AUSTRALIAN ENERGY MARKET COMMISSION

REVIEW

Final Report: Volume 1 of 3

Transmission access reform
Final recommendations

September 2024

Inquiries

Australian Energy Market Commission
Level 15, 60 Castlereagh Street
Sydney NSW 2000

E aemc@aemc.gov.au
T (02) 8296 7800

Reference: EPR0098

About the AEMC

The AEMC reports to the energy ministers. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the energy ministers.

Acknowledgement of Country

The AEMC acknowledges and shows respect for the traditional custodians of the many different lands across Australia on which we all live and work. We pay respect to all Elders past and present and the continuing connection of Aboriginal and Torres Strait Islander peoples to Country. The AEMC office is located on the land traditionally owned by the Gadigal people of the Eora nation.

Copyright

This work is copyright. The Copyright Act 1968 (Cth) permits fair dealing for study, research, news reporting, criticism and review. You may reproduce selected passages, tables or diagrams for these purposes provided you acknowledge the source.

Citation

To cite this document, please use the following:
AEMC, Transmission access reform, Final report: Volume 1 - Final recommendations, September 2024

Summary

1 The transition to a net-zero National Electricity Market (NEM) is well-underway and means a physical transformation of the electricity system. Over the next couple of decades, unprecedented amounts of new generation and transmission are set to be built to replace ageing infrastructure, meet increasing consumer demand and contribute to economy-wide emissions reduction targets at both state and federal levels.

2 With this transformation comes new challenges and opportunities. Participants must change the way they invest, maintain and operate, so they can continue to support the sector. Policy-makers must evolve regulatory frameworks, so they remain fit for purpose. The power system must continue to deliver secure, reliable, affordable, and sustainable electricity to meet the long-term interests and needs of consumers.

A coordinated and timely transition to net-zero is in the long term interests of consumers

3 A coordinated and timely transition to a net-zero electricity system is in the long-term interest of consumers. Australia's energy sector plays a pivotal role in decarbonising our economy, supporting national prosperity and, in turn, ensuring the long-term well-being of society. Delivered effectively, a smooth and timely transition to a net-zero power system can provide households and businesses with low cost, low emissions energy when and where they need it. A successful energy system transition will also have far-reaching benefits, enabling other industries, such as transportation, to achieve their emissions reduction objectives.

4 Governments have identified the opportunities to be gained from a smooth and timely transition and are getting involved by setting targets and introducing schemes to coordinate and (in some cases) underpin new investment in energy infrastructure.

5 The NEM relies on a wide range of parties — including governments, investors, market bodies and consumers — to work together to deliver efficient outcomes for consumers. The key role for the NEM market and regulatory frameworks is to align participant behaviour with the long term interests of consumers.

6 Access and pricing arrangements are fundamental components of the NEM regulatory framework that seek to align investment and operational behaviour with efficient whole of system outcomes. They aim to do this by signalling where plant should locate and how plant should operate, such that network infrastructure is used efficiently and consumers do not pay more than necessary to have electricity.

7 'Access arrangements' refer to the arrangements that govern how market participants interact with the wholesale market to 'access' or dispatch electricity into the grid. 'Pricing arrangements' refer to the arrangements that govern what those supplying electricity get paid. The NEM is an open access, regionally priced market.

Energy Ministers asked the AEMC to develop a hybrid access reform model and provide recommendations

8 The combination of open access and regional prices, along with the market arrangements to determine dispatch when there is congestion, mean the investment and operational decisions generators and storage make in their individual interests will not necessarily deliver outcomes in the best interests of the system as a whole. This can lead to dispatch and investment

inefficiencies. Because of this, access and pricing arrangements have long been the subject of discussion in the NEM, with a range of alternatives put forward over the years.

9 The AEMC's *Transmission access reform review* (this review) is the latest iteration of access and pricing reform discussions. It began in late 2023, when Ministers agreed that the AEMC should continue the Energy Security Board's (ESB) and Energy Advisory Panel's (EAP) work on transmission access reform that sought to improve locational signals in the market over investment and operational timeframes.

10 Specifically, Ministers asked the AEMC to continue to develop a particular access reform model that was proposed by stakeholders: the hybrid model which combines a priority access model with a congestion relief market (CRM) model. The hybrid model was seen as a potential way of sending stronger locational signals to achieve efficiency benefits in both investment and operational timeframes, while also addressing key stakeholder concerns.

The Commission does not recommend implementing the hybrid model or either component individually

11 The Commission has designed what it considers is the preferred version of the hybrid model, taking on board stakeholder feedback. This version is summarised in chapter 3 of this volume of the final report, with details on the design of the hybrid model provided in volume 2. It is important to develop a model and consider its design when making recommendations about the future of transmission access reform.

12 The Commission does not recommend implementing the hybrid model. The Commission also does not recommend implementing either component of the hybrid model individually.

13 We consider the combined and complementary effects of jurisdictional Renewable Energy Zone arrangements (REZs), and the Capacity Investment Scheme (CIS) can support efficient investment in the NEM. As such, we consider the benefits of priority access to improve investment efficiency and certainty over and above what can be achieved through jurisdictional schemes, if delivered effectively, would likely be marginal.

14 We consider that the CRM model is workable and has the potential to deliver benefits in operational timeframes. However, it is complex and contains a number of design compromises, which creates uncertainty about whether the potential benefits would materialise and outweigh the costs of implementation. We recognise that without reform, operational inefficiencies will remain in the NEM, however we do not consider the CRM to be an appropriate solution given we are uncertain whether the benefits will materialise. This is because stakeholders have told us they are unlikely to participate in the mechanism.

15 We acknowledge and appreciate the significant amount of stakeholder effort that has gone into helping design and provide feedback on the hybrid model. Through this review, and the ESB and EAP processes before it, good faith attempts have been made to design improved national access and pricing arrangements with stakeholders, focusing on models that are voluntary and minimise implementation costs.

16 While the preferred variant of the hybrid model described in this report could theoretically be implemented, the Commission cannot be confident the benefits are sufficient to outweigh the costs given the introduction of jurisdictional schemes.

17 Our recommendation not to implement the hybrid model takes into account the broader context, scale and speed of the transformation of the NEM that lies ahead. By acknowledging the role of government schemes we are preferring a practical approach to drive investment in the energy

system, recognising that the long term interests of consumers is best-served by governments, investors, market bodies and consumers all playing a role in delivering a smooth and timely transition.

18 We recognise that the cumulative burden of regulatory reforms can have impact on our collective ability to achieve the task of transitioning the NEM to net-zero by 2050. A pragmatic approach to regulatory reform allows us to focus on the most important elements of the regulatory framework in order to achieve the transition and deliver consumer benefits.

The Commission recommends measures to support effective delivery of jurisdictional schemes

19 While the ESB, EAP and Commission have been considering the hybrid model as a market-based way of reforming access and pricing to provide better locational signals, NEM jurisdictions have introduced policies and schemes to coordinate and in some cases underpin investment in renewable energy and transmission infrastructure in identified locations to drive emissions reductions. These schemes also provide locational signals, investment certainty and (in the case of REZs) a level of access protection that is absent from the open access, regional pricing arrangements in the national framework.

20 They serve as a practical way to coordinate and manage the significant scale and speed of investment required on the pathway to net zero. If delivered effectively, these schemes will likely achieve many of the benefits access reforms were seeking to achieve over investment timeframes, albeit in a different way. Where past access and pricing reforms have broadly sought to retain open access arrangements and reform pricing to make the settlement price more locational, REZ frameworks do the opposite; they retain regional prices and replace open access with physically controlled access regimes that apply to parts of the network.

21 There are risks and challenges in delivering such schemes in an interconnected system like the NEM. Although governments may take congestion on the shared system into account when developing REZs, these do not provide rights to access the shared system. Generators therefore remain subject to congestion and curtailment outside REZs. Similarly, incentives for batteries to locate and behave in a way that alleviates congestion will remain weak. Even if batteries are encouraged in REZs or through the CIS, in the absence of coordinating charging and discharging with other generators (such as co-located assets behind the meter), they could exacerbate rather than alleviate congestion.

22 These risks and challenges can be mitigated with careful design and implementation of schemes by governments. In the absence of reforms to national access and pricing arrangements, it is even more important that these schemes are delivered efficiently and effectively so that consumers benefit from the transition underway.

23 Therefore, the Commission recommends the following measures to support the efficient and effective delivery of jurisdictional schemes and coordinate investment in generation and transmission including that:

1. Jurisdictions and market bodies establish a collaborative forum to support the effective delivery of jurisdictional schemes. Collaboration efforts would focus on understanding the impact of schemes on the broader power system and addressing common operational issues that arise as jurisdictional schemes are developed and implemented. This could include understanding congestion patterns and how they may change within and between regions outside REZs.

2. AEMO continue to work with transmission network service providers (TNSPs) and market participants to improve the quality and timeliness of locational information over time through the annual Enhanced Locational Information reports, including by providing locational information on system security issues.
3. AER work with stakeholders, including through its review of the network capability component (NCC) component of the service target performance incentive scheme (STPIS), to improve processes and incentives to identify and progress efficient, low-cost, transmission augmentation projects that could alleviate local congestion.
4. The Commonwealth Government through the CIS, and any other government schemes that underwrite new energy infrastructure, should consider congestion impacts as a key factor when designing schemes and assessing and awarding contracts under them.

24 Together these measures will go some way to helping coordinate and deliver the investment required to deliver a net-zero NEM by 2050.

25 With a collective focus from market bodies, jurisdictions and participants to identify and address inefficient investment or operational outcomes in targeted ways, as they arise, the inefficiencies built into the national access and pricing framework can be managed in the period ahead.

The Commission has considered stakeholder views and the broader context of the energy transition when making its recommendations

26 In making its recommendation to not implement the hybrid model of access reform or either of its individual components, the Commission built on ESB and EAP's consultation processes and design decisions, and also drew from:

- stakeholder feedback from 40 submissions to our consultation paper published in April 2024
- bilateral and small group engagements with interested stakeholders, including consumers
- regular engagement with and feedback from the AER and AEMO
- four technical working group (TWG) meetings and a public forum
- AEMO's prototyping work using historical dispatch data
- AEMO's advice on implementation, including cost estimates
- ACIL Allen's advice on whether the hybrid model can be modelled for the purposes of providing meaningful information to inform investment decisions
- Endgame's stylised model that was published for stakeholders to interact with
- regular workshops with jurisdictions and their scheme coordinators and delivery partners.

27 Industry stakeholders were broadly opposed to the hybrid model, considering the benefits did not outweigh the cost and complexity and that jurisdictional schemes, along with congestion risk itself provide strong enough locational signals without the need for national access or pricing reforms. This is consistent with historical industry opposition to all types of access and pricing reforms — regardless of the model proposed.

28 Consumer representatives considered that the hybrid model made up of priority access and the CRM, could deliver significant benefits to consumers. This is consistent with their previous support for meaningful access and pricing reforms over many decades.

29 The Commission seeks to understand a broad range of perspectives not to weigh up support or opposition to a reform, but to establish how the benefits, risks, costs and implementation considerations might flow through to consumer outcomes. As required by the National Electricity Objective (NEO), the Commission is focused on the long term interests of consumers when

making its decisions.

30 Informed by stakeholder feedback and noting the significant changes in the policy landscape, the Commission has made its recommendations not to implement the hybrid model and instead leverage jurisdictional schemes and existing frameworks and processes to the greatest extent possible. We consider this will deliver consumer benefits in the context of the transition to a net-zero energy system which will require investment in a significant amount of transmission and generation capacity at an unprecedented rate.

We considered our recommendations against reform objectives agreed by Ministers and stakeholder feedback

31 The ESB, in consultation with stakeholders, developed four transmission access reform objectives which were agreed by Energy Ministers:

- **Investment efficiency:** Better long-term signals for market participants to locate in areas where they can provide the most benefit to consumers, taking into account the impact on overall congestion.
- **Access risk:** Establish a level playing field that balances investor risk with the continued promotion of new entry that contributes to efficient competition in the long-term interest of consumers.
- **Operational efficiency:** Provide incentives for cost reflective bidding to promote better use of the network in operational timeframes, resulting in more efficient dispatch outcomes and lower costs for consumers.
- **Congestion relief:** Create incentives for demand side and two-way technologies to locate where they are needed most and operate in ways that benefit the broader system. These reform objectives will provide benefits over investment timeframes as well as operational timeframes.

32 These objectives have underpinned our work to progress development of the hybrid model and consider recommendations to Ministers on transmission access reform. Achieving these objectives would contribute to the NEO by promoting efficient investment in, and efficient operation and use of, electricity systems for the long-term interests of consumers.[1]

33 We have also considered how our recommendations would impact on emissions reductions, given:

- emissions reduction was added to the national energy objectives in September 2023, after the ESB developed the reform objectives
- jurisdictional schemes, most predominantly jurisdictional REZ schemes and the Commonwealth Government's CIS, have been introduced with the objective of reducing emissions in the NEM. The introduction of these schemes have changed the base case against which a hybrid model is compared in terms of emissions reduction.

The Commission will work with relevant parties to progress any recommendations agreed by Ministers

34 The purpose of this review was to provide final recommendations to Energy Ministers on a design of the hybrid model that best meets the reform objectives.

1 Section 7 of the NEL.

35 The AEMC will work with jurisdictions, market bodies and other relevant stakeholders to progress any recommendations agreed by Energy Ministers.

How to read this report

36 This volume is the first of three in the AEMC's final report on transmission access reform. A brief outline of the three volumes is provided below:

- **Volume 1: Transmission access reform recommendations to Ministers** - This volume provides the AEMC's recommendations and reasons supporting these. It also includes an overview of the jurisdictional schemes and the Commission's assessment of the hybrid model against the reform objectives and the NEO.
- **Volume 2: Detailed design of the hybrid model** - This volume provides a detailed description of the Commission's preferred version of the priority access model and the CRM model, and a summary of stakeholder issues. It also details the key pieces of analysis and testing that were conducted by the ESB, EAP and AEMC.
- **Volume 3: Access and pricing in the NEM** - This volume provides background and context about the NEM's access and pricing arrangements. It describes what they are, how they work and the inefficiencies that result from them. It also summarises the key reviews that have been conducted into congestion, access and pricing.

List of recommendations

Recommendation 1: Do not implement priority access

The Commission does not recommend implementing priority access. We consider the combined and complementary effects of jurisdictional Renewable Energy Zones (REZ) and other government schemes that underpin energy infrastructure can provide locational signals to manage access and support efficient investment in the NEM. As such, we consider the benefits of priority access to improve investment efficiency and certainty over and above what can be achieved through jurisdictional schemes, if delivered effectively, would likely be marginal.

