



ESB PROJECT UPDATE – TRANSMISSION ACCESS REFORM

Key points

On 24 February, Ministers agreed a way forward on the complex issue of transmission access reform. Ministers agreed to immediately implement 'enhanced information' reforms to provide east-coast market participants with better information on the optimal location for new generation and storage. Ministers requested the Energy Security Board (ESB) to work with Senior Officials and stakeholders to develop the voluntary Congestion Relief Market (CRM) and the priority access model and to bring forward a detailed design for consideration by ECMC in mid-2023. Ministers decided not to further develop or consider the congestion management model and congestion fee options, ruling out any models using locational marginal pricing.

This project update outlines the ESB's latest work on access reform and describes the next phase of the transmission access reform work program.

The ESB's cost benefit analysis published in conjunction with this project update has identified a substantial net benefit associated with transmission access reform. The preferred model combination (CRM and priority access) results in quantified net benefits estimated at \$2.1-5.9 billion, plus a reduction in emissions by 23 million tonnes over 20 years. This model has advantages over the other options in terms of supporting and strengthening REZ schemes and is more likely to have a downward impact on cost of capital. It also has lower risks to realising the benefits based on the risks of implementation timing and transitional costs.

Modelling analysis published in conjunction with this project update shows the complexity and risks to efficiency of operating the market under the current design as we transition to a low carbon future. Congestion is a national, not a localised, problem. Significant congestion arises near regional boundaries and affects interconnector flows. In the absence of reform, the market design will be increasingly ineffective in achieving the least cost combination of resources to meet demand. The CRM design results in the efficient use of the transmission network, particularly interconnectors.

To progress reforms to provide enhanced information, the ESB will work with stakeholders to develop a set of detailed changes. To progress the detailed design process of the hybrid model for transmission access reform, the ESB will:

- develop in detail the prototype of the model based on the CRM and priority access
- publish a draft model including detailed design choices for consultation
- establish an education workstream to familiarise stakeholders with the changes (including work to present technical information in an accessible way and measures to help stakeholders become familiar with the proposed reforms)
- continue to seek input from stakeholders, including the Congestion Management Technical Working Group
- engage with jurisdictions on the specific design of the priority access regime and how it should apply in each region, including as part of state Renewable Energy Zone (REZ) schemes.

If Ministers accept the ESB's recommendations for a detailed design in mid-2023, the next step would be to move to a further phase of consultation on draft amendments to the National Electricity Rules. Once rule changes are finalised there will be a period for implementation of system changes to give effect to those rules. While the systems changes associated with transmission access reform are anticipated to go live in 2027, market participants can be expected to change their decision making processes following the rules being finalised given this will provide certainty about the new market design.



Context

The transition to net zero means a physical transformation of the electricity system. The current market design will no longer deliver the best outcomes for customers under this transformation.

It would be wasteful to build a transmission system that can transport all generation on the windiest or sunniest of days, since at these times, energy supply exceeds demand. Eliminating all congestion would involve building a huge transmission system. Instead, it is more efficient to have a smaller system and manage congestion by efficiently rationing which generators get to use it.

Congestion needs to be carefully managed, since it prevents the least cost combination of generation resources from being dispatched. Congestion arises when a higher cost generator in one location must be used instead of a lower cost one at another location – because using the lower cost generator would exceed the physical limits of a particular part of the transmission network, while using the higher cost generation would not exceed the limits, given the generators' relative locations.

In the NEM, generators do not face the costs they impose on third parties when, as a result of their use of the transmission network, another generator is curtailed. The party taking the action has no reason to ensure costs are minimised, because the costs are borne by somebody else. Similarly, because storage is not paid for the benefits they provide when charging and helping to alleviate congestion, their incentive to do is diminished.

Transmission access reform is needed to:

- avoid wasting solar and wind investments
- ensure that renewable energy zones (REZs) are not undermined by generators located outside the zone free-riding on investments intended for REZ participants
- create market opportunities for batteries and flexible demand (e.g. hydrogen) by rewarding behaviour that benefit customers
- maximise the value of investment in interconnectors
- avoid overspend in building the transmission network that customers (or taxpayers) pay for
- achieve emissions savings by making greater use of existing renewables resources.

The ESB's hybrid model is based on extensive work with stakeholders and builds on models proposed by clean energy industry groups. This project update summarises submissions to the Directions Paper and further modelling undertaken by the ESB. It then sets out the ESB's proposed process going forward.



Submissions to the Directions Paper

The ESB received 32 submissions in response to its Directions Paper from generators, investors, consumer representatives and others. Stakeholders continue to hold diverse views on how (or if) to manage congestion.

Operational timeframes

In operational timeframes, representatives of generators, investors and the Energy Users Association of Australia supported further work to develop the CRM. However, stakeholders raised concerns around some of the design choices within the CRM and requested more time and information to help them understand how it will work before they decide whether to support it. Energy Consumers Australia (ECA) prefers the CMM to the CRM, however, they are willing to support other reforms that correct the current market failure on transmission access and congestion prior to the next investment cycle.

Investment timeframes

In investment timeframes, there is no clear preference among stakeholders between priority access and congestion fees. There is a growing level of acceptance of the priority access model due to the benefits it offers in terms of investment certainty. The ESB considers that priority access best meets the access reform objectives due to its potential advantages in reducing investor risk and its ability to support REZ schemes, provided it is supplemented by the CRM to avoid inefficiencies that would otherwise be introduced.

