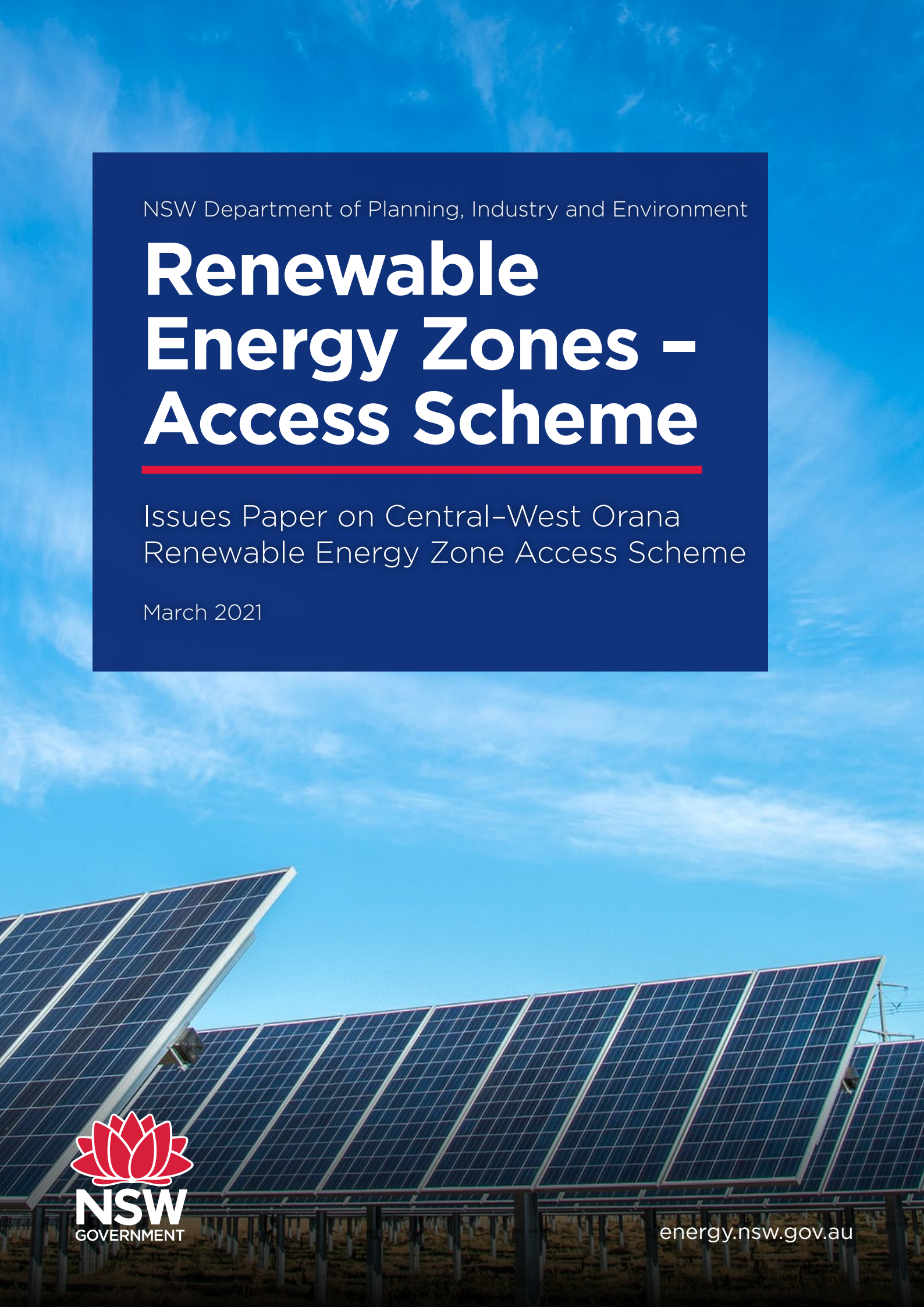
NSW Department of Planning, Industry and Environment

Renewable Energy Zones – Access Scheme

Issues Paper on Central–West Orana Renewable Energy Zone Access Scheme

March 2021



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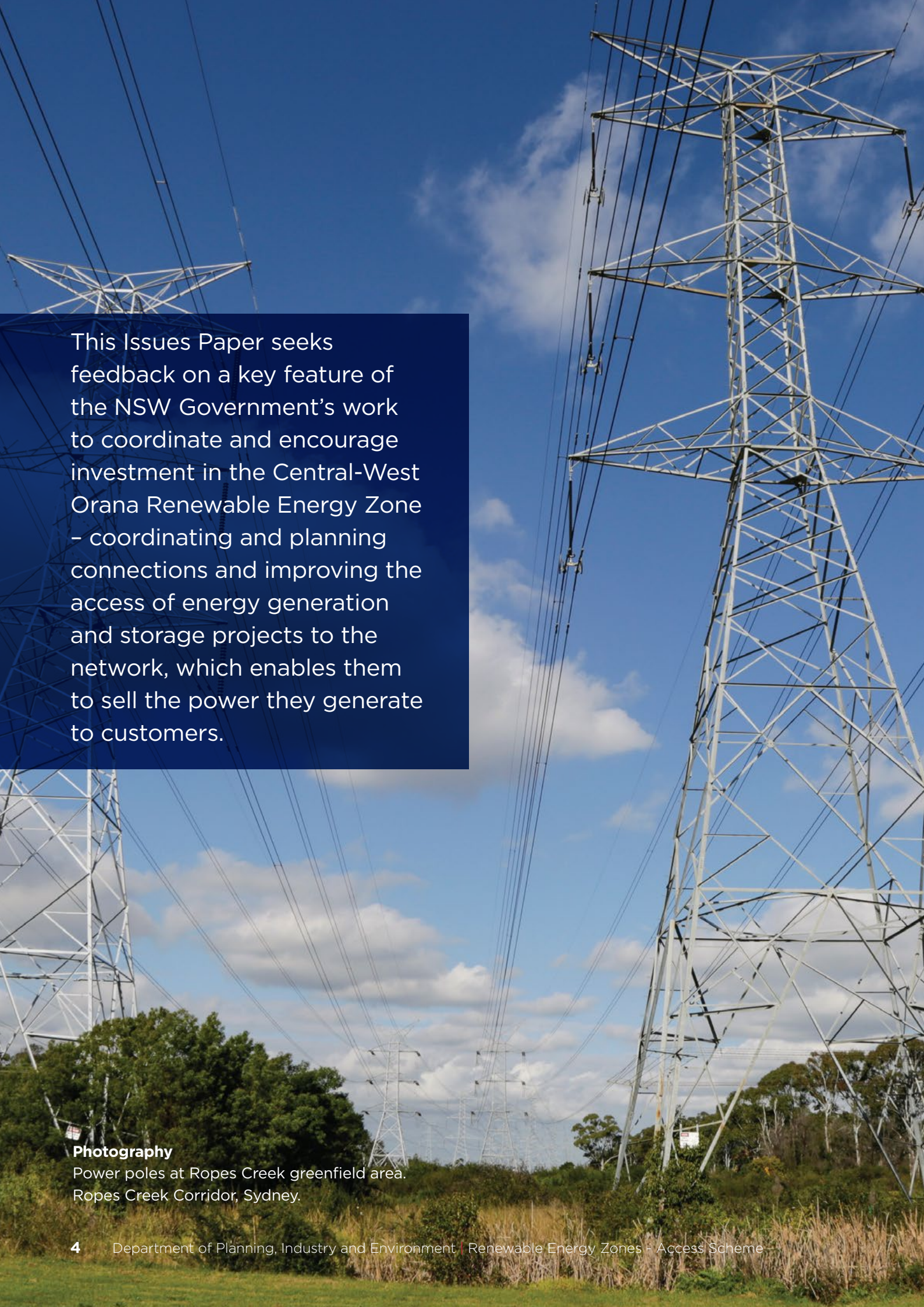
Photography
A wind farm near the town of Dalgety, NSW.



This Issues Paper seeks feedback on a key feature of the NSW Government's work to coordinate and encourage investment in the Central-West Orana Renewable Energy Zone – coordinating and planning connections and improving the access of energy generation and storage projects to the network, which enables them to sell the power they generate to customers.

Photography
Power poles at Ropes Creek greenfield area.
Ropes Creek Corridor, Sydney.

Section 1: Executive Summary

The November 2020 Electricity Infrastructure Roadmap (the Roadmap) describes how the NSW Government plans to develop our world–class renewable energy resources, modernise the State's electricity system and provide NSW consumers with a more affordable, reliable, secure and sustainable electricity supply.

The Roadmap is being implemented under the *Electricity Infrastructure Investment Act 2020* (the Act). The Act specifies the bodies and rules under which the Roadmap will be implemented, including the coordinated development of five or more Renewable Energy Zones (REZs), involving large–scale wind and solar farms, transmission and distribution lines, electricity storage and firming infrastructure. This coordination is essential to ensuring timely and efficient development of new energy infrastructure, that this infrastructure is built in locations where communities want it and that benefits are equitably shared with host regions. The Energy Corporation of NSW (EnergyCo) will lead the coordination of REZs, taking a holistic view of REZ planning and consultation to ensure the benefits of coordination are realised.

The Central–West Orana REZ (CWO REZ) will be the first REZ to be developed, with an intended network capacity of 3,000 megawatts (MW). The NSW Government has committed over $40 million to the planning and delivery of the CWO REZ, and in June 2020 ran a registration of interest process for the REZ which drew proposals from over 27,000 MW of new energy generation and storage projects – nine times the amount required to deliver the REZ. The NSW Government is also working with TransGrid, the State's transmission network planner and operator, to design and develop new network infrastructure in the REZ. TransGrid has commenced consultation on the CWO REZ Transmission Study Corridor and the project has been declared Critical State Significant Infrastructure. Separately, the NSW Government has commenced a comprehensive on–the–ground consultation program to hear from the community how the REZ can best reflect local priorities.

This Issues Paper seeks feedback on a key feature of the NSW Government's work to coordinate and encourage investment in the CWO REZ under the Act – coordinating and planning connections and improving the access of energy generation and storage projects to the network, which enables them to sell the power they generate to customers. Under current arrangements, a lack of coordination between generation, storage and network investment creates two main challenges for investment.

First, investors cannot commit to build new energy generation and storage projects if the electricity grid does not have enough capacity left to transport the power they propose to produce – but network companies cannot be certain to recover the full cost of upgrading the network, to enable new energy generation and storage projects to connect, unless these projects are committed to be built. This 'chicken and egg' problem will be addressed by the Act's provisions for authorising and directing the construction of network infrastructure, while ensuring electricity consumers only pay the efficient costs of these network upgrades.

Second, access to the grid by generation and storage projects is not coordinated, planned or restricted. This means that energy generation and storage projects which connect early in the development of a REZ, when the grid has enough capacity to send their full output to market, may find their access progressively reduced as other projects connect later in the same REZ. The power produced by those later projects may cause bottlenecks or 'constraints' in the grid which prevent the early connecting projects from sending their full output to market. Because projects have no control over this risk, it reduces their appetite to invest.

The focus of this Issues Paper is on addressing the second of these challenges. The Act empowers the Minister to declare an access scheme that would govern whether energy generation and storage projects can connect to specified network infrastructure in the REZ, and how they may use that infrastructure.

It is proposed that under an access scheme the NSW Government would run a process to allocate access rights to the new network infrastructure in the REZ (REZ Shared Network), including planning the connection of energy generation and storage projects to optimise the energy system benefits of the REZ and help ensure that infrastructure in the REZ minimises impacts on local communities. Generators would pay an access fee to connect to the REZ Shared Network which would include a component to support community and employment initiatives, per the Act.

Arrangements would be put in place under the access scheme to provide energy generation and storage projects with greater certainty over the risk of constraints in the grid. This paper describes three models for these arrangements for the new network infrastructure in the CWO REZ and seeks feedback on them.

- **The first model (Option 1: Limited physical connection)** would prevent potential projects from connecting to the network in a REZ beyond a specified threshold, where that would reduce the access of existing projects.
- **The second and third models (Options 2A and 2B)** would enable projects to purchase priority rights to access the grid ('Tier 1'), and non–priority rights ('Tier 2'). A project that holds Tier 2 rights would be required to financially compensate a project holding Tier 1 rights for income losses which are caused by the Tier 2 rights holder constraining the Tier 1 rights holder from accessing the network in the REZ. These models would also place an overall limit on the right of projects to connect.

Option 2A (Financial compensation) would provide the same amount of access for all times of day, whereas **Option 2B (Enhanced financial compensation)** would allow that access amount to vary at different times of day.

Option 1 is designed to allow projects to have greater visibility and certainty of their access to the network so should enhance their confidence to invest. It is also simpler as it does not require financial transfers between projects. However, placing a regulated physical limit on the connection of energy generation and storage projects increases the risk that the network infrastructure is used less efficiently because there are a greater number of instances where the power being transported through the system is less than it can handle.

Options 2A and 2B are designed to increase the utilisation of the network (relative to Option 1) by allowing a greater amount of energy generation and storage to access the network, while still providing certainty of output and earnings for Tier 1 projects. Option 2B is intended to make more efficient use of the network than Option 2A by varying access levels by time of day. A possible disadvantage of both options is the complexity of financial transfers between projects.

This paper seeks feedback from the energy industry, investors, consumer representatives and other interested stakeholders on which of these models should be progressed to implement an access scheme in the CWO REZ, and any changes that should be made to make the model most effective. The feedback provided will support the identification of a preferred access scheme model and help ensure the model supports the NSW Government's objective of encouraging and coordinating generation, storage and network investment in the CWO REZ.

Section 2: Context, purpose and scope of paper

Context

The NSW Government is acting to secure a reliable, affordable and sustainable electricity future and to set our State up as a modern, global, energy superpower. The Government is supporting investment in the generation, long-duration storage, network and firming infrastructure needed to deliver this future. This investment will allow NSW to capitalise on significant opportunities to grow the economy, support jobs, and attract major new industries.

The NSW Electricity Infrastructure Roadmap, published in November 2020, sets out an integrated 'whole of system approach' to attract and secure investment in new electricity infrastructure. Central to the Roadmap is delivering Renewable Energy Zones by encouraging and coordinating investment in new network, generation, long-duration storage and firming infrastructure.

The Roadmap is supported by its enabling legislation the *Electricity Infrastructure Investment Act 2020*. Under the Act, the development of the REZs will include:

- appointing an Infrastructure Planner, to coordinate delivery of energy infrastructure in REZs including assessing and recommending the development of network infrastructure projects in REZs. EnergyCo will be the Infrastructure Planner for the Central-West Orana, New England, South West, Hunter-Central Coast and Illawarra REZs.
- appointing a Consumer Trustee to implement the Electricity Infrastructure Investment Safeguard (the Safeguard), by planning the development pathway for energy infrastructure investment and conducting tenders to award Long Term Energy Service Agreements (LTESAs); and authorise or recommend ministerial directions to build network infrastructure projects in REZs, on advice of the Infrastructure Planner.
- declaring REZ access schemes. The body responsible for administering the access scheme will be appointed in the declaration but is referred to as the REZ Administrator throughout this document.

The Roadmap builds on the 2018 NSW Transmission Infrastructure Strategy and 2019 NSW Electricity Strategy (the Strategy), including the NSW Government's commitment to develop a 3,000 MW REZ in the Central-West Orana region. Since the Strategy's release, the NSW Government has been working to design and implement key elements of the REZ, in line with its target of delivering a 'shovel-ready' Central-West Orana REZ by the end of 2022.

The NSW Government has committed over $40 million to the planning and delivery of the CWO REZ, and in June 2020 ran an industry registration of interest process for the REZ which drew proposals from over 27,000 MW of new energy generation and storage projects – nine times the amount required to deliver the REZ. The NSW Government is also working with TransGrid, the State's transmission network planner and operator, to design and develop new network infrastructure in the REZ. TransGrid has commenced consultation on the CWO REZ Transmission Study Corridor and the project has been declared Critical State Significant Infrastructure. Separately, the NSW Government has commenced a comprehensive on-the-ground consultation program to hear from the community how the REZ can best reflect local priorities.

This Issues Paper seeks feedback on models for implementing an access scheme in the CWO REZ (CWO REZ Access Scheme). An access scheme in the CWO REZ will address key barriers to investment in new generation and storage infrastructure under current arrangements. Under the current 'open access' rules in the National Electricity Market (NEM), access to the grid by generation and storage projects is not

coordinated, planned or restricted. This means that energy generation and storage projects which connect early in the development of a REZ, when the grid has enough capacity to send their full output to market, may find their access progressively reduced as other projects connect later in the same REZ. Currently, the early connectors are unable to secure access rights that allow them to manage this risk, reducing investment confidence and raising the cost of capital. Greater planning and coordination of connection in REZs will also support scale–efficient and streamlined delivery of generation, storage and network infrastructure, and improved outcomes for local communities.

It is proposed that the access scheme will authorise or prohibit access to, and use of, the specified network in the REZ by network operators and operators of generation and storage infrastructure.[1] It will enable the REZ Administrator to run a process to allocate access rights and define the rights of parties to access and use the network once connected. It would also provide greater certainty for energy generation and storage projects in the REZ of their access to the REZ Shared Network to the point at which the REZ Shared Network connects to the existing transmission network, but not beyond this point.

While for the CWO REZ, the REZ Shared Network will form part of the transmission network, distribution networks will also play an important role in the success of the CWO REZ Access Scheme and REZs more generally. Technical analysis to identify the interactions between distribution and transmission networks in REZs will be essential to designing and implementing REZ Access Schemes. The NSW Government will also explore ways of maximising the efficiency of generation, storage and load connection across both transmission and distribution networks in NSW REZs. Distribution level initiatives could also play an important role in delivering benefits to REZ host regions.