Recommendation 2: Do not implement a congestion relief market (CRM)

The Commission does not recommend implementing the CRM. We consider that the CRM model is workable and has the potential to deliver benefits. However, it is complex and contains a number of design compromises, which creates uncertainty on whether the potential benefits would materialise and outweigh the costs of implementation.

Recommendation 3: Establish a collaborative forum to support effective delivery of jurisdictional schemes

The Commission recommends jurisdictions and market bodies establish a collaborative forum to support delivery of jurisdictional schemes. Collaboration efforts would focus on understanding the impact of schemes on the broader power system and addressing common operational issues that arise as jurisdictional schemes are developed and implemented. This could include understanding congestion patterns and how they may change within and between regions outside REZs.

Recommendation 4: Improve locational information

The Commission recommends AEMO continue to work with transmission network service providers (TNSPs) and market participants to improve the quality and timeliness of locational information to inform investors and other stakeholders through the annual Enhanced Locational Information Report, including by providing locational information on system security issues.

Recommendation 5: AER consider improvements to network capability component (NCC) of the service target performance incentive scheme (STPIS)

The Commission recommends the AER work with stakeholders, including through its review of the NCC component of the STPIS, to improve processes and incentives to identify and progress efficient, low-cost transmission augmentation projects that could alleviate local congestion.

Recommendation 6: Governments to specifically consider congestion issues when designing and implementing schemes that underpin new energy infrastructure

The Commission recommends the Commonwealth Government through the CIS, and any other government schemes that underwrite new energy infrastructure, should consider congestion impacts as a key factor when designing schemes and assessing and awarding contracts under them.

Contents

Figures

1 The AEMC was tasked with developing the hybrid model to improve investment and operational efficiency

In late 2023, Energy Ministers agreed that the Australian Energy Market Commission (AEMC) should continue the Energy Security Board (ESB) and Energy Advisory Panel's (EAP) work on transmission access reform that sought to improve locational signals in the National Electricity Market (NEM) over investment and operational timeframes. Specifically, Ministers asked the AEMC to further develop a particular access reform model — the **hybrid model**. In February 2023, Ministers had decided not to further develop the previously considered congestion management model and congestion fee options, ruling out any models requiring locational marginal pricing for settlement.

The hybrid model combines versions of the **congestion relief market (CRM) model** originally proposed by Edify Energy and the **priority access model** originally proposed by the Clean Energy Investor Group. By integrating the two components, the hybrid model was seen as a potential way of providing stronger locational signals in investment and operational timeframes while also addressing some key stakeholder concerns. It was modelled as achieving greater benefits when compared to each component individually.

Priority access would provide a locational signal for investment efficiency and enable investors to manage congestion risk more effectively. A generator or storage facility would be assigned a priority level up front which is factored into the project's investment and siting decision.

The CRM would provide voluntary incentives for generators to bid more cost-reflectively and achieve a more efficient dispatch. It would also incentivise storage and demand response providers to locate and operate where they can relieve congestion, with benefits to the system. The way the CRM would operate ensures that the access of existing generators is broadly unchanged.

The voluntary nature of the CRM, along with a clear intention to assign the highest priority access to any existing plant, were two key design features that sought to address concerns raised by industry stakeholders in response to previous access reform models.

Under section 45 of the National Electricity Law (NEL), the AEMC initiated a review to underpin this work by publishing Terms of Reference and a project plan.[2] Over the course of 2024, the AEMC has worked closely with the Australian Energy Market Operator (AEMO), the Australian Energy Regulator (AER), jurisdictions and industry and consumer stakeholders to carry on the ESB and EAP's work to design a hybrid model that best meets the transmission access reform objectives, taking into account emissions reductions as per the updated energy objectives. These objectives are outlined in appendix A.

Our aim was to design a hybrid model to a sufficient level of detail in order to we could confidently provide recommendations to Ministers. Our key deliverables included:

- the development of, and final design recommendations for, the priority access and CRM components of the hybrid model
- the development of a simple, stylised network model for stakeholders to interact with and improve their understanding of the hybrid model

2 Full terms of reference can be found here. The project plan can be found here.

- advice addressing key stakeholder concerns and issues, including:
  - the timing of priority access allocation to generators and how this would impact investment decisions and the connection process
  - the ability to meaningfully model priority access to support an investment case
  - setting out the prototype testing and work to date
  - prioritisation and the impact of certain constraints
  - power purchase agreement (PPA) impacts from the implementation of the hybrid model
  - financial market impacts of the hybrid model.

We published a consultation paper on 24 April 2024 and received 40 submissions from a wide range of stakeholders.[3] Many of the submissions were from industry participants, with a submission from Energy Consumers Australia to represent consumers in the NEM. A summary of stakeholder views, and the AEMC's responses, is provided in Appendix A of volume 2.

We note that over many decades of access reform discussions, industry stakeholders have consistently opposed fundamental changes to access and pricing arrangements regardless of the model proposed. Such reforms would alter how participants manage locational risks and costs, which are currently passed onto consumers but would be shifted directly onto participants. We note that similar commentary was raised by Energy Consumers Australia in their submission to the ESB in December 2022 where they provided commentary on industry views, locational marginal pricing and the models being considered at that point in time.[4]

The Commission seeks to understand a broad range of perspectives not to weigh up support or opposition to a reform, but to establish how these benefits, risks, costs and implementation considerations might flow through to consumer outcomes. As required by the National Electricity Objective (NEO), the Commission is focused on the long term interests of consumers when making its decisions in addition to best meeting the reform objectives.

In making our recommendations, we built on ESB and EAP's consultation processes and design decisions, and also drew from:

- stakeholder feedback to our consultation paper
- bilateral and small group informal engagements with interested stakeholders, including consumers
- monthly technical working group (TWG) meetings[5]
- AEMO's prototyping work using historical dispatch data
- AEMO's advice on implementation, including cost estimates
- ACIL Allen's advice on whether the hybrid model can be modelled for the purposes of providing meaningful information to inform investment decisions[6]
- simplified examples of how the hybrid model could change investment and operational behaviour, tested through Endgame's stylised model[7]
- regular workshops with jurisdictions and their scheme coordinators and delivery partners

3 Submissions were received from 11 renewable generators, 6 gentailers, 4 developers, 5 industry groups, 2 battery developers, 2 thermal generators, 2 network businesses, 1 market body, 1 consumer group, 1 academia, and 3 others.

4 ECA, Submission to the ESB's Transmission Access Reform Directions Paper, December 2022, found here.

5 See TWG papers and meeting summaries on the project page here.

6 ACIL Allen's advice is published on the project page here.

7 The stylised model can be accessed on the project page here.

In line with the terms of reference for this review, the Commission has designed a version of the hybrid model that it considers best meets the reform objectives. This version is summarised in chapter 3 of this volume of the final report, with details on the design of the hybrid model provided in volume 2. The Commission does not recommend implementing the hybrid model for reasons outlined in the rest of this report.

The structure for the remainder of the paper is:

- Chapter 2 sets out the context in which the Commission is making its recommendations
- Chapter 3 sets out the Commission's final recommendations and next steps.

2 Governments are prioritising investment to transition to a net-zero energy system

The transition to net zero means a physical transformation of the electricity system. Over the next couple of decades, unprecedented amounts of new generation and network are set to be built in order to replace ageing infrastructure, meet increasing consumer demand and contribute to economy-wide emissions reduction targets at both state and federal levels.

With this transformation comes new challenges and opportunities. Participants must change the way they invest, maintain and operate so they can continue to support the sector, and policy-makers must evolve regulatory frameworks so they remain fit for purpose and affordable for consumers. As the transition plays out, the power system must continue to deliver secure, reliable, affordable, and sustainable electricity for the long-term interests and needs of consumers.

This chapter outlines:

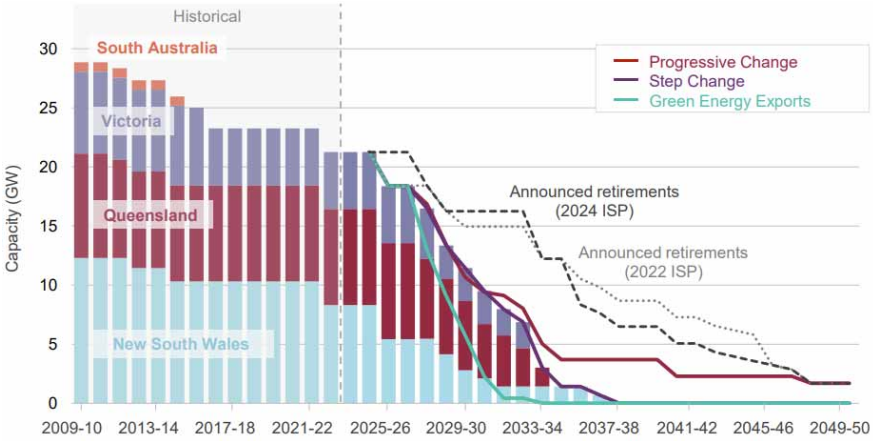
- the significant task to transform the current NEM into a net-zero power system by 2050 and the importance of this in delivering the long term interests of consumers
- the role national open access and regional pricing arrangements play in guiding investment and operational decisions in the NEM
- how the regulatory landscape has changed with the introduction of jurisdictional schemes that help coordinate investment in generation and transmission and provide stronger locational signals and access protection in the context of the transition.

2.1 The task to transform the NEM into a net-zero power system by 2050 is significant and in the long term interests of consumers

The transformation of the NEM to a net zero power system is well underway and is the largest transformation since its inception. The retirement of thermal generation requires large investments in renewables and storage and low emissions sources of electricity, with AEMO's 2024 ISP projecting a required trebling of total capacity. The energy transition is happening at pace, amid rapid changes. Australia faces unique challenges, including the growing scale, pace and engagement of CER in a grid that covers vast distances and multiple jurisdictions. We are proactively managing the power system engineering and economic challenges associated with new technologies and the huge influx of inverter-based technologies that can see the generation and technology mix rapidly vary on any single day. In particular, and of relevance to this review, the transformation necessitates the efficient and effective coordination of transmission and generation to ensure that the electricity is delivered to consumers in a cost-effective and timely way.

As illustrated in Figure 2.1, the retirement of coal-fired generation is happening quicker than projected due to high operating costs, high maintenance costs and competition from renewable energy in the wholesale market. Jurisdictions have implemented a range of policies that complement the price signals from the wholesale market to ensure that replacement capacity is delivered in time to ensure reliable supply for consumers while meeting emissions reduction targets, as well as making sure exits are managed in an orderly fashion.

Figure 2.1: Projected NEM coal capacity (GW, 2009-10 to 2049-50)



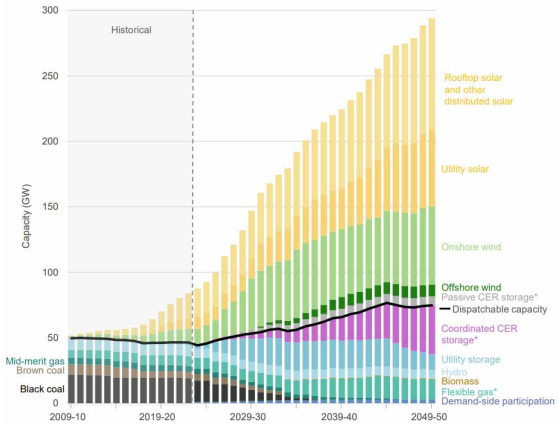
Source: AEMO, 2024 Integrated System Plan, 26 June 2024, p.10

With coal retiring, AEMO's 2024 ISP identified renewables firmed with storage and backed up by gas-powered generation to be the lowest cost mix of resources to meet consumer needs. The changing generation mix will require an expansion of the transmission and distribution networks to connect new and diverse resources to residential, commercial and industrial consumers.

2.1.1 AEMO's ISP projects large increases in wind and solar capacity to replace retiring thermal generation

The 2024 ISP forecasts a six-fold increase in grid-scale wind and solar capacity and 16-fold increase in storage capacity between 2024 and 2050 (see Figure 2.2 below). A significant pipeline of large-scale renewable generation and storage is driving a wave of major new transmission projects to transport the electricity produced to market.

Figure 2.2: Projected NEM capacity (GW, 2009-10 to 2049-50, Step change scenario)



Source: AEMO, 2024 Integrated System Plan, 26 June 2024, p.11

By state, the needs forecast are as follows:[8]

- **New South Wales**: 34 GW new utility-scale wind and solar by 2049-50. Resource diversity will be opened by new networks, with an even mix of wind and solar across the state.
- **Queensland**: 43 GW new utility-scale wind and solar by 2049-50. The CopperString 2032 and Queensland SuperGrid upgrades allow new renewables in the centre and north of the state, with new renewables in the south forecast to make use of existing network capacity as coal retires.
- **South Australia**: Close to 10 GW new utility-scale wind and solar by 2049-50.
- **Tasmania**: Over 3.2 GW of new onshore wind by 2049-50.
- **Victoria**: 23 GW new utility-scale wind and solar by 2049-50 including 9 GW offshore wind. Increased interconnector capacity will allow more wind and solar in north west Victoria, while offshore wind can access existing network capacity as coal retires in the southeast.

A large portion of this investment in infrastructure is projected to occur in the next five years as states seek to achieve emissions reductions targets by 2030, with the energy sector doing the early heavy lifting while mechanisms and policies are developed to decarbonise other sectors.

Investments leading to 2030 are pivotal to maintain reliability and meet emissions reduction targets

With most coal-fired generation forecast to retire by 2034-35, critical investments are needed over the next decade to replace existing capacity and meet the demand of a rapidly electrifying energy system. Under the ISP's Step Change scenario renewables reach 70% of annual generation by 2027-28 and 99% by 2049-2050. For the generation mix in the NEM to meet the ISP's projection, an acceleration of investment is required with around 6GW of capacity required per year until 2029-2030.[9]

The energy transition is a significant task that requires a large and coordinated effort from governments, market bodies, investors and consumers

The scale of the transition away from thermal generation to a net-zero power system requires a coordinated effort by all stakeholders, including governments, investors and consumers. Government schemes have already sought to accelerate the deployment of renewables and provide firmer guarantees of access to the transmission network through the development of REZs.

REZ arrangements differ between jurisdictions but are all based on the introduction of a physical access model that allocates a defined amount of transmission network capacity to new renewable generation and storage projects based on expected generation and load profiles. Each REZ scheme also includes additional mechanisms (or the ability to establish them) that would allow a central body (often a designated REZ planning body) to control connections in and around REZ network infrastructure. While having the potential to be useful in managing the access for REZ projects, assessing impacts from projects on REZs in an interconnected, meshed system can be difficult and mean that physical access cannot always guaranteed.

