCo NSW), Neil Gibbs (Online Power) and Kane Thornton (CEC), Australian Clean Energy Summit collaboration awards presentation, July 2022. NSW EnergyCo, AEMO and Transgrid won for their collaboration on the development of the NSW REZ Access Standards within a 4-month period.

Deliverables

- Development of industry award to recognise strong cross-industry collaboration.
- Ongoing communications and encouragement of collaboration forums and initiatives to support better connections experiences.

Outcomes

Reinforcing the value of collaboration across the connection process; better foundations when challenges in the process are encountered.

In Flight Reforms

Section 3



A note on levels of support for CRI reforms

The CRI reforms are complex. Solutions presented in this document have been developed through an extensive process of collaboration by many people who work with or are involved in the connections process, including developers and their technical advisors, OEMs, TNSPs, DNSPs, AEMO and the CEC.

While the collaborative process means the changes proposed in these reforms generally enjoy a high level of support, that support is not unanimous. The sponsor organisations for all reforms (i.e. AEMO or CEC) are accountable for delivering their respective reforms; however, securing unanimous support across all industry participants for all elements of these major reforms is not a realistic objective.

Therefore, it should be noted that the positions presented in these reforms do not necessarily represent the combined, shared views of AEMO and the CEC.

Streamlined Connections Process (SCP)

Section 3.1

Background & Objectives

- Reform was originally “Batching” to consider integrated impact assessments at Application stage to avoid rework if nearby projects become committed.
- However early work identified that for streamlining to be effective, this reform needed to consider wider changes to the connections process, particularly earlier in the connections process; batching remains an element of the reform.
- The reform as rebranded as the Streamlined Connection Process (SCP) with the aim of identifying streamlining opportunities across the end-to-end connections process.

Work Undertaken

- Delivery Team (25 volunteers across developers, NSPs, OEMs and AEMO) conducted an end-to-end review of current process.
- Ideation and deep dive process resulted in identification of nine initial streamlining initiatives (see following page) across the connections process. Notable among these initiatives is a Pre-Application Stage that brings forward work to de-risk later stages.
- Launched an open EOI calling for volunteer organisations and projects to be involved trials of the SCP initiatives. Resulted in the ‘SCP Program of Trials’ with seven trials taken forward in the first phase.

Linkages

- Stage 1 of the ‘Investment Certainty for R1’ (reform 6) considered specific changes at the R1 stage of the connections process. Common members across these reforms helps to ensure alignment across both reforms.
- ‘Efficient management of system strength on the power system’ rule change came into effect in March 2023 and expected will impact early stages of the connections process. The SCP delivery team was in communication with the AEMC with a view to understanding these impacts on the new proposed streamlined connections process.

Next Steps

1. **June 2023 - Oct 2023:** Deliver phase 1 of SCP trials.
2. **June 2023 - Dec 2024: Updated guidelines.** Subject to trial outcomes, guidelines will be created/updated for implementation of the SCP initiatives.
3. **Oct 2023 - Mar 2024: End of phase 1 of SCP trials.** Lessons learned from each trial will feed into the SCP and will inform the design and implementation of the improvements. (Timing subject to progress of each project in the trial program.)

SCP initiatives



CONNECTIONS REFORM INITIATIVE

Stage	#	Initiative	Next step
Enquiry	1	Update the connection enquiry form to incorporate additional proponent info and checklist of info back from NSP.	Perform detailed design prior to trial
Pre-application - new (see next page)	2	Detailed design of the optional pre-application stage.	Progressing via trial 4
	3	Develop the Guideline that sets out the 'menu' of design packages, possible studies to be performed against each clause and guiding principles.	
Application	4	Develop the detailed design and process for batched assessment studies.	Perform detailed design prior to trial
	5	Identify the appropriate responsibility / scope split between AEMO and NSP on key GPS clauses.	Progressing via trials 1, 3 4 and 5
	6	AEMO access standards assessment requirements Guideline review.	Perform detailed design prior to trial
R1 & Registration	7	Work through the practical implications and detailed design of decoupling R1 and registration.	Perform detailed design prior to trial
	8	R1 pre-agreed scope.	Progressing via trial 6
Commissioning	9	Commissioning stage detailed review: generator commissioning practices, NER gap-analysis and review of AEMO's Commissioning Guidelines and templates.*	Work in progress via external consultant.

SCP Program of Trials

January 2023

- Expression of Interest (EOI) for Streamlined Connections Process Trials closed on 20 January.
- Ten EOI submissions received across nine proponents and four direct approaches from proponents.

February 2023

- Submissions were discussed with proponents and assessed against several criteria:
 - Improvement of connection process (efficiency, certainty, quality and scalability)
 - Diversity across participants and connection stages
 - Supportive environment
 - AEMO undertook meetings with Network Service Providers (NSPs) to discuss trials and agree on which trials could be supported.
- **Seven trials confirmed for trial phase 1 (with two identified for future trials).**









March - May 2023

- Detailed trial plans developed in collaboration with proponents and NSPs.
- Four trials underway, remaining trials to commence shortly (depending on progress of their connection application).

Thank you to all of the proponents and AusNet, Transgrid, and AEMO Victorian Connections for their contribution, support, and engagement throughout the trial process.










SCP Program of Trials: Confirmed trials for phase 1

The following table lists the trials that have been confirmed for phase 1 of the Program of trials.

Trial	Tech	Description of the trial	Trial period	Benefits
1	Grid forming BESS	<p>Prior to submitting their application package, the proponent will prepare a tuning document detailing the tuning process, tuning results and proposed GPS settings (i.e. S5.2.5.5). The NSP and AEMO will review this document and provide feedback to assist the proponent in preparing their application package.</p> <p>The NSPs and AEMO will agree to the split in scope and responsibility on the assessment of key GPS clauses, before the assessment begins. This will help clarify the roles of the NSP and AEMO, with the aim of formalising these roles to the extent possible in the future.</p>	May - Oct 2023	 Speed  Efficiency  Timing certainty
2	Grid forming BESS	<p>The proponent, the NSP and AEMO will determine if it is possible to use lessons learnt from other projects using the same OEM to shorten the due diligence phase.</p>	April - Sept 2023	 Speed  Efficiency
3	Wind Farm	<p>The proponent, NSP and AEMO will prepare a GPS assessment methodology document detailing the assessment approach, ahead of the connection package being submitted. The intent is to provide certainty to the proponent on the application requirements, and to help them prepare their application package.</p> <p>If this trial demonstrates benefits, this step could be incorporated into the BAU connections process.</p> <p>The NSPs and AEMO will agree to the split in scope and responsibility on the assessment of key GPS clauses, before the assessment begins. This will help clarify the roles of the NSP and AEMO, with the aim of formalising these roles to the extent possible in the future.</p>	May - Oct 2023	 Speed  Efficiency  Timing certainty