There are a number of reviews underway by energy market bodies which are relevant to the design and implementation of the CWO REZ Access Scheme. The NSW Government is consulting closely with the Energy Security Board (ESB) on its REZ Stage 2 Consultation Paper, and Post 2025 Workstream (see 'Alignment with ESB REZ Stage 2 and Post 2025 workstreams' below) and the Australian Energy Market Commission (AEMC) on relevant rule change requests including the Dedicated Connection Assets (DCA) rule change request (ERC 0294), and efficient management of system strength on the power system rule change request (ERC 0300).

The Minister's discretion to declare an access scheme will facilitate the implementation of bespoke access schemes in NSW REZs, which may depart from NEM network access arrangements where necessary. However, the NSW Government continues to support the development of national reforms which can deliver timely investment in electricity infrastructure in NSW at the scale required.

1 s24(2) of the *Electricity Infrastructure Investment Act 2020*

Purpose and scope

This Issues Paper outlines three potential models for the CWO REZ Access Scheme and seeks stakeholder feedback on these models and other aspects of the framework. Stakeholder feedback on these issues will be used to inform recommendations for the declaration of the CWO REZ Access Scheme. The NSW Government is seeking stakeholder feedback on which of the proposed models to adopt and any changes that could be made to improve the proposed models.

The Issues Paper also seeks feedback on two additional opportunities for the NSW Government to play a coordinating role in the CWO REZ – coordinating the development of common connection assets and improving connection processes.

The implementation of each of the proposed access scheme models will involve a process to allocate access rights. This will allow projects to be assessed on their merits, including social impacts and local economic benefits, and optimisation of the technology mix in the REZ to support the efficient utilisation of the REZ Shared Network. In return for greater certainty over their access to the network, energy generation and storage project proponents would be required to pay a fee to access the network. The models by which this greater certainty is provided is the focus of this access paper. The NSW Government is undertaking further design work on the process for allocating access rights and setting access fees, including integration with the process for allocating LTESAs. These matters are out of scope for the purposes of this paper, but further information will be available on these matters later in 2021.

Other mechanisms under the Roadmap to support new generation and storage projects connecting in the CWO REZ are out of scope for this Issues Paper. This includes the Electricity Infrastructure Investment Safeguard.

Electricity Infrastructure Investment Safeguard

The NSW Government has established the Safeguard to support timely investment in optimal mixes of renewable generation, storage and firming infrastructure. Under the Safeguard, Long Term Energy Services Agreements (LTESAs) will be awarded through a competitive process to reduce investor risk and encourage investment. LTESAs will target projects within REZs but will also be available to 'outstanding' projects outside the REZs. LTESAs will be financial contract arrangements that give projects the option to access a competitively set minimum price for their energy services.

The CWO REZ Access Scheme will be complementary to the Safeguard. By providing multiple opportunities for projects to reduce risks and uncertainty, the NSW Government is putting downward pressure on project costs and ultimately reducing costs for NSW consumers. The processes for allocating access rights and LTESAs will be coordinated to ensure those projects seeking LTESAs in REZs have sufficient access rights, to minimise complexity for participating projects and to ensure that the outcomes of both processes maximise value to consumers.

A key objective of the implementation of NSW REZs is delivering meaningful benefits to regions that host REZ infrastructure. While the CWO REZ Access Scheme will play a key role in funding initiatives for community and employment purposes via access fees, feedback is not sought on these initiatives in this Issues Paper. These initiatives will be developed separately in close consultation with local communities.

Photography
Workers during set up at Moree Solar Farm. Moree, NSW.
Image courtesy of Neil Fenelon, Department of Planning, Industry and Environment.

Delivering benefits to local communities

EnergyCo will be responsible for leading on the ground delivery of the CWO REZ. As part of this it will take a holistic view of REZ planning and consultation and will work with communities to ensure the benefits of investment are equitably shared with host regions.

The development of REZs will support jobs and investment, help drought-proof farming communities by providing host landowners with an alternative income stream, deliver financial contributions through community enhancement funds and bring flow-on benefits like infrastructure upgrades such as improvements to roads.

Distribution-level initiatives will also likely play an important role in delivering regional benefits and will be explored further by the NSW Government in partnership with distribution networks. Potential initiatives could include community battery projects, standalone power systems, improved telecommunications infrastructure capacity and electric vehicle charging stations.

The NSW Government has recently commenced a comprehensive program of on-the-ground consultation with local communities in the CWO REZ and is working with local stakeholders and program partners to develop community benefit sharing models that ensure the economic benefits of the REZ are equitably distributed across communities.

Alignment with ESB REZ Stage 2 and Post 2025 workstreams

On 5 January 2021, the ESB released a consultation paper on stage 2 of its interim REZ framework. The purpose of the ESB's paper is to set out options for how REZs could be implemented in the near term, addressing the questions of how to establish a REZ, and how to maintain a REZ once it is established. Consultation closed on 12 February 2021. The ESB will make recommendations to Energy Ministers on stage 2 in April 2021.

The models set out in this Issues Paper have a degree of alignment with Options 1 and 2 in the ESB REZ stage 2 consultation paper. Where this alignment arises, it is described in further detail under the description of the models in Section 6.

This Issues Paper seeks stakeholder input on more detailed design characteristics of the CWO REZ Access Scheme models. This is needed to progress the NSW Government's work to deliver a 'shovel-ready' CWO REZ by the end of 2022. Stakeholder feedback on this Issues Paper will inform the NSW Government's development of a fit-for-purpose CWO REZ Access Scheme which could inform subsequent access schemes for REZs across NSW and the NEM.

Where stakeholders have made submissions to the ESB's Stage 2 consultation, these submissions may also be relevant to this process and could be provided in response to the questions in this Issues Paper. However, targeted responses to the specific models and questions raised in this Issues Paper are encouraged, as this will support the NSW Government in more effectively designing the CWO REZ Access Scheme.

The ESB will also soon release an Options Paper on its Post 2025 Market Design work, including options for medium-term NEM-wide access reform.

The NSW Government will continue to work closely with the ESB, and submissions to both the NSW and ESB processes will inform further design work on the CWO REZ Access Scheme.

Submissions

The NSW Government invites written submissions from all interested parties on the models and questions set out in this Issues Paper. The closing date for submissions is 5pm on Friday, 30 April 2021.

Please note that providing submissions is entirely voluntary, is not assessable, and will in no way impact an entity's participation in, or be used in the assessment of, any future procurement or competitive process in regard to the Safeguard, CWO REZ or other NSW Government programs.

The NSW Government is committed to an open and transparent process. Except where explicitly requested by the participant, all submissions will be made publicly available on the Department of Planning, Industry and Environment's (Department) REZ website. If a submission author regards any content of their submission as revealing protectable, corporate intellectual property, they should clearly note and define this in their submission. In the absence of an explicit declaration to the contrary, the Department will assume that information can be made public.

Please ensure you specify whether your submission should be anonymous and/or confidential in your response. The submission response template includes fields requesting this information. All submissions will be made publicly available on the Department's website unless a submission author indicates a preference for confidential treatment.

The Department may disclose appropriate confidential information provided by you to the following parties:

- the NSW Minister for Energy and Environment or Minister's office
- the NSW Ombudsman, Audit Office of NSW or as may be otherwise required for auditing purposes or Parliamentary accountability
- directly relevant DPIE staff, consultants and advisers
- other parties where authorised or required by law to be disclosed.

Unless explicitly requested by you, the Department may disclose appropriate confidential information provided by you to the following parties:

- the Australian Energy Market Operator (AEMO), Australian Energy Market Commission, Australian Energy Regulator, and the Energy Security Board
- TransGrid, the Clean Energy Finance Corporation and the Australian Renewable Energy Agency
- Essential Energy, Endeavour Energy and AusGrid

Where the Department discloses this information to any of these parties, it will inform them that the information is strictly confidential. The Department will otherwise only disclose confidential information provided by you with your consent. The Department may publish or reference aggregated findings from the consultation process in an anonymised way that does not disclose confidential information.

Participants should also be aware that provisions of the *Government Information (Public Access) Act 2009 (NSW)* may apply to any documents submitted (and information should be submitted on that basis) and also to any summary report compiling key information and feedback.

Written submissions should be provided as documents that can be published on the Department's REZ website. To help us consider your submission, please set out your responses against the consultation questions identified in each section of this Issues Paper. You may wish to respond to some or all the questions raised.

Next steps

In addition to inviting submissions, the Department will conduct targeted engagement with representative stakeholders and hold a public webinar on the Issues Paper.

Following consultation, the NSW Government will draw on the feedback from stakeholders to help identify a preferred model for the CWO REZ Access Scheme. A timeline for the steps in this consultation process is included below.

Dates	Key milestone
22 March	Issues Paper published
15 April	Open invitation webinar
30 April	Consultation closes

Photography
Solar panels at Moree Solar Farm. Moree, NSW. Image courtesy of Neil Fenelon, Department of Planning, Industry and Environment.

Section 3: CWO REZ key features

The key features of the CWO REZ are outlined below to provide stakeholders with sufficient context to help inform their responses to this Issues Paper. The NSW Government encourages stakeholders to consider the specific context of the CWO REZ in providing feedback.

Physical features of the CWO REZ

The CWO REZ is expected to have the following physical features:

- 3,000MW network capacity.
- Connection of both generation and storage projects; may also connect load, including distribution load.
- 330 kV transmission line backbone loop, with 500 kV sections.
- Two or three boundary points at which the REZ Shared Network connects into the existing shared network owned and operated by TransGrid.
- Substations and switching stations that can be hubs, where multiple private connection assets (Dedicated Connection Assets (DCAs) and Third Party Identified User Shared Assets (IUSAs)) could connect into the REZ Shared Network.[2]
- Potential for common, privately funded storage and connection assets to be developed by generators or other investors (DCAs and Third Party IUSAs). Section 7 of this paper includes proposed principles for how consistency between access policies on common connection assets and the CWO REZ Access Scheme could be achieved.

In delivering the CWO REZ, consideration will be given to ways to maximise the efficient connection of generation, storage and load across the REZ Shared Network and distribution network in the REZ, to reduce whole–of system costs.

Delivery features

- The CWO REZ Shared Network is expected to be to be 'shovel–ready' by the end of 2022.
- The *Electricity Infrastructure Investment Act* 2020 will apply to its delivery.
- The NSW Government has committed over $40 million funding to the planning and delivery of the CWO REZ.
- The Commonwealth Government has committed financial support for TransGrid under the NSW and Commonwealth Government's $2 billion Memorandum of Understanding on energy and emissions reduction.
- Up to $5 million funding has been approved by the Australian Renewable Energy Agency (ARENA), as part of a $16.2 million feasibility and detailed scoping study, led by TransGrid.

As noted above, the CWO REZ Access Scheme will apply between the point of connection for projects to the CWO REZ Shared Network and the point at which the CWO REZ Shared Network interconnects with the existing shared network (the REZ Shared Network boundary points). It is not proposed to protect generators from being constrained off due to technical or market constraints beyond the boundary points of the CWO REZ Shared Network or the impact of projects connected outside the REZ Shared Network.

2 The AEMC is currently reviewing the framework under the National Electricity Rules (NER) that applies to DCAs with a proposal to move to a new framework involving replacing the concept of large DCAs with a framework for designated network assets that treats transmission lines of 30km or more in length that are funded by market participants as part of the transmission network, rather than connection assets. This Issues Paper assumes the current framework, but any CWO REZ Access Scheme will take into account potential changes to the NER. The AEMC DCA draft determination can be found here: https://www.aemc.gov.au/rule-changes/connection-dedicated-connection-assets

Figure 1: Map of the REZ Transmission study corridor for the CWO REZ.

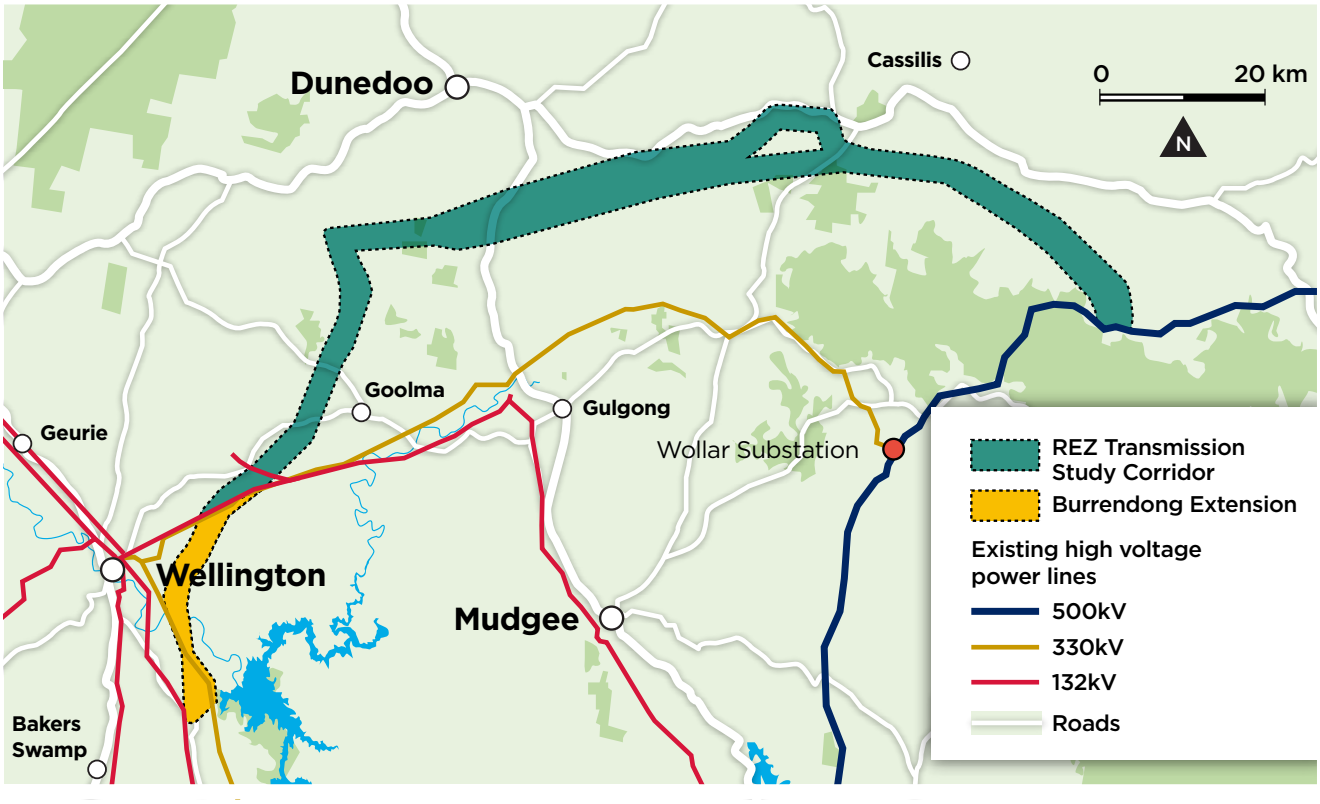
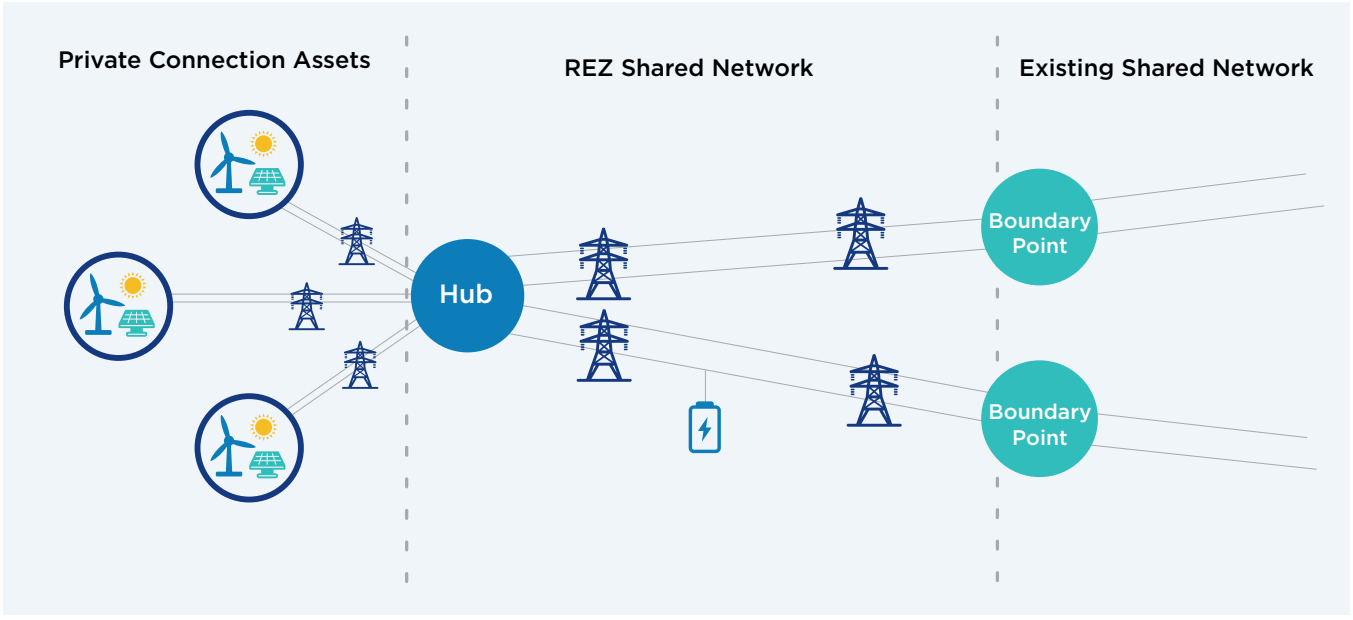


Figure 2: Indicative diagram illustrating the relationship between components of the CWO REZ.