As well as managing transmission and generation build and access, REZs allow for a holistic approach to planning approvals and social licence concerns, while also sharing the cost of transmission infrastructure more equitably between participants and consumers.

8 AEMO, 2024 Integrated System Plan, 26 June 2024, p.53.

9 Ibid., p.52.

2.1.2 A coordinated and timely transition to net-zero is in the long term interests of consumers

An effective electricity system and market is secure, reliable, affordable, and sustainable. These ideas are captured in the NEO.

The NEM relies on a wide range of participants — including governments, private sector investors, market bodies and consumers themselves — working together to achieve these objectives. This is particularly true when it comes to investing in the infrastructure required to replace ageing infrastructure, meet growing consumer demand, and transition to a lower-emissions power system.

A coordinated and timely transition to a net-zero electricity system is in the long-term interest of consumers. Australia's energy sector plays a pivotal role in decarbonising our economy, supporting national prosperity and, in turn, ensuring the long-term wellbeing of society.

The exit of coal-fired generation and growth in renewables capacity as detailed above present the sector with an opportunity to improve energy affordability and reliability for consumers — both of which are key enablers of optimal consumer living standards. Done well, a smooth and timely transition to a net-zero power system can provide households and businesses with low cost, low emissions energy when and where they need it. A successful energy system transition will have far-reaching benefits, enabling other industries, such as transportation, to achieve their emissions reduction objectives.

The Commission appreciates that consistent and stable policy frameworks play a role in maintaining certainty for governments, investors and consumers. The Commission aims to refine and improve regulatory arrangements over time. However, at times when fundamental changes are proposed — such as in this review — the Commission must consider what the priorities are for achieving the long-term interests of consumers.

We recognise that the cumulative burden of regulatory reforms can have impact on our collective ability to achieve the task of transitioning the NEM to net-zero by 2050. A pragmatic approach to regulatory reform allows us to focus on the most important elements of the regulatory framework in order to achieve the transition and deliver consumer benefits.

The Commission considers that national, market-based frameworks are best placed to deliver efficient outcomes and benefits to consumers over the long term, however efficiencies during the transition will be achieved through pragmatic rules that take into account the context in which they are operating. We also recognise the broader task of transitioning the NEM to net-zero by 2050 and the need to focus on other important elements of the regulatory framework in order to achieve this task and deliver consumer benefits.

2.2 Access and pricing arrangements play an important role in guiding investment decisions

The key role for the market and regulatory frameworks underpinning the NEM is to align private sector behaviour with the public interest to ensure that the long-term interests of consumers are served. These frameworks will need adjustments to remain effective throughout the rapid transition we are in now.

Factors that influence investment decisions can range from the quality of energy resource and availability of land to the sentiment of the hosting community and biodiversity factors, before an investor even considers the energy market and regulatory frameworks. Congestion is now one of many areas that investors consider.

Within the NER the arrangements for access and pricing play a fundamental role in signalling where to locate and how to operate plant in the most efficient way.

The ultimate purpose of access and pricing arrangements in power systems are to guide investment and operational decisions of generators that lead to efficient use of network infrastructure so consumers do not pay more than necessary to transport electricity to their homes and businesses.

'Access arrangements' refer to the arrangements that govern how generators and batteries 'access' or dispatch electricity into the grid and 'pricing arrangements' govern what they get paid. The NEM is an open access, regionally priced market where prospective units have a choice on where to connect:

- **Open access**: Refers to the right that assets have to connect to the grid if they meet the relevant technical standards, irrespective of whether the investment provides value to, or causes congestion on, the broader power system. Assets that connect to the grid do not receive any right to be dispatched.
- **Regional pricing**: Refers to the price assets get paid for their output. The output of generators (and load) is paid at their corresponding regional reference price (RRP) for its output, no matter where they are located within a region. Regional prices do not capture the effect individual assets have on the operation of the broader market.[10]

Access and pricing in the NEM have long been a subject of discussion with a range or alternatives put forward over the years, including as part of this review.

2.2.1 Access and pricing arrangements have been the subject of ongoing reform discussions

The NEM's open access, regionally-priced market design appears relatively simple. We have heard that it is well understood by market participants and investors, with this helping participants offer financial contracts to help them manage risk. While there was consideration of more granular locational prices at the commencement of the NEM, regional prices were chosen because there were:

- concerns about the depth of financial markets given the nascence of the market at the time
- practical considerations to simplify implementation with the acknowledgement that locational signals could be improved over time.

However, the combination of open access and regional prices, along with the market arrangements to determine dispatch during congestion, mean the investment and operational decisions generators make in their individual interests will not necessarily deliver outcomes in the best interests of the system as a whole. This can lead to inefficient dispatch and investment.[11]

Inefficient dispatch

The current open access and regional pricing arrangements can result in inefficient and counter-intuitive dispatch outcomes in the presence of congestion, including race-to-the-floor (disorderly) bidding and counter-price flows across regional boundaries (which create settlement deficits that are funded by consumers) that can increase generating costs above efficient levels. These inefficiencies can increase long-term costs for consumers. The introduction of looped

10 Note that locational effects of assets on the system are somewhat captured through location-dependent marginal loss factors (MLF), which function as a multiplier of an asset's spot revenue.

11 For more information on these inefficiencies from the current access and pricing arrangements, refer to volume 3 of this final report.

interconnectors, such as Project EnergyConnect, may further complicate congestion patterns and have the potential to exacerbate the counter-price flow issue.[12]

Regional pricing (where everyone within a region gets paid the same price) also means that flexible resources such as storage and demand response may not be encouraged to operate in a manner that recognises how they can add value to the system as a whole. Storage providers can be incentivised to discharge when prices are high and exacerbate congestion. Storage providers are also not rewarded for alleviating congestion as they:

- are not able to capture the full value they can provide to the power system and are therefore under-incentivised to enter the market in aggregate
- do not receive efficient price signals to locate at nodes where they can provide value to the power system, meaning that this is likely to result in investment inefficiency in the medium to long term given the locational flexibility of storage (in particular, batteries)
- do not receive efficient price signals to operate in a way that maximises value to the system.

Storage providers are missing out on a material revenue stream, and consumers are missing out on an opportunity to efficiently reduce congestion costs. In practice, batteries are now seeking to invest alongside (i.e. co-locate with) solar to obtain part of these benefits.

Inefficient investment

Under the current open access, regional pricing arrangements, locational signals are not as clear as they could be for participants on where to build assets and best utilise the network. In certain circumstances, the current market design can make it profitable for a new entrant generator to locate in a low value, congestion-prone area by cannibalising the access of a pre-existing generator. This can lead to situations where the net increase in low-cost and low-emission generation is modest due to the reduction in output of the existing generators, compared to the new generator locating in an uncongested area.

For some investors, the risk of curtailment and risk of being cannibalised by a later new entrant may discourage investment in these lower-value, congestion-prone locations. However, due to the inability to hedge these risks, these investors might either avoid such locations entirely or demand a higher cost-of-capital in order to bear them. In this sense, cannibalisation is a double-edged sword that creates risks and uncertainty for investors that are almost impossible to measure or manage and which could either lead to over or under-investment in congested areas.

Both these outcomes would likely result in inefficient system-wide investment outcomes, including higher cost of capital and, ultimately, higher costs for the customer.

Access and pricing reforms

These inefficiencies in the national framework, have the potential to increase costs for consumers. They can increase generation costs over time, increase the cost of project financing and reduce the incentive for further investment, and prompt transmission investment to alleviate the costly constraints, which is paid for by consumers.

Because of these inefficiencies, the open access, regional pricing arrangements in the NEM have been reviewed many times to consider whether they effectively allocate risk and provide appropriate signals about where to locate and how to operate plant in a way that delivers the lowest cost combination of generation across the system. Past reviews on access and pricing,

12 The AEMC is currently considering a rule change request from AEMO that relates to amending the National Electricity Rules for inter-regional settlements residue (IRSR) arrangements for transmission loops.

predominantly undertaken by the AEMC and the National Electricity Code Administrator (NECA), AEMC's predecessor, consistently considered the need for improved and refined locational pricing signals to drive efficient investment in and operation of generation and transmission. Key reviews and other projects relating to access and congestion in the NEM are summarised in volume 3 of this final report.[13]

The focus of this review has been to consider whether the introduction of priority access and the CRM can effectively address the inefficiencies built into the national access and pricing framework.

2.3 Governments are directing investment in generation and transmission

As outlined in section 2.1, the scale of investment needed to support the transition to net zero has hastened new investment in transmission and generation infrastructure and governments have been playing an active role. This has resulted in a changed landscape compared to when this iteration of access reform commenced, which has informed the Commission's recommendations.

The ability of these government policies and schemes to address investment inefficiencies depends on how effectively they are implemented. If implemented effectively, they can efficiently guide and coordinate investment in generation and transmission infrastructure. However, they are not without risks and challenges, as described in appendix B.2.

It is also important to note these policies and schemes do not address operational inefficiencies present in the NEM.

2.3.1 REZs provide locational signals and value for investors

While the ESB, EAP and AEMC have been developing the hybrid model, the NEM jurisdictions have sought to coordinate, and in some cases underpin, investment in renewable energy and transmission infrastructure in their jurisdictions through REZs. They have done this by establishing REZs and accompanying reforms within their regions.

REZs are being developed across the NEM. In New South Wales, Queensland, Tasmania and Victoria, REZs will be supported by state-specific REZ schemes. South Australia is pursuing REZ zones identified in the ISP under the national framework, such as the Mid North Renewable Energy Zone expansion, as well as building hydrogen generation through its Hydrogen Jobs Plan and the Hydrogen and Renewable Energy Act 2023.[14]

The primary driver of these schemes has been need to reduce emissions in line with jurisdictional targets, but also serve as a way of coordinating energy investment and planning with environmental and social licence approvals and have the added benefit of providing improved locational signals and help to reduce access risk.

While the details of the state REZ schemes differ, they are all based on the introduction of a physical access model that allocates a defined amount of transmission network capacity to new renewable generation and storage projects based on expected generation and load profiles.

13 These include: Transmission and distribution pricing review (1997-1999), The scope for integrating the energy market and network services (1999-2001), Towards a truly national and efficient energy market (2001-2002), Regulatory and Institutional Framework for Transmission (2003, Energy Reform: The way forward for Australia (2006-2007), Abolition of the Snowy region and related rule changes (2006-2007), Process for Region Change (2006-2007), Congestion Management Review (2005-2008), Arrangements for Managing Risks Associated with Transmission Network Congestion (2009), Review of Energy Market Frameworks in light of Climate Change Policies (2008-2009), Transmission Frameworks Review (2010-2013), Optional Firm Access, Design and Testing (2014-2015), Coordination of generation and transmission investment implementation (2016-2020), Transmission access reform (2020-present).

14 Unlike other states, South Australia has indicated that renewable generation and storage located in specified REZs will be delivered under the Hydrogen and Renewable Energy At 2023, which introduces a "one window to government" licensing and regulatory system for the lifecycle of the large-scale hydrogen and renewable energy projects in state.

Jurisdictional REZ schemes essentially modify the connection arrangements set out in the NER. A common feature is that jurisdictions, using REZ arrangements, can physically control who can connect to the transmission network at certain locations and the requirements for connection at that location. This then influences a plant's access to the transmission network. REZ frameworks facilitate connection in REZs and therefore the locational decisions of proponents can be largely driven by incentives to connect in REZs, rather than incentives in the national framework.

Some REZ schemes include additional mechanisms that allow a central body (often a designated REZ planning body) to control connections in and around REZ network infrastructure. For instance:

- **New South Wales:** The access control mechanism allows the REZ coordinator to control connections to specified non-REZ infrastructure.
- **Queensland:** The REZ framework introduces the concept of 'REZ-controlled assets' for assets outside a REZ. Powerlink can control the connection of these assets if they materially affect the capacity or functioning of the REZ and are identified in the REZ management plan.
- **Tasmania:** The draft legislation as proposed provides a mechanism for control over connections around REZ network infrastructure which includes both REZ infrastructure and REZ controlled assets set out via the REZ declaration process. Potential controls include prohibiting, restricting or limiting access to REZ network infrastructure including through the terms and conditions of the access scheme.
- **Victoria:** REZ generators are protected from excessive network curtailment arising from new generator connections outside REZs, as generation projects seeking connection outside a REZ undergo a grid impact assessment to preserve the integrity of the REZ.

Note that REZ arrangements, while enabling better coordination of investment, do not directly affect or adjust the dispatch process. An overview of the REZ schemes being developed and implemented by the states, at this point in time, is provided in appendix B.

Through REZs, governments can provide value for investors and communities

The development of REZs by jurisdictional governments is intended to drive coordinated transmission and generation investments. Governments have noted that such an approach will help to accelerate the delivery of critically required generation capacity, while at the same time resolving community concerns in a comprehensive and complementary way. They also provide a means of ensuring that connecting parties contribute to the cost of transmission infrastructure. In New South Wales, EnergyCo (the state's Infrastructure Planner) articulates some of the benefits of REZs as including:[15]

- energy bill savings from reduced wholesale electricity costs
- emissions reduction from a cleaner energy sector
- reliable energy from significant amounts of new energy supply
- host community benefits through strategic planning and best practice engagement and formalised benefit sharing arrangements.

The Commission understands that jurisdictional Governments are seeking to leverage REZs to provide tangible benefits and minimise disruptions for the communities who host the infrastructure required to reliably replace ageing thermal generation.

These REZ schemes are typically based on physical access rights applying in specific areas of the region. Physical access rights are a practical way of managing access when there is a lack of

15 See EnergyCo's website here.

market-based locational signals. However, the benefits of a physical regime are limited as electricity flows consistent with the laws of physics, so generators outside of the infrastructure associated with the scheme also use the infrastructure in practice.

2.3.2 Commonwealth schemes seek to support jurisdictions in meeting emissions reduction targets

At a national level, the Commonwealth has taken an active role in accelerating the delivery of renewable generation and storage via policies and funding mechanisms including the Commonwealth Capacity Investment Scheme (CIS) and Rewiring the Nation.

Capacity Investment Scheme

The Capacity Investment Scheme (CIS) provides a national framework to encourage new investment in renewable capacity, such as wind and solar, as well as clean dispatchable capacity, such as battery storage. Specifically, the CIS involves the Commonwealth Government seeking competitive tender bids for renewable capacity and clean dispatchable capacity projects to:

- deliver an additional 32 GW of capacity by 2030
- fill expected reliability gaps as ageing coal power stations exit
- deliver the Australian Government's 82% renewable electricity by 2030 target.