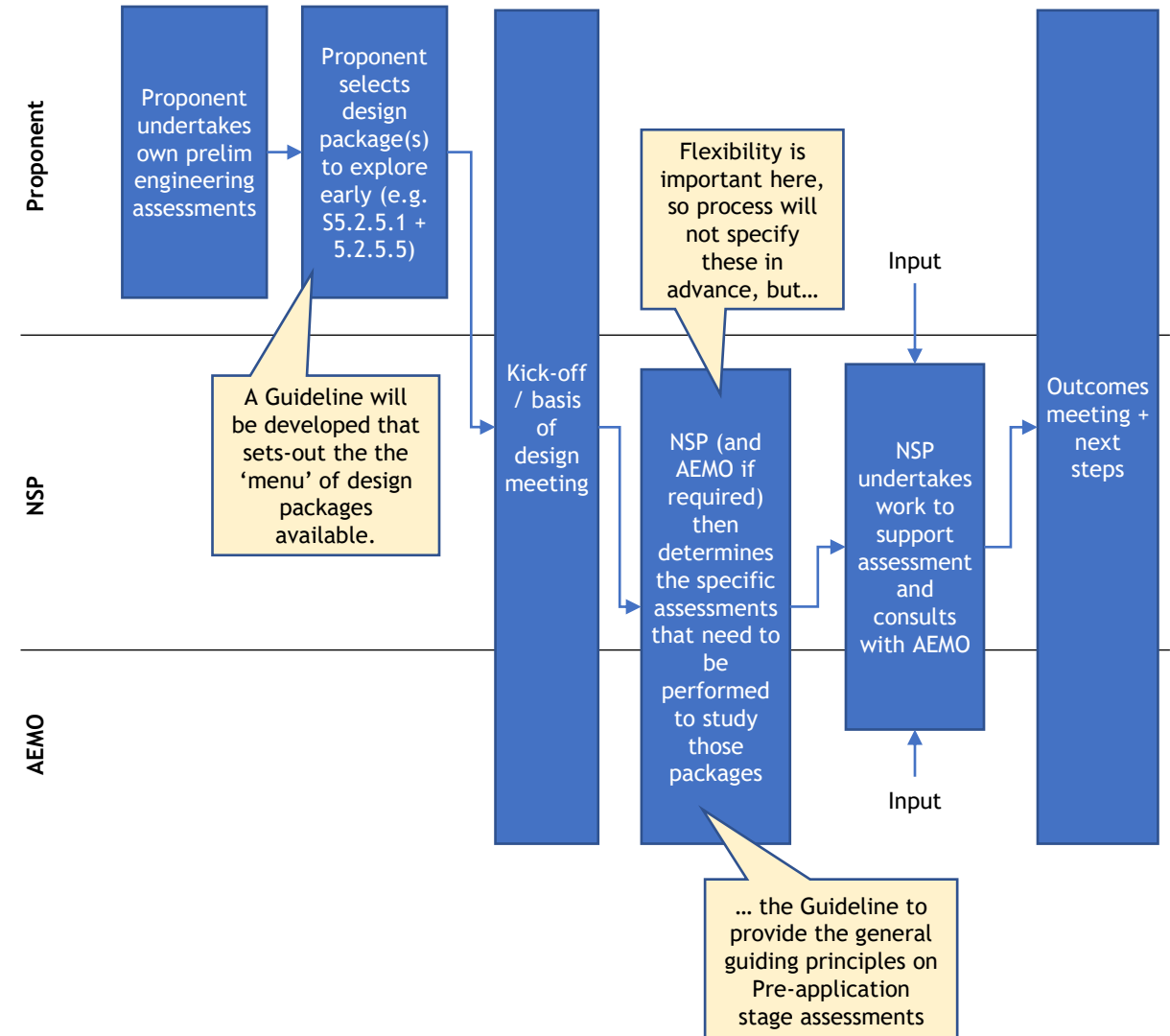
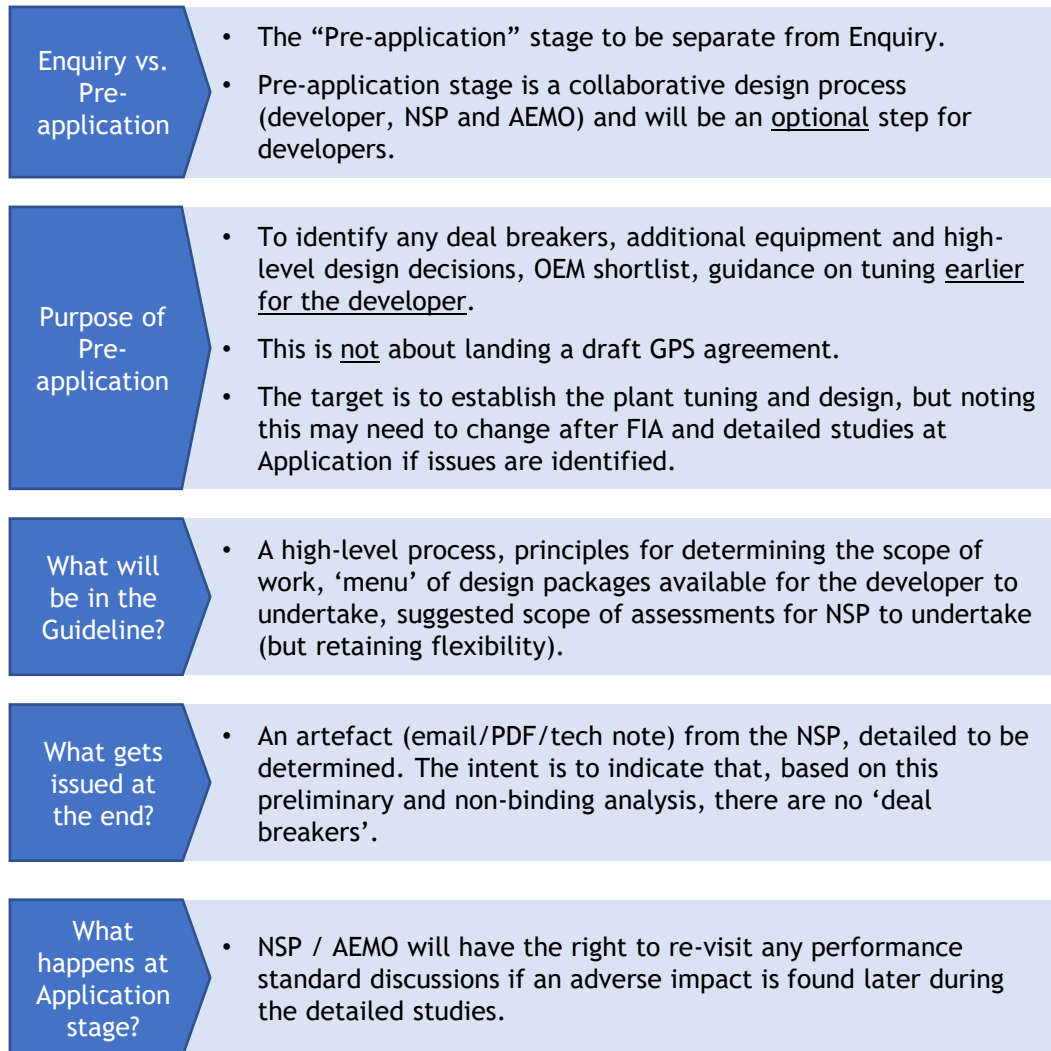
(Continued over)

SCP Program of Trials: Confirmed trials for phase 1 (cont.)

Trial	Tech	Description of the trial	Trial period	Benefits
4	Solar farm and BESS	<p>The proponent will submit a partial application package for NSP and AEMO to review, provide input and suggestions to the proponent to be incorporated into the application package. This will stage the application phase of the project so that critical aspects of the project's design (e.g., harmonic filters, reactive power compensation devices, transformers, etc.) can be tentatively agreed before the submission of a complete connection application package.</p> <p>This trial will inform the design of the pre-application phase and the recommendations for the associated menu of design packages.</p> <p>The NSPs and AEMO will agree to the split in scope and responsibility on the assessment of key GPS clauses, before the assessment begins. This will help clarify the roles of the NSP and AEMO, with the aim of formalising these roles to the extent possible in the future.</p>	May - Oct 2023	   Speed Efficiency Timing certainty
5	Solar and BESS	<p>The NSPs and AEMO will agree to the split in scope and responsibility on the assessment of key GPS clauses, before the assessment begins. This will help clarify the roles of the NSP and AEMO, with the aim of formalising these roles to the extent possible in the future.</p>	April - Sept 2023	  Speed Efficiency
6	BESS	<p>The NSP, AEMO and proponent will agree to the R1 scope ahead of the registration package being submitted. This will be based on the materiality of changes between R0 and R1.</p>	Nov 2022 - June 2023	  Speed Efficiency
7	Grid forming BESS	<p>For this connection project comprised of three identical batteries that will be commissioned sequentially, the proponent, NSP and AEMO will explore opportunities to remove duplication in testing scope.</p> <p>The results of this trial will inform opportunities to reduce testing scope for projects comprised of similar technologies in similar locations.</p>	May - July 2023	  Speed Efficiency

Pre-application stage: Design principles and high-level process

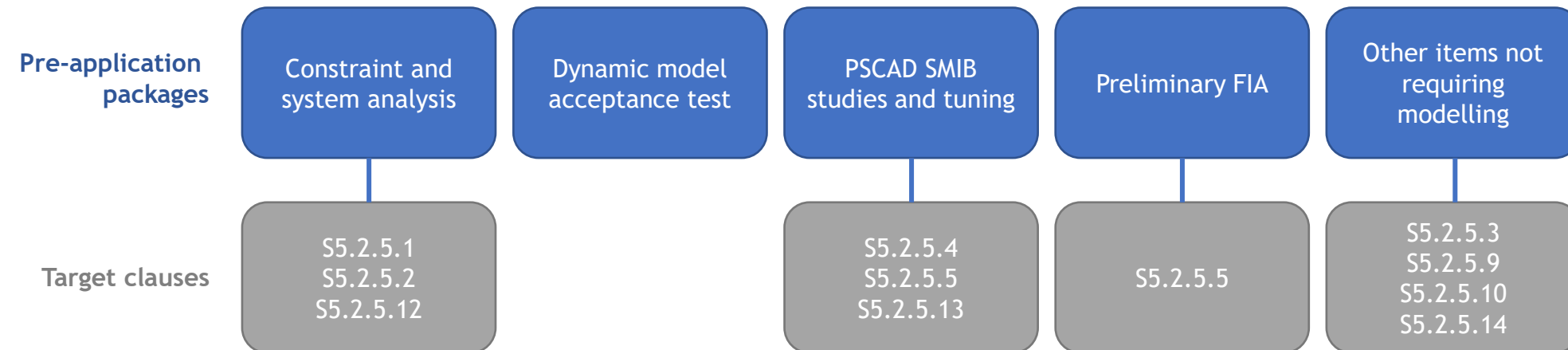
The SCP working group has proposed a possible design for the pre-application stage.