Section 4: CWO REZ Access Scheme objectives

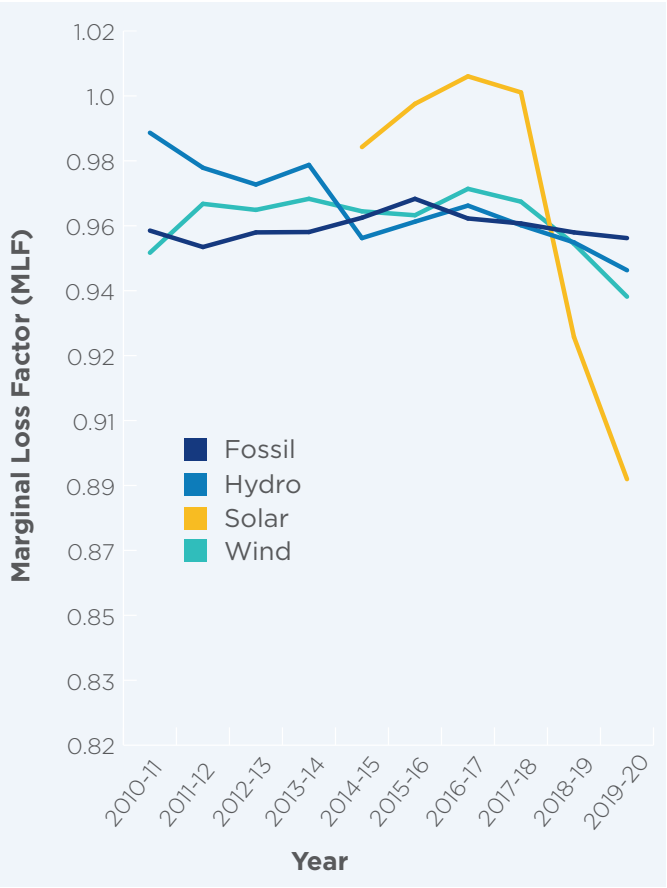
Generators in the NEM currently connect to the network under 'open access' arrangements. Under these arrangements, any generator has a right to negotiate connection to the network, subject to meeting certain technical requirements. However, the network is planned to meet the requirements of electricity consumers for reliable supply and connected generators have no guarantee of access to uncongested capacity on the network to export their output to the market. Accordingly, generators do not have to pay shared network access or use fees.[3]

The current NEM network access arrangements create challenges for coordination of investment in generation and new network infrastructure. This has become a major source of uncertainty and risk for connecting projects, pushing up costs for projects and electricity prices for consumers.

This is because under the current open access arrangements:

- revenue uncertainty for generation projects has increased as a result of higher congestion and marginal loss factor (MLF) risk on the shared network in areas where more generation projects have connected than the network has capacity to support. This has arisen either due to poor forecasting of congestion or a lack of transparency and coordination around the identity and type of subsequent generators connecting;
- new renewable generation projects have had their connection delayed or output significantly curtailed due to system security issues, which are exacerbated by a lack of shared network capacity; and
- generation projects have no incentive to fund shared network improvements because if a generator funds network improvements other 'free rider' competitors may subsequently increase shared network congestion and losses, while benefiting from the investments made by other generators without themselves contributing to the cost of the improvements.

Figure 3: Generation-weighted average MLF In the NEM



3 Generation and storage projects do have to pay the upfront and any ongoing costs of their connection to the existing shared network (such as the cost of connection assets and costs associated with the connection application process). Generators also face some potentially significant costs to remediate system strength.

Designing a new CWO REZ Access Scheme that helps resolve these challenges, while still efficiently utilising network capacity, will be important to delivering low-cost electricity from the CWO REZ to NSW consumers. The following table summarises the intended objectives and benefits of the CWO REZ Access Scheme:

Table 1: Objectives and benefits of the CWO REZ Access Scheme

Details	Category
Objectives of the CWO REZ Access Scheme	• Active coordination of investment in new generation, storage, network and related infrastructure to optimise the utilisation of the REZ Shared Network infrastructure, delivery of infrastructure in the REZs and outcomes for local communities. • Provide greater investment certainty for generation and storage projects, while promoting efficient utilisation of REZ infrastructure, improving competition and keeping downward pressure on energy prices for all consumers.
Benefits the CWO REZ Access Scheme should deliver to connecting projects	• Reduced cost of capital for connecting projects: – as a result of greater certainty about constraint risk. – as a result of greater certainty and stability of transmission losses. • Greater competitive pressure on energy prices. • Sufficient benefits and savings for projects connecting to the REZ Shared Network, relative to if they connected to the existing shared network, such that it is economic for them to pay for access rights. Projects thereby contribute to REZ Shared Network costs and reduce the cost to consumers. • Potential to reduce connection costs and improve certainty of connection timing, as greater control over network access means connection requirements can be coordinated at scale.

Questions for stakeholders:

Question 1: If the CWO REZ Access Scheme delivers on the proposed objectives and benefits, how would connecting projects value connecting under this Scheme rather than elsewhere under current NEM network access arrangements? Should proposed benefits be given weightings, and if so, what should these be?

Question 2: What, if any, additional benefits should the CWO REZ Access Scheme deliver to provide value to connecting generation and storage projects?

Section 5: Evaluation criteria

The NSW Government has developed a set of evaluation criteria to assess the relative merits of potential access scheme models. These evaluation criteria have been used to identify a shortlist of access scheme models for consultation. They are also proposed to be used as the basis for assessing and comparing the shortlisted models, in order to select a final model for adoption. This assessment will have regard to feedback received through this consultation process; further work to assess the overall costs and benefits of the shortlisted models; the ESB's ongoing work to progress REZ and broader NEM access reforms; and the final design of LTESAs.

Table 2: Evaluation criteria

Evaluation criteria	Key requirements
Greater certainty and lower costs of capital for generation and storage investors	• Increases revenue certainty for connecting parties, by providing greater transparency, certainty and stability of constraint risk across the REZ Shared Network, relative to under current NEM network access arrangements. • Increases revenue certainty for connecting parties, by ensuring greater transparency, certainty and stability of MLF risk, relative to under current NEM network access arrangements. • Results in benefits for access right holders, relative to if they connected elsewhere in the network, sending a clear locational signal. • Supports investor confidence, with low complexity of payment structures, risk and administrative burden for connecting projects.
Efficient investment in and utilisation of the REZ Shared Network	• Incentivises efficient use of capacity on the REZ Shared Network for each trading interval. • Incentivises storage capacity to connect within the REZ. • Greater competitive pressure on prices.
Timely implementation	Administratively simple to set-up in near-term timeframes (e.g. compatible with the CWO REZ timeframes).
Limited administrative and enforcement burden for REZ Administrator	• Low frequency and duration of ongoing administrator involvement. • Low governance requirements to administer scheme. • Ease of monitoring compliance. • Limited anticipated enforcement requirements.
Minimal intervention in existing energy and contract markets	• Minimal interference with the NEM bidding or other central dispatch processes operated by AEMO.
Coexists with proposed national reforms	• Could integrate with potential ESB REZ reforms. • Could integrate with potential ESB transmission and access reforms under Post 2025 workstream. • Minimises departure from the National Electricity Laws and Rules, where possible.

Questions for stakeholders:

Question 3: Do you agree with the proposed evaluation criteria? What, if any, additional criteria should be considered?

Section 6: Access scheme design

Designing an effective access scheme will help ensure NSW REZs deliver their intended outcomes. This section gives an overview of the models under consideration for the CWO REZ Access Scheme. It also identifies several key advantages and disadvantages of each model, considering the evaluation criteria proposed in Section 5. A more detailed preliminary evaluation of each model is provided in Appendix A. The description of advantages and disadvantages and Appendix A do not constitute a full or final assessment of the options against the criteria and are provided to facilitate participants' consideration of the models and evaluation criteria.

It is important to note that the implementation of each of the proposed access scheme models will involve a process to allocate access rights to generation and storage projects to connect to the REZ. This process will sit alongside the LTESA award process to ensure that projects are assessed on their merits, including social impacts, local economic benefits, and land use compatibility. It will also allow optimisation of the technology mix in the REZ to support the efficient utilisation of the REZ Shared Network. In return for greater certainty over their access to the network, energy generation and storage project proponents would be required to pay a fee to access the network.

This Issues Paper does not provide detailed descriptions of implementation design. For all models, issues of implementation such as roles and responsibilities for compliance, trading and dispute resolution, will be worked through in the next stage of policy design.

International examples of access schemes

Internationally, there are a range of network access schemes implemented, from open access through to firm access. The range of approaches adopted in other markets illustrates that the issue of network access can be addressed in different ways, each with pros and cons. It is important to note that these access schemes do not sit in isolation and are nested in broader market designs and planning processes that also differ from each other and from the NEM.

In Texas and Germany generation connections to the network are not capped or limited. Germany reduces the curtailment uncertainty for connected generators by mandating curtailment principles and Texas has a financial transmission rights (FTR) mechanism (which essentially creates financially firm access).

In Britain typically new transmission connections are only approved and given a connection timeframe when there is, or will be, sufficient network capacity to support their export. This provides a level of physical firmness. In addition, if a generator is directed to curtail its dispatch, it is financially compensated for this curtailment through the balancing market and an uplift charge split between consumers and some generators. Generators do have the option to connect ahead of network reinforcement with temporary non–firm access rights that provide no entitlement to compensation.

Ireland's earlier approach to access arrangements (termed, Gate 1 and Gate 2 connections) similarly provided firm access. Like the British model, it combines tight control over connection capacity (physical firmness) with financial compensation for curtailment (financial firmness). The newer approach (Gate 3) does not guarantee firm access but provides a commercially binding firm access quantity for each generator, which acts as a cap on curtailment, over which curtailment is compensated.

Other international examples demonstrate the potential for hybrid approaches, such as optional firm access. Examples include the access regime in the UK distribution network, and the Scottish Islands.

Overview of shortlisted access scheme models

The NSW Government has shortlisted three potential access scheme models for consultation and further assessment.

It is important to note that these models are proposed to apply to projects connecting to the REZ Shared Network only. As the REZ Shared Network will be meshed with the rest of the grid, REZ projects will still need to manage the risk of congestion occurring as a result of flows from outside the REZ Shared Network and congestion in other parts of the network, to the extent this is not mitigated by the technical features of the CWO REZ. As such, references to 'firmness' in this Issues Paper relate to firmness with respect to other projects in the REZ.

There are three primary mechanisms through which greater certainty or firmness of access could be provided to participating projects in the CWO REZ:

- **Limiting connection:** setting a cap on the total MW capacity of generation and storage that can connect to the REZ Shared Network.
- **Financial compensation:** compensating access right holders when they are curtailed as a result of other projects connected to the REZ Shared Network dispatching above their access rights.
- **Limiting offers:** limiting the capacity that REZ generation and storage projects can offer in the wholesale market to the total quantity of their access rights for the relevant interval.

The three shortlisted options in this paper represent two of the certainty/firmness mechanisms listed above – 'limiting connection' and 'financial compensation'. The other mechanism ('limiting offers') was considered as part of a model that has not been progressed (the 'Limited NEM bidding model').

The **three** shortlisted models are:

- **Option 1 Limited physical connection model:** This model gives connecting parties greater certainty of their constraint risk because the capacity of projects allowed to connect to the REZ Shared Network is physically capped either at the export capacity of the REZ Shared Network or at an efficient level above export capacity. Under this model, generators may still be constrained off due to congestion caused by other projects connected to the REZ Shared Network.
- **Option 2A Financial compensation model:** This model has two tiers of access rights which can be purchased by projects connected to the REZ Shared Network. Tier 1 access right holders are entitled to financial compensation from Tier 2 access right holders, if Tier 1 access right holders' capacity is curtailed as a result of Tier 2 access right holders' dispatch. Under this 'simple' model, access right holders would be entitled to the same quantity of access for all trading intervals. This is referred to as "flat, 24–hour, access."
- **Option 2B Enhanced financial compensation model:** As with the Option 2A, this model has two tiers of access rights, and Tier 1 access right holders are entitled to compensation from Tier 2 access right holders. Under this 'enhanced' model, the quantity of access rights would be defined on a trading interval basis and could therefore differ across a day or period. This is referred to as "interval–based access."

Two additional models were identified which are not proposed for further consideration:

- **Limited NEM bidding model:** This model has two tiers of access rights. Tier 1 access rights are firm, giving access right holders certainty that they can generate up to their capacity for which they hold access rights they hold. This would be achieved with an automatic bid filtering system that would limit bids in excess of access rights if the REZ Shared Network was congested. Tier 2 access rights are "non–firm" and access right holders could only access the network when capacity is underutilised by Tier 1 access right holders.
- **REZ Locational Marginal Pricing (LMP) model:** Revenue of connected parties is based on locational marginal pricing (LMP) rather than the regional reference price. There is no limit to the capacity of generation and storage that can connect to the REZ Shared Network, however connected parties are able to hedge the financial risk of constraint from other REZ Shared Network connected assets by purchasing financial transmission rights (FTRs).

The rationale for not progressing these models further is outlined later in this section at page 39.

Table 3 below outlines the characteristics of each of the shortlisted models. Further detail on design choices within some of these characteristics is provided in Section 7.

Table 3: Characteristics of shortlisted models

Characteristic	Option 1: Limited physical connection model	Option 2A: Financial compensation model	Option 2B: Enhanced financial compensation model
Total capacity of access rights available	Access rights allocated at an efficient level above the export capacity of the REZ Shared Network. Option: allocating rights at the export capacity of REZ.	Tier 1 access rights allocated to REZ Shared Network export capacity only, Tier 2 access rights allocated to a capped level above this.	Tier 1 access rights allocated to REZ Shared Network export capacity only, Tier 2 access rights allocated to a capped level above this.
Firmness of REZ Shared Network access (relative to other projects in the REZ)	Non-firm. Access right holders are able to assess and understand the risks ahead of connecting.	Tier 1: Financially firm Tier 2: Non-firm	Tier 1: Financially firm Tier 2: Non-firm
Constraint risk on the REZ Shared Network	Greater certainty than under current NEM network access arrangements due to capped connection, but access right holders can still be curtailed on REZ Shared Network.	Yes - Tier 1 and Tier 2 access right holders can be constrained off, but Tier 1 will be compensated for constraints caused by Tier 2	Yes - Tier 1 and Tier 2 access right holders can be constrained off, but Tier 1 will be compensated for constraints caused by Tier 2
MLF risk	Provides greater certainty than under current NEM network access arrangements by capping connection of projects to the REZ Shared Network (i.e. MLF likely to be within a certain range), but MLF will not be fixed nor will declines in MLF be compensated.		

Characteristic	Option 1: Limited physical connection model	Option 2A: Financial compensation model	Option 2B: Enhanced financial compensation model
Compensation for being constrained off	No compensation	Yes - Tier 1 access right holders compensated if constrained off because of Tier 2 access right holders	Yes - Tier 1 access right holders compensated if constrained off because of Tier 2 access right holders
Shape of access rights (see explanation below)	Shape relevant to determining technology mix	Flat, 24hr	Interval-based
Coverage of access rights (see explanation below)	Required to hold access rights for nameplate capacity	Required to hold access rights (Tier 1 or 2) to cover nameplate capacity	Required to hold access rights (Tier 1 or 2) to cover nameplate capacity
Treatment of storage	Overall storage capacity connected to the REZ Shared Network is capped.	Must hold access rights (likely Tier 2, potentially Tier 1). Could be incentivised to charge during congestion.	Must hold access rights (likely Tier 2, potentially Tier 1). Could be incentivised to charge during congestion.
Monitoring and compliance	Limited compliance. No compliance regime required to monitor access right holders' use of access rights, due to non-firm access.	Automated enforcement of compliance with access rights, due to compensation mechanism.	Automated enforcement of compliance with access rights, due to compensation mechanism.
Near-term implementation	Easiest to implement, with no new payment systems needed.	Payment systems needed to implement compensation mechanism, and potentially a storage charging incentive scheme, if introduced.	Payment systems needed to implement compensation mechanism, and potentially a storage charging incentive scheme, if introduced.
Market-based trading of access rights	Not permitted (Permanent transfers to be dealt with through 'use it or lose it' provisions).	Permitted, with approval and mitigations against non-competitive behaviour.	Permitted, with approval and mitigations against non-competitive behaviour.
'Use it or lose it' provisions	Provisions will apply, including potential loss of both access rights and any bid bonds or payments for access fees, in some circumstances.		
Term of access rights	Term of rights to be determined.		

Shape and coverage of access rights

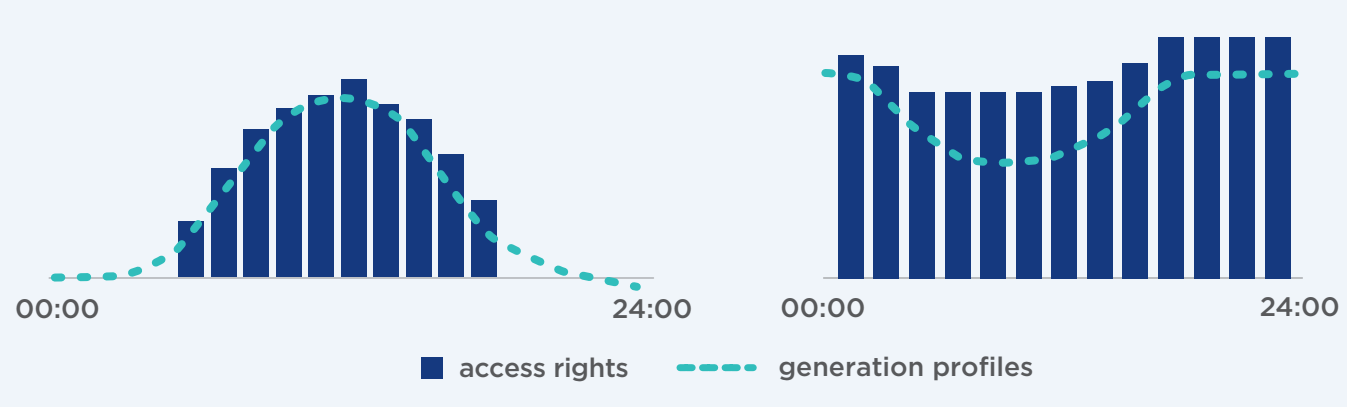
Shape of access rights

The shape of access rights refers to the forecast generation profile of parties connecting to the REZ Shared Network across every dispatch interval in any given day.