The Commonwealth's CIS is a key policy, intended to add to and complement state and territory government schemes. It has been designed to provide revenue underwriting to successful CIS tender projects to achieve its objectives.

AEMO has run the first generation tender process on behalf of the Commonwealth targeting 6 GW of renewable capacity generation across the NEM.[16] Projects are assessed against published eligibility and merit criteria, and shortlisted projects are invited to Stage B.[17] The Commonwealth Government has indicated that regular, competitive tenders will be held until 2027.

Among other things, the assessment for CIS projects includes consideration of a project's impact on the electricity system, including on congestion. The aim is to support projects that intend to locate in strong areas of the network or with a connection that is not likely to lead to material curtailment and/or congestion of its output and neighbouring renewable projects. This should and is encouraging generators, storage and co-located plant to locate in areas where they will have less negative impact on system congestion and, in doing so, can help lead to more efficient use of the transmission network.

Rewiring the Nation

Rewiring the Nation (RTN) is an Australian Government program to "make clean energy more accessible and affordable for Australian consumers". The program is investing $20 billion to modernise the electricity grid and deliver new and upgraded transmission infrastructure so that power can flow across the NEM. The program provides finance at concessional rates to minimise the costs of these investments, with the aim of lowering the cost of this essential infrastructure to consumers.

The Australian Government appointed the Clean Energy Finance Corporation (CEFC) as the financing arm of the broader RTN program, allocating an additional $19 billion to the CEFC to finance RTN-related projects.

16 The Australian Government has engaged AEMO Limited, and its subsidiary AEMO Services Limited, to administer CIS competitive tender processes, including to recommend projects to the Australian Government consistent with tender guidelines. Stage A of the CIS Tender 1, NEM Generation (tender 1) closed on 1 July 2024.

17 The eligibility and merit criteria can be found here.

In addition to the $19 billion of financing, $1 billion has been allocated to the Rewiring the Nation Special Account.[18] The Special Account enables the CEFC to invest in the timely delivery of eligible projects. The focus of RTN to date been on providing support for investments in clean energy generation, storage and networks. The recipients of RTN funding for network projects have been TNSPs (such as Transgrid) or government bodies (such as EnergyCo) to accelerate major ISP and Electricity Infrastructure Investment Act transmission projects.

2.3.3 Governments have been cognisant of the need to design schemes and policies that encourage efficient siting decisions and avoid contributing further to congestion

Assuming that REZ networks are sized efficiently, and that access to REZ networks is assigned efficiently, these schemes can go some way to dealing with the lack of locational investment incentives under the current framework. Physical access schemes that centrally coordinate generation and transmission investment will, in theory, allow the 'optimal mix' of generation resources to be assigned to the available REZ transmission capacity, minimising congestion risk for those generators participating in a REZ scheme.

Although governments may take congestion on the shared system in to account when developing REZs, these do not provide rights to access the shared system and generators remain subject to congestion and curtailment outside REZs. Jurisdictional REZ schemes have attempted to deal with this issue by including mechanisms that enable a central body to control connections in and around a REZ. However, such access control mechanisms can be challenging to implement in meshed networks and will not effect generators connecting in different jurisdictions.

In terms of the CIS, the inclusion of an assessment criterion focused on impacts on the electricity system, including congestion, is likely to provide an incentive for generators wishing to participate in the CIS to locate in areas where they will have less negative impact on system congestion. However, the success of the CIS as a locational signal is reliant on a central party successfully modelling the impacts that new generators seeking a CIS agreement may have on congestion in the NEM. This is an inherently complex task and is likely to become more difficult as more variable renewable generation enters the system.

Incentives for batteries to locate and behave in a way that alleviates congestion will remain weak. As mentioned in section X, storage is not rewarded for locating in areas that add value to the system by relieving congestion and can be incentivised to discharge when prices are high. Even if batteries are encouraged in REZs or through the CIS, in the absence of coordinating charging and discharging with other generators (such as co-located assets behind the meter), they may exacerbate rather than alleviate congestion.

If implemented effectively, state REZ schemes and the CIS are likely to provide clearer signals for generation investment locations and offer some investment certainty. As a result, the investment inefficiencies created by the current access and pricing arrangements may be largely mitigated while these policies and schemes are in place.

We consider it important that jurisdictions actively monitor the implementation of REZs and the CIS and address any issues that arise from their design and operation in an interconnected system and market. If there are common issues across jurisdictions, we consider that it may be advantageous for jurisdictions to collectively address such issues. This is discussed further in our recommendations in section 3.2.1.

18 See DCEEW's website for Rewiring the Nation here.

2.3.4 Recent and current reforms partially address congestion issues without reforming access or pricing arrangements

Incremental improvements to the existing arrangements have been made in recent years. While these do not reform the access and pricing arrangements, introduce stronger locational signals into the NEM nor change the underlying incentives for participants to locate in congested areas or bid disorderly to compete for access, they do go some way to partially addressing inefficiencies summarised in section 2.2.1.

Specifically, key recent reforms include:

- The *Integrating energy storage systems* rule change made changes to introduce bidirectional resources as a stand alone registration category, to encourage the efficient entry and operation of storage and hybrid systems. These changes supported the co-location of batteries with VRE by providing aggregated dispatch conformance for hybrid systems, subject to system security limitations. This will help alleviate congestion leading to improved and more efficient system outcomes. While this encourages co-location of batteries, as discussed above, it does not alter the incentives for standalone batteries or load to locate in areas and alleviate congestion. The effectiveness of these arrangements are partly depends on the patterns of congestion. The Commission noted at the time of the final determination that further work was needed to determine the most efficient approach for sending the right price signals to storage to locate in the right areas and reward storage for doing so.
- The *Transparency of new project* rule change requires AEMO to make and maintain an available information resource that provides data on existing and proposed connections of generation in the NEM. This provides increased transparency and information to investors. While such information is useful it does not change the fundamental incentives that investors are exposed to and so there may still be inefficiencies.
- The *Enhanced locational information* reforms by Energy Ministers have AEMO publishing an annual Enhanced Locational Information (ELI) report that consolidates different sources of locational information, such as transmission annual planning reports, system strength charges, marginal loss factors and REZ scorecards from the ISP. As per the above, while this may have a positive impact by helping developers avoid making poorly informed decisions, it does not provide new or different locational signals (it only consolidates existing signals).

There are also some current processes that may address congestion issues in an incremental or indirect ways. This includes:

- The *Improvements to the cost recovery framework for non-network options* rule change process, under which the Commission is considering opportunities to improve the cost recovery framework for non-network options (NNO).[19] NNOs include a variety of ways of meeting network needs without building more 'poles and wires'. For example, using a battery to address localised congestion issues instead of upgrading a transmission line. In certain cases, NNOs could be delivered more quickly and at lower cost than network options.
- The AER's current review of the network capability component (NCC) of the service target performance incentive scheme (STPIS), as part of its *Transmission STPIS Review: MIC and NCC*, through which the AER is considering the NCC's effectiveness in the context of the energy transition.[20] The NCC is designed to provide incentives and funding to increase the efficient capability of existing assets in the network when most needed, while maintaining adequate levels of reliability. The operative element of the NCC is the network capability

19 The project page can be found here.

20 AER, Transmission STPIS Review: MIC and NCC, Issues paper, 8 December 2023, found here

incentive parameter action plan (NCIPAP), which requires a TNSP to identify any low-cost solutions it can undertake to address limitations in the transmission network in the forthcoming regulatory control period.

3 The Commission has made final recommendations

This chapter outlines our recommendations on transmission access reform.

In line with our Terms of Reference for this review, we have focused on and progressed development on a design of the hybrid model — comprising the **priority access** and **congestion relief market** models — that best meets the reform objectives.

While we have developed our preferred design of the hybrid model that could best meet the reform objectives, we **do not recommend** implementing the hybrid model. We also **do not recommend** implementing either individual component of the hybrid model.

Jurisdictional schemes, such as REZs and the CIS, have already been or are in the process of being implemented. We consider the combined and complementary effects of these schemes can support efficient investment in the NEM. As such, we consider the benefits of priority access to improve investment efficiency and certainty over and above what can be achieved through jurisdictional schemes, if delivered effectively, would likely be marginal.

We consider that the CRM model is workable and has the potential to deliver benefits in operational timeframes. However, it is complex and contains a number of design compromises, which creates uncertainty about whether the potential benefits would materialise and outweigh the costs of implementation. We recognise that without reform, operational inefficiencies will remain in the NEM, however we do not consider the CRM to be an appropriate solution. This is because we are uncertain whether the benefits will materialise since stakeholders have told us they are unlikely to participate in the mechanism.

The Commission considers efficiencies during the transition will be achieved through pragmatic rules that take into account the context in which they are operating.

Therefore, the AEMC considers Ministers should focus on leveraging current frameworks and processes to support efficient delivery of these jurisdictional schemes to provide locational signals and the benefits that this brings to customers through better coordinating generation and transmission. Specifically, the AEMC recommends that:

1. Jurisdictions and market bodies establish a collaborative forum to support the effective delivery of jurisdictional schemes. Collaboration efforts would focus on understanding the impact of schemes on the broader power system and addressing common operational issues that arise as jurisdictional schemes are developed and implemented. This could include understanding congestion patterns and how they may change within and between regions outside REZs.
2. AEMO continue to work with TNSPs and market participants to improve the quality and timeliness of locational information over time through the annual Enhanced Locational Information Report, including by providing locational information on system security issues.
3. AER work with stakeholders, including through its review of the network capability component (NCC) component of the service target performance incentive scheme (STPIS), to improve processes and incentives to identify and progress efficient, low-cost, transmission augmentation projects that could alleviate local congestion.
4. The Commonwealth Government through the CIS, and any other government schemes that underwrite new energy infrastructure, should consider congestion impacts as a key factor when designing schemes and assessing and awarding contracts under them.

We recognise that these recommendations, while supporting jurisdictional schemes to improve investment efficiency, will not directly improve operational efficiency. Given the scale, challenges,

and opportunities of transitioning the NEM to net-zero, we consider that delivering efficient investment in the NEM is a key priority in the near future. Furthermore, while alternative options or models may exist that could improve operational efficiency, this review has been focused on designing the hybrid model developed by the ESB.

Further details on the Commission's recommendations are explained in more detail below.

3.1 We do not recommend implementing priority access and the CRM

In line with the Terms of Reference of our review, we progressed development on a design of the hybrid model that best meets the transmission access reform objectives. We provide an overview in section 3.1.1 of our preferred design of each component of the hybrid model, with more detailed design decisions and stakeholder feedback provided in volume 2 of this final report.

However, we do not recommend implementing the hybrid model. We also do not recommend implementing either priority access nor the CRM as a standalone reform. Implementing the hybrid model, or either component of the hybrid model, may not deliver material benefits as:

- Jurisdictional schemes are in the process of being implemented, with the aim of improving investment certainty and coordinating generation and transmission investment. This reduces the need for, and incremental benefits that could be gained by, implementing priority access component.
- Complexity and compromises inherent in the hybrid model design, such as the voluntary nature of the CRM, means that while costs are certain, benefits are uncertain. We are therefore uncertain whether the benefits would outweigh the cost and complexity that would be introduced with the implementation of the hybrid model.

Therefore, we consider the uncertain benefits that the hybrid model could deliver would likely not outweigh the added cost and complexity.

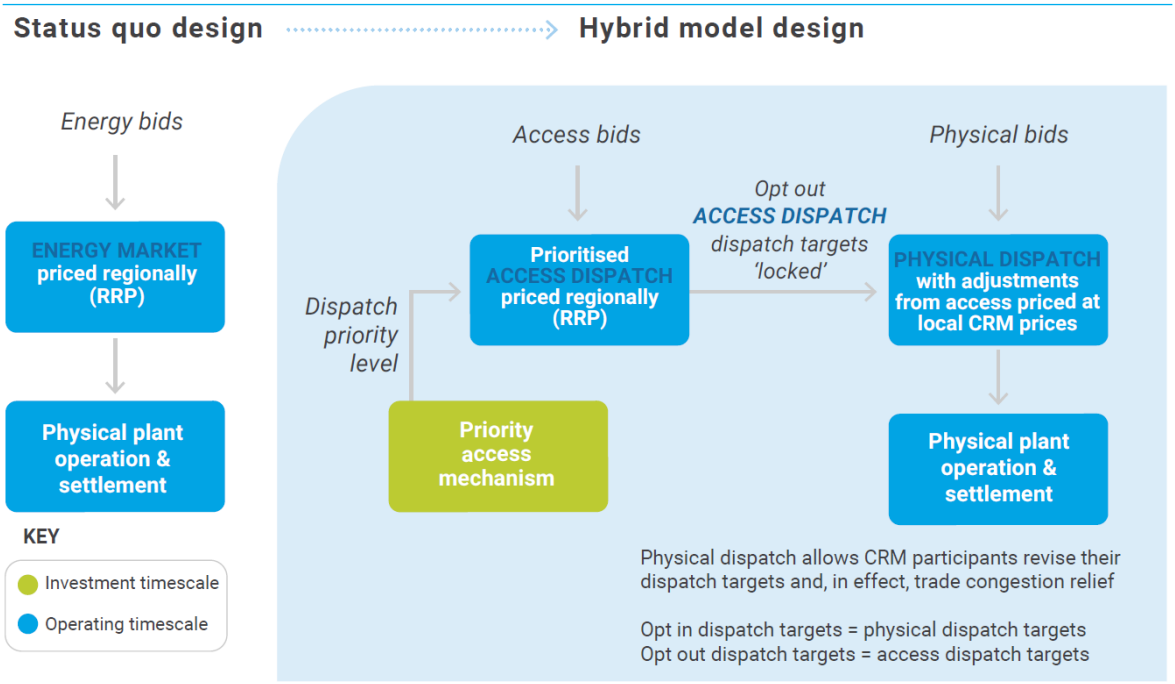
We consider the long term interests of consumers is best-served by governments, investors and market bodies focusing on collectively delivering a smooth and timely transition. There are numerous other challenges that the industry must grapple with in the transition, with congestion just one of these issues. Changes to regulatory frameworks need to be considered within this context, and we do not consider that the costs and complexity from implementing the hybrid model align with this context.

3.1.1 Our preferred design of the hybrid model

The hybrid model combines the priority access and the CRM models together to best deliver on the reform objectives. This section outlines our preferred design of each component of the hybrid model, and should not detract from our overall recommendations.

Figure 3.1 provides a high-level illustration of how the current arrangements would change if the hybrid model was introduced.