Pre-application stage: Packages

In the optional pre-application stage proposed by the CRI working group, proponents will be able to select a pre-application area to explore with each targeting specific GPS clauses - examples are shown below.

The inputs required from proponents, NSPs and AEMO for each option would need to be refined.



Next steps

The CRI team will share this proposal with NSPs and other stakeholders for feedback. If there is sufficient support, the CRI team will progress the implementation of the pre-application phase.

Investment Certainty for R1

Section 3.2

Objectives

To introduce a suite of complementary reforms that create a more stable investment environment with reduced risk of changes or delays between project commitment and commencement of revenue.

Work Undertaken

- A program of workshops with members of the reform delivery group plus other stakeholders, resulted in a draft change to the national electricity rules to standardise the R1 assessment process and provide enhanced certainty for investors.
- The draft rule change request focuses on six areas of reform (see following page).
- CEC held further consultation sessions on the draft rule change to ensure that all stakeholder concerns are heard and accounted for in the final design of the rule change request. This includes dedicated sessions with: AEMO, ENA staff and members, CEC membership, CRI Leadership Group and Delivery Groups.
- CEC also presented the concept at the Australia Large-Scale Solar Summit (March 2023).

Outcomes (to date)

1. Developed a draft rule change to standardise the R1 assessment process, provide enhanced certainty for investors and avoid delays to energization/revenue for minor issues.
2. Distributed draft rule change and conducted multiple feedback sessions with stakeholder groups including the CRI, AEMO, ENA and the CEC membership.
3. Proposed rule change submitted to the AEMC on May 17, 2023.

Next Steps

Launch of reform ‘Stage 2’: In the 2021 roadmap, the CEC identified a related issue around how to facilitate ‘collective retuning’ of generators during operational plant life. Though not part of the connections process directly, this relates to investment certainty at R1 as there is some evidence to suggest that a lack of flexibility during operational life (due to NSPs/AEMO having no easily accessible mechanism to adjust settings post Registration) may be making it harder for plant to progress through the R1 stage. Retuning also shows promise as a way to increase hosting capacity. It may also offer an alternative pathway to address generator non-conformance.

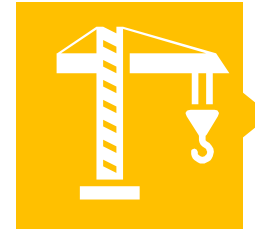
Work remains to be done to ensure this work is supported, and the CEC will lead work on this area through 2023.

Key elements of the proposed rule change request



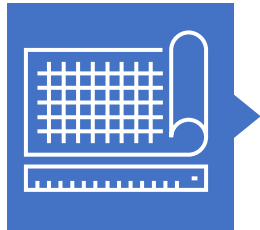
Time bound decisions

The rule change seeks to set the R1 process in the NER. As part of this NSPs are required, on the advice of AEMO where relevant, to make a time defined decision on an applicant's R1 model which is provided to demonstrate compliance with the negotiated connection agreement.



Network can procure security services

Allow NSPs to procure services from any provider, including the applicant, in response to system security/grid issues identified in the R1 model without holding up the registration process.



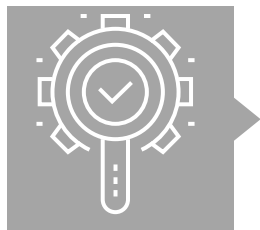
Materiality allowance

Create the possibility of a materiality to be applied to the assessment of the R1 model to enable connections with minimal impacts on network security to be proceed. If the Applicant's performance is within materiality threshold, then it is deemed compliant, with performance standards being updated accordingly.



Transparency in decision making

Require NSPs, on the advice of AEMO where relevant, to demonstrate reasons why to reject applicant R1 modelling and assessment.



Conditional approval

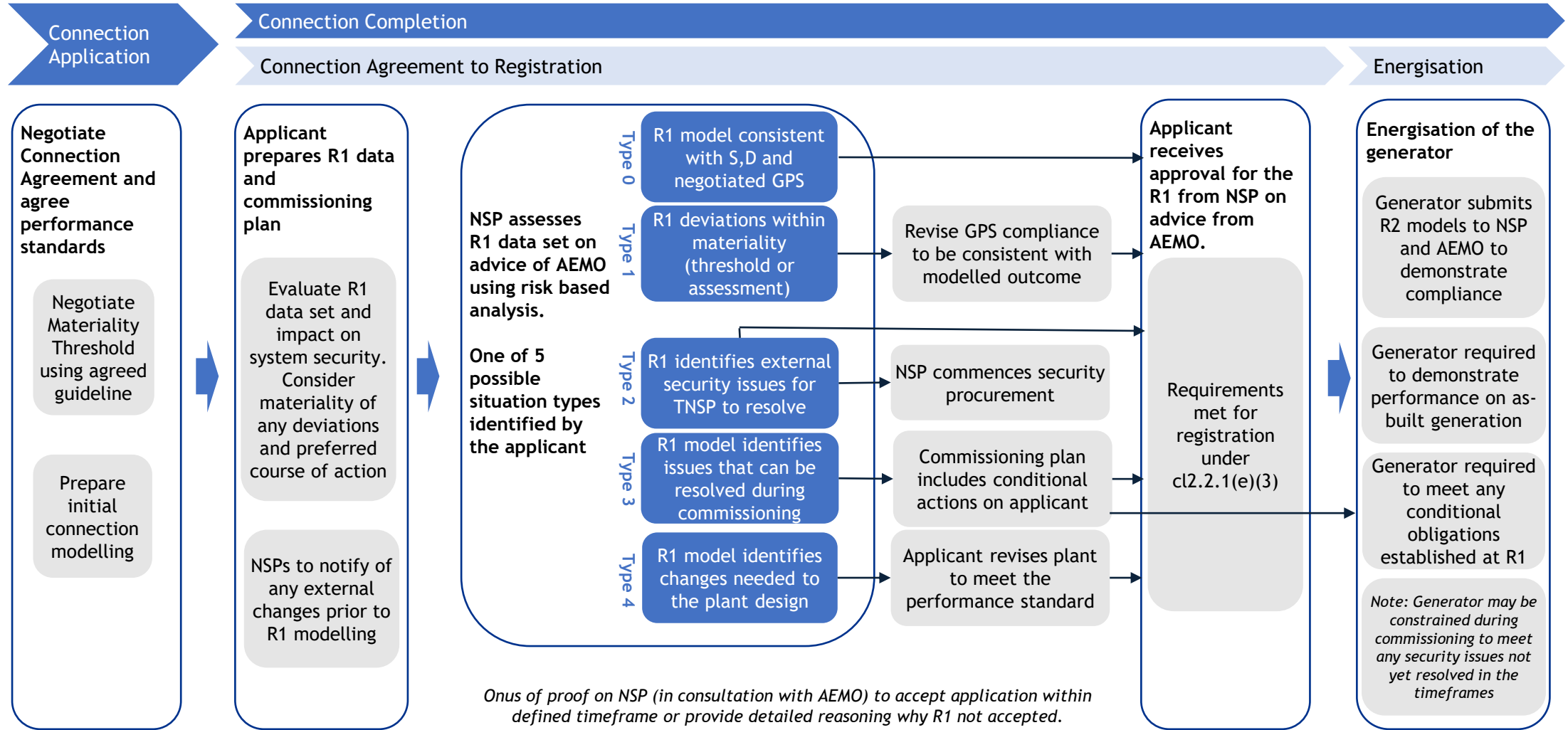
Facilitate conditional approval of an applicant's compliance with its performance standards by NSPs to enable registration, conditional on the applicant making setting or design changes as part of the commissioning program. This would only apply to minor issues which can easily be resolved at R2.