A flat, 24-hour access right is the simplest approach to shaping access rights, but also introduces the highest risk of REZ Shared Network underutilisation. For example, a solar farm with no storage behind the connection will only use the REZ Shared Network during sunlight hours, and therefore a flat, 24-hour access right held by a solar farm would be underutilised through the non-sunlight hours.

Interval-based access rights could be allocated on a time-interval basis (such as five-minute intervals, in line with market settlement intervals from October 2021). Generators could hold access rights for the volumes and intervals that align with their generation profile – as demonstrated in Figure 4 below.

Figure 4: Examples of interval-based access rights to match generation profile



Another option is that access rights could be allocated in a series of predefined, generic bundled generation shapes. For example, a series of generic solar bundled interval options for a REZ (fixed, single-axis tracking, multi-axis tracking), a generic wind option for the REZ, a number of options to suit hybrid assets, and a flat option. The generic nature of these shapes may provide greater tradability of the access rights relative to bespoke shapes specific to each generator's output profile.

For Option 1 in this Issues Paper, assumptions around the generation 'shape' of different technology types will be used to plan the REZ Shared Network and define the optimal technology mix that will be allowed to connect, but it is proposed that the access rights allocated to connecting assets will be based on the nameplate capacity and technology type, rather than a specific shape of access rights.

Coverage of access rights

The extent to which project proponents must hold access rights that cover their generation profile has a significant impact on REZ Shared Network utilisation and the likelihood that connecting projects will be constrained off due to congestion on the REZ Shared Network. If proponents are required to hold access rights to cover their expected generation at a given time (such that the probability of exceedance (POE) of that generation is, for example, 0.5 or POE50), then REZ Shared Network utilisation is likely to be relatively high and a level of congestion is expected to occur. If a lower POE level is used, e.g. POE10, then REZ Shared Network utilisation will reduce because – by definition – generation is likely to fall short of this value 90% of the time. However, the lower POE level will result in less risk to connected parties of being constrained off than a higher POE number.

This Issues Paper proposes to require project proponents to hold access rights to cover their

registered nameplate capacity,[4] or maximum (i.e. POE0) generation output. The benefit of this approach is consistency in how the value is calculated.

Requiring all access right holders to use the same, consistent, methodology when assessing the quantum of access rights they require will provide all connecting parties with more confidence in how much capacity will be connecting to the REZ Shared Network. This is important for the purposes of assessing the risks of congestion on the REZ Shared Network. Requiring that access rights cover nameplate capacity rather than expected generation estimates reduces the risk of inconsistent estimates and removes the need for independent verification of estimates. The key trade-off is REZ Shared Network underutilisation; however, this is proposed to be managed both by oversubscribing the REZ capacity to an efficient level, and by allocating suitable volumes of network capacity to storage and other flexible technologies. Further consideration would also need to be given to how projects that could use some of their capacity behind the meter would be treated, noting that they may not often export at their nameplate capacity. The NSW Government welcomes feedback on this design characteristic.

Option 1: Limited physical connection model

Description of right

Under Option 1 the nature of the rights that connected projects would receive is as follows:

- The project may connect up to a specified MW capacity at a specified connection point on the REZ Shared Network.
- The REZ Administrator must ensure that the total MW generation and storage capacity at all the connection points to the REZ Shared Network does not exceed a certain cap set upfront by the REZ Administrator. This cap may also have sub-caps for different technology types.

It is proposed that the initial upfront cap set by the REZ Administrator would be at a level above the export capacity of the REZ Shared Network, to support efficient utilisation. The NSW Government welcomes feedback on this design characteristic. Under all models in this Issues Paper, additional connections beyond the initial upfront cap would only be permitted in circumstances where the connecting party fully funds the network augmentation required to ensure that they do not adversely impact the access of any existing connected project. These augmentations would need to be designed such that they integrate effectively with the strategic planning of the REZ, the administration of the access scheme, and the commercial arrangements for the ownership and operation of the REZ Shared Network.

This model does not provide firm dispatch rights on the REZ Shared Network i.e. the project bears congestion and MLF risk. However, the limitation on the total connected capacity in the REZ Shared Network allows generation and storage projects to understand and undertake due diligence on these risks upfront, with greater certainty than they would have under current NEM network access arrangements in the absence of this limitation on connection.

As with all models in this Issues Paper, this model does not provide any additional certainty about risks of congestion beyond the boundary points of the REZ Shared Network, or congestion caused by generators connected outside the REZ Shared Network.

Under this model, limited compliance and enforcement is required. No compliance and enforcement regime is required to monitor access right holders' use of access rights. Further, the REZ Administrator is not expected to bear risk or liability provided it has the regulatory and contractual mechanisms in place to ensure the capped capacity limits for REZ connection

4 Nameplate capacity reflects the maximum MW capacity the site can export to the grid, rather than the installed MW capacity of generation or storage assets. For inverter-connected generation, the nameplate capacity is the rated capacity of the inverter, which can, and often is, lower than the rated capacity of the generating system (solar panels for solar PV, and wind turbines for wind).

are maintained, and that any additional connections are consistent with the terms of the access scheme.

Under Option 1, the REZ Administrator would use assumptions around the network access profile of different technology types to develop technology-specific connection capacity limits for the REZ Shared Network, reflecting an optimal technology mix. For example, solar, wind and storage would be limited to a specific MW amount respectively. Project proponents would apply for access rights based on their technology type and nameplate capacity but would not purchase 'access rights' aligned with the shape of their asset-specific generation profiles.

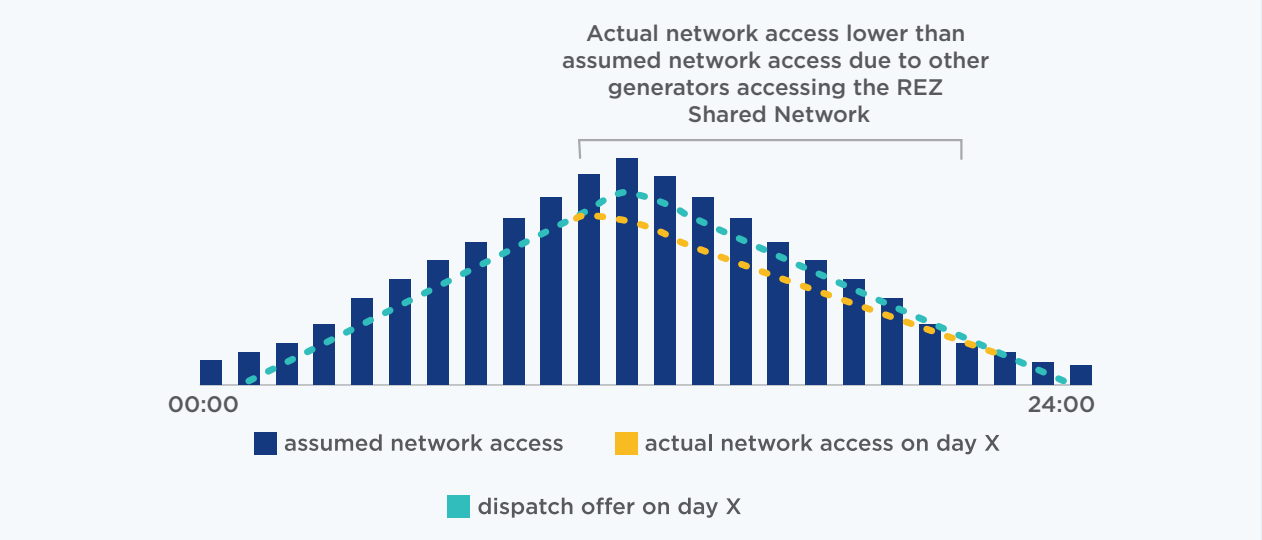
As all access right holders are required to hold rights for their nameplate capacity, it is not proposed that trading of access rights be permitted under this model unless an access right holder does not require its full allocation on a permanent basis.

Worked example of Option 1

Before allocating access rights for the REZ Shared Network, the REZ Administrator would publish the technology mix for which access rights will be available. For example, for a 1000MW REZ Shared Network, with efficient oversubscription, the technology mix might be 700 MW of solar, 400 MW of wind, and 200 MW of storage. Investors could then assess the risk they would face of being constrained off under this portfolio of technologies connecting to the REZ Shared Network and decide whether to seek access to the REZ Shared Network on this basis.

If a solar farm with a nameplate capacity of 100MW without storage connects to a REZ under this model, as part of the 700 MW of permitted solar connection, its use of the REZ Shared Network would be assumed to be 100MW.

Figure 5: Illustration of potential curtailment where access rights capped above hosting capacity at efficient utilisation level.



When REZ network congestion does occur, the solar farm may be constrained off and it will not be compensated for this lost revenue. As connection to the REZ Shared Network is capped the long-term risk of being constrained will be meaningfully calculable before development. This means the solar farm owner is able to better factor the lower risk of constraint into project development than under the current NEM network access arrangements.

Alignment with ESB models

Option 1 aligns most closely with the ESB's proposed 'Connection Access Protection Model'. One potential difference is that the ESB has not explicitly proposed oversubscribing the REZ Shared Network capacity to improve efficiency of network utilisation.

Key advantages and disadvantages of Option 1

A key advantage of Option 1 is the greater level of certainty and confidence that it provides access right holders around congestion and MLF risk, relative to connecting under current NEM network access arrangements. This option provides greater certainty of the risk that access right holders will be constrained off due to capping connection capacity to the REZ Shared Network by technology.

The extent of this certainty may be impacted by the ability to predict the dispatch of storage. Is proposed that the total capacity of storage allowed to connect to the REZ Shared Network would be capped like other technologies, and it is likely that storage would dispatch outside of periods of REZ Shared Network congestion (during peak solar hours). However, storage could foreseeably contribute to congestion during high price periods. Likewise, it may also create additional capacity by charging during periods of congestion (for example, sunlight hours).

Another key implementation advantage of Option 1 is that it is relatively simple, both administratively and for participants, and could be implemented in the near term. It does not introduce significant administrative burden on participants or the REZ Administrator through the requirement to establish and maintain payment systems. While there will be ongoing governance requirements to assess new connections, there would be limited ongoing monitoring and enforcement requirements compared to the financial compensation models.

This option largely aligns with the ESB's Connection Access Protection Model and could foreseeably coexist with any broader access reform in the rest of the grid.

The key disadvantage of Option 1 is that access rights are not firm with respect to other projects in the REZ Shared Network. This is expected to reduce the value of access rights to access right holders.

Another disadvantage of this model is that it is less likely to support the most efficient utilisation of the REZ Shared Network. This could be mitigated by allocating access rights to an efficient level above the export capacity of the REZ Shared Network, noting that this would also increase the risk that access right holders will be constrained off, thus reducing investor certainty.

Options 2A and 2B: Financial compensation models

Description of right

The financial compensation models would introduce two tiers of access rights. Tier 1 access rights would be allocated up to the export capacity of the REZ Shared Network, and additional Tier 2 access rights would be allocated up to a capped total connection capacity. Tier 1 access rights would have priority over Tier 2 access rights in terms of financial access to the REZ Shared Network.

Tier 1 access rights would provide:

- The right to connect up to a certain MW capacity at a connection point with the REZ Shared Network (the MW capacity is defined based on the sum of both Tier 1 and Tier 2 access rights held).
- The right to receive compensation payments from Tier 2 projects, when dispatch from the Tier 2 project has caused the Tier 1 project to be constrained off. This is a reallocation of revenue from Tier 2 to Tier 1 and is capped at the Regional Reference Price (per megawatt-hour (MWh)) earned by Tier 2 right holders for the capacity that contributed to the constraint.
- The compensation only extends to situations where Tier 1 access right holders are constrained off due to congestion created by Tier 2 right holders connected to the REZ Shared Network and does not extend to congestion outside the REZ Shared Network, or caused by projects connected outside the REZ Shared Network.

Tier 2 access rights would provide:

- The right to connect up to a certain MW capacity at a connection point with the REZ Shared Network (the MW capacity is defined based on the sum of both Tier 1 and Tier 2 access rights held).
- The right to export electricity to the REZ Shared Network,[5] but with a requirement to pay compensation to Tier 1 access right holders where that dispatch causes a Tier 1 generator to be constrained off.

As with Option 1:

- The REZ Administrator must ensure that the total MW generation and storage capacity at all the connection points to the REZ Shared Network does not exceed a certain cap set upfront by the REZ Administrator. The cap will be set above the export capacity of the REZ Shared Network.
- Additional connections beyond the initial upfront cap would only be permitted in circumstances where the connecting party fully funds the network augmentation required to ensure that they do not adversely impact the access of any existing connected project. These augmentations would need to be designed such that they integrate effectively with the strategic planning of the REZ, the administration of the access scheme, and the commercial arrangements for the ownership and operation of the REZ Shared Network.
- This model does not provide any additional certainty about risks of congestion beyond the boundary points of the REZ Shared Network, or congestion caused by generators connected outside the REZ Shared Network.

5 Subject to being dispatched by AEMO if the project participates in central dispatch.

The financial compensation models provide greater certainty to connecting projects with Tier 1 access rights, relative to connection under current NEM network access arrangements, by entitling them to financial compensation for constraints on the REZ Shared Network caused by Tier 2 access right holders. These models provide less benefits for Tier 2 access right holders. It is expected that connected projects would use Tier 2 access rights to cover a small percentage of their total nameplate capacity, with Tier 1 access rights covering the larger percentage, rather than projects connecting primarily with Tier 2 access rights.

It will be important to the operation of Tier 2 access right holders that sufficient information about expected generation from generators connected to the REZ Shared Network is available, so that they are able to assess the risk of REZ Shared Network congestion before making offers to dispatch. Currently, some of this data is not available at a sub-regional level (such as a REZ).

It is proposed that the compensation mechanism under these models would involve the reallocation of post-settlement regional reference price from Tier 2 to Tier 1 right holders. The feasibility of the financial compensation model depends upon the extent to which financial risks that could impact project finance, such as risk of financial loss and counterparty risk, can be managed in the design of the compensation mechanism. The subsection – 'Implementing the compensation mechanism' at page 31 outlines a proposed approach to determining compensation and reallocating revenue, as well as potential financial risks and mitigants relevant to the financial compensation models.

Depending on the definition of curtailment, the application of this compensation mechanism may be conditional on the offer prices of Tier 1 and Tier 2 access right holders, relative to each other or to the regional reference price, or could occur irrespective of price. Appendix B outlines different ways that being constrained could be defined. The examples below assume that curtailment is not defined to take into account price-based merits.

Photography
Windmills at Boco Rock Wind Farm, Nimmitabel. Sheep graze in the foreground.
NSW Department of Planning, Industry and Environment / Jaime Plaza Van Roon.

Option 2A: Financial compensation model

The financial compensation model would define access rights as flat, 24-hour rights to a given capacity of network access. Sharing and trading of flat, 24-hour access rights would be permitted, subject to approval. Trading of access rights would need to preserve the integrity of flat access rights and would not be on a more granular basis. For example, a generator holding 80 MW of Tier 1 access rights and 20 MW of Tier 2 access rights may elect to trade with another connected project to hold more or less Tier 1 access rights, while ensuring its nameplate capacity (100 MW) is still met by the sum of Tier 1 and Tier 2 rights.

The example below assumes that compensation occurs irrespective of price.

Worked example of Option 2A

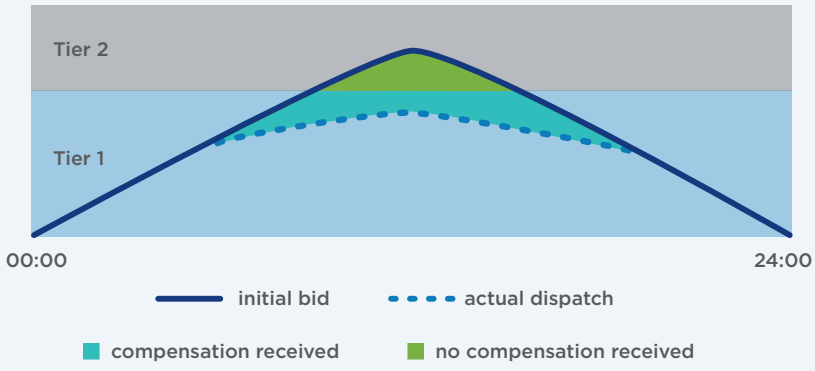
If a 100 MW solar farm connected to a REZ under this model, it might hold 80 MW of Tier 1 flat, 24-hour access rights, giving it financially firm access for 80 per cent of its nameplate capacity. It would then be required to hold 20 MW of Tier 2 flat, 24-hour access rights to cover its total nameplate capacity.

In this example, the solar farm offers to dispatch 85 MW at an interval through the trading day, 5 MW in excess of its Tier 1 access rights. However, if we assume the aggregate capacity of offers made by Tier 1 and Tier 2 access right holders in this interval exceed the export capacity of the REZ Shared Network, the solar farm is curtailed to just 75 MW. This is less than its Tier 1 access rights.

Because the Tier 1 access rights are financially firm within the REZ Shared Network, this generator is entitled to compensation for the generation that it offered but that was not dispatched, up to the capacity of its Tier 1 access rights (the 5 MW of generation between the 75 MW that was dispatched and the 80 MW of its Tier 1 access rights). It is not entitled to any compensation for the capacity above the Tier 1 access right, even though it had made an offer above this (the 5 MW from the Tier 1 access rights capacity up to the 85 MW that it bid) because the Tier 2 access rights are not firm.