Figure 3.1: High-level hybrid model design



The priority access model

The priority access model improves the likelihood of dispatch for an asset over newer assets when congestion arises, to provide investment certainty and improve investment efficiency. Priority access would improve investment certainty by protecting generator access to the regional reference price (RRP) from cannibalisation by newer entrants, as well as reducing incentives for new entrants to inefficiently locate in congested areas. Priority access also provides a mechanism to support the delivery of REZs and the coordination of generation and transmission investments. It also can protect REZ generators from the financial impact of congestion caused by generators located outside the zone (and free-riding on investments intended for REZ participants).

Our preferred design of the priority access model would operate as follows:

- the dispatch of an asset would be prioritised over any newer assets when there is congestion[21]
- priority would be given effect in the NEM dispatch engine (NEMDE) through adjustments to the floor price that participants can bid to for an asset (i.e. the bid price floor), such that higher priority assets can bid lower than lower priority assets
- due to limitations on the number of meaningful bid price floors (and subsequently number of priority access levels) that can be used, new assets (outside of a REZ) and REZs would be grouped based on the year they meet multiple criteria in the connections (for assets) or development (for REZs) process
- each group would progress through ten levels of priority access (each with a separate bid price floor) in a queue-based system, before pooling in the highest level of priority access
- assets joining in a REZ would receive the same level of priority access as their REZ, meaning that all assets in a REZ would have the same level of priority access

21 Specifically, the probability of dispatch for a prioritised asset would be increased relative to newer assets.

- all incumbents would automatically receive the highest level of priority access
- when an asset reaches the end of its economic life as determined by a central planner, they would permanently move to the lowest level of priority access.

For more information on detailed design preferences on the priority access model, along with stakeholder views and feedback, refer to chapter 2 of volume 2 of this final report.

The CRM model

The CRM model would introduce a market to trade congestion relief, improving operational efficiency in the dispatch of energy. The CRM is a voluntary, opt-in mechanism that allows market participants to revise their initial dispatch outcomes which set how much they can sell at the RRP. It can be more profitable for CRM participants to revise their position by increasing or decreasing their dispatch bids, as revisions are paid at CRM prices that can differ from the RRP in the presence of congestion. These revisions would occur across CRM participants such that this effective trading in the CRM can be seen as trading 'congestion relief'.

Our preferred design of the CRM model would operate as follows:

- there would be two separate, sequential dispatch runs for each trading interval (as opposed to one dispatch run in the current arrangements)
  - the first dispatch run (called the access dispatch) would dispatch market participants with settlement of these dispatch outcomes at the RRP
    - this would mimic the current dispatch, with the only difference being the inclusion of priority access
  - the second dispatch run (called the physical dispatch) would allow market participants that opt into the CRM to trade congestion relief by revising their access dispatch outcome, with revisions settled at their local CRM prices
    - the physical operation of assets would be based on the physical dispatch
    - the access dispatch outcomes for market participants that do not opt into the CRM would be their physical dispatch
    - the physical dispatch would not include priority access (i.e. all CRM participants would have the same bid price floors in the physical dispatch)
- the CRM would be voluntary, meaning market participants would not participate in the CRM unless they choose to opt into the CRM, with this key design principle focusing on reducing implementation costs
- market participants that opt into the CRM would:
  - submit two sets of bids, one for each dispatch
  - be settled at their access dispatch quantity at their RRP, with any difference between their physical and access dispatch quantities settled at their CRM price
- market participants that do not opt into the CRM would continue to operate and participate in the NEM as per the status quo, including:
  - only submitting one set of bids and being dispatched in accordance with those bids
  - being settled at the RRP in their region for their dispatch, with no exposure to CRM prices
- the two dispatches would be 'tethered', meaning that both the access and physical dispatch outcomes for an asset in a trading interval must be within the ramp rate limits of their actual output at the start of the trading interval.

For more information on detailed design preferences on the CRM model, along with stakeholder views and feedback, refer to chapter 3 of volume 2 of this final report.

3.1.2 We do not recommend priority access as it would likely not deliver material benefits

Priority access is a model aimed at improving investment certainty by providing a degree of protection to generators from those who may join later and cannibalise their dispatch when there is congestion. The model could also promote efficient levels of investment in congested areas, as new generators that would overly exacerbate congestion would be given lower priority in dispatch than existing generators when there is congestion, and be incentivised to locate in less congested areas of the network.

In the absence of other reforms underway, we consider that the preferred design of priority access could deliver benefits in improving investment efficiency and certainty. However, we consider that the combined and complementary effects of the REZs and CIS will guide new investments and promote a more efficient investment pathway in the near future. We consider that these jurisdictional schemes, if designed and implemented effectively, would mean that any additional benefits from priority access in terms of improving investment certainty and efficiency would likely be marginal.

Therefore, we do not recommend implementing the priority access model, either as part of the hybrid model or as a standalone reform.

We consider jurisdictional schemes will likely deliver improved investment efficiency in the near future

We consider recently progressed jurisdictional schemes, namely jurisdictional REZs and the CIS, will likely improve investment efficiency compared to the current NEM open access arrangements. We expect that they will provide benefits into the near future that will likely mitigate the need for priority access.

Most NEM jurisdictions are implementing REZs and have a range of REZ access schemes that will guide and coordinate generation, storage and transmission investments. While priority access can support REZs by providing them with priority access over newer, non-REZ investments, we consider that jurisdictional REZ designs and schemes should be sufficient to promote efficient levels of investment in and around REZs. The REZ schemes, while differing between jurisdictions, are based on the introduction of a physical access model that allocates a defined amount of transmission network capacity to new renewable generation and storage projects. The REZ schemes also include additional mechanisms that allow a central body (often a designated REZ planning body) to control connections in and around REZ network infrastructure where the access of REZ generators may be impacted, which can allow for cannibalisation risks to be managed. However, these REZ schemes do not enable the control of connections of assets and REZs across regional boundaries.

We expect that the CIS will improve investment efficiency through a centrally-planned process by supporting projects that are expected to be most beneficial to the system. Projects that significantly cannibalise existing generators, or overly exacerbate congestion, would perform poorly in system benefits merit criteria and would likely not be awarded CIS agreements. Conversely, projects that provide the significant benefits to the system (such as being optimally located in line with an efficient investment pathway) would be more likely to be awarded CIS agreements. Since the CIS aims to incentivise investment in 32 GW of renewable capacity and clean dispatchable capacity by 2030, we expect that the CIS will likely have a material and beneficial impact on investment decisions, efficiency and certainty.

While the CIS and REZs could improve and promote investment efficiency, we consider that there are several risks, including that jurisdictional schemes:

- are time limited (the last CIS tender is planned for 2027 and REZ contracts will end) in their associated guidance to new investment
- do not address operational inefficiencies in the NEM, as they do not affect the dispatch process
- could result in inefficient generation and transmission investments, if the schemes are not implemented effectively.

These risks can be managed with careful design and implementation of schemes but should continue to be monitored.

Stakeholders broadly opposed priority access

Our recommendation to not implement priority access is broadly aligned with views from industry stakeholders. In response to our consultation paper, stakeholder feedback (primarily from industry participants) was overwhelmingly in opposition to priority access with a range of reasons and concerns. These reasons and concerns include (without limitation):

- other reforms, including REZs and the CIS, mean that priority access is unnecessary[22]
- the case for priority access was overstated or does not exist[23]
- priority access would stifle investment by increasing congestion cost and risk for incoming generators[24]
- priority access could increase the RRP which could materially reduce benefits.[25]

In strong contrast to the views of industry stakeholders, consumer representatives considered that the hybrid model, with both priority access and the CRM, could deliver significant benefits to consumers.[26]

As discussed above, we consider that recent progression with jurisdictional schemes has reduced the need for and benefits of priority access. We consider that these jurisdictional schemes should be supported to ensure that they are implemented effectively and deliver improvements to investment efficiency.

However, we do not agree with all industry stakeholder views. In particular, we consider that it is in line with the intent of priority access that new entrants would bear the risks and costs of the congestion that they cause through their locational decisions. This is opposed to the current arrangements, where the costs of congestion are socialised onto existing investors through cannibalisation. While this would have the effect of altering investment levels — it would do so in a way that promotes benefits in the system. In other words, it would prevent inefficient over-investment in already congested areas.

22 Submissions to the April 2024 consultation paper: Acciona, p.2; AEC, p.2; AEMO, p.2; AFMA, p.1; AGL, p.1; Baringa, p.1; CEC, p.2; CEIG, pp.4-5; CleanCo, p.1; CS Energy, p.2; Edify, p.1; EnergyAustralia, pp.8-9; Iberdrola, p.2; Origin, p.1; Snowy Hydro, p.6; Stanwell, pp. 8-9; Tesla, p.1; Tilt, p.2.

23 Ibid: Atmos, p.1; Avenis, p.2; Baringa, p.1; CEC, p.21; Edify, p.1; Eneflux, p.2; Edify, p.1; Iberdrola, p.3; IB Vogt, p.2, Stanwell, p.2.

24 Ibid: AFMA p.3; AGL, p.1; Avenis, p.4; CEC, p.1; CS Energy, p.3; EnergyAustralia, p.7; Eneflux, pp.2-3; Iberdrola, pp.2-3; SMA, p.2; Snowy Hydro, p.14; Stanwell, p.2; Tesla, pp.1-2; Tilt, p.1.

25 Ibid: AEC, p.3; AGL, pp.3-4; CEC, pp.1-2; CS Energy, p.6; EnergyAustralia, p.8; Iberdrola, p.1; Origin, p.2; Snowy Hydro, pp.5-6; Tesla, p.2; Tilt, p.1; Transgrid, p.2.

26 Ibid: ECA, p.1.

Recommendation 1: Do not implement priority access

The Commission does not recommend implementing priority access. We consider the combined and complementary effects of jurisdictional Renewable Energy Zones (REZ) and other government schemes that underpin energy infrastructure can provide locational signals to manage access and support efficient investment in the NEM. As such, we consider the benefits of priority access to improve investment efficiency and certainty over and above what can be achieved through jurisdictional schemes, if delivered effectively, would likely be marginal.

3.1.3 We do not recommend the CRM as its benefits are uncertain at the current time

The CRM model would introduce a new voluntary market. Market participants could choose to opt into this market and trade 'congestion relief'. The CRM is designed to deliver more operationally efficient physical dispatch outcomes by incentivising cost-reflective bidding, including in congested areas. This differs to the current arrangements, where constrained down participants are incentivised to bid disorderly which can lead to an inefficient dispatch.

We consider that the CRM model has the potential to deliver material and meaningful benefits by improving operational efficiency, and could be an improvement upon the current arrangements. The CRM model is also easier to implement than other previous access reform models. Compared to other models, the voluntary nature of the CRM reduces implementation costs for participants by allowing them to choose whether or not they would participate and upgrade various systems (such as bidding), while also helping to reduce impacts on the financial markets.

However, the voluntary nature of the CRM means that there would be uncertain benefits at the current time, whereas the costs of the CRM are more certain. Many industry participants who wrote submissions to our consultation paper noted that they would not participate in the CRM. While we consider that the operational inefficiencies in the market are important to address, the fact that implementation costs (particularly costs for AEMO) are certain while participation and benefits are uncertain creates a degree of uncertainty in whether implementing the CRM would deliver net benefits.

Therefore, we do not recommend implementing the CRM model as part of the hybrid model.

The Commission considered a standalone CRM

As discussed in section 3.1.2 above, the Commission considers the combined and complementary effects of the Commonwealth CIS and jurisdictional REZs can provide locational signals to manage access and support efficient investment in the NEM if they are implemented effectively. However, these schemes do not address operational inefficiencies present in the NEM. Because of this, we considered if there was value in progressing the CRM model as a standalone reform. The CRM does provide incentives for participants to bid more cost reflectively, and could improve the efficiency of interconnector flows.

Operational issues appear in the NEM the form of inefficient and counter-intuitive dispatch outcomes in the presence of congestion, including race-to-the-floor (disorderly) bidding and counter-price flows across regional boundaries (which create settlement deficits that are funded by consumers). Operational issues may be exacerbated by flexible resources such as storage and demand response that are not be encouraged to operate in a manner that recognises how they can add value to the system as a whole. The introduction of looped interconnectors, such as

Project EnergyConnect, may further complicate congestion patterns and have the potential to exacerbate the counter-price flow issue.[27]

While we recognise that the without reform, operational inefficiencies will remain in the NEM, we do not consider the CRM to be an appropriate solution given we are uncertain whether the benefits will materialise given stakeholders have told us that they may not participate.

If addressing operational dispatch inefficiencies is revisited in the future, or alternatively, if inefficiencies are exacerbated or new issues arise, we consider that this work on operational options will be informative.

Compromises, costs and complexity could reduce the benefits of the CRM

A key design principle of the CRM is that it is voluntary, which distinguishes it from previously considered access reform options. We (as well as the ESB) have developed and designed the CRM model to maintain and reinforce the voluntary nature of the CRM.

Implementing the CRM is likely to have material costs, primarily relative to IT system changes. The voluntary nature of the CRM and the fact that it is designed to modify NEMDE reduces implementation and ongoing costs compared to other proposed access reform models, however these costs are still material compared to the potential benefits. The ESB's cost benefit analysis estimated total implementation and ongoing costs of $121m to $247m (NPV, $2022) for market participants and $62m ± 50% (NPV, $2022) for AEMO, with operational benefits estimated to be between $334m and $639m (NPV, $2022) in addition to a roughly reducing emissions by 1m tonnes annually.[28]

While we would expect there to be sufficient participation in the CRM, this is not certain. Stakeholders have told us they would not utilise the mechanism in which case the likely net benefits at the current time are uncertain. This was supported by AEMO's view, as AEMO considers that the CRM has some benefits in allowing trading of congestion relief and facilitating a more efficient dispatch outcome. However, AEMO also considers that these benefits are marginal at best and highly dependent on the level of uptake of the CRM:[29]

> The ESB's CBA assumed 86% uptake from day one rising to 100% after two years which seems very optimistic and highly unlikely to be achieved. The net present cost of implementing the reform, estimated at $76m, however is significant and unaffected by the level of participation and the project would take three and half years to implement. AEMO questions the merits of implementing such a major reform with marginal benefits compared to other higher priority reforms such as CER integration, timely delivery of transmission, and frameworks for wholesale and essential system services.

Many stakeholders broadly opposed the CRM model, although there was more support than for priority access

AEMO and many industry stakeholders do not consider the benefits from the CRM would be net positive or sufficiently material for the CRM to be implemented. These stakeholders considered

27 The AEMC is currently considering a rule change request from AEMO that relates to amending the National Electricity Rules for inter-regional settlements residue (IRSR) arrangements for transmission loops. The AEMC project page can be found here.