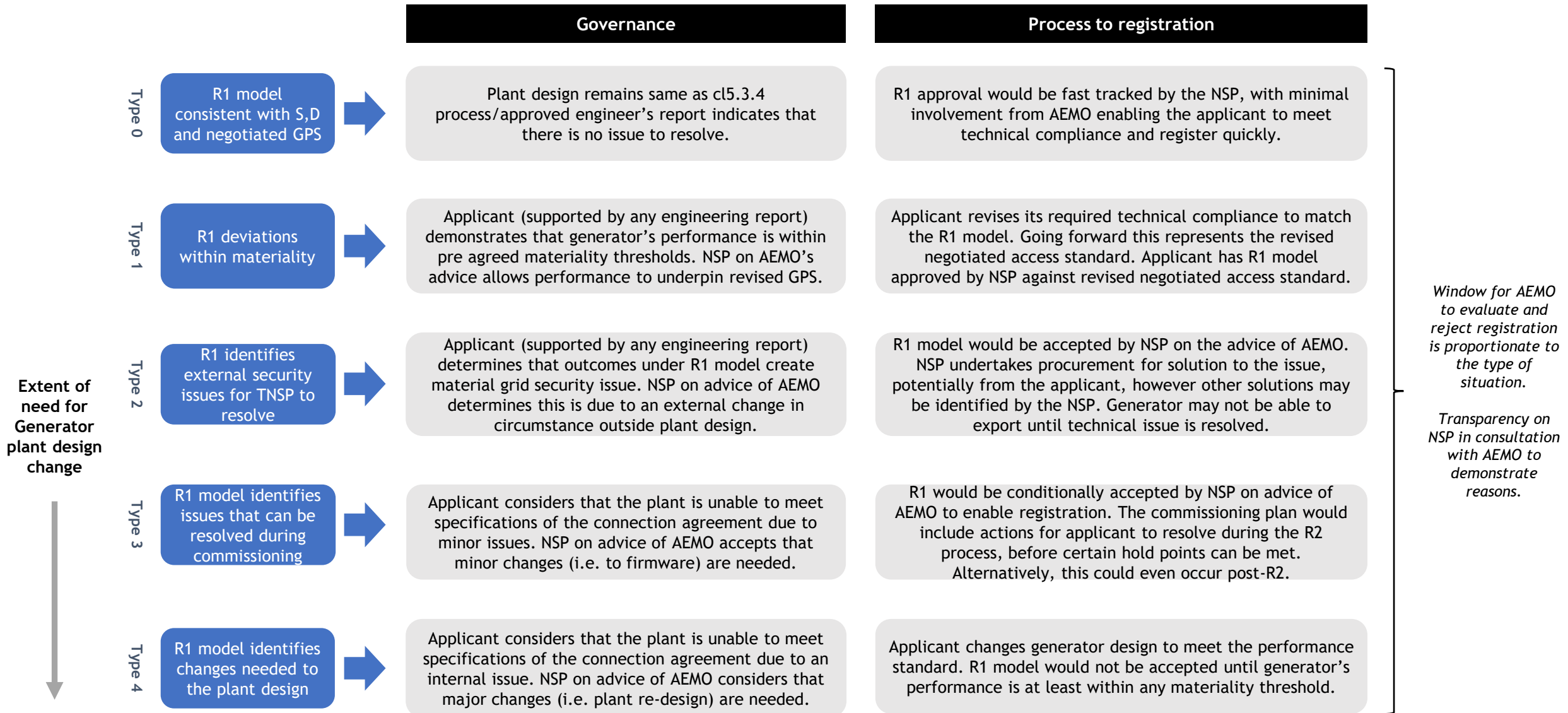
Dispute resolution

Introducing a additional dispute resolution process where the NSP raises a concern with R1 application that allows for facilitated discussions with all parties participating in good faith. This is to encourage collaboration on addressing the problem.

Proposed model



How R1 process will work across the various outcome types



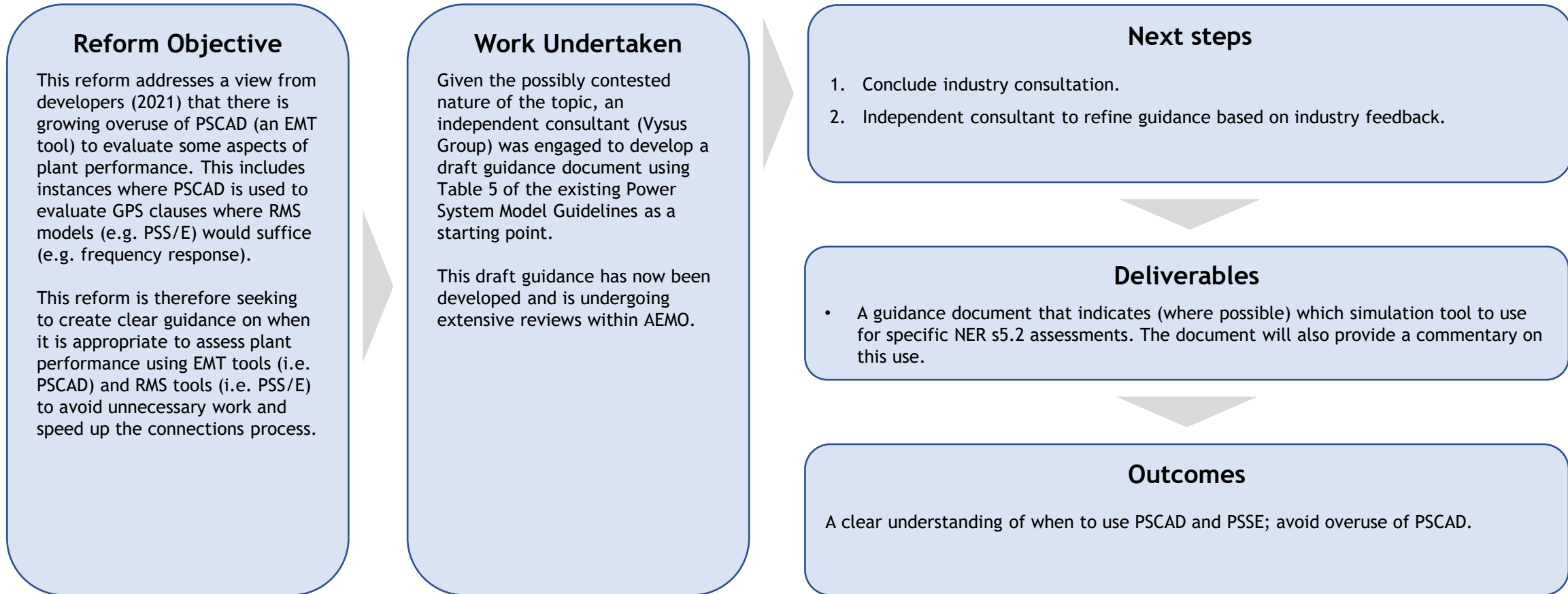
Other In Flight Reforms

Section 3.3

Guidance on use of RMS and EMT simulation tools

Benefits

- Speed**
Faster connection process speed
- Efficiency**
Lower cost of connection
- Grid outcomes**
Improved hosting capacity, system strength
- Timing certainty**
Firmier connection process timeframes



2.1 Guidance on use of RMS and EMT tools



Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023	Jan 2024+
Independent guidance development												

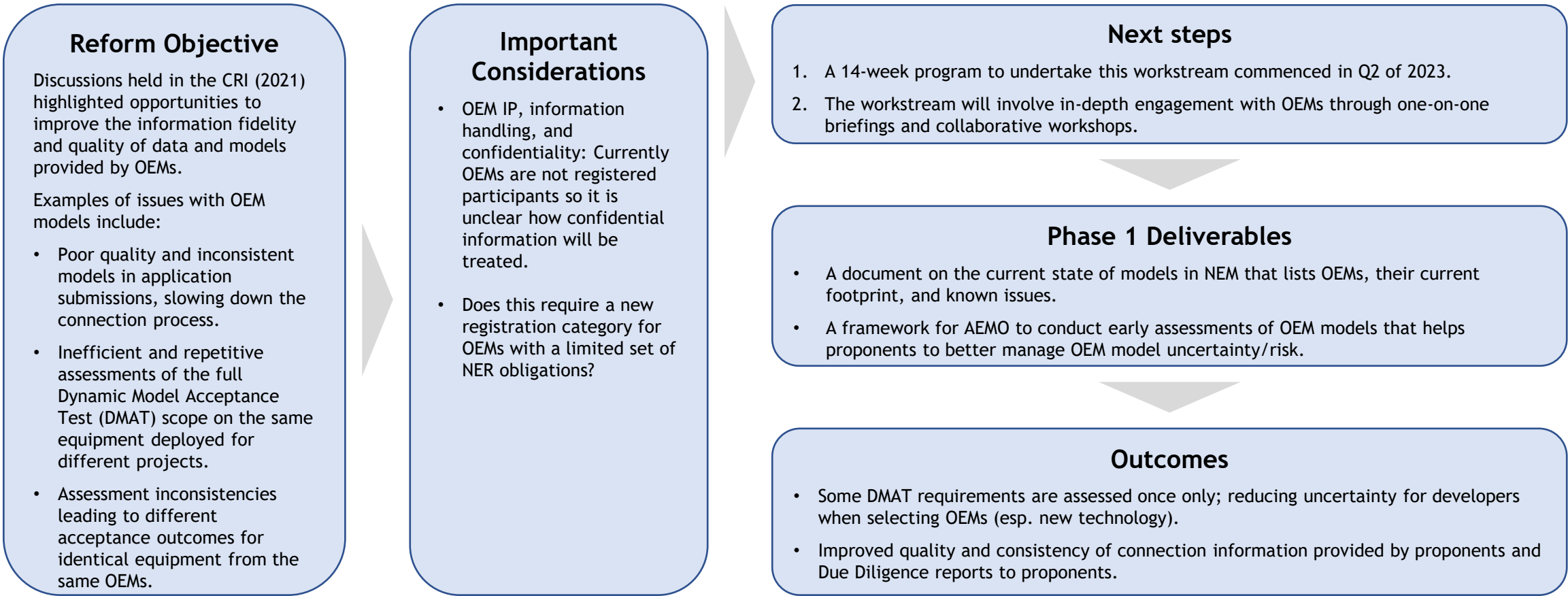
OEM Data and Modelling

Benefits

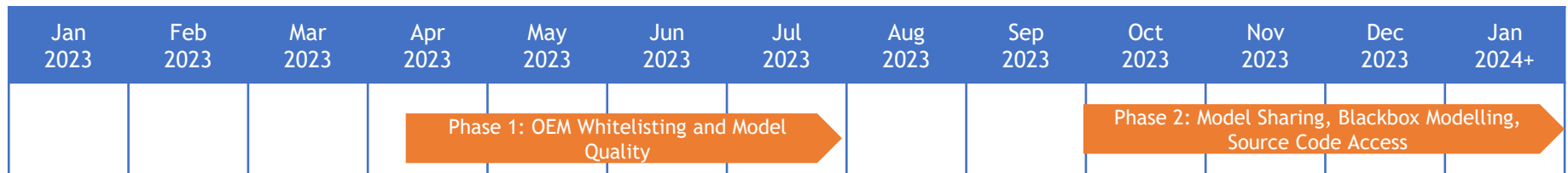
- Speed**
Faster connection process speed
- Efficiency**
Lower cost of connection
- Grid outcomes**
Improved hosting capacity, system strength
- Timing certainty**
Firmier connection process timeframes