Through compensation settlement processes, the solar farm would recover the lesser of the market revenue as though it had dispatched 100% of its available Tier 1 capacity (80 MW), or the market revenue earned by the Tier 2 access right holders that displaced its Tier 1 capacity (in general, these are expected to be the same value).

Figure 6: Illustration of compensation under Option 2A



Alignment with ESB models

Option 2A aligns most closely with the ESB's proposed 'Financial access protection model'. One key difference is that the ESB proposes that projects would either connect with firm access rights (equivalent to Tier 1) or connect without access rights. The proposed design for the NSW Government's financial compensation models includes a second tier of access rights. Tier 2 access right holders are required to compensate Tier 1 access right holders that they constrain on the REZ Shared Network but benefit from a cap on capacity connecting to the REZ Shared Network. A cap on capacity connecting to the REZ Shared Network will provide more certainty to connected projects about congestion and loss factor risk and other potential risks that may arise with unrestricted connection to the REZ Shared Network.

Another notable difference is the ESB's proposal that compensation be paid to Tier 1 access right holders based on a pro rata metric (e.g. availability in a given interval) rather than based on their dispatch offers. The NSW Government welcomes feedback from stakeholders on different approaches to compensation.

Photography
Large scale solar generation.

Option 2B: Enhanced financial compensation model

Under this Option, Tier 1 and Tier 2 access rights would be allocated on an interval basis. Permanent and temporary trading of access rights would be permitted, subject to approval. The example below assumes that the compensation occurs irrespective of price.

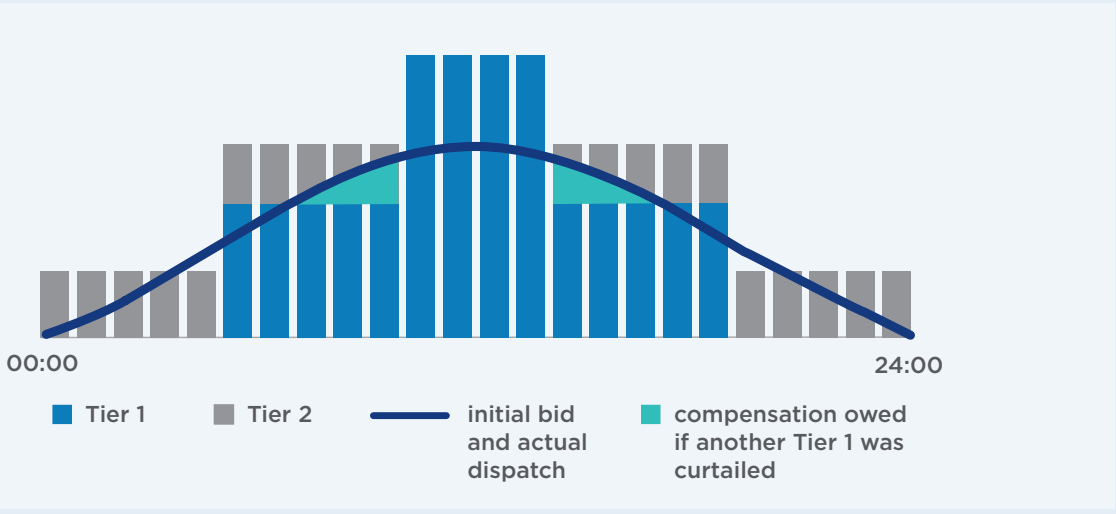
Worked example of Option 2B

If a 100 MW solar farm connected to a REZ Shared Network under this model, it might hold:

- 100 MW of Tier 1 access rights for trading intervals from 12:00 to 14:00,
- 50 MW of Tier 1 access rights and 30 MW of Tier 2 access rights for the trading intervals from 10:00 to 12:00 and from 14:00 to 17:00, and
- 20 MW of Tier 2 access rights for the remaining intervals.

For a trading interval at 16:30, the solar farm would be entitled to dispatch 50 MW on a firm basis. If there was sufficient unused capacity on the REZ Shared Network at the time, the solar farm could dispatch another 30 MW without consequence. However, if doing so caused a Tier 1 access right holder to be constrained off, it would need to pay compensation proportionate to its contribution to this constraint (i.e. proportionate to its individual contribution to total Tier 2 access right holders sent out generation).

Figure 7: Illustration of compensation under Option 2B



Implementing the compensation mechanism

The financial compensation models provide "firm" access with respect to other generators in the NEM through Tier 2 access right holders compensating Tier 1 access right holders where Tier 1 access right holders are constrained off by Tier 2 dispatch. Tier 1 access right holders would be compensated for the lesser of either:

- the market revenue they would have received had they not been constrained off due to congestion in the REZ Shared Network because of Tier 2 access right holders, or
- the total market revenue earned by Tier 2 access right holders for the dispatched generation that resulted in Tier 1 access right holders being constrained off.

There are a number of ways that the compensation mechanism could be designed, and this design will impact the extent to which the financial compensation model meets the evaluation criteria outlined in this Issues Paper, in particular improving investor certainty and minimising administrative burden.

It is proposed that this compensation mechanism be an ex-post compensation process. Post-settlement compensation would be reallocated automatically, soon after AEMO's settlement occurs via software based on a fixed and pre-determined formula. However, there may be benefits and efficiencies in embedding this compensation process within AEMO's existing settlement processes (e.g. by building on the existing reallocations framework). The potential opportunity to do this will be explored further.

Calculating compensation

Under the financial compensation models, the compensation owed to Tier 1 access right holders would be collected from all relevant Tier 2 access right holders required to pay compensation. The payments from Tier 2 access right holders would be directly proportionate to their contribution to the constraints on the capacity of the REZ Shared Network under a formula. For example, if only one Tier 2 access right holder is dispatched, it is responsible for 100% of Tier 2 dispatch and must pay 100% of the compensation payable to Tier 1 access right holders (to the extent that Tier 1 dispatch is constrained off by the Tier 2 generation). If a Tier 2 access right holder dispatches 10 MWh and another dispatches 90 MWh in a given settlement interval, the compensation payments will be split 10% and 90% respectively.

Compensation payments would be pooled and distributed to the Tier 1 access right holders pro rata to the market revenue they would have earned had they been dispatched to their offer quantity.

As simplified formulas, without considering price-based merits, the compensation process for a single settlement interval where there was congestion on the REZ Shared Network would be:

Maximum compensation amount equals the lesser of:

- Sum of Tier 1 market revenue foregone = ((Total quantity bid by Tier 1 – Total quantity of Tier 1 dispatched) x Regional reference wholesale price x MLF*); or
- Sum of Tier 2 market revenue = (Total quantity dispatched x Wholesale regional reference price x MLF*)

Compensation paid by a Tier 2 generator = (Quantity of electricity supplied by Tier 2 access right holder to the REZ Shared Network / Quantity of electricity supplied by all Tier 2 access right holders to the REZ Shared Network) x Maximum compensation amount

Compensation owed to a Tier 1 access right holder = (Quantity bid by Tier 1 access right holder – Quantity dispatched by Tier 1 access right holder x Regional reference wholesale price x MLF*) / Sum of Tier 1 market revenue foregone) x Maximum compensation amount

* Calculations will apply individual generator MLFs to their respective dispatched volume.

Further consideration will be given to the role of loss factors in these calculations, including whether bid volumes and settlement prices included in the compensation calculations are loss factor adjusted (which currently occurs in the case of AEMO's NEM Dispatch Engine (NEMDE) process, both in terms of bids submitted and subsequent dispatch outcomes). This will be particularly relevant if there is a risk of significant MLF differences between projects in the REZ, noting though this risk is lower given the co-ordinated nature of generation, storage and network investment in the CWO REZ, as opposed to potential MLF outcomes under the open-access regime.

A more detailed example is provided in the table below, reflecting dispatch over one hour and with MLFs not taken into account, for the purposes of simplicity. This example assumes the REZ Shared Network export capacity is 500 MW.

The example also assumes a compensation mechanism that treats Tier 1 access rights as firm, irrespective of dispatch offer price. This is the simpler approach to calculating compensation and affords Tier 1 access right holders the firmest, and therefore most valuable, access rights. As discussed in Appendix B, a more complex approach would be to incorporate dispatch offer prices into the compensation mechanism and allow Tier 2 access right holders greater access to the REZ Shared Network when making dispatch offers at a lower price than Tier 1 access right holders. This more complex approach has potential benefits but has not been included in the worked example for simplicity.

Photography
Worker inspecting solar panels. Image courtesy of Department of Planning, Industry and Environment.

Table 4: Detailed worked examples

Access right holder	Asset A	Asset B	Asset C	Asset D	Asset E
Access rights tier	Tier 1	Tier 1	Tier 1	Tier 2	Tier 2
Available capacity	250 MW	100 MW	150 MW	100 MW	50 MW
Actual energy dispatched (assuming 1 hour, for simplicity)	250 MWh	95 MWh	135 MWh	15 MWh	20 MWh
Available Tier 1 capacity curtailed	0 MWh	5 MWh	15 MWh		
Market price	$100/MWh	$100/MWh	$100/MWh	$100/MWh	$100/MWh
Market revenue received (energy dispatched x wholesale price)	$25,000	$9,500	$13,500	$1,500	$2,000
Tier 1 market revenue lost due to being constrained off		$500	$1500		
Dispatched capacity as a percentage of total Tier 2 dispatch				43%	57%
Total compensation owed to Tier 1 (lesser of Tier 2 market revenue and Tier 1 market revenue lost due to being constrained off)		$2000			
Compensation paid				$857	$1143
Compensation received		$500	$1,500		

Settlement processes

The proposed approach to settlement processes for the compensation mechanism would align with the AEMO market settlement process where possible. The REZ Administrator (or another body, as appropriate) would act as a clearing house for the compensation payments. This could occur immediately following the AEMO market settlement for the given NEM billing period.

However, there may be benefits and efficiencies in embedding this compensation process within AEMO's existing market settlement processes (e.g. by building on the existing reallocations framework), and the potential opportunity to do this will be explored further.

Clearing would occur with limited recourse provisions, and a 'money out equals money in' approach, whereby the REZ Administrator is not liable to pay compensation which has not yet been received and is therefore not required to maintain a capital fund. Where compensation from a Tier 2 access right holder is not received on the settlement day, compensation payments would be reduced and the due compensation corrected for in a subsequent settlement. More detail on the potential stages of such an approach is outlined below.

The compensation settlement process could occur on a weekly basis, in line with the AEMO Billing Period, which is a seven–day period.

1 **Preliminary compensation statements**
Following the end of an AEMO Billing Period, AEMO releases its Preliminary Statement for market settlement. The REZ Administrator could subsequently issue an initial Preliminary Compensation Statement using the same data. This would allow REZ access right holders to take into account their likely compensation owed or owing at the same time as reviewing their preliminary market revenue from AEMO.

2 **Final compensation statements**
After a fixed period of time (18 days from the end of a Billing Period), AEMO releases Final Statements and the REZ Administrator could subsequently release Final Compensation Statements, with this updated data and any amendments following the Preliminary reports.

Settlement would occur two business days after the Final Compensation Statement is released.

3 **Payment of compensation**
The REZ Administrator, or another body bearing the responsibility, would hold a settlement clearing role to receive the compensation owing and pay the compensation owed, for the given Billing Period.

Clearing would occur with limited recourse provisions, and a 'money out equals money in' approach, whereby the REZ Administrator is not liable to pay compensation which has not yet been received and is therefore not required to maintain a capital fund. This would potentially require financial licensing and credit worthiness requirements to be met. Where compensation from a Tier 2 access right holder is not received on the settlement day, compensation payments would be reduced, and the due compensation corrected for in a subsequent settlement.

4 **Dispute resolution**
If disputes arise, and these cannot be addressed in the period between the Preliminary and Final Compensation Statements, the disputed settlement is proposed to go ahead and, following a dispute resolution process, any necessary adjustments can be made as corrections in subsequent settlement processes.

Managing financial risk

The financial compensation models offer a potential solution to both providing 'firm' access to the REZ Shared Network and also allowing for some additional connections to optimise network utilisation. However, there are a number of risks which need to be either managed, mitigated or accepted by investors, in order for these models to be feasible options for adoption.

In considering the two financial compensation models, the NSW Government has distilled these risks down to three key elements that, if not appropriately addressed, will impact on the potential for these models to deliver on the objectives referred to above. Design features that could mitigate the risks have then been identified.

Table 5: Financial compensation risks and mitigants

Risk	Description	Mitigations
Risk of financial loss impacting project financeability	Tier 1 access right holders may not be financeable if there is a risk of loss to Tier 1 generators due to curtailment caused by Tier 2 generators. Tier 2 access right holders may not be financeable if compensation to Tier 1 generators is greater than revenue received.	• Tier 2 access right holders required to compensate curtailed Tier 1 access right holders up to total market revenue earned by Tier 2 access right holders. • Low and forecastable risk that total market revenue earned by Tier 2 access right holders is less than loss suffered by Tier 1 access right holders.
Counterparty risk borne by Tier 1 generators impacting project financeability	Tier 1 access right holders may not be financeable if Tier 1 generators exposed to credit risk from Tier 2 access right holders.	• REZ Administrator (or potentially AEMO) takes central clearing role in managing scheme compensation but is not required to pay compensation that exceeds amounts collected from Tier 2 access right holders. • Tier 2 access right holders required to meet credit requirements and provide appropriate security to minimise risk of payment shortfalls. REZ Administrator must draw down security from defaulting Tier 2 access right holders to meet payment shortfalls. • Timeframes for settlement aligned with AEMO market settlement timeframes or form part of AEMO settlement processes, enabling AEMO to reallocate market revenue from Tier 2 access right holders to Tier 1 access right holders.

Risk	Description	Mitigations
REZ Administrator is exposed to insolvency risks under scheme impacting project financeability.	If the model design exposes the REZ Administrator to insolvency risk in circumstances where a Tier 2 access right holder fails or is unable to pay amounts owed, then Tier 1 access right holders may not be financeable due to uncertain value of access rights in protecting Tier 1 access right holders from losses.	• REZ Administrator (or AEMO) takes central clearing role in managing scheme compensation but is not required to pay compensation that exceeds amounts collected from Tier 2 access right holders. • Tier 2 access right holders required to meet credit requirements and provide appropriate security for payment to minimise risk of payment shortfalls. REZ Administrator must draw down security from defaulting Tier 2 access right holders to meet payment shortfalls. • Timeframes for settlement aligned with AEMO market settlement timeframes or form part of AEMO settlement processes, enabling AEMO to reallocate market revenue from Tier 2 access right holders to Tier 1 access right holders.

Specific stakeholder feedback is sought on whether the NSW Government has identified the key risks associated with the models and whether the challenges can be sufficiently managed through the design features of the model referred to above. In addition to these challenges noted above, the NSW Government also seeks feedback on the way that the financial compensation models would interact with other contracts, for example power purchase agreements (PPA's).

Photography
Lyell Dam, NSW.

Key advantages and disadvantages of Options 2A and 2B

A key advantage of the financial compensation models is that Tier 1 access right holders would benefit from the certainty of financially firm access (with respect to and other generators in the REZ Shared Network). Although Tier 2 access right holders would not enjoy firm access, projects with Tier 2 access rights would still be able to use REZ Shared Network capacity outside of congested periods without facing compensation requirements. Tier 2 access right holders would also benefit from the improved certainty of loss factors and other conditions due to the overall cap on connected capacity in the REZ Shared Network.

Relative to Option 1, the financial compensation models also provide greater potential for optimisation of REZ Shared Network utilisation. The financial compensation models incentivise efficient use of network capacity by allocating Tier 2 access rights above the physical capacity of the REZ Shared Network and incentivising them to use the REZ Shared Network when unused capacity is available. The application of flat, 24-hour access rights under Option 2A may reduce the efficiency of this approach because the model depends on the individual access right holders firming their generation to utilise the REZ Shared Network access, which may result in uncoordinated solutions being deployed rather than more scale-efficient options, but could facilitate subsequent connection of storage as technology costs come down.

Option 2B, however, would allow more capacity to connect to the REZ Shared Network compared to Option 2A, benefiting network utilisation. The flexibility may also benefit access right holders as they will be able to curate their access rights, including the split of Tier 1 and Tier 2 access rights, to best meet their needs.

As noted above, these models could operate without any significant changes to existing market settlement processes. This is because under the current proposed design the compensation settlement process for implementing this model would occur ex-post, outside of the AEMO settlement processes. However, there may be benefits and efficiencies in embedding this compensation process within AEMO's existing market settlement processes (e.g. by building on the existing reallocations framework), and the potential opportunity to do this will be explored further.

Options 2A and 2B largely align with the ESB's financial access protection model and could potentially be transitioned to a financial transmission rights regime if this were adopted as part of broader national reform. However, consideration would need to be given to the risks of complexity and uncertainty for investors, as well as administrative burdens associated with the transition.

A disadvantage of these models is that relative to Option 1, they are more complex to administer and implement. The financial compensation models are significantly more challenging to implement in the near-term, as they may require a payment system to be established to manage compensation. IT systems would be required to monitor access right allocations, and determine and distribute compensation, with ongoing governance and reporting requirements to properly administer the scheme and calculate and distribute compensation. Further, the entity in the compensation clearing role would likely require financial licences and may need to implement credit assessments and prudential requirements for access right holders, unless the financial compensation process is embedded in AEMO's existing market settlement processes.

In this respect, the NSW Government is assessing the implementation and on-going costs of delivering these options against the potential value gains from the most efficient use of the REZ Shared Network. Having regard to the scale of infrastructure to be delivered and scope for economies of scale for any IT platform, on a preliminary basis, and subject to further analysis, Option 2B is the NSW Government's preferred option.