28 ESB, Transmission Access Reform Cost Benefit Analysis, 2023, pp.38, 40, 50, 53.

29 Submission to the April 2024 consultation paper: AEMO, p.2.

that the voluntary nature of the CRM diminishes benefits and/or that the ESB's cost benefit analysis was flawed.[30]

Some industry stakeholders also expressed concerns that the CRM would not be voluntary in practice.[31] We do not agree with that the CRM would be involuntary, as it was a clear design principle for the model that we sought to retain and reinforce through our design decisions. We note that participants would not have to participate in the CRM and could still remain exposed to their RRP (with no exposure to CRMPs) without needing to change their bidding.

A minority of stakeholders supported the CRM model in being voluntary and improving operational efficiency.[32] Of particular note, consumer advocates considered that the hybrid model (including priority access and the CRM) could deliver significant benefits to consumers and that the current approach to allocating access is unfair and inefficient and leads to higher costs for consumers and government.[33] Energy Consumers Australia has also previously advocated for a mandatory market with locational marginal pricing as a more preferable approach to the CRM, which is overly complicated and complex in order to be voluntary.[34]

As discussed above, we consider that the CRM could deliver benefits by improving operational efficiency, however we are uncertain on the magnitude of likely benefits due to the compromises, costs and complexity of the model. We consider that the CRM has the potential to deliver material benefits, however we consider that it is also possible that these benefits may not materialise and/or may not exceed implementation costs due to limitations in the design of the CRM.[35]

Recommendation 2: Do not implement a congestion relief market (CRM)

The Commission does not recommend implementing the CRM. We consider that the CRM model is workable and has the potential to deliver benefits. However, it is complex and contains a number of design compromises, which creates uncertainty on whether the potential benefits would materialise and outweigh the costs of implementation.

3.2 We recommend leveraging existing projects and processes to support effective delivery of jurisdictional schemes

While the ESB, EAP and Commission have been considering the hybrid model as a market-based way of reforming access and pricing to provide better locational signals, NEM jurisdictions have introduced policies and schemes to coordinate and in some cases underpin investment in renewable energy and transmission infrastructure in identified locations to drive emissions reductions. While not the primary purpose, these schemes also provide locational signals, investment certainty and (in the case of REZs) a level of access protection that is absent from the open access, regional price arrangements in the national framework.

They serve as a practical way to coordinate and manage the significant scale and speed of investment required on the pathway to net zero. If delivered effectively, these schemes will likely

30 Submissions to the April 2024 consultation paper: AEMO, p.2; AFMA, pp.2-3; AGL, p.4; Baringa, pp.22-25; CEIG, pp.12-13; CS Energy, p.2; EnergyAustralia, p.12; Engie, p.2; Shell, p. 2; Snowy Hydro, p.1; Stanwell, p.6; Tesla, p.6; TotalEnergies, pp.1-2; Tilt, p.4.

31 Ibid: AGL, p.4; CEC, p.7; CEIG, p.8; Snowy Hydro, pp.6-7, 17; Stanwell, p.5; Tilt, p.10.

32 Ibid: Atmos, p.2; Avenis, p.2; ECA, p.1; Eneflux, p.2; HydroTasmania, p.1; IB Vogt, p.6; Terrain Solar, p.1.

33 Ibid: ECA, p.1.

34 See ECA's submission to the ESB's Transmission access reform November 2022 directions paper, found here.

35 For example, the benefits of the CRM would be proportional to the degree of participation. High participation would lead to high benefits; low participation would lead to low to no benefits.

achieve many of the benefits access reforms were seeking to achieve over investment timeframes, albeit in a different way.[36]

There are risks and challenges in delivering such schemes in an interconnected system like the NEM but these can be mitigated with careful design and implementation.

In the absence of reforms to national access and pricing arrangements, it is even more important that these schemes are delivered efficiently and effectively so that consumers benefit from the transition underway.

Therefore, the Commission recommends the following measures to support the efficient and effective delivery of jurisdictional schemes and coordinate investment in generation and transmission including that:

1. Jurisdictions and market bodies establish a collaborative forum to support the effective delivery of jurisdictional schemes. Collaboration efforts would focus on understanding the impact of schemes on the broader power system and addressing common operational issues that arise as jurisdictional schemes are developed and implemented. This could include understanding congestion patterns and how they may change within and between regions outside REZs.
2. AEMO continue to work with TNSPs and market participants to improve the quality and timeliness of locational information over time through the annual Enhanced Locational Information Report, including by providing locational information on system security issues.
3. AER work with stakeholders, including through its review of the NCC component of the STPIS, to improve processes and incentives to identify and progress efficient, low-cost, transmission augmentation projects that could alleviate local congestion.
4. The Commonwealth Government through the CIS, and any other government schemes that underwrite new energy infrastructure, should consider congestion impacts as a key factor when designing schemes and assessing and awarding contracts under them.

Together these measures will go some way to helping coordinate and deliver the investment required to deliver a net-zero NEM by 2050.

With a collective focus from jurisdictions, investors and market bodies to identify and address inefficient investment or operational outcomes in targeted ways, as they arise, the inefficiencies built into the national access and pricing framework can be managed in the period ahead.

These measures are explained in more detail below.

3.2.1 Establishing a forum to collaborate on operational issues will support efficient and effective delivery of jurisdictional schemes

The Commission recommends that jurisdictions and market bodies work together to establish a collaborative forum that could be used to understand the impact of government schemes on the broader power system, and identify and address common operational and implementation issues that arise as government schemes are developed and implemented. This could include understanding congestion patterns and how they may change within and between regions outside REZs.

We acknowledge that each jurisdiction has unique circumstances in which they are operating in and this is understandably driving the development of arrangements that are fit for these specific

36 Past access and pricing reforms have broadly sought to retain open access arrangements and reform pricing to make the settlement price more locational. REZ frameworks do the opposite; they retain regional prices and replace open access with physically controlled access regimes that apply to parts of the network.

circumstances. We consider that the various approaches being developed and implemented in each jurisdiction to coordinate investment in generation and transmission can be an effective way of managing access to and congestion in the grid — particularly in an environment where the investment task is large and the timeframes short.

The proposed collaborative forum would not seek to influence the objectives or outcomes of jurisdictional policy. Instead, it acknowledges the potential risks and challenges in delivering such schemes in an interconnected system like the NEM (discussed in appendix B.2) particularly given the interconnected nature of the NEM and the fact that actions and decisions taken in one region can have flow-on consequences to other regions. These risks and challenges are more likely to be managed if they are understood, and in turn, this can improve the design and implementation of schemes.

In that context, the collaborative forum would provide an opportunity for jurisdictions to share their knowledge and experience when facing common challenges, and for members of the forum to seek and provide advice where relevant.

The ESB's recommended principles for how REZs can be planned, established and implemented and maintained provide a good foundation to work from.[37] The proposed forum will provide ongoing opportunities to share and build on this base with the knowledge and experience gained by jurisdictional governments and scheme delivery bodies through actual project delivery.

Through the proposed forum, market bodies would also be able to provide early and regular advice relating to the NER and its procedures, particularly in relation to the implications for real-time power system operation.

For example:

- understanding how scheme decisions may impact the shared network, e.g. if congestion patterns will change within or between regions
- early collaboration with AEMO regarding new contractual products to underwrite new investment and provide access rights can help ensure they are consistent with the foundational principles of power system security and reliability
- knowledge sharing on options to assess impacts and manage access of connections outside REZs would allow for productive use of resources and support best-practice decision-making.

The proposed collaborative forum would establish periodic workshops to identify common challenges, share knowledge, and to trouble-shoot options relating to the development and/or implementation of jurisdictional schemes.

This forum could be established within the Energy and Climate Change Ministerial Council working group structure with terms of reference to reflect a specific operational focus. Alternatively, it could leverage existing AEMO industry forum or working group or other cross-jurisdictional forums that have an operational focus, depending on the final agreed scope of the proposed forum.

Members would include representatives from market bodies, each NEM jurisdictional government, the Commonwealth Government and each scheme delivery body. Market participants would be invited to attend as relevant, and links with other relevant industry forums or working groups would be established to support effective scheme outcomes.[38]

37 ESB, Interim Framework for Renewable Energy Zones - Final recommendations, June 2021, found here.

38 For example if a matter was identified in the proposed forum that was best addressed through joint planning processes, AEMO would be able to leverage both forums to address it.

Jurisdictions would agree on the specific terms of reference, but broadly the proposed forum would focus on understanding the impacts and identifying potential operational challenges relating to the implementation of jurisdictional REZs, the CIS and any other jurisdictional schemes that seek to coordinate or drive investment in generation and transmission. It would enable:

- planning and operational challenges and opportunities to be identified and discussed as they emerge, including feedback from market participants
- jurisdictions to engage early and in a coordinated way with market bodies, particularly AEMO as NEM system planner and operator
- knowledge sharing and, where relevant, facilitate joint approaches to solving common challenges.

Recommendation 3: Establish a collaborative forum to support effective delivery of jurisdictional schemes

The Commission recommends jurisdictions and market bodies establish a collaborative forum to support delivery of jurisdictional schemes. Collaboration efforts would focus on understanding the impact of schemes on the broader power system and addressing common operational issues that arise as jurisdictional schemes are developed and implemented. This could include understanding congestion patterns and how they may change within and between regions outside REZs.

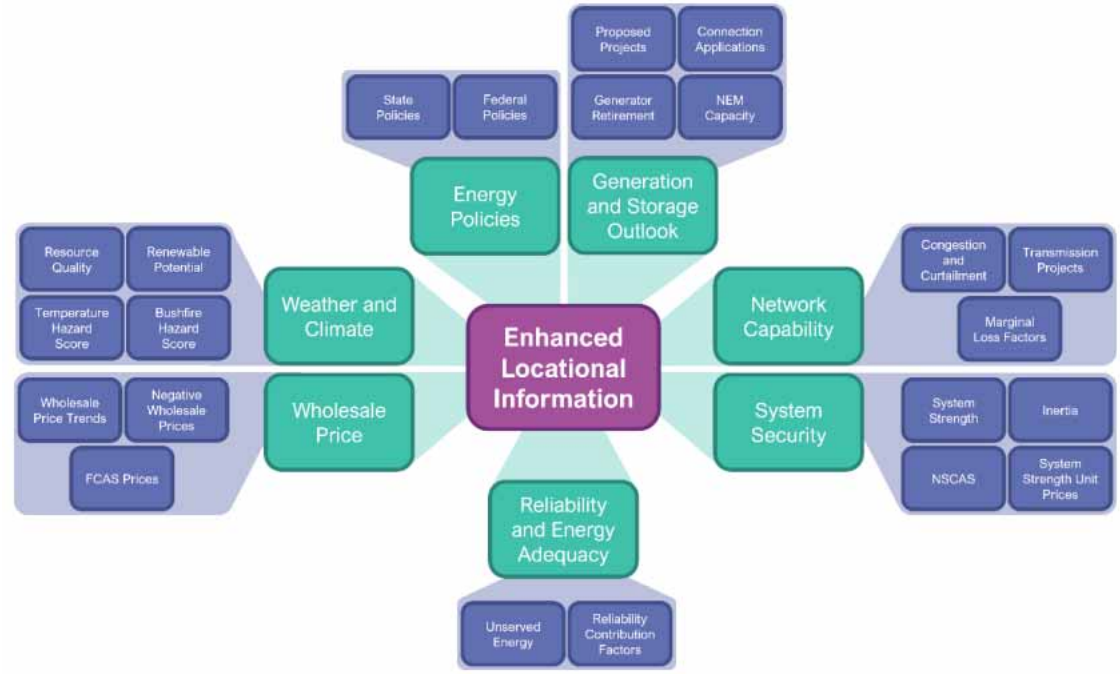
3.2.2 Continued enhanced locational information will inform efficient investment decisions

The Commission recommends AEMO continue to work with TNSPs to improve the quality and timeliness of locational information in the NEM. The Commission also recommends that AEMO should continue to work with stakeholders and take on board feedback as to how this information can be the most useful for the market.

In February 2023, Energy Ministers agreed to immediately implement 'enhanced information' reforms to provide NEM participants with better information on the optimal locations for new generation and storage investments. AEMO published the first enhanced locational information (ELI) report in June 2024. The report contains a host of locational information ranging from system security assessments and network capability data such as congestion and curtailment, through to information on wholesale price trends, weather and climate data and generation and storage outlook.

The ELI report explains that the NEM provides a range of signals and mechanisms to help guide new investment towards the most efficient and cost-effective locations. However, the effectiveness of these signals can be limited if they are difficult to access, difficult to interpret, or difficult to compare across competing locations. The ELI report aims to increase the transparency and accessibility of such signals by comparing a spectrum of associated locational metrics with graphic representation, as summarised below.

Figure 3.2: Overview of indicator types considered in the 2024 ELI Report



Source: AEMO 2024 Enhanced locational information (ELI) report, figure 1, p.3

Collating this information and providing commentary about how it should be interpreted can assist investors when considering where the optimal locations might be to build assets. For example, AEMO's headline observations in the 2024 ELI are:

- investment opportunities are available in all regions, however proponents must carefully consider competing investment signals
- thermal generation continues to withdraw, creating opportunities for new supply investment
- the effectiveness of reliability-based investments are heavily influenced by network location
- state and federal energy policy is driving investment and reshaping the energy landscape
- some network locations are now experiencing significant levels of congestion and curtailment, presenting both risks and opportunities for new service providers.

This information can be particularly useful for investors that are new to the Australian market and power system and smaller players that may not have the resources to collect and interrogate data in-house. It can also be useful for REZ delivery bodies and the CIS to inform assessments and more broadly by policymakers that wish to influence outcomes in the NEM — for example, to reach emissions reduction or technology targets.

While many investors will be influenced by jurisdictional REZ schemes when identifying locations for new plant in the near term, locational information will be a useful complementary tool.

Transparent and high quality locational information is important as AEMO's ISP includes, as an assumption underpinning its optimal development path, that generators, storage and load will locate efficiently.

AEMO has been working closely with TNSPs through joint planning arrangements to improve the consistency and usefulness of locational information in Transmission Annual Planning Reports. AEMO has also consulted with stakeholders more broadly on the usefulness of the 2024 ELI

report and will utilise ongoing consultation to continue to refine the scope for subsequent ELI reports.

We encourage AEMO to consider enhancing and evolving the report such that it includes information on where investments to provide system security services are required in the network since we have heard from stakeholders that this would be valuable.