CONNECTIONS REFORM INITIATIVE



1.2 OEM Data and Modelling



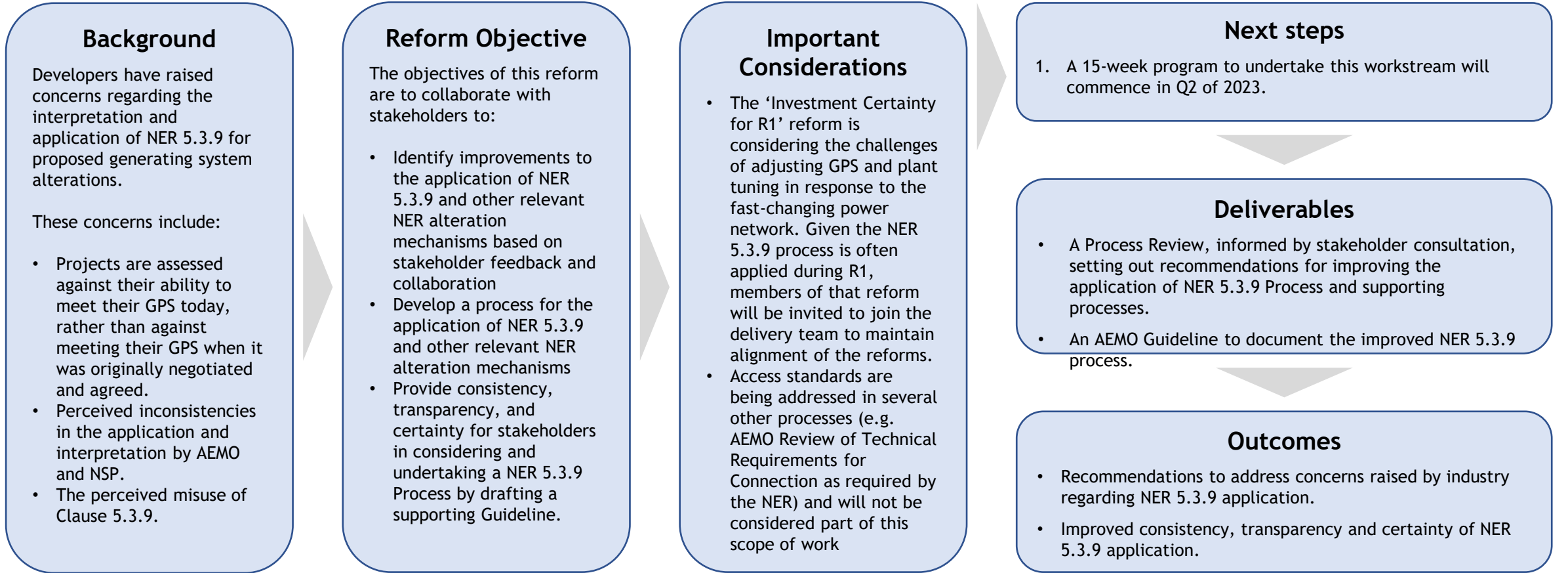
NER 5.3.9 Review

Benefits

- Speed**
Faster connection process speed
- Efficiency**
Lower cost of connection
- Grid outcomes**
Improved hosting capacity, system strength
- Timing certainty**
Firmier connection process timeframes



CONNECTIONS REFORM INITIATIVE



7. NER 5.3.9 Review



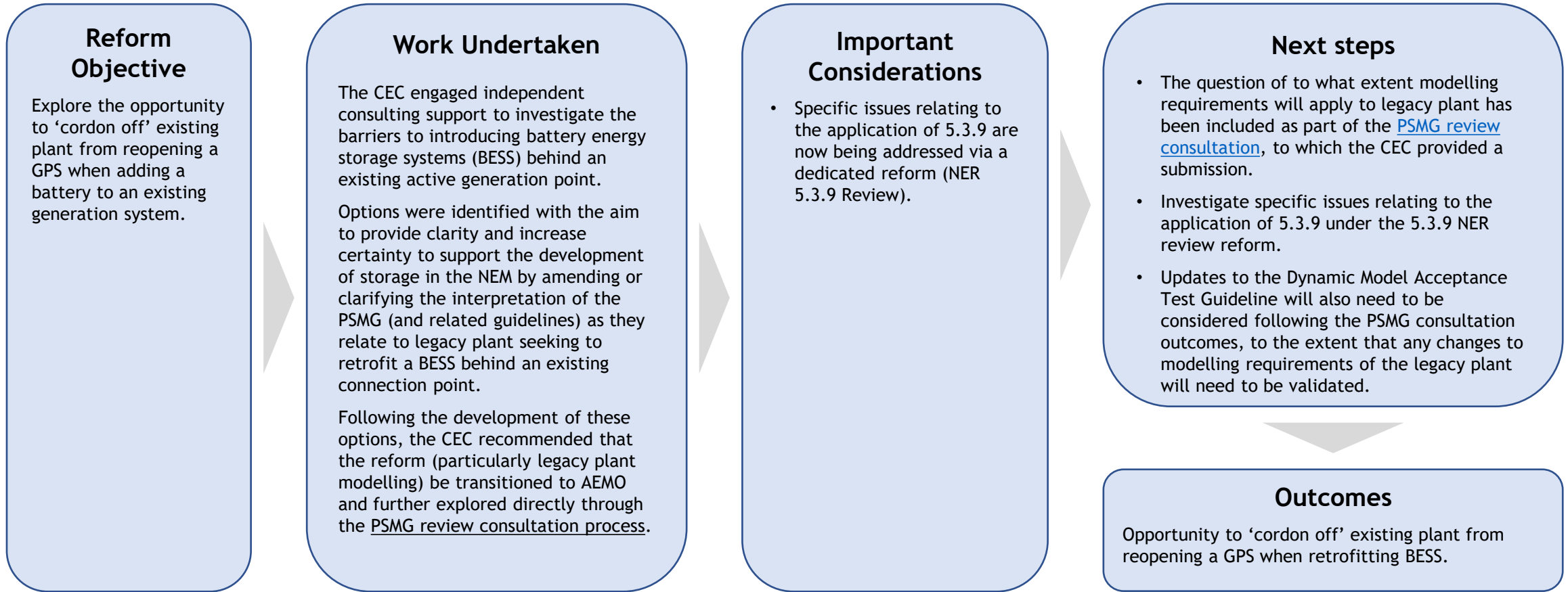
Introducing BESS behind existing generation

Benefits

- Speed**
Faster connection process speed
- Efficiency**
Lower cost of connection
- Grid outcomes**
Improved hosting capacity, system strength
- Timing certainty**
Firmier connection process timeframes



CONNECTIONS REFORM INITIATIVE



6.6 Introducing BESS behind existing connection point



Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023	Jan 2024+
			Work being undertaken through PSMG & 5.3.9									