Questions for stakeholders:

General

Question 4: Which of the shortlisted models presented is preferred? Which best balances the need to deliver value to investors with the need to maximise utilisation of the REZ, and together achieve the access scheme's objectives?

In particular, does the 'non-firm' connection right, under Option 1 provide sufficient certainty to investors to be of value? If it does not, is this outweighed by the increased utilisation of the REZ that would result under such non-firm connection rights?

Question 5: Are there other access models that you consider would be superior to the shortlisted models in this paper? If so, what are these models, and what are their strengths in comparison to the shortlisted models?

Question 6: How could the characteristics of either Option 1, 2A or 2B be adjusted to improve them in a manner that achieves the access scheme's objectives?

Question 7: Characteristics such as more granular access rights (for example, rights defined in five-minute intervals) and tradeable rights can provide flexibility to access right holders, but also make the access scheme more complex. How should the trade-off between flexibility for access right holders and simplicity of the access scheme be assessed? Which better achieves the access scheme's objectives?

Question 8: If not nameplate capacity, what is the appropriate level of capacity that should be used to determine requirements for access rights coverage that would better achieve the scheme's objectives? If a Probability of Exceedance (POE) value is used, what process should be used to verify this?

Question 9: How should the allocation of access rights to hybrid (storage plus generation) assets be approached? What 'shape' of access rights would suit a hybrid asset? How could projects which use some of their maximum capacity 'behind the meter' be accounted for in determining the appropriate level of capacity for access rights coverage?

Question 10: Is there a minimum term (in years) for which access rights would need to apply to benefit project finance?

Option 1

Question 11: Under Option 1, connected generation capacity could be capped above the capacity of the REZ Shared Network. How should generation and storage capacity be set or capped to optimise REZ Shared Network utilisation without introducing too much constraint risk?

Question 12: How could network capacity be allocated between different generation types? Should it, for example, be based on a particular, pre-defined generation profile ("shape") for different types of generation technologies?

Options 2A and 2B

Question 13: How would 24-hour access rights impact the value and efficiency of a financial compensation model? If access rights were defined as flat, 24-hour, access rights, would access right holders be incentivised to firm up their generation to make efficient use of the access rights (either technically, or commercially with sharing arrangements)? If not, what adjustments would need to be made to the access scheme design to incentivise this?

Question 14: Would currently available information, including solar and wind forecasts for corresponding Tier 1 generators, be sufficient for Tier 2 access right holders to make a reasonable assessment of the risk of being constrained off? Or would additional data need to be available to achieve this?

Question 15: With reference to Appendix B, to what extent should curtailment (and therefore the compensation mechanism) take bid price or market settlement price into account? In particular, what would be the downside to limiting compensation to only the bids from Tier 1 access right holders that are below the market settlement price?

Question 16: In what ways could the proposed models and compensation mechanism design result in changes to the bidding strategies of Tier 1 and Tier 2 access right holders? Would this be expected to have a material impact on the NSW market?

Question 17: There could be circumstances in which the revenue earnt by Tier 2 access right holders will not equal the revenue lost by the Tier 1 access right holders through subsequent curtailment. This includes instances of intra-REZ constraints, and when MLFs for Tier 2 generators are systematically lower than for Tier 1 generators. What are the other circumstances, if any, in which potential "compensation inadequacy" may occur? How material is this risk for Tier 1 access right holders compared with the open-access regime?

Question 18: Does this Issues Paper identify the key risks associated with the Financial Compensation Models? Can the risks be sufficiently managed through the design features of the models and the proposed compensation mechanism referred to in this Issues Paper?

Question 19: How would the implementation of the financial compensation models impact existing contracts, such as PPAs? Could the compensation mechanism be appropriately accounted for in the design of new contract structures?

Other access scheme models considered but not progressed

As noted above, the NSW Government identified two additional access scheme models which have not been proposed for further assessment:

Limited NEM bidding model

The Limited NEM bidding model is a physically firm model. It involves allocating firm Tier 1 access rights up to the REZ export limit and allocating a capped capacity of Tier 2 access rights beyond this. All dispatch bids would be filtered through a bespoke software system prior to submission to AEMO's NEMDE. In the case of anticipated congestion on the REZ Shared Network (aggregate capacity of bids from projects connected to the REZ Shared Network exceeds the REZ Shared Network export capacity), bids would be filtered by the software system to prioritise Tier 1 access rights and filter out Tier 2 access rights in excess of the REZ export capacity. AEMO would only receive the pre-filtered bids. This would guarantee the offers of Tier 1 access right holders are prioritised in dispatch ahead of offers of Tier 2 access right holders.

The limited NEM bidding model would provide physically firm access for access right holders, up to the level of their access rights. In this sense, it offers a very high degree of certainty to investors. Further, there is limited risk of non-compliance by access right holders under this option as bid quantities are subject to automatic filtering, and there is no need for an ex-post enforcement regime or payment system to retrospectively reallocate revenue between access right holders.

However, a key disadvantage of this option is its complexity and the risks of being unable to integrate effectively with the dynamic and multifaceted NEM central dispatch process. The software required to implement this option would need to be capable of dynamic interaction with AEMO's systems, including to account for bids, rebids, Frequency Control Ancillary Services (FCAS) bids and contingency events, as well as

other market needs, right up until the relevant dispatch interval. There is a risk that, in filtering the bids and preventing AEMO from seeing the full bid stack from the REZ Shared Network, the most efficient market outcomes will not be achieved, particularly when market conditions change between the time initial bids are made, and the start of the relevant dispatch interval.

The disadvantages referred to above create implementation risks for this model. In particular, the development and demonstration of such complex software presents challenges for near-term implementation and could impact the confidence and support of investors, as well as create costs for consumers by diminishing competitive tension in the bidding process. With the REZ Administrator ultimately responsible for the software and its operation, the model also potentially places a significant liability with the REZ Administrator in the case that the software malfunctions.

For these reasons, this model has not been shortlisted and further design work on this model has not been progressed.

REZ Locational Marginal Pricing (LMP) model

The REZ Specific LMP model involves establishing a locational marginal price in the REZ, to allow for energy and storage projects that hold access rights to be compensated by other market participants for congestion. No limit on the volume or capacity of the connection of generators to the REZ would apply, although oversight of connection may still be desirable. This option aligns with two of the options considered by the ESB in its REZ Stage 2 Consultation Paper – the REZ as a region model, and the early allocation of FTRs model.

This model has a number of advantages and would perform well against some of the evaluation criteria. However, as with the limited NEM bidding model, this model has disadvantages that likely render it unsuitable for facilitating efficient REZ development in the near-term. In particular, the REZ Specific LMP Model is also a very complex model to implement and it would require a significant lead time to establish the systems and demonstrate the approach to investors. As with the limited NEM bidding model, it would not be suitable for facilitating REZ development in the near-term, including delivering the 'shovel ready' CWO REZ by the end of 2022. Furthermore, there is limited co-ordination of generation, storage and network investment, which as noted upfront in this paper, is vital to ensuring sufficient and appropriate de-risking of generation investment as well as lowering costs for consumers.

For these reasons, this model has not been shortlisted and further design work on this model has not been progressed.

Questions for stakeholders

Question 20: The NSW Government is not proposing to progress the Limited NEM Bidding and REZ Locational Marginal Pricing models further at this time. Are there elements unique to these two models which should be considered for integration into the models that have been shortlisted?

Section 7: Access scheme design issues

Trading

The financial compensation models include the ability to trade access rights, permanently or temporarily. Flexibility to trade underutilised access rights would improve efficient REZ Shared Network utilisation under these models.

Permanent trades may be used when access right holders increase or decrease their capacity or REZ Shared Network usage needs relative to the access rights they were initially allocated – for example when a wind farm installs fewer turbines than initially intended. Temporary trades may be used when an access right holder is unlikely to use their full access rights for a shorter, known period of time, such as when generating units are offline for planned maintenance.

Access rights will be recorded in a central register, which will be the formal record and source of truth on access rights, to aid the monitoring of compliance and to enable financial settlement.

Beyond this, there may also be a role for a centralised, fit-for-purpose trading platform to facilitate the trading of access rights. This would improve the oversight and monitoring of trading, providing for more control over the movement of access rights. However, it would also introduce a significant cost and administrative burden.

Options include:

- **Fit-for-purpose trading platform:** A centralised trading platform is developed to facilitate trades. This would allow for more transparency and oversight of trading as well as ensuring that trades do not inhibit the integrity and technical optimisation of the REZ.
- **Central register only:** No centralised trading platform is developed. Trading can occur bilaterally or on privately established exchanges and platforms. A central register is used to track, approve and officiate trades, with access right holders required to submit applications for trade approvals prior to their formal recognition in the register.

Questions for stakeholders

Question 21: How valuable is the ability to trade access rights, and in what circumstances would this be useful?

Question 22: To what extent would flexibility to trade access rights increase the value of access rights for their holders? How flexible and unrestricted would access rights trading need to be to provide value?

Question 23: Would the introduction of a central access rights trading platform be of benefit to access right holders? If so, why? If beneficial, then which party would be best placed to design, maintain and operate this trading platform?

Treatment of storage

Storage will play an important role in REZs, and in the future electricity system in NSW more broadly. Storage may require unique treatment in the CWO REZ Access Scheme to incentivise the market to build and operate storage in a way that leverages its potential to deliver system benefits, including as technology costs come down. Access rights for storage should incentivise charging and dispatching at optimal times to reduce congestion and increase the efficiency of REZ Shared Network utilisation. They should also account for the different access needs of long-duration storage, such as pumped hydro storage, relative to shorter duration battery storage.

It is expected that, most of the time, market signals would incentivise storage to dispatch when the network is underutilised, rather than during periods of congestion. However, the models proposed in this Issues Paper are currently designed to require storage to hold access rights, which would enable storage connecting to the REZ Shared Network to have greater certainty of dispatch in the same way as generation projects. This may be useful in instances where the market signal – which is ultimately based on demand at the regional reference node, is not aligned with the needs of the REZ (for example, periods where the REZ is congested yet NSW spot prices remain relatively high).

Currently, the financial compensation models (Options 2A and 2B) would require storage to hold Tier 1 or Tier 2 access rights, with the non-firm Tier 2 rights expected to give storage the flexibility to operate when there is capacity on the REZ Shared Network, without needing to pay for Tier 1 rights. The Limited Physical Connection Model (Option 1), with a single tier of access rights, would require storage to hold access rights, along with other generation types.

In addition to this, an incentive scheme could be introduced to incentivise charging or pumping of storage at times when the REZ Shared Network is congested. Depending on the storage duration and certainty around charging or pumping, it may be appropriate for storage to create additional Tier 1 access rights if charging or pumping at particular times creates additional export capacity on the REZ Shared Network, with this forming the basis of the incentive. The option to introduce incentives of this nature are canvased in the 'Treatment of Load' section below.

ESB proposed approach to the treatment of storage

In its REZ Stage 2 consultation paper, the ESB proposes an approach to the treatment of storage under a financially firm access rights model.

The proposed approach would see storage connect without firm access rights (in the financial compensation models in this Issues Paper, this would be Tier 2 access rights). The storage could avoid paying compensation by not discharging during periods of congestion. In any case, the circumstances in which REZ congestion coincides with high market prices would be rare, providing limited market incentive to discharge during congested periods.

The ESB proposes storage would receive a favourable price for charging when the REZ faces congestion (i.e. further to the incentive provided by the prevailing signal at the regional reference node). The ESB proposes that a price of $0 may apply for charging during these periods (and likewise for discharging during these periods, as a result of the constraint compensation mechanism). This would be paid for by the generators that benefit from the battery charging.

Questions for stakeholders

Question 24: For generation projects connecting to the REZ, how important is it that storage is required to purchase access rights (i.e. that total connecting storage capacity is limited)? If storage was not to be required to purchase access rights, how high is the risk of storage competing with (i.e. curtailing) generation dispatch?

Question 25: Would proponents of storage projects value firm access rights? In the financial compensation models, how would storage operations differ under Tier 1 versus Tier 2 access rights? How could an access scheme provide sufficiently flexibility for storage to connect in future as technology costs come down and the market evolves?

Question 26: Would prevailing market signals provide sufficient and appropriate incentive for storage to operate in a manner that is aligned with the needs of the REZ? If not, then what REZ-specific types of incentive mechanisms should be considered to incentivise load and storage to consume electricity when the REZ Shared Network is congested?

Question 27: If an incentive mechanism for storage is implemented how should the costs of this arrangement be recovered?

Question 28: How should the treatment of storage under the CWO REZ Access Scheme account for differences between long-duration storage and fast-firming technologies?

Treatment of load (other than storage)

Load (other than storage) connected to the REZ Shared Network has the potential to increase utilisation of the REZ Shared Network, by reducing losses and increasing REZ export capacity. This includes traditional single-site load such as industrial sites, as well as load connected through distribution networks serving a wider network of consumers. To leverage the potential of load in REZs both to support the technical capability of the REZ and provide economic benefits to local communities, a unique approach may need to be developed within or complementary to the REZ Access Scheme.

Further work is needed to confirm how load could be incorporated into the CWO REZ Access Scheme, and the NSW Government welcomes feedback from stakeholders on the opportunity. The approach developed for the treatment of load may also be applied to the treatment of charging or pumping for storage, given the system-wide benefits it may offer a REZ are the same. Options include:

- **Load not initially included in CWO REZ Access Scheme:** The REZ Shared Network is initially developed with only coordinated generation and storage able to hold access rights and participate in the CWO REZ Access Scheme. Load would be permitted to connect to the network under current NEM network access arrangements.
- **Incentives to connect load:** A new incentive scheme could be developed to incentivise load capable of drawing electricity during peak-generation (congested) periods to connect to the REZ Shared Network. This could be based on determining how much additional 'headroom' for generation and storage access is unlocked on the REZ Shared Network as a result of the load connecting, and allowing the load to share in the value gained through making additional access rights available.

- **Incentives for strategic operation of load:** A new incentive scheme could be developed to incentivise connected load to consume electricity when the REZ Shared Network is congested, reducing congestion and constraints. The scheme could see load benefiting from low or zero electricity prices during periods of congestion on the REZ Shared Network, funded by the projects connected to the REZ Shared Network which benefit from the additional load.
- **Load treated on a case-by-case basis:** If there are likely to be few load connections in the REZ, the access arrangements for each could be addressed on a case-by-case basis. This may be appropriate for large loads or demand centres connecting to the REZ Shared Network, as the most suitable approach to treating this connection may be different to that which would apply to a smaller connection.

If an additional incentive scheme were introduced for the strategic operation of load (or storage), there are various ways that this could be achieved.

One option, for example, would be to guarantee that load/storage would pay $0/MWh (or an alternative low price) for electricity during periods of REZ congestion. If the wholesale market settlement price in these periods is already at or below the $0/MWh or the alternative low-price, no additional incentive would be provided (assuming that the commercial incentive is strong). However, if the market settlement price during these periods is above $0/MWh or the alternative low price an incentive payment would be made to effectively reduce the price for storage or load.

One approach for recovering these costs would be to split the cost equally between all dispatched generators and storage – assuming that all benefited equally from the additional network capacity made available by the charging/load. Another approach would be more akin to the current FCAS causer pays mechanism, with dispatched generation and storage covering half the cost and consumers covering the remaining half.

Questions for stakeholders

Question 29: How should load be integrated into REZs and what types of incentives (if any) would be needed to attract load to connect to the REZ Shared Network?

Question 30: Would additional incentives be necessary, beyond market-based commercial incentives, to encourage storage/load to increase their electricity use during periods of REZ network congestion?

Question 31: If an incentive mechanism for load is implemented how should the costs of this arrangement be recovered?

Impact of distribution load/embedded generation on REZ hosting capacity

Changes in load (and embedded generation within the distribution network) have the ability to impact the hosting and power transfer capability of the CWO REZ, as they will affect the flow of energy at the bulk supply points (BSPs) that connect the distribution and transmission networks.

Understanding the interactions at the BSPs in the CWO REZ is an important component of designing an effective access regime and minimising the impacts on surrounding networks. In particular, the BSPs allow for two-way flows, meaning flows from the BSP into the REZ could impact capacity on the REZ Shared Network while flows from the REZ may also have impacts for surrounding networks. As a result, it is important to understand current and future flows on the transmission network in the CWO REZ, including those from the distribution network, and for the access scheme to be robust to future changes in these flows.

Questions for stakeholders

Question 32: How should the potential impact of changes in distribution load and embedded generation on the CWO REZ hosting/export capacity be incorporated into the CWO REZ Access Scheme design and implementation?

Treatment of non-scheduled generation and exempt generators

Non-scheduled generation typically includes small generation assets (currently between 5 MW and 30 MW) connected to transmission and distribution networks which are not required to participate in NEM central dispatch processes (e.g. make offers to dispatch). In addition, certain generators operating generating systems with specific characteristics may be exempt from the usual requirements of generators in the NEM and are not permitted to participate in the NEM.

The description of the access scheme models in this Issues Paper (particularly the financial compensation models) have focused on the treatment of generation and storage that participates in central dispatch. However, the treatment of non-scheduled generation and any access rights requirements on them, or caps on their aggregate connection capacity, will need to be incorporated into further design work. The NSW Government welcomes feedback from stakeholders on how non-scheduled generation should be treated under the CWO REZ Access Scheme.

Questions for stakeholders

Question 33: Should non-scheduled generation and exempt generators be required to hold access rights under the CWO REZ Access Scheme, and/or should the total capacity of non-scheduled generation or generation from exempt generators permitted to connect be capped? Is there an alternative approach to the treatment of non-scheduled generation or generation from exempt generators which should be considered?

‘Use it or lose it’ provisions

All access scheme models presented in this Issues Paper are proposed to include ‘use it or lose it’ provisions, to ensure that the access rights granted are used by new generation and storage that will supply electricity to NSW electricity consumers. This will be an important measure to ensure the efficient utilisation of the REZ Shared Network and meet the objective of delivering cheap, reliable and sustainable energy.