Recommendation 4: Improve locational information

The Commission recommends AEMO continue to work with transmission network service providers (TNSPs) and market participants to improve the quality and timeliness of locational information to inform investors and other stakeholders through the annual Enhanced Locational Information Report, including by providing locational information on system security issues.

3.2.3 Improving the network capability component of the service target performance incentive can encourage low-cost network investment to alleviate pockets of congestion

The Commission recommends the AER continue to explore opportunities to improve the NCC of the STPIS so that it can continue to play a role in addressing congestion issues in specific locations in a cost-effective way.

As discussed in section 2.3.4, the AER is currently reviewing the NCC as part of its *Transmission STPIS Review: MIC and NCC* to consider its effectiveness in the context of the energy transition. [39]

In submissions to the AER's issues paper, most stakeholders expressed preferences for the NCC to be retained, but some consider it should be amended to encourage more projects. Some TNSPs want to amend the NCC to make participation optional, while consumer groups generally support the scheme and generators are supportive of retaining the NCC.[40]

The AER is considering changes to the scheme to improve the effectiveness of the scheme and maximise the delivery of high benefit projects. The Commission considers that improvements to the NCC would be valuable in incentivising efficient, low-cost transmission investment to alleviate impactful congestion issues as they arise.

The rationale of providing incentives to pursue low-cost solutions to improve the capability of the existing network, rather than high-cost capital augmentations, is likely to be of even greater benefit than when the scheme was introduced in 2012. Increasing connections of new generation to lower network capacity locations potentially creates new congestion. Improving capability of the existing infrastructure in a cost-effective way through this scheme will assist in delivering required investment to transition the power system.

While the priorities and challenges facing TNSPs and AEMO today are very different and there is a focus on large network projects through the ISP to underpin the transition, this does not negate the value that low-cost augmentations can provide in specific locations.

Over the 12 years since the scheme was introduced over 100 projects have been delivered. These projects have improved the capability of network elements that were congested by more than 8000MW in total, at a cost to consumers of $270 million. The number of projects in recent times, however, has fallen away. While minor augmentations may not get the same focus as ISP projects, we consider that they can improve the utilisation of existing infrastructure in a cost-effective way

39 AER, Transmission STPIS Review: MIC and NCC, Issues paper, 8 December 2023, found here.

40 Stakeholder submissions to the AER's review of the STPIS can be found here.

that will assist in delivering required investment to transition the power system. Some of these projects may open up areas of the grid with access to good natural resources, land, supportive hosting communities or other attributes that are equally important in delivering successful investments.

Recommendation 5: AER consider improvements to network capability component (NCC) of the service target performance incentive scheme (STPIS)

The Commission recommends the AER work with stakeholders, including through its review of the NCC component of the STPIS, to improve processes and incentives to identify and progress efficient, low-cost transmission augmentation projects that could alleviate local congestion.

3.2.4 Actively considering congestion impacts when designing and implementing schemes to underpin energy infrastructure could lead to more efficient use of the transmission network

The Commission recommends government schemes that underwrite new energy infrastructure, such as the CIS, should consider congestion impacts as a key factor when designing schemes and assessing and awarding contracts under them.

Government schemes that seek to underpin new investment in energy infrastructure are accelerating the deployment of large-scale renewable generation, storage and transmission in order to meet their emissions reduction and technology targets. If delivered effectively, these schemes will help deliver the investment required to transition the energy sector smoothly and quickly.

However, there is a risk that government-backed energy infrastructure, if not coordinated, can contribute to, rather than alleviate congestion in the system leading to inefficient outcomes and potentially hindering the achievement of dispatch or emissions reduction targets.

For example, as discussed in section 2.3.2, the Commonwealth is assisting in the delivery of renewable by underwriting the revenue of projects through the CIS. This has the potential to guide investment and improve investment efficiency, by supporting projects that would be most beneficial to the system as a whole. It also has the potential to bring on investment in generation, before there is adequate transmission infrastructure to get it to market.

The design of the CIS mitigates this risk through its eligibility and merit criteria. Among other things, the assessment for CIS projects includes consideration of a project's impact on the electricity system, including on congestion. The aim is to support projects that intend to locate in strong areas of the network or with a connection that is not likely to lead to material curtailment and/or congestion of its output and neighbouring renewable projects.

This should and is encouraging generators, storage and co-located plant to locate in areas where they will have less negative impact on system congestion and, in doing so, can help lead to more efficient use of the transmission network.

In the future, this may encourage intending investors not only to locate in less congested areas, but also to invest in assets that can operate in congestion-alleviating ways. For example co-located storage may already receive higher scores under current merit criteria given it can "soak up" renewable energy for free (ignoring round-trip losses) that would otherwise be spilled in the middle of the day, which would improve operational efficiency. This energy could then be dispatched at another time, contributing to the overall goal of reaching 82% renewables by 2030. In a similar vein, the current merit criteria, along with new rules that make it easier for generators

to charge behind the meter, may incentivise existing VRE generators to retrofit storage for the same reason.

Long-Term Energy Service Agreements (LTESAs) in NSW are another government project that should seek to include congestion impacts and benefits as a key consideration when assessing and awarding future projects. LTESAs provide revenue certainty for private investment in new renewable energy generation, firming and long-duration storage, LTESAs are part of the NSW Electricity Infrastructure Investment Safeguard, a framework to ensure orderly and efficient investment to meet the needs of the electricity system. The Commission is encouraged that one of the aims of the scheme is to ensure planning for the generation and firming capacity required in NSW will be undertaken in a structured and coordinated manner.

The Commission considers a proposed project's impact on system congestion to be an important factor to consider when Governments are designing schemes to underpin new energy infrastructure, and when assessing proposed projects under existing or future schemes.

We recommend a continued focus on this as future CIS tender processes drive more generation to connect to the grid to meet 2030 targets. If specific congestion issues arise that could be addressed or alleviated by adapting the CIS eligibility and merit criteria for future tender processes, the Commission notes the Commonwealth Government's ability to do so.

Recommendation 6: Governments to specifically consider congestion issues when designing and implementing schemes that underpin new energy infrastructure

The Commission recommends the Commonwealth Government through the CIS, and any other government schemes that underwrite new energy infrastructure, should consider congestion impacts as a key factor when designing schemes and assessing and awarding contracts under them.

3.3 Supporting efficient delivery of jurisdictional schemes is a practical way to underpin the investment needed to reach 2030 targets

The purpose of this review was to provide final recommendations to Energy Ministers on a design of the hybrid model that best meets the reform objectives. The Commission has recommended:

- not implementing the hybrid model of transmission access reform, given the Commission can not be confident that the benefits are sufficient to outweigh the costs given the introduction of jurisdictional schemes
- measures to support the efficient and effective delivery of jurisdictional schemes and coordinate investment in generation and transmission.

The AEMC will work with jurisdictions, market bodies and other relevant stakeholders to progress any recommendations agreed by the Energy Ministers.

The Commission has made its recommendations in the context of the transition to a net zero energy system which will require investment in a significant amount of transmission and generation capacity at an unprecedented rate. This is particularly important as the NEM replaces most of its ageing power stations over the next 20 years. The 2024 ISP includes a six-fold increase in grid-scale wind and solar capacity and 16-fold increase in storage capacity between 2024 and 2050.

The investment and regulatory landscape has changed significantly since the commencement of the latest round of access reform discussions. Government schemes are accelerating the deployment of large-scale renewable generation, storage and transmission in order to meet their emissions reduction and technology targets.

These schemes simultaneously provide locational signals, manage access to grid infrastructure and increase investment certainty for investors connecting within a REZ. REZ arrangements can provide additional value for investors but helping manage the interactions between energy, planning and environmental policy and social license issues, While there are risks and challenges in delivering REZ schemes effectively and efficiently, they are a practical way to coordinate and manage the scale and speed of investment in the period ahead.

The Commission considers efficiencies during the transition will be achieved through pragmatic rules that take into account the context in which they are operating.

We consider the long term interests of consumers is best-served by governments, participants and market bodies focusing on playing their part in delivering a smooth and timely transition.

A Making our recommendations

At the November 2023 Energy and Climate Change Ministerial Council meeting, Energy Ministers agreed to progress the agreed transmission access reform and congestion management through further design work, having considered advice from the EAP and stakeholder engagement.

The AEMC initiated a review to underpin this further design work by publishing Terms of Reference and project plan.

The purpose of this review was to provide final recommendations to Energy Ministers on a design of the hybrid model that best meets the reform objectives.

When considering the issues within this review, the Commission has considered the range of factors outlined in the Terms of Reference and project plan, and is also guided by the National Energy Objectives.

This chapter outlines:

- the National Electricity Objective (NEO) that guides all our work
- the assessment framework based on the objectives decided by the ESB in consultation with stakeholders and agreed by Ministers.
- the impact of the hybrid model on emissions given the changes to the NEO made in September 2023.

A.1 The Commission must act in the long-term interests of energy consumers

In conducting reviews, the Commission must have regard to the relevant energy objectives. For this review, the relevant energy objective is the National Electricity Objective (NEO).[41]

The NEO is:[42]

> to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system; and
>
> (c) the achievement of targets set by a participating jurisdiction—
>
> (i) for reducing Australia's greenhouse gas emissions; or
>
> (ii) that are likely to contribute to reducing Australia's greenhouse gas emissions.

The targets statement, available on the AEMC website, lists the emissions reduction targets to be considered, as a minimum, in having regard to the NEO.[43]

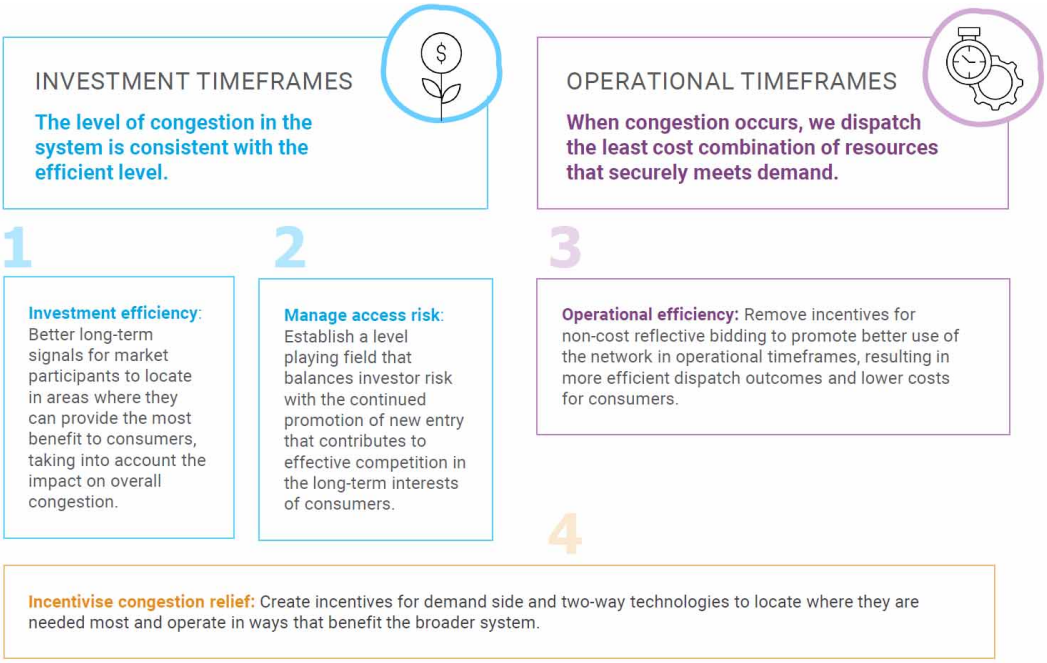
A.2 Five objectives have underpinned work on transmission access reform

The ESB, in consultation with stakeholders, developed four transmission access reform objectives which were agreed by Energy Ministers and are illustrated in Figure A.1 below:

41 Section 32 of the NEL.
42 Section 7 of the NEL.
43 Section 32A(5) of the NEL.

- **Investment efficiency:** Better long-term signals for market participants to locate in areas where they can provide the most benefit to consumers, taking into account the impact on overall congestion
- **Access risk:** Establish a level playing field that balances investor risk with the continued promotion of new entry that contributes to efficient competition in the long-term interest of consumers
- **Operational efficiency:** Provide incentives for cost reflective bidding to promote better use of the network in operational timeframes, resulting in more efficient dispatch outcomes and lower costs for consumers
- **Congestion relief:** Create incentives for demand side and two-way technologies to locate where they are needed most and operate in ways that benefit the broader system.

Figure A.1: Transmission access reform objectives



These reform objectives will provide benefits over investment timeframes as well as operational timeframes.

These objectives have underpinned the AEMC's work to progress development of the hybrid model and consider recommendations to Ministers on transmission access reform. Achieving these objectives would contribute to the NEO by promoting efficient investment in, and efficient operation and use of, electricity systems for the long-term interests of consumers and contributing to emission reduction targets.

We have also considered how our recommendations would impact on emissions reductions, given:

- emissions reduction was added to the national energy objectives in September 2023, after the ESB developed the reform objectives
- jurisdictional schemes, most predominantly state-REZ schemes and the CIS, have been introduced with the headline objectives of reducing emissions in the NEM. The introduction of

these schemes have changed the base case to which a hybrid model is compared in terms of emissions reduction.

Chapter 2 and chapter 3 discuss the rationale for our recommendations. In relation to each of the reform objectives, our recommendations are guided by the following:

- **Investment efficiency**: Jurisdictional schemes are seeking to promote renewable investment in generation and storage to help achieve the necessary scale of investment needed in the transition. Many are underpinned by formal gigawatt or generation proportion targets to provide certainty over the expected levels of investment. Jurisdictional REZs provide clear locational signals and are designed in a way that manages access to network infrastructure. The CIS includes merit criteria that encourage plants to locate in areas where they will have less negative impact on system congestion and, in doing so, can help lead to more efficient use of the transmission network.
- **Access risk:** Due to the scale of the transition, there are numerous factors in addition to access risk that are considered in participant investment decisions. While the market-based hybrid model would have reduced access risk, so too do state-based REZs for plants locating within the REZ using physical controls. Both approaches are valid ways to manage access, and given REZ schemes have already been, or are in the process of being, implemented, the additional benefits of a hybrid model managing access risk would be immaterial.
- **Operational efficiency:** While operational efficiency could be improved in the NEM, the Commission considers the potential benefits of the CRM to be uncertain, including the achievement of improved operational efficiency.
- **Congestion relief:** Similar to the above, the uncertainty around whether the benefits from the CRM would materialise mean that there are uncertainties about how this reform objective could be achieved.
- **Emissions reduction:** The hybrid model, specifically the CRM component, would theoretically increase the amount of low emissions electricity being dispatched in the NEM. This was estimated in the ESB's cost benefit analysis as emissions reductions of 23 million tonnes over 20 years, which can be quantified as a net benefit of $1.6 billion using the interim value of emissions reduction.[44] However, the Commission is uncertain about whether these emissions reductions would materialise given:
  - they are largely dependent on the level of participation in the CRM
  - stakeholders have suggested implementation of the hybrid model could negatively impact investment certainty and slow the transition more broadly.