AEMO Connections Scorecard

Section 4

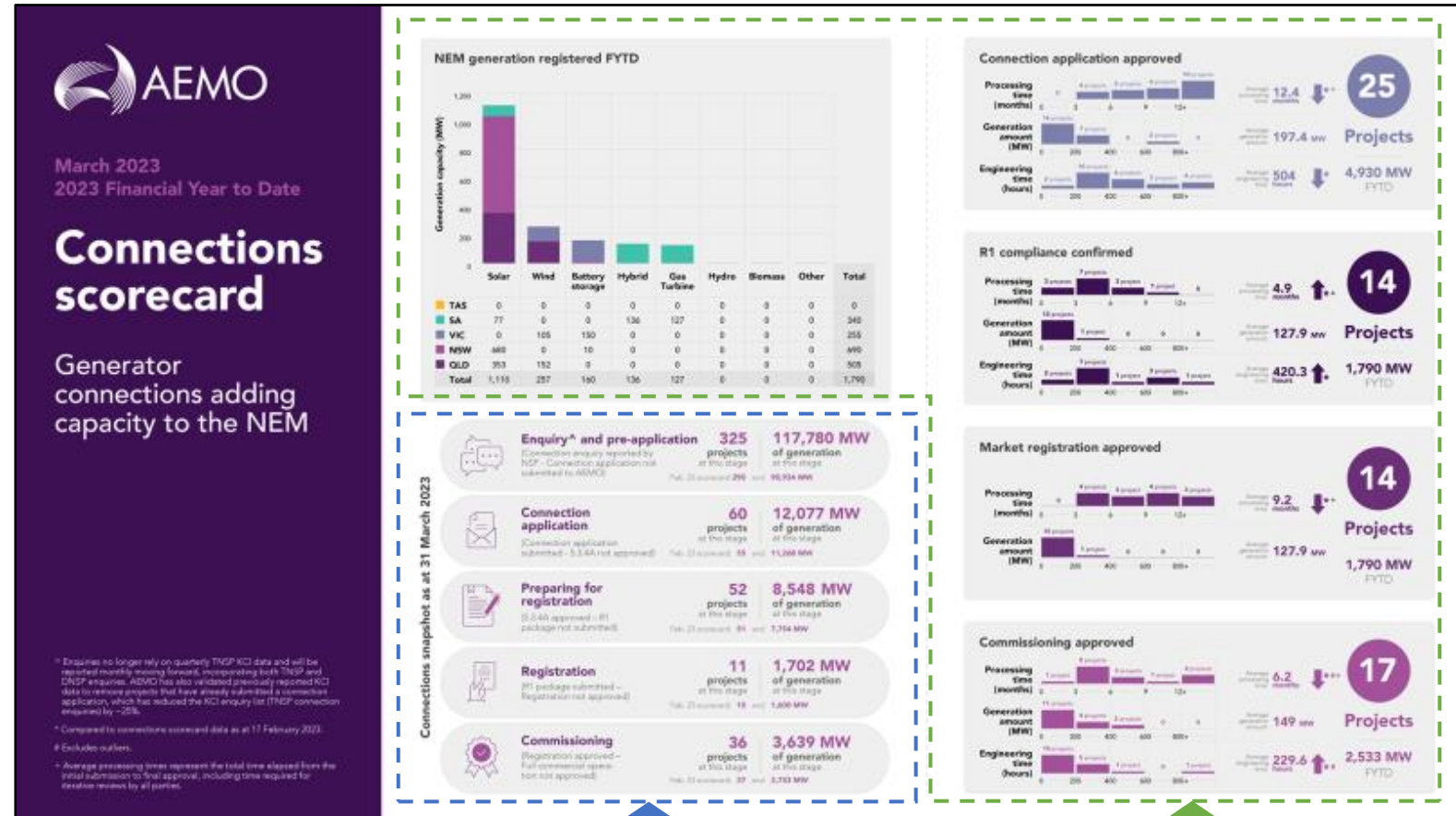
Overview of the AEMO Connections Scorecard

AEMO has introduced the publication of a connections scorecard that reports key NEM generation connection statistics including volumes and timeframes. This reporting aims to increase understanding of progress as we work together as an industry to build the generation we need across the NEM.

The AEMO connections scorecard provides a long-term foundation that may indicate the impact of the CRI, however will also be impacted by other AEMO and industry initiatives.

The scorecard is updated monthly and tracks all projects across key stages of the process, is based on a combination of data provided by NSPs and data generated internally by AEMO.

The end of FY22 scorecard and the latest scorecard (March 2023) are provided in the following slides. Additional scorecards are available on the [AEMO Connections Scorecard](#) webpage.

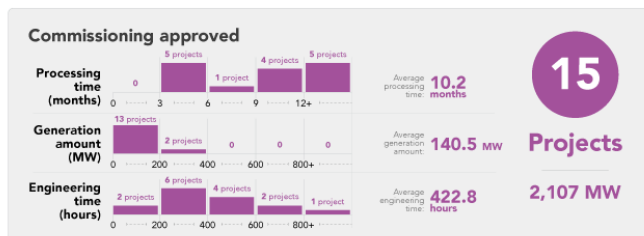
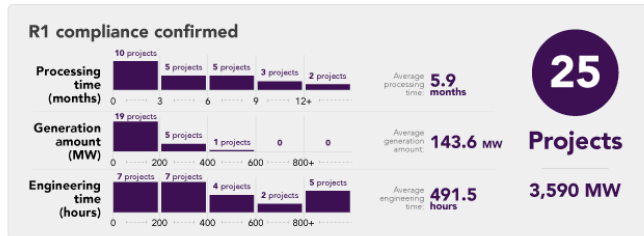
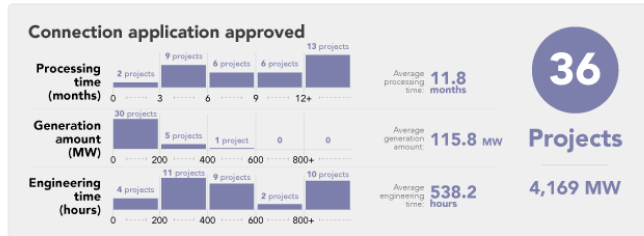


Connections snapshot - total number of projects and MW in each phase of the connections process as at reporting date

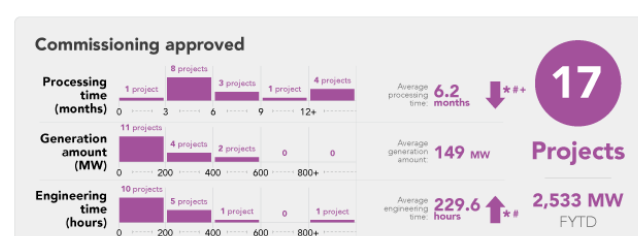
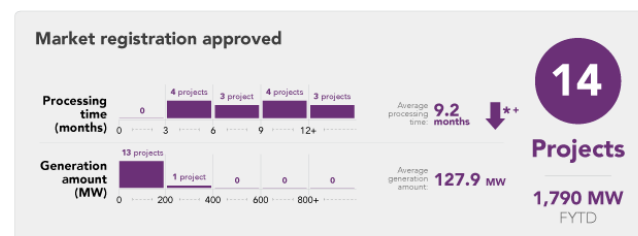
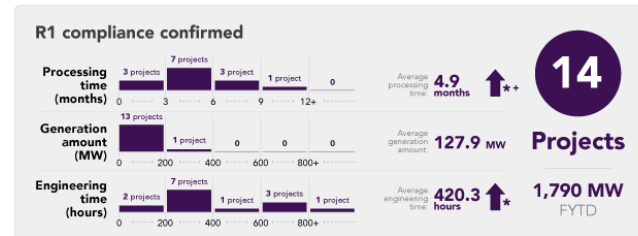
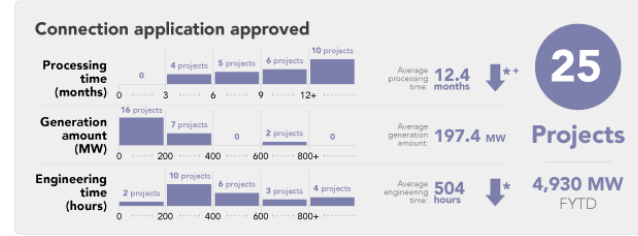
Connections milestones achieved financial year to date - number of projects and MW and associated processing time and hours

Connections Scorecard: Comparison of FY22 vs FY23 to date

End of FY22 milestones



FY23 to date milestones *



Key Insights:	FY22	FY23 to date
More connections approved →	4,169 MW	4,930 MW
Larger average project size →	115 MW	197 MW
MW commissioned projects FY23 to date have already exceeded FY22 →	2,107 MW	2,533 MW
Quicker time to commissioning approval →	10.2 months	6.2 months

* Connections scorecard data as at March 2023

Connections Scorecard: Comparison of July 2022 to March 2023

July 2022 snapshot



March 2023 snapshot *



Key Insights:

- Total projects in each phase remains high, reflecting complexity of large scale generator connections in obtaining planning, environmental and other approvals.
- Increased number of projects in the Enquiry phase demonstrating high interest in generator connections, 40 GW more than end of FY22.
- Projects under commissioning have reduced reflecting improved processing times.