The ‘use it or lose it’ provisions will need to specify the circumstances in which an access right holder may lose (or be required to sell) their access right due to underutilisation, and how this process will work.

Options which could be introduced include:

- Sunset period: this would require that access rights be returned (for compensation) or sold if a connecting project does not reach a particular milestone (e.g. date of financial close or commissioning) by a particular date; and/or
- Minimum utilisation requirements: this could require that access rights be returned (for compensation) or sold if determined to be under-utilised after the access right is acquired. For example, this may include a generator closure or mothballing, or a generator developed to a lower capacity than initially planned.

Questions for stakeholders

Question 34: If ‘use it or lose it’ provisions were introduced, how should the utilisation requirements be set/measured? What exemptions or concessions should be considered?

Question 35: If an access right holder was required to return some or all of its access rights under the use it or lose it provisions, how should these provisions be structured?

Management of MLFs

Reductions in expected revenue due to deteriorating MLFs has been a key area of concern and source of risk and uncertainty for many renewable generators in the NEM in recent years.

Lower MLFs and greater volatility of MLFs for renewable generators reflects the confluence of new generators connecting in resource-rich areas of the grid which are also at the remote edges of the network with limited network capacity. These locations are also a significant distance from demand centres, resulting in greater losses of electricity as it travels from these generators to the regional reference node. These generators also tend to have correlated output (especially the case for solar PV, but also for wind) and are typically located close to each other. These elements of correlation and co-location have exacerbated the decline in, and volatility of MLFs for these generators.

The coordinated planning of generation, storage and network investment that underpins the CWO REZ, including the active coordination by the REZ Administrator of the technology mix within the REZ, is expected to reduce this risk by providing more certainty on the capacity in future years within the boundary points of the REZ . This is supported by overall caps on connection under each of the access scheme models presented in this Issues Paper.

Questions for stakeholders

Question 36: What impact do you consider capping of connection in a REZ, and the proposed access scheme models, will have on reducing the risk of volatile MLFs? Are additional measures warranted? If so, what measures?

Common connection assets

Currently, multiple parties can connect to the network via single privately funded connection assets called DCAs.[6] DCAs currently have one single connection point with the transmission network (transmission network connection point or TNCP) and key requirements under the NER apply at that point (e.g. metering for settlements, MLFs and performance standards).

The AEMC proposes to reclassify large DCAs (over 30km) as designated network assets (DNAs) in its Draft National Electricity Amendment (Connection to Dedicated Connection Assets) Rule dated 26 November 2020. DNAs will form part of the Transmission Network Service Provider's transmission network, rather than being connection assets. Each project connected to a DNA will have an individual TNCP on the DNA at which key obligations under the NER are applied(.e.g. settlement, metering, performance standards, MLFs). Generation or storage projects connected to a DNA will access the REZ Shared Network via a single boundary point between the DNA and the REZ Shared Network. Under the draft Rule, the concept of DCAs is retained, but only applies to power lines less than 30km in length, i.e. small DCAs, which remain connection assets used to connect a single project to the network.

While under the rule the DNA remains transmission network, it is not subject to the open access regime that applies to the rest of the network. This can be achieved because the DNA is a radial asset and not meshed. Instead of open access, there is a special access regime applying to the DNA. The point of delineation where open access and the special access regime apply on the transmission network is called a 'boundary point'.

As a result of this demarcation, it will be important where multiple generation and storage projects connect via a large DCA or DNA in the REZ that the access scheme applying to the DCA/DNA does not conflict with the access scheme for the REZ Shared Network. This will ensure the most efficient utilisation of the REZ Shared Network. The NSW Government has considered how this need for consistency could be managed and proposes the following principles for stakeholder feedback (note the term DNA is adopted to cover connection infrastructure to which multiple parties connect):[7]

- Generation and storage projects proposing to connect to the REZ Shared Network via a DNA will need to be allocated a right to connect to the REZ Shared Network in the same way as generators connected directly to the REZ Shared Network.
- The owner/operator of a DNA connected to the REZ Shared Network must not connect generation and storage projects to the DNA unless the projects hold a right to connect to the REZ Shared Network, and sufficient access rights to cover their connected nameplate capacity.
- Access rights for DNA connected generators and storage projects will be assessed at the boundary point between the DNA and the REZ Shared Network (including financial compensation under Options 2A and 2B). The REZ Shared Network Access Scheme would not extend into the DNA, other than to the extent required to manage compliance with the REZ Shared Network Access Scheme. The REZ Shared Network access arrangements will not manage or accommodate MLFs or constraints on the DNA itself.

6 "Large DCAs" are DCAs with power lines 30km or longer in length that connect a project or group of projects to the transmission network. The operators of large DCAs are required to put in place access policies approved by the Australian Energy Regulator that govern how parties may connect to the asset. Small DCAs are DCAs with power lines less than 30km in length that connect a project or group of projects to the shared transmission network. Operators of small DCAs are not required to put in place access policies in relation to these assets.

7 Note: Under the AEMC's proposed rule change the DNA will technically form part of the transmission network (i.e. it will not technically be connection infrastructure).

- It is expected that a DNA will be sized to accommodate the generation capacity of, and access rights held by, the generation and storage projects connecting to the DNA. Similar to the REZ Shared Network, this capacity may be optimised by connecting a combination of generation types. Generation and storage projects connecting to the DNA would:
  - need to reasonably demonstrate the feasibility of building the relevant DNA and that the DNA can accommodate the access rights purchased by the connecting parties; and
  - could be subject to 'use it or lose it' arrangements if the DNA is not then developed within a required timeframe.
- Subsequent generators and storage projects may connect to the DNA provided they augment both the DNA and the REZ Shared Network to ensure that they do no harm to the power transfer capability available to existing connected projects.

As part of the CWO REZ Access Scheme design, specific requirements for generation and storage projects connecting to the REZ Shared Network via DNAs would be developed, including whether aspects need to be controlled by contract and/or regulation.

Questions for stakeholders

Question 37: What are your views on the appropriateness of the principles for managing the interface between the CWO REZ Access Scheme and common DCAs/ DNAs? How could consistency between the CWO REZ Access Scheme and access policies on DCAs and DNAs best be achieved?

Photography
Worker monitoring controlled horticulture facility.

Section 8: Governing the REZ Access Scheme

The CWO REZ Access Scheme will be subject to fit-for-purpose governance arrangements. The Act outlines several functions in relation to the declaration of an access scheme.

In addition to these legislated functions, it is possible that the Consumer Trustee would be responsible for the process of allocating access rights under an access scheme to allow effective integration between the process for allocating LTESAs.

Further, the REZ Administrator will administer the access scheme on an ongoing basis, including managing subsequent connections and potentially acting as an intermediary for financial settlements if one of the financial compensation models is adopted. The entity that undertakes the role of the REZ Administrator has not yet been determined. The body or bodies undertaking the functions of the REZ Administrator must have the resources and expertise to undertake the roles, including the ability to manage the associated risks.

These functions are summarised in the table below.

Table 6: CWO REZ Access Scheme Roles and Responsibilities

Organisation	Roles and responsibilities
Minister	Declares Renewable Energy Zones. Declares Access Schemes. Publishes guidelines about the exercise of the Minister's functions in relation to the declaration of Access Schemes. Establishes committees under s34W(1)(b) of the *Energy and Utilities Administration Act 1987 (s34W(1)(b) committees).*
Consumer Trustee	Runs allocation process for LTESAs. Potentially runs allocation process for access rights. Sets access fees payable to the Scheme Financial Vehicle. Seeks advice from s34W(1)(b) committee on access fees. Authorises/ recommends final REZ network infrastructure project solution.
REZ Administrator	Administers Access Scheme on an ongoing basis
EnergyCo	Makes recommendations to the Consumer Trustee on REZ network infrastructure projects.
Scheme Financial Vehicle	Receives Access Scheme fees.

Section 9: Other coordination initiatives

Coordination of common connection assets

Privately funded connection assets (DCAs or Third Party IUSAs, potentially DNAs under the AEMC's proposed rule change) will be important components of the CWO REZ. It is anticipated that generators and storage providers could connect to the REZ Shared Network via connection assets at a number of hubs. In many cases, a coordinated approach to developing these connection assets is likely to be more efficient than individual point-to-point connections. However, past experience suggests that there are hurdles to this outcome and that it is unlikely to occur without coordination.

Support to develop coordinated connection assets

The NSW Government wishes to explore opportunities to assist in the coordination of scale-efficient common connection assets that serve a number of connected projects, and to minimise the social and environmental impacts of connection infrastructure in the REZ. Coordinated REZs, such as the CWO REZ, present a unique opportunity to coordinate the development of scaled, private connection assets connecting multiple projects, because there will be more transparency of connecting projects than in the rest of the NEM due to the requirement for projects to obtain access rights before connecting to the REZ Shared Network. Further, projects allocated access rights in the initial allocation round are likely to be working to aligned timeframes and developing their network infrastructure at broadly the same time.

As noted earlier in this Issues Paper, further work will be required to consider the interaction between the CWO REZ Access Scheme and access policies for large common, private connection assets.

Questions for stakeholders

Question 38: Would a process to coordinate connection assets for multiple projects be of interest? If so, what coordination initiatives would be of interest?

Question 39: Given the unique nature of connecting to coordinated REZs, such as the CWO REZ, we expect the barriers to coordination of connection assets to be reduced. What further barriers to coordination will still need to be overcome, and how could this be achieved?

Coordinated connection process for the REZ Shared Network

The current network connection process, has been identified a source of significant uncertainty and risk for many generation and storage developers.[8] Issues with the connection process have arisen, in part, because the connection process was not established to accommodate the unprecedented volume of connection applications that are now being received. Increasingly, this process also involves analysis and remediation of network security issues like system strength, which can add to the cost and create further delays.

The proposed CWO REZ Access Scheme, including the centralised allocation of access rights, presents a number of unique opportunities to address challenges in the connection process. In particular, it is likely to reduce uncertainty as to how the connection of other generators will impact on the conditions of connection, as the CWO REZ Access Scheme will be designed having regard to the export capacity of the REZ Shared Network. In addition, the allocation process is likely to result in closely aligned connection timeframes for projects located in the CWO REZ. This could present both opportunities and challenges, with multiple generation and storage projects looking to connect in parallel or in close succession to the REZ shared network.

The NSW Government is considering whether an improved and streamlined network connection process could be applied in the CWO REZ. This would help to ensure the full generation capacity in the CWO REZ is able to be developed in a timely manner and would also improve the value proposition of connecting to the REZ Shared Network.

The NSW Government welcomes feedback from stakeholders about potential improvements to the connection process for the CWO REZ Shared Network.

Questions for stakeholders

Question 40: What opportunities exist for the NSW Government to improve connection processes in the CWO REZ? What improvements would deliver greatest value?

Question 41: What, if any, additional connection challenges could be created under the CWO REZ Access Scheme? How could these be mitigated?

Question 42: What value could be delivered to generation and storage projects through centralised approaches to connection and system services, and what are the trade-offs? For example, would projects be willing to forego optionality around aspects of their project through requirements like minimum equipment standards, to reduce costs and the risk of potential delays to commissioning?

8 Clean Energy Council, Clean Energy Outlook Confidence Index, December 2020 at https://www.cleanenergycouncil.org.au/resources/resources-hub/clean-energy-outlook-confidence-index

Section 10: Summary of questions

Objectives and evaluation

Question 1: If the CWO REZ Access Scheme delivers on the proposed objectives and benefits, how would connecting projects value connecting under this Scheme rather than elsewhere under current NEM network access arrangements? Should proposed benefits be given weightings, and if so, what should these be?

Question 2: What, if any, additional benefits should the CWO REZ Access Scheme deliver to provide value to connecting generation and storage projects?

Question 3: Do you agree with the proposed evaluation criteria? What, if any, additional criteria should be considered?

Access scheme models

Question 4: Which of the shortlisted models presented is preferred? Which best balances the need to deliver value to investors with the need to maximise utilisation of the REZ, and together achieve the access scheme's objectives?

In particular, does the 'non-firm' connection right, under Option 1 provide sufficient certainty to investors to be of value? If it does not, is this outweighed by the increased utilisation of the REZ that would result under such non-firm connection rights?

Question 5: Are there other access models that you consider would be superior to the shortlisted models in this paper? If so, what are these models, and what are their strengths in comparison to the shortlisted models?

Question 6: How could the characteristics of either Option 1, 2A or 2B be adjusted to improve them in a manner that achieves the access scheme's objectives?

Question 7: Characteristics such as more granular access rights (for example, rights defined in five-minute intervals) and tradeable rights can provide flexibility to access right holders, but also make the access scheme more complex. How should the trade-off between flexibility for access right holders and simplicity of the access scheme be assessed? Which better achieves the access scheme's objectives?

Question 8: If not nameplate capacity, what is the appropriate level of capacity that should be used to determine requirements for access rights coverage that would better achieve the scheme's objectives? If a Probability of Exceedance (POE) value is used, what process should be used to verify this?

Question 9: How should the allocation of access rights to hybrid (storage plus generation) assets be approached? What 'shape' of access rights would suit a hybrid asset? How could projects which use some of their maximum capacity 'behind the meter' be accounted for in determining the appropriate level of capacity for access rights coverage?

Question 10: Is there a minimum term (in years) for which access rights would need to apply to benefit project finance?

Option 1

Question 11: Under Option 1, connected generation capacity could be capped above the capacity of the REZ Shared Network. How should generation and storage capacity be set or capped to optimise REZ Shared Network utilisation without introducing too much constraint risk?

Question 12: How could network capacity be allocated between different generation types? Should it, for example, be based on a particular, pre-defined generation profile ("shape") for different types of generation technologies?

Options 2A and 2B

Question 13: How would 24-hour access rights impact the value and efficiency of a financial compensation model? If access rights were defined as flat, 24-hour, access rights, would

access right holders be incentivised to firm up their generation to make efficient use of the access rights (either technically, or commercially with sharing arrangements)? If not, what adjustments would need to be made to the access scheme design to incentivise this?

Question 14: Would currently available information, including solar and wind forecasts for corresponding Tier 1 generators, be sufficient for Tier 2 access right holders to make a reasonable assessment of the risk of being constrained off? Or would additional data need to be available to achieve this?

Question 15: With reference to Appendix B, to what extent should curtailment (and therefore the compensation mechanism) take bid price or market settlement price into account? In particular, what would be the downside to limiting compensation to only the bids from Tier 1 access right holders that are below the market settlement price?

Question 16: In what ways could the proposed models and compensation mechanism design result in changes to the bidding strategies of Tier 1 and Tier 2 access right holders? Would this be expected to have a material impact on the NSW market?

Question 17: There could be circumstances in which the revenue earnt by Tier 2 access right holders will not equal the revenue lost by the Tier 1 access right holders through subsequent curtailment. This includes instances of intra-REZ constraints, and when MLFs for Tier 2 generators are systematically lower than for Tier 1 generators. What are the other circumstances, if any, in which potential "compensation inadequacy" may occur? How material is this risk for Tier 1 access right holders in comparison to the open-access regime?

Question 18: Does this Issues Paper identify the key risks associated with the Financial Compensation Models? Can the risks be sufficiently managed through the design features of the models and the proposed compensation mechanism referred to in this Issues Paper?

Question 19: How would the implementation of the financial compensation models impact existing contracts, such as PPAs? Could the compensation mechanism be appropriately accounted for in the design of new contract structures?

Other models considered but not progressed

Question 20: The NSW Government is not proposing to progress the Limited NEM Bidding and REZ Locational Marginal Pricing models further at this time. Are there elements unique to these two models which should be considered for integration into the models that have been shortlisted?

Access scheme design issues

Question 21: How valuable is the ability to trade access rights, and in what circumstances would this be useful?

Question 22: To what extent would flexibility to trade access rights increase the value of access rights for their holders? How flexible and unrestricted would access rights trading need to be to provide value?

Question 23: Would the introduction of a central access rights trading platform be of benefit to access right holders? If so, why? If beneficial, then which party would be best placed to design, maintain and operate this trading platform?

Question 24: For generation projects connecting to the REZ, how important is it that storage is required to purchase access rights (i.e. that total connecting storage capacity is limited)? If storage was not to be required to purchase access rights, how high is the risk of storage competing with (i.e. curtailing) generation dispatch?

Question 25: Would proponents of storage projects value firm access rights? In the financial compensation models, how would storage operations differ under Tier 1 versus Tier 2 access rights? How could an access scheme provide sufficiently flexibility for storage to connect in future as technology costs come down and the market evolves?

Question 26: Would prevailing market signals provide sufficient and appropriate incentive for storage to operate in a manner that is aligned with the needs of the REZ? If not, then what REZ-specific types of incentive mechanisms should be considered to incentivise load and storage to consume electricity when the REZ Shared Network is congested?

Question 27: If an incentive mechanism for storage is implemented how should the costs of this arrangement be recovered?

Question 28: How should the treatment of storage under the CWO REZ Access Scheme account for differences between long-duration storage and fast-firming technologies?

Question 29: How should load be integrated into REZs and what types of incentives (if any) would be needed to attract load to connect to the REZ Shared Network?

Question 30: Would additional incentives be necessary, beyond market-based commercial incentives, to encourage storage/load to increase their electricity use during periods of REZ network congestion?

Question 31: If an incentive mechanism for load is implemented how should the costs of this arrangement be recovered?

Question 32: How should the potential impact of changes in distribution load and embedded generation on the CWO REZ hosting/export capacity be incorporated into the REZ Access Scheme design and implementation?

Question 33: Should non-scheduled generation and exempt generators be required to hold access rights under the CWO REZ Access Scheme, and/or should the total capacity of non-scheduled generation or generation from exempt generators permitted to connect be capped? Is there an alternative approach to the treatment of non-scheduled generation or generation from exempt generators which should be considered?