In addition, the base case (against which implementation of the hybrid model must be compared in considering emissions impacs) has changed significantly with new jurisdictional emissions reductions/renewable energy, such as REZs and the CIS. The incremental emissions reduction achieved by the hybrid model may be expected to be much lower than the original cost-benefit analysis estimate, as well as being less certain, as noted above.

A coordinated and timely transition to a net-zero electricity system is in the long-term interest of consumers. The Commission considers efficiencies during the transition will be achieved through pragmatic rules that take into account the context in which they are operating. We also recognise the broader task of transitioning the NEM to net-zero by 2050 and the need to focus on other regulatory approaches that will help reduce emissions and deliver consumer benefits with more certainty and greater potential materiality.

44 The ESB's CBA found that the hybrid model would reduce emissions by 23 million, which the AEMC quantified in April 2024 based on the interim value of emissions reductions (found here). For more information on the CBA, refer to Appendix B of volume 2 of this final report.

B Government schemes to coordinate investment in generation and transmission

While the ESB, EAP and Commission have been considering the hybrid model as a way of providing better locational signals through access and pricing reforms, NEM jurisdictions have introduced policies and schemes that seek to drive reductions in emissions by coordinating, and in some cases funding, investment in renewable energy and transmission infrastructure. These schemes also seek to coordinate energy investment and planning with environmental and social licence approvals.

If implemented effectively, these policies and schemes can be a practical way to coordinate generation and transmission investment by providing locational signals to investors on where to build.

B.1 REZs are a planning tool used by governments to accelerate renewables development in a coordinated way

The NEM jurisdictions have sought to promote more coordinated development of generation, storage, and transmission. This is because existing access arrangements do not incentivise generators and storage facilities to locate and operate in a way that is most likely to minimise consumer costs. They have done this by establishing REZs and accompanying reforms within their regions. For instance, New South Wales, Queensland, Tasmania and Victoria are supported by state-specific REZ schemes. South Australia is pursuing REZ zones identified in the ISP under the national framework, such as the Mid North Renewable Energy Zone expansion, as well as building hydrogen generation through its Hydrogen Jobs Plan and the Hydrogen and Renewable Energy Act 2023.[45]

While the details for each state-specific REZ scheme differ, they all include the introduction of a physical access model that allocates a defined amount of transmission network capacity to new renewable generation and storage projects based on expected generation and load profiles.

Jurisdictional REZ schemes essentially modify the connection arrangements set out in the NER. A common feature is that jurisdictions, using REZ arrangements, can physically control who can connect to the transmission network at certain locations and the requirements for connection at that location. This then influences a plant's access to the transmission network. REZ frameworks facilitate connection in REZs and therefore the locational decisions of proponents can be largely driven by incentives to connect in REZs, rather than incentives in the national framework.

REZ schemes can also include mechanisms that enable a central body, which is often a designated REZ planning body, to control connections in and around REZ network infrastructure.

An overview of the access arrangements being developed and implemented by each jurisdiction, at this point in time, is provided below.

45 South Australia's *Hydrogen and Renewable Energy Act 2023* (HRE Act) is Australia's first dedicated licensing and regulatory system for large-scale hydrogen and renewable energy projects. The HRE Act introduces a mechanism for renewable energy development over government-owned, designated land (pastoral land, prescribed Crown lands and state waters) called release areas. The state government starts the release area process by working with Native Title groups and other landowners, representative organisations, communities and interest groups to identify areas of land that can sustainably host large-scale renewable energy development. Once a release area is declared, renewable energy companies will submit competitive tenders to develop large-scale renewable energy projects on the land. This will ensure only the most suitable projects are awarded access. The release area process will ensure development is strategic, sustainable, supportive of regional development objectives, and is the best use of the land, while co-existing with existing land uses.

B.1.1 New South Wales

New South Wales is the most advanced of the NEM jurisdictions in terms of implementing its REZ framework. Access schemes are a key part of the NSW Government's plan to coordinate and encourage renewable energy and storage investment in REZs and realise the objectives of the NSW Electricity Infrastructure Roadmap and the Electricity Infrastructure Investment Act 2020.

Access schemes, if declared, would introduce a target curtailment level within a REZ. Generation and storage projects that wish to connect to network infrastructure which is subject to an access scheme must apply for an access right – either through an application process or a competitive tender. Before being granted an access right, proposed projects will be assessed against a set of merit criteria, which includes an assessment of the impact of a proposed project is expected to have on the NSW electricity system, including on congestion. Access right holders will contribute access fees that include funds for community benefit and employment purposes in the region.

The NSW model also enables the inclusion of an access control mechanism as part of a REZ access scheme. The inclusion of an access control mechanism in a REZ access scheme would enable the REZ coordinator (EnergyCo) to control connections to specified non-REZ infrastructure. An access control could take a number of forms. For the CWO REZ, two implementation options were considered before EnergyCo decided not to include an access control: a requirement for projects seeking to connect to the access control network to participate in a merit evaluation through the competitive tender allocation process; and a separate additional 'do no harm' test.[46]

B.1.2 Queensland

Queensland is also relatively advanced in terms of implementing its REZ framework. Unlike models in other jurisdictions, the Queensland REZ has been designed as a market-led REZ approach. The market-led REZ model is characterised by Powerlink working with renewable generators to identify projects which are of a size and maturity to drive efficient development of REZs. The model promotes the appropriate allocation of risk and costs and is predominantly funded by the renewable generators connecting to the REZ.

Importantly, the infrastructure linked to REZs in Queensland will operate under a special access regime. Within a REZ, Powerlink has indicated that a level of curtailment could be 'planned' — that is, include a given curtailment envelope.

Outside a REZ, the model introduces the concept of 'REZ controlled assets'. These are assets that materially affect the capacity or functioning of the REZ (that are outside the REZ or inside the REZ but not part of the 'REZ transmission network') and that are identified in the REZ management plan. Powerlink will be able to control the connection of parties to these assets.

B.1.3 Tasmania

The Tasmanian REZ framework is less progressed than in other jurisdictions. Draft legislation from July 2024 includes instruction on coordination and governance roles and responsibilities associated with the planning, delivery, maintenance and operation of a REZ. It also includes a mechanism to declare a REZ and its physical boundaries, as well as an access scheme to limit connections in a REZ and provide revenue certainty for REZ projects. Additionally, REZ projects would contribute to a regional community benefits fund, which could be used to support projects in local communities, address local issues, or provide financial benefits to residents.

46 EnergyCo, CWO REZ Access Rights and Scheme Design: Positions Paper, July 2022.

B.1.4 Victoria

The Victorian REZ model has been finalised as part of a new, broader, Victorian access regime which will apply to new energy generation projects seeking to connect to Victoria's transmission network. In addition to each REZ being subject to its own REZ access scheme, some features of the new access regime will apply across Victoria's Declared Shared Network — that is, outside Victoria's REZ.[47]

The REZ access scheme will place a cap on connections (known as an access limit) within a REZ up to the efficient network hosting capacity. Access will be granted in accordance with the process set out in the REZ access scheme which may be on a first-ready first-served basis, via a tender process, or a hybrid approach. To be granted access, proposed projects will need to meet the access conditions specified by the REZ access scheme.

REZ generators will also be protected from excessive network curtailment arising from new generator connections outside REZs through the requirement for generation projects seeking connection outside a REZ to undergo a grid impact assessment, which is designed to preserve the integrity of the REZ.

B.2 Government policies and schemes can be delivered effectively if risks and challenges are mitigated

Stakeholders have argued that the need for, and benefits of, the proposed transmission access reforms are mitigated by the range of recent government policies, including the CIS and state-specific REZ schemes. Stakeholders have argued that these policies and schemes, when combined with existing locational signals in the NEM (including the risk of network curtailment), provide sufficient locational signals to investors, meaning that the proposed transmission access reform is unnecessary.

Jurisdictional policies and schemes, which help to coordinate investment in renewable generation and storage with transmission infrastructure, provide a practical way to coordinate and manage the scale and speed of investment required to deliver net zero. These government policies and schemes can be delivered effectively if risks and challenges are mitigated.

When considering whether these policies and schemes address some of the inefficiencies in the existing market design, it is important to be clear that the state-specific REZ schemes and the CIS do not attempt to modify the dispatch process operated by AEMO using NEMDE. This means that the dispatch or operational inefficiencies present in the existing national market design are not addressed by the state-based access regimes or the CIS.

In terms of investment, assuming that REZ networks are sized efficiently and access to REZ networks is assigned efficiently, these policies and schemes may help to address the lack of locational investment incentives under the current framework. By using physical access schemes to centrally coordinate generation and transmission investment, a subset of generators will be able to access network capacity within a pre-defined geographic area. In theory, this allows the optimal mix of generation resources to be assigned to the available REZ transmission capacity, while also offering generators within the REZ an advantage over uncoordinated participants who risk greater congestion uncertainty via open access arrangements.

47 This differs from the REZ access schemes implemented (or proposed) in the other jurisdictions which enable the control of connections in and around REZs, but not broadly across the network.

There are a range of risks and challenges to the efficient, effective delivery of REZs and other government schemes. These are explained below and can be mitigated through careful design and implementation of government schemes

Although governments may take congestion on the shared system in to account when developing REZs, this does not provide rights to access the shared system and generators remain subject to congestion and curtailment outside REZs. This means that in practice, generators within a REZ can face congestion risks from non-REZ generators locating close by who may be able to cannibalise them. Where this is allowed to occur, projects located in the REZ would have no advantage in dispatch compared with those located outside the REZ. State-specific REZ schemes have attempted to deal with this issue by including mechanisms that enable a central body to control connections in and around a REZ, where those connections may have a material impact on generators connected within the REZ. These access control mechanisms are challenging to implement in meshed networks (where identifying specific infrastructure and associated impacts is challenging) and are unlikely to be effective in circumstances where REZ generators are competing with generators located on different sides of a regional boundary (i.e. in different jurisdictions).

Several jurisdictional REZ schemes include these mechanisms, however they have not yet been tested in practice. For example in NSW (the jurisdiction that is most advanced in implementing its REZ scheme), neither the Central-West Orana nor South West REZ access schemes include controls that manage connections to network infrastructure which may affect the access of REZ generators but is outside of the infrastructure identified in the REZ declaration.

Further, the effectiveness of these mechanisms as a tool to facilitate efficient investment outside REZs is reliant on the accuracy of the REZ coordinators planned approach and modelling to deliver efficient outcomes. This is not without its challenges and places the risks and costs associated with inefficient decisions on governments or consumers.

In terms of flexible demand including storage, the state-specific REZ schemes do not currently incorporate additional incentives for storage to mitigate congestion. As per the current national arrangements, storage is incentivised to discharge at times of high prices in line with other generators, and so is unlikely to offset the use of REZ network capacity during periods of high demand. Even if batteries are encouraged in REZs or through the CIS, in the absence of coordinating charging and discharging with other generators (such as assets co-located behind the meter), they could exacerbate rather than alleviate congestion.

In terms of the CIS, the inclusion of an assessment criterion focused on impacts on the electricity system, including congestion, is likely to provide an incentive for generators wishing to participate in the CIS to locate in areas where they will have less negative impact on system congestion. It should encourage generators to consider their impact on the overall electricity system, not just their individual output and, in doing so, can help lead to more efficient use of the transmission network.

However, the success of the CIS as a locational signal is reliant on a central party (the tender body) successfully modelling the impacts that new generators seeking a CIS agreement may have on the network. This is an inherently complex task and is likely to be more difficult in meshed areas of NEM and as more variable renewable generation enters the system. The risks and costs of any errors and inaccuracies will be ultimately borne by consumers.

Generators are under no obligation to participate in a CIS tender, so it does not provide a complete solution to investment efficiencies in the NEM and the Commonwealth Government does not, at this stage, intend to run CIS tenders beyond 2027, meaning it does not provide an enduring

solution to investment inefficiencies in the NEM. Except for limited performance requirements, the CIS does not currently impose operational requirements on projects that would address operational inefficiencies.

Given these risks and challenges, we consider that it will be important for jurisdictions to monitor the delivery of these policies and schemes, and collaborate on ways to address the risks and challenges outlined above, such as inefficient outcomes arising from their design and operation in an interconnected system and national electricity market.

Abbreviations and acronyms

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
BPF	Bid price floor
CBA	Cost benefit analysis
CIR	Congestion Information Resource
CIS	Capacity Investment Scheme
CMM	Congestion Management Model
COAG	Council of Australian Governments
COGATI	Coordination of generation and transmission investment
Commission	See AEMC
CRM	Congestion relief market
CRMP	Congestion relief market price
DP	Dispatch priority
DUID	Dispatchable Unit Identifier
EAP	Energy Advisory Panel
ECMC	Energy and Climate Change Ministerial Council
ELI	Enhanced Locational Information
ERIG	Energy Reform Implementation Group
ESB	Energy Security Board
FCAS	Frequency control ancillary service
FTR	Financial transmission right
GTUOS	Generator transmission use-of-system
IESS	Refers to the *Integrated Energy Storage Systems in the NEM* rule change
IRSR	Inter-regional settlement residue
ISP	Integrated System Plan
LMP	Locational marginal price
MCE	Ministerial Council on Energy
MFP	Market floor price
MLF	Marginal loss factor
MNSP	Market network service provider
NCC	Network capability component - part of the STPIS
NCIPAP	Network capacibility incentive parameter action plan
NECA	National Electricity Code Administrator
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NEMDE	National Electricity Market Dispatch Engine
NEO	National Electricity Objective

NER	National Electricity Rules
NMAS	Non-market ancillary service
NNO	Non-network option
NSP	Network service provider
OFA	Optional Firm Access
PASA	Projected Assessment of System Adequacy
PPA	Power purchase agreement
QNI	Queensland-NSW Interconnector
RERT	Reliability Emergency Reserve Trader
REZ	Renewable energy zone
RRN	Regional reference node
RRP	Regional reference price
SRA	Settlement residue auction
SRMC	Short-run marginal cost
STPIS	Service Target Performance Incentive Scheme
TNSP	Transmission network service provider
TUOS	Transmission use-of-system
TWG	Technical working group
VNI	Victoria-NSW Interconnector
VRE	Variable renewable energy
WTA	Winner-takes-all