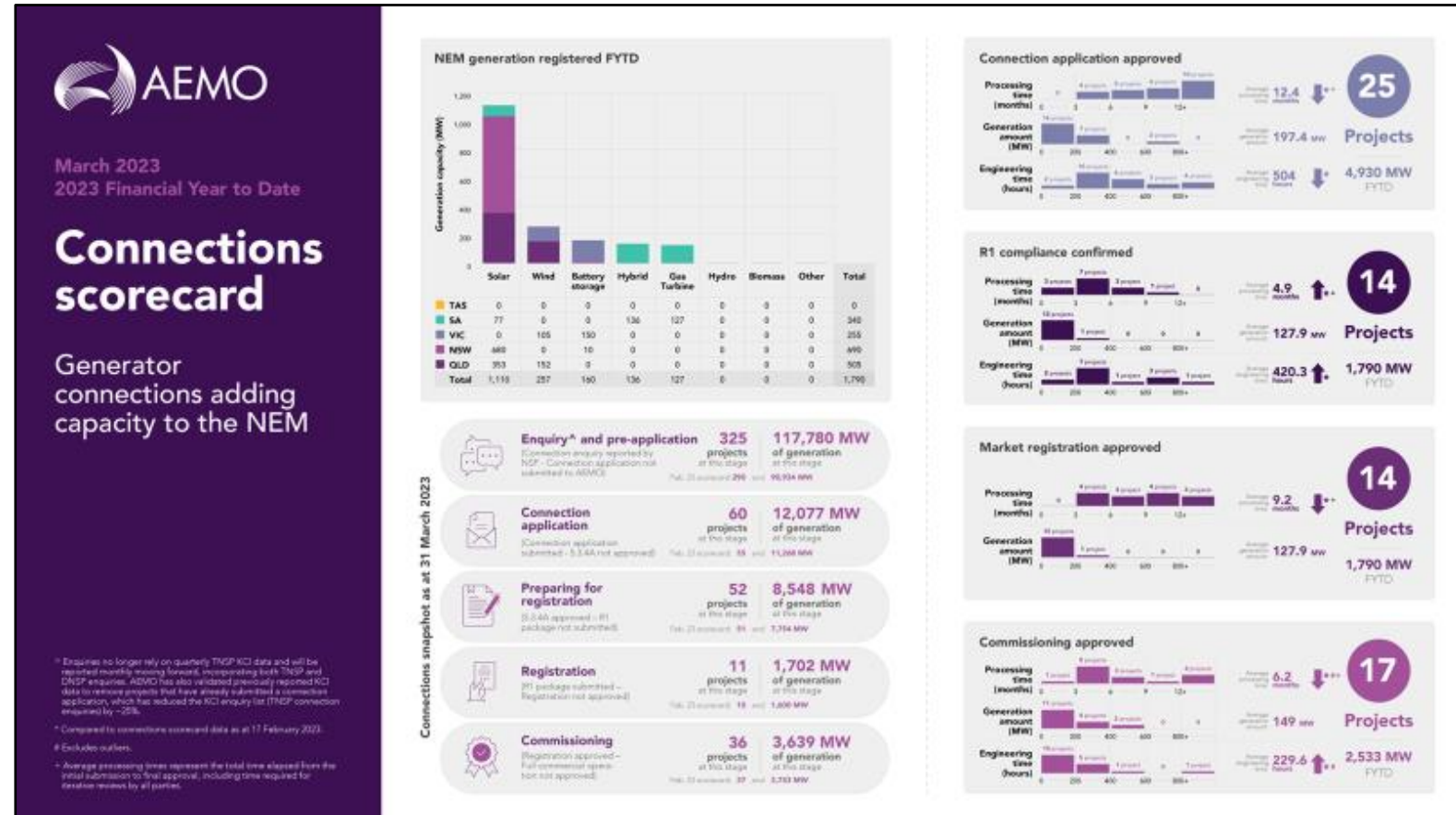
* Connections scorecard data as at March 2023

Connections Scorecard: Future Improvements

In the coming months, AEMO is planning to continue to improve the Connections Scorecard through:

- Enhanced representation of progress through the connections process and comparison of connections information from year to year with explanation of any material changes over time.
- Increased focus on understanding the complexities and reasons for projects with particularly long timeframes - to identify systemic issues that need a broader solution across the underlying process.

Improvements will take into account commercially sensitive information which may affect the granularity of published information.



^a Enquiries no longer rely on quarterly TNCP KCI data and will be reported monthly moving forward. Incorporating both TNCP and DNSP enquiries, AEMO has also validated previously reported KCI data to remove projects that have already submitted a connection application which has reduced the KCI enquiry list (TNCP connection enquiries by -25%).

^b Compared to connections scorecard data as at 17 February 2023.

^c Excludes outliers.

^d Average processing times represent the total time elapsed from the initial submission to final approval, including time required for iteration requests by all parties.



CRI Governance and funding models

Section 5

Strong Governance and funding models ensure CRI reforms deliver on outcomes, with a high degree of transparency

Funding for CRI reforms is provided by industry

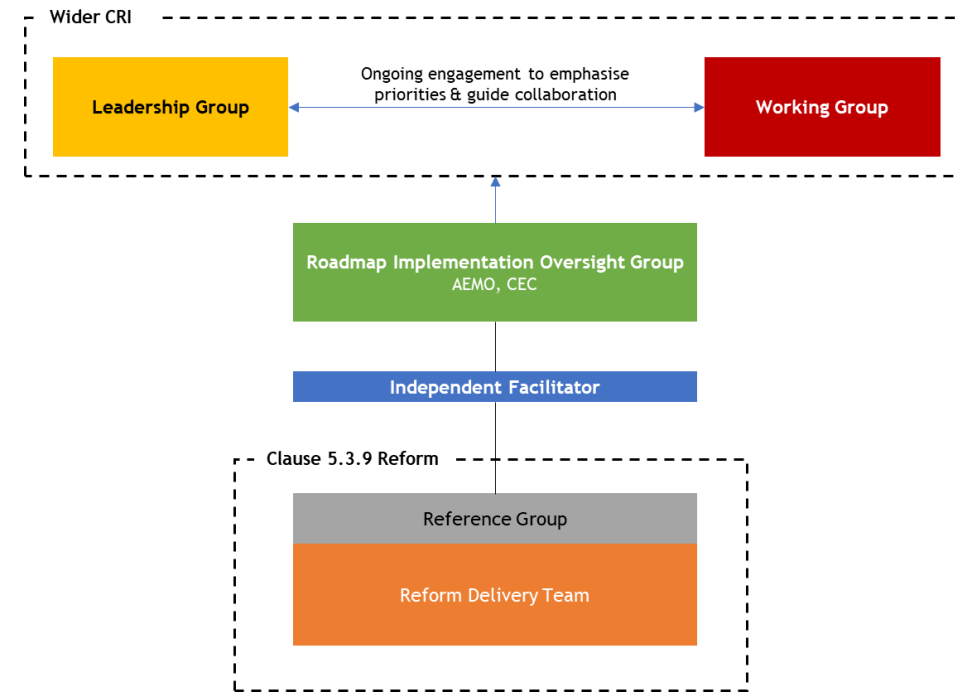
Funding for CRI reforms is via an uplift in connections fees charged by AEMO to proponents. A flat rate uplift of \$30/hour has been applied to AEMO invoices from the 1st July, 2022. Projects that were in the registration phase or beyond at that date were deemed exempt as it was unlikely that they would benefit from improvements to the connections process by the time they connect. The \$30/hour rate was endorsed by the Leadership Group; the recovery mechanism will operate for as long as it takes to recover the cost of the program for sponsor organisations, and no longer.

The funding will be dedicated to approved CRI reform areas and an appropriate level of program management overseen by the CRI Roadmap Implementation Oversight Group (RIOG), which consists of members from sponsor organisations (AEMO, Clean Energy Council).

A robust Governance model has been developed to provide oversight and ensure reforms progress to delivering their outcomes.

The Reform Implementation Oversight Group (RIOG) and Leadership Group (LG) within the CRI governance framework act as the key internal monitoring bodies overseeing the governance of the funding mechanism. These groups include senior members from across industry who will receive monthly reports from the Independent Facilitator to support monitoring and compliance of the CRI funding mechanism. Those reports will provide the RIOG and LG groups with transparency of fund movements and enable them to identify and address misuse of funds.

Given the scale of the CRI and the uniqueness of the Funding Model, the Independent Facilitator has suggested that an appropriate audit be undertaken, with a focus on ensuring transparency of data capture.