Question 34: If 'use it or lose it' provisions were introduced, how should the utilisation requirements be set/measured? What exemptions or concessions should be considered?

Question 35: If an access right holder was required to return some or all of its access rights under the 'use it or lose it' provisions, how should these provisions be structured?

Question 36: What impact do you consider capping of connection in a REZ, and the proposed access scheme models, will have on reducing the risk of volatile MLFs? Are additional measures warranted? If so, what measures?

Question 37: What are your views on the appropriateness of the principles for managing the interface between the CWO REZ Access Scheme and common DCAs/DNAs? How could consistency between the CWO REZ Access Scheme and access policies on DCAs and DNAs best be achieved?

Other coordination initiatives

Question 38: Would a process to coordinate connection assets for multiple projects be of interest? If so, what coordination initiatives would be of interest?

Question 39: Given the unique nature of connecting to coordinated REZs, such as the CWO REZ, the barriers to coordination of connection assets may be reduced. What further barriers to coordination will still need to be overcome, and how could this be achieved?

Question 40: What opportunities exist for the NSW Government to improve connection processes in the CWO REZ? What improvements would deliver greatest value?

Question 41: What, if any, additional connection challenges could be created under the CWO REZ Access Scheme? How could these be mitigated?

Question 42: What value could be delivered to generation and storage projects through centralised approaches to connection and system services, and what are the trade-offs? For example, would projects be willing to forego optionality around aspects of their project through requirements like minimum equipment standards, to reduce costs and the risk of potential delays to commissioning?

Section 11: Probity, confidentiality and caveats

While development of the CWO REZ will ultimately involve market engagement and procurement processes, it is important to note that this Issues Paper and feedback process to it, are not part of, nor a pre-requirement to, any procurement process.

Participation by any entity in this stakeholder engagement process is entirely voluntary. Participation, or non-participation, in feedback will not provide any participant any advantage or disadvantage in any future procurement process for the Program. No information provided by submission will be used in any future evaluation of competitive offers.

Industry information gained from feedback may be used in the further scoping and development of the CWO REZ. Internal NSW project and program staff and advisors – who are subject to confidentiality requirements – will have access to submissions in full, including submitter details. Participants should also be aware that provisions of the Government Information (Public Access) Act 2009 (NSW) may apply to any documents submitted (and information should be submitted on that basis) and also to any summary report compiling key information and feedback.

This Issues Paper has been developed as a market engagement tool to ensure that, as far as is practical, equal information and information access will be provided to all interested parties in the CWO REZ program.

Any participation in this engagement process or any reliance on this document shall be entirely at a person or entity's risk. Whilst this document sets out current information and options regarding the CWO REZ and has been prepared in good faith and with reasonable efforts, it is issued without prejudice and is subject to change at any time (including as a result of this Market Sounding Process).

Nothing in this document is, or should be relied upon as, a promise or representation by the NSW Government that any Project will subsequently proceed. The Department reserves the right to alter or amend any process, stated or implied within this document, at any time.

By participating in the option to provide a written submission, you or your organisation agrees to the following conditions:

- participation in this feedback process does not imply any registration, pre-qualification or any other preferred status in respect of any project.
- any person or organisation which does not participate will not be prejudiced in any way in respect of any subsequent procurement process in relation to this, or any other project.
- in the event of the commencement of any formal competitive or procurement process, participants will not rely on any information supplied or communicated as part of this Issues Paper.
- participants are discouraged from providing unsolicited offers or any marketing material on the capabilities of their organisation. This information will not be considered.

Appendix A: Evaluations

The tables below evaluate each of the models in more detail. This evaluation will be reviewed and revised to reflect stakeholder feedback on this Issues Paper and additional analysis to support identification of a preferred model.

Evaluation of Option 1: Limited physical connection model

This model performs well against criteria regarding simplicity and low administrative burden, and less well against criteria concerning REZ Shared Network utilisation.

Table 7: Evaluation of Option 1

Criteria	Description
Greater certainty and lower costs of capital for generation and storage investors	**Certainty and stability of constraint risk:** Constraints can still occur, and will not be compensated for, but there is increased certainty of constraint risk compared to current NEM network access arrangements due to control over connections and a cap on total connection capacity within the REZ Shared Network. The access scheme does not provide certainty around conditions beyond the boundary points of the REZ Shared Network. Additional subsequent connections will need to meet requirements to ensure existing connected assets are not adversely affected. **Low and stable risk of transmission losses:** Improved stability of loss factors compared to the current NEM network access arrangements, due to control over connections and a cap on total connection capacity in the REZ. The access scheme does not provide certainty around conditions beyond the boundary points of the REZ Shared Network. **Valuable outcomes for access right holders:** Access rights deliver benefits relative to current NEM network access arrangements. However, the value is not as high as it would be with financially firm access rights. **Low complexity of implementation and payment structures, for access right holders:** Low implementation complexity for access right holders and REZ Administrator, with no additional payment systems to settle compensation required.

Criteria	Description
Efficient investment in and utilisation of the REZ Shared Network	**Incentivises efficient use of transmission capacity for each trading interval:** The single tier of access rights under this model is a limitation on efficient network utilisation. Allocating a greater capacity of access rights would increase utilisation, but reduce the certainty provided to connected projects in relation to constraint risk. **Incentivises storage capacity to connect within the REZ:** Storage is incentivised to connect with access rights in this model, as a capped capacity of access rights for dispatchable technology types is likely to be made available alongside capped allocations for key generation types. This model would not introduce a new incentive, in addition to market price signals, for storage to avoid dispatching when the REZ Shared Network is congested (no compensation requirements). **Greater competitive pressure on prices:** May allow the connection of fewer generation and storage projects relative to Options 2A and 2B.
Timely implementation	**Administratively simple to set–up in near–term timeframes:** This model is relatively simple to implement in the near–term, as it does not require payment systems to settle compensation.
Limited administrative and enforcement burden for REZ Administrator	**Low frequency and duration of administrator involvement, low governance requirements to administer scheme and low administrative burden for generators:** The single tier of access rights and no need for payment systems to settle compensation mean the ongoing administrative requirements are limited. As with all access models, there will be governance requirements to assess new connections, ensure sufficient allocation of rights, and ensure no material deterioration of existing access rights. **Ease of monitoring compliance and limited anticipated enforcement requirements:** Monitoring and enforcement of compliance under this model are limited. This model is non–firm and there is no enforcement of access rights involved. Connecting generators would expect to be curtailed and would understand and accept this risk before connecting. Further, given generators must hold access rights to cover their nameplate capacity, there is limited scope for non–compliance with access rights.
Minimal intervention in existing energy and contract markets	**Minimal interference with AEMO processes:** This model does not impact NEM central dispatch processes operated by AEMO.

Criteria	Description
Coexists with proposed national reforms	**Integrate with potential ESB REZ reforms:** This model aligns relatively closely with the ESB's proposed 'Connection access protection model'. **Integrate with potential ESB transmission and access reforms:** LMPs and FTRs could be introduced into the REZ alongside this access regime with minimal disruption, as the access scheme does not impact NEM settlements or dispatch. **Minimise departure from the National Electricity Laws and Rules, where possible:** This model will require departures from the current NEM network access arrangements (specifically, the connections process) but does not require any changes to NEM settlement or dispatch processes operated by AEMO.

Evaluation of Option 2A: Financial compensation model

This model performs well against investor certainty criteria, as it provides Tier 1 access right holders financially firm access to the REZ Shared Network as well as the certainty provided by caps on connections.

Table 8: Evaluation of Option 2A

Criteria	Description
Greater certainty and lower costs of capital for generation and storage investors	**Certainty and stability of constraint risk:** Tier 1 access right holders have greater revenue certainty than under Option 1 as their financial risk of being constrained off due to congestion on the REZ Shared Network is minimised, given they are entitled to compensation. Tier 2 access right holders have some level of certainty of network access through the capping of total connections to the REZ Shared Network. The access model does not provide certainty around conditions beyond the boundary points of the REZ Shared Network. Subsequent connections will need to meet requirements to ensure existing connected assets are not adversely affected. **Low and stable risk of transmission losses:** Improved stability of loss factors compared to the current NEM network access arrangements, due to control over connections and a cap on total connection capacity in the REZ Shared Network. There is no certainty around conditions beyond the boundary points of the REZ Shared Network. **Valuable outcomes for access right holders:** Access rights deliver benefits for Tier 1 access right holders, relative to current NEM network access arrangements through financially firm access to the REZ Shared Network. Tier 2 access right holders benefit from capped and coordinated connection and stability of loss factors, relative to current NEM network access arrangements. **Low complexity of implementation and payment structures, for access right holders:** Implementation is complex relative to the limited physical connection model (Option 1) and new payment systems will be required to facilitate the payment of compensation from Tier 2 access right holders to Tier 1 access right holders where Tier 1 access holders are constrained off. The potential for settlement of compensation to be made through AEMO's NEM settlement systems (e.g. as reallocations of market revenue) will be further explored.

Criteria	Description
Efficient investment in and utilisation of the REZ Shared Network	**Incentivises efficient use of transmission capacity for each trading interval:** The financial compensation models incentivise efficient use of REZ Shared Network capacity by allocating Tier 2 access rights above the physical REZ Shared Network capacity and incentivising its use when unused capacity is available. The application of flat, 24–hour access rights under option 2A reduces this efficiency slightly as the flat 24–hour access rights approach depends on the individual access right holders firming their generation to utilise the REZ Shared Network, which may result in uncoordinated solutions being deployed rather than more scale–efficient options, but could support the addition of greater storage capacity as technology costs come down. Allowing for the trading of access rights supports efficient use of the REZ Shared Network capacity. **Incentivises storage capacity to connect within the REZ:** The financial compensation models incentivise storage connecting to the REZ Shared Network by enabling storage to hold Tier 2 access rights for some (or all) of their capacity. Further, the compensation requirements on Tier 2 access right holders provide a disincentive to discharge when the REZ Shared Network is congested. An additional incentive mechanism may be used to incentivise storage charging during periods of REZ Shared Network congestion. **Greater competitive pressure on prices:** May allow the connection of a larger number of generation and storage projects than Option 1, through the availability of Tier 2 rights.
Timely implementation	**Administratively simple to set up in near–term timeframes:** This model is more challenging to implement in the near–term, as it requires a payment system to be established to settle compensation. The potential for settlement of compensation to be made through AEMO's NEM settlement systems (e.g. as reallocations of market revenue) will be further explored. The allocation of flat 24–hour access rights will be simpler to implement than more granular access rights.

Criteria	Description
Limited administrative and enforcement burden for REZ Administrator	**Low frequency and duration of administrator involvement, low governance requirements to administer scheme and low administrative burden for generators:** IT systems would be required to monitor access right allocations and determine the level of congestion caused by Tier 2 access holders and settle compensation. There are ongoing governance requirements to properly administer the scheme and calculate and settle compensation, as well as reporting processes. As with all models, there will be governance requirements to assess new connections, ensure sufficient allocation of rights, and ensure no material deterioration of existing access rights. **Ease of monitoring compliance and limited anticipated enforcement requirements:** Compliance monitoring and enforcement requirements under this model are expected to be minimal, as the compensation calculations are all undertaken centrally.
Minimal intervention in existing energy and contract markets	**No interference with AEMO dispatch processes:** This model does not impact NEM central dispatch processes operated by AEMO. As noted above, the potential for settlement of compensation to be made through AEMO's NEM settlement systems (e.g. as reallocations of market revenue) will be further explored.
Coexists with proposed national reforms	**Integrate with potential ESB REZ reforms:** This model aligns with the Financial Access Protection Model consulted on by the ESB. **Integrate with potential ESB transmission and access reforms:** Could integrate with an LMP/FTR regime given both use a financial compensation mechanism to provide firm rights. However, would need consideration of risks of complexity and uncertainty for investors, as well as administrative burdens associated with the transition. **Minimise departure from the National Electricity Laws and Rules, where possible:** The introduction of two tiers of access rights, and the introduction of an ex–post compensation process, will require more of a departure from the current regulatory framework than the limited physical connection model.

Evaluation of Option 2B: Enhanced financial compensation model

This model performs well against network utilisation criteria but is more complex which increases uncertainty for investors and administrative burden.

Table 9: Evaluation of Option 2B

Criteria	Description
Greater certainty and lower costs of capital for generation and storage investors	**Consistent with Option 2A**
Efficient investment in and utilisation of the REZ Shared Network	**Incentivises efficient use of transmission capacity for each trading interval:** The financial compensation models incentivise efficient use of transmission capacity by allocating Tier 2 access rights above the physical capacity of the REZ Shared Network and incentivising its use when unused capacity is available. Shaped or interval-based access rights are also expected to increase utilisation of the REZ Shared Network, relative to flat 24-hour access rights as proposed in Option 2A. This approach allows for access rights to be available for generation and storage with complementary dispatch profiles and network use needs, rather than depending on individual access right holders sharing their access rights to achieve this complementarity. Allowing for the trading of access rights supports efficient use of REZ Shared Network capacity. **Incentivises storage capacity to connect within the REZ:** The financial compensation models incentivise storage connecting to the REZ Shared Network by enabling storage to hold Tier 2 access rights. Further, the compensation requirements on Tier 2 access right holders provide a disincentive to discharge when the REZ Shared Network is congested. Shaped or interval-based access rights also provide a means for storage to hold Tier 1 access rights while not risking inefficient use of the REZ Shared Network, as they can hold rights that are complementary to the generation portfolio. An additional incentive mechanism may be used to incentivise storage charging during periods of REZ Shared Network congestion. **Greater competitive pressure on prices:** May allow the connection of a larger number of generation and storage projects than Option 1, through availability of Tier 2 rights.

Criteria	Description
Timely implementation	**Administratively simple to set up in near–term timeframes:** This model is more challenging to implement in the near–term, as it requires a payment system to be established to settle compensation. The potential for settlement of compensation to be made through AEMO's NEM settlement systems (e.g. as reallocations of market revenue) will be further explored. The allocation of shaped or interval–based access rights will be more challenging than for the 'simple' model. As with all models, there will be governance requirements to assess new connections, ensure sufficient allocation of rights, and ensure no material deterioration of existing access rights.
Limited administrative and enforcement burden for REZ Administrator	**Consistent with option 2A**
Minimal intervention in existing energy and contract markets	**Consistent with Option 2A.**
Coexists with proposed national reforms	**Integrate with potential ESB REZ reforms:** This model broadly aligns with the 'Financial Access Protection Model' consulted on by the ESB but less closely than Option 2A. **Integrate with potential ESB transmission and access reforms:** Consistent with Option 2A. However, the complexity of the access rights allocated (shaped, interval–based) would add further complexity to any integration process. **Minimise departure from the National Electricity Laws and Rules, where possible:** Consistent with Option 2A.

Appendix B: Definition of constraints under Options 2A and 2B

The question of when a project will be considered constrained off is a key issue to be defined under the financial compensation models as it will determine the when a Tier 1 access right holder will be entitled to compensation under the access scheme and the quantum of any such compensation.

Irrespective of which constraint definition is adopted in the final design, it will only apply to congestion due to conditions in the REZ Shared Network and will not apply for any constraints based on conditions beyond the boundary points of the REZ Shared Network.

Constraints based on volume

In its simplest sense, a generation or storage project that holds Tier 1 access rights could be considered constrained off under the access scheme if some of the electricity it offers into the market cannot be dispatched because there is not enough available REZ Shared Network capacity to carry it. While adopting this volume-based definition would be of benefit to the access scheme in terms of simplicity of implementation and transparency of the compensation mechanism, it risks resulting in some unintended outcomes because it is blind to the price at which access right holders offered to dispatch electricity. While the REZ Shared Network generation will not necessarily be the marginal price-setting generation in the NEM, the access scheme design should support competitive market outcomes resulting from dispatch of the lowest cost generation in the NEM.

Under this simple definition of constraints, based on volume and with no reference to price, a Tier 1 access right holder could make a dispatch offer at a high price, including above the market settlement price, knowing that it will be dispatched or compensated for the full volume of its dispatch offer if a lower priced Tier 2 access right holder is dispatched ahead of it, causing it to be constrained off.

For Tier 2 access right holders, this subordination of their access to Tier 1 access right holders, irrespective of how competitive they are in the market, may limit the incentive to acquire Tier 2 access rights.

Constraints based on volume and settlement price

An alternative approach to defining when a project holding Tier 1 access rights is considered constrained off for the purposes of the access scheme would be to include both volume and price. Constraints could be defined as capacity which was offered to the market *and would have been dispatched on price merits*, not being dispatched due to a shortfall in available REZ Shared Network export capacity.

Under Options 2A and 2B, this definition would change the circumstances in which Tier 2 access right holders are required to compensate Tier 1 access right holders. If a Tier 1 access right holder submits a dispatch offer at a price which, in an ex-post assessment, exceeded the market settlement price for that interval, it would not be entitled to compensation. Only the Tier 1 access right holders who submitted dispatch offers below the market settlement price and were not dispatched due to congestion caused by Tier 2 access right holders would be entitled to compensation.

This approach to constraints would not be expected to significantly impact the firmness of the Tier 1 access rights.

This volume and settlement price definition of constraints is currently the preferred definition of constraint for the purposes of the CWO REZ Access Scheme.

Constraints based on volume and price

A third option for defining curtailment would be to more fully integrate the offer price of Tier 1 and Tier 2 access right holders. If a Tier 2 access right holder was dispatched ahead of a Tier 1 access right holder on price–based merits, with a lower offer price, it would not be required to pay compensation. In practice, this would mean a Tier 1 access right holders would only be entitled to compensation in the case that they had the same offer price as a Tier 2 access right holder and its dispatch was reduced as a result of the Tier 2 access right holder also being dispatched.

A volume and price definition of constraint significantly reduces the firmness of Tier 1 access rights, and therefore their value. As such, it is not proposed to be adopted for the CWO REZ Access Scheme.

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