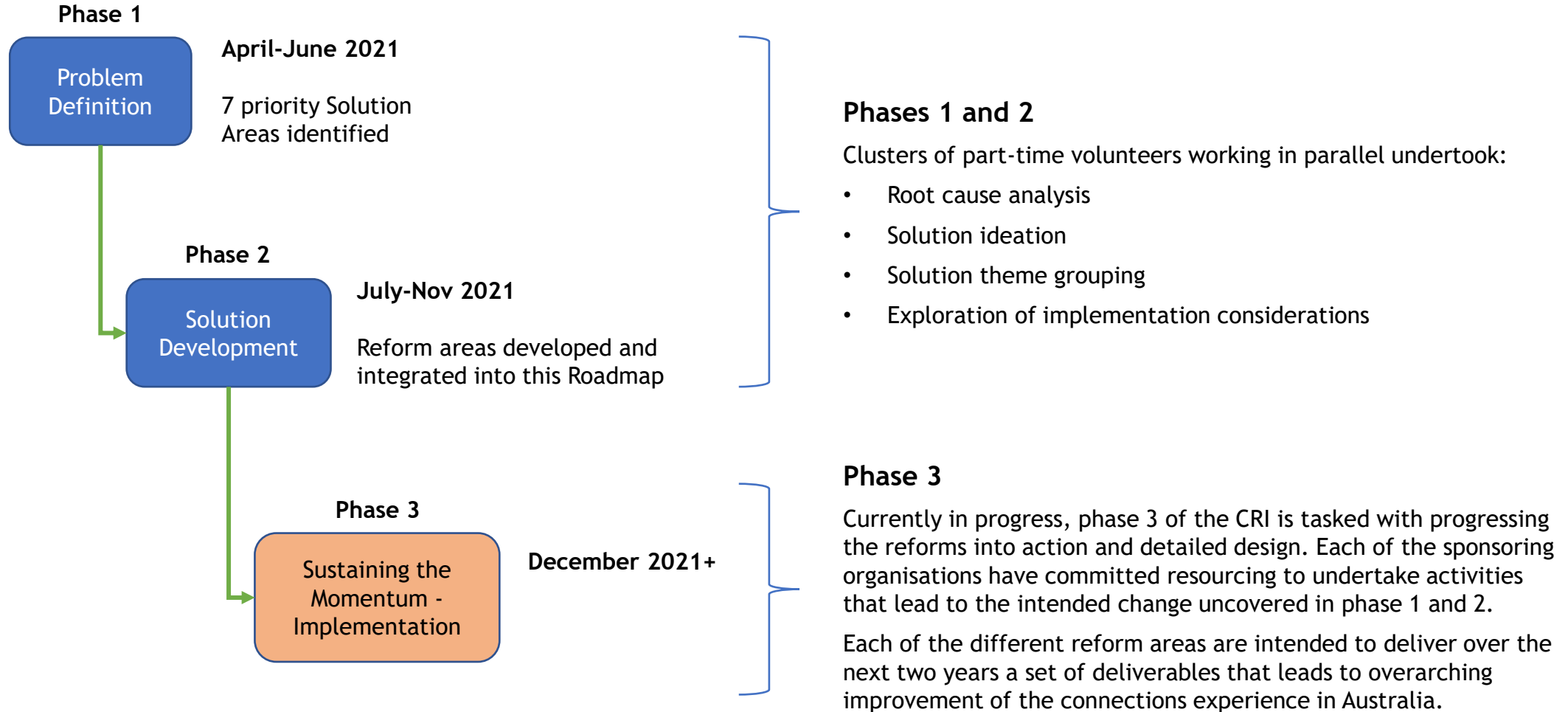
CONNECTIONS REFORM INITIATIVE

APPENDICES



APPENDIX A: CRI brief history

The CRI was created to help overcome challenges in connecting new generators to the grid during the fastest clean energy system transition in the world. Over three multi-year phases it has been tasked with delivering tangible positive benefits for the connections experience in Australia.



APPENDIX B: CRI participants

We thank each of the people who make up the CRI Community for their care, thought, energy and passion as they have engaged collaboratively with others to address complex issues, and find alternatives.

Acciona	Siham Knowles	ElectraNet	Lucas Millmore	NSW EPA	Tony Chappel
Acciona	Kav De Silva	ElectraNet	Rainer Korte	Online Power	Neil Gibbs
Acciona	Luis Brasa Perez-Coleman	ENA	Andrew Dillon	Online Power	Tom Gibson
AECOM	Abbie McQueen	ENA	Dominic Adams	Online Power	Nick Barr
AECOM	Rajesh Arora	Enel	Aydin Kizilirmak	Pacific Partnerships	Tim Johnson
AEMC	Charles Pople	Enel	Carolina Mayol	PowAR	Geoff Dutailis
AEMO	Adam Gorton	Enel	Erick Sanchez	Powerlink	Frank Montiel
AEMO	Alicia Webb	Enel	Werther Esposito	Powerlink	Kevin Paice
AEMO	Erika Twining	EnergyAustralia	Victor Petrovski	Powerlink	Sachin Goyal
AEMO	Jenny Selway	Energy QLD	Christina Green	RES Group	Duan Serfontein
AEMO	Logan Peters	EnergyCo NSW	Catherine O'Neill	RES Group	Martin Hemphill
AEMO	Margarida Pimentel	ESB	Jess Hunt	Risen Energy	Praneel Pradhan
AEMO	Melanie Tan	ESCO	Mark Shilliday	Sentient Impact	Venetia Roberts
AEMO	Merryn York	Essential Energy	Darrin Edwards	Siemens	Amir Baf
AEMO	Navin Subash	Finlaysons	Jeremy Schultz	Spark	Charbel Antoun
AEMO	Niluksha Herath	Fluence	Pouya Jamborsalamati	Sungrow Power	Henry Liu
AEMO	Syed Junaid Ahmed	Fluence	Zachary Ward	Tesla	Josef Kryger Tadich
AEMO	Tania McIntyre	GE	Thai Vo	Tesla	Mark Twidell
AER	Mark Wilson	GE	Chandana Samarasinghe	Tilt	Damien Sanford
AGL	Shevy Moss Feiglin	GPG	Satya Rajamuni	Tilt	Rick Zhang
Akaysha Energy	Nick Finch	Goldwind	John Titchen	Total Eren	Trevor Lim
Amp.Energy	Hieu Nguyen	Goldwind	Sam Fyfield	TransGrid	Jahan Peiris
Ark Energy	Sharon Tissai-Krishna	Goldwind	Angela Riley	TransGrid	Malithi Gunawardana
Aurecon	Babak Badrzadeh	Iberdrola	Praveen Pillai	TransGrid	Shane Slattery
AusNet	Liyang Wang	Jacobs	Keith Frearson	UPC	Con Van Kemenade
AusNet	Sorrell Grogan	KPMG	Alex Fattal	Vestas	Duc Nguyen
CEC	Christiaan Zuur	KPMG	Andrew Truswell	Vestas	Janakiraman Sivasankaran
CEC	Kane Thornton	KPMG	Eamonn Corrigan	Vestas	Ragu Balanathan
CEC	Paul Beaton	KPMG	Isobel McDonald	Vestas	Ram Raghuraman
CEFC	Bobby Vidakovic	KPMG	Sally Torgoman	Vestas	Anoop Vijay Tiwari
CitiPower Powercor	Alastair Meldrum	KPMG	Sam Lynch	Vestas	Serel Ogten
CWP	Mike Middleton	Lumea	Maheshini Weerackoon	Vestas	Vajira Ganepola
DigSILENT	Jennifer Crisp	Maoneng	Michael Tran	Vysus Group	Tony Morton
DigSILENT	Julian Eggleston	Mint	Peter Cowling	Windlab	Rahul Victor
Edify Energy	Ian Christmas	Neoen	Ronny Schnapp	Windlab	Steven Nethery
Edify Energy	John Cole	Neoen	Scott Partlin	X Elio	Javier Gomez
ElectraNet	Andrew Van Eyk	Nordex	Himanshu Upadhyay	X Elio	Mahub Rabbani

APPENDIX C: Reform primary contact information

Reform	Reform Sponsor	Primary Contact
1.1 Network Access - Changes to S5.2.5.5 MAS	AEMO	Erika Twining, Manager - Connections Engineering (Vic/SA/Tas) erika.twining@aemo.com.au
1.2 OEM Data and Modelling ¹	AEMO	Niluksha Herath, Manager - Connections Reform niluksha.herath@aemo.com.au
1.3 Forums and Initiatives to Drive Collaboration	CEC	Christiaan Zuur, Director Energy Transformation czuur@cleanenergycouncil.org.au
2.1 Guidance on use of RMS and EMT tools	AEMO	Niluksha Herath, Manager - Connections Reform niluksha.herath@aemo.com.au
2.4 KCI updates for DNSP projects	CEC	Christiaan Zuur, Director Energy Transformation czuur@cleanenergycouncil.org.au
3.1 Streamlined Connections Process ²	AEMO	Corine Mulet, Principal Project Manager, Connections Reform corine.mulet@aemo.com.au
6.1-6.5 Investment Certainty for R1	CEC	Christiaan Zuur, Director Energy Transformation czuur@cleanenergycouncil.org.au
6.6 Introducing BESS behind existing generation	AEMO	Niluksha Herath, Manager - Connections Reform niluksha.herath@aemo.com.au
6.7 Process to Introduce Changes to AEMO Guidelines	AEMO	Niluksha Herath, Manager - Connections Reform niluksha.herath@aemo.com.au
8. Review of the 5.3.9 rule	AEMO	Andrea Marinelli, Principal Project Manager, Connections Reform andrea.marinelli@aemo.com.au

¹ Incorporates previous Whitelisting (1.2), Model Quality (2.2) and OEM Provision of Black-box Models (2.3).

² Incorporates previous Batching (3.1), Approach (1.1b) and Base cases (1.1c) reforms.



CONNECTIONS REFORM INITIATIVE

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AEMO

Niluksha Herath, Manager - Connections Reform

E: niluksha.herath@aemo.com.au | M: 0409 165 114

CRI Independent Facilitator

Neil Gibbs

E: neil@onlinepower.com.au | M: 0432 755 455