While the congestion fees variant appears simpler in concept, there are significant implementation challenges to forecast and calculate the congestion fee, which could be subject to dispute for each project. The congestion fees variant does not reduce investor risk (including the risk of cannibalisation) as effectively.

Enhanced information is widely supported and will assist, but it does not change the features of the current market design that can make it profitable to invest in inefficient locations.

Stakeholder engagement

A key theme of submissions was that more work is required before a decision is made. Generators and investors raised concerns around some of the design choices within the CRM and were reluctant to commit to any model without further clarification of how it will work. Twelve submissions recommended an extension for the ESB's final recommendations to Ministers. A number of submissions also requested targeted education initiatives, a cost benefit analysis, and more worked examples/models, particularly for the CRM.

Additional modelling results

Market modelling

The ESB has published the results of its modelling exercise in conjunction with this project update.

The current market design is divided into five regions reflecting the five States that participate in the NEM. This is an abstraction of actual physical power flows on the system, which are determined by physics. In the absence of congestion, the abstract market model delivers outcomes that are broadly aligned with the physical system. When congestion occurs, discrepancies between the market design and the physical system starts to cause problems.



Our current market design is not able to identify the least cost combination of resources, with the result that energy flows across the system become distorted. These distortions percolate widely through the NEM.

As VRE penetration increases, congestion will become more common. Consequently, the current market design is not well placed to support the changing dynamics that will arise as the market transitions to higher levels of VRE.

Modelling undertaken for the ESB by NERA shows the complexity and risks to efficiency of operating the market under the current design into a low carbon future.

In particular, it highlights the increasing prevalence of counter-price flows across interconnectors as new VRE enters the system. In the absence of reform, it will be increasingly necessary for AEMO to clamp¹ the interconnectors to avoid customers having to fund revenue shortfalls. Given that the forecast cost of interconnector investments is over \$11 billion², it is important that our ability to use them is not undermined by shortcomings in the market design. Counter-price flows, and hence the need for interconnector clamping, would be substantially mitigated by the proposed reforms.

Stakeholders are correct to point out that as zero marginal cost VRE enters the system, there will be higher levels of curtailment at a low price point in future. However, NERA's modelling suggests that the total value of curtailment will be substantially higher in the future than at present, due to the increased prevalence of congestion, and because dispatch inefficiency becomes more costly when it results in non-VRE alternatives setting the price instead of VRE. In the longer term, the distribution of RRP's may be dominated by zero prices but there will also be periods of high prices.

Cost benefit analysis

The ESB has published a cost benefit analysis (CBA) in conjunction with this project update.

The CBA suggests that there are substantial benefits to consumers associated with transmission access reform. The ESB's preferred model is a hybrid of the two stakeholder proposed models, the CRM and priority access. The preferred model combination results in quantified net benefits estimated at \$2.1-5.9 billion, plus a reduction in emissions by 23 million tonnes over 20 years.

The key drivers of the quantified benefits are:

- Efficiency savings arising from efficient congestion management in operational timeframes (based on detailed modelling supported by top-down analysis).
- Reduced capex and fuel costs arising from more efficient investment decisions (based on detailed modelling supported by international studies showing even greater benefits).

While the various hybrid models are similar in terms of efficiency savings, the preferred model has further advantages in terms of supporting and strengthening REZ schemes, and lower risks to realising the benefits based on the risks of implementation timing and transitional costs. Priority access and the CRM are more likely than the alternative options (CMM and

¹ Counter-price flows occur when electricity flows from a higher-priced region to a lower-priced region. When the accrued value of counter-price flows across an interconnector exceeds \$100,000, AEMO "clamps" the interconnector (i.e. intervenes in dispatch to stop the counter-price flow) to avoid the need for customers to pay for the counter-price flows.

² AEMO, 2022 Integrated System Plan.



congestion fees) to deliver lower customer prices due to reductions in risk to investors. However, these changes are not readily quantifiable.

The report also highlights significant emissions reductions associated with the operational models (based on NERA's modelling results for 2023).

The benefits case relies on the estimated benefits of similar reforms in other jurisdictions. Comprehensive bottom-up modelling has proven problematic given the major changes affecting the energy industry at this time, and the erratic market outcomes arising under the status quo. These factors make it very difficult to disentangle the impacts of the proposed reforms. However, simplified analysis demonstrates clear benefits associated with a more orderly approach to congestion management.

Current thinking on design of hybrid model

This section sets out the ESB's current thinking on the detailed design choices for visibility. Prior to reaching a final view, the ESB will seek input from its Technical Working Group (and other stakeholders) and publish a further consultation document.

The ESB's technical experts have been collaborating with AEMO to develop a prototype model of the CRM. While a range of issues remain to be worked through, there is good progress, and the prototype will be developed in further detail before finalising recommendations. The Directions Paper explored a range of design choices pertaining to the CRM. Some design choices were oriented toward maintaining the optional nature of the CRM; while other design choices considered alternatives which included more inbuilt change, and hence a more substantive change to the market design. For instance, the ESB considered whether the regional reference price should be derived using bids into the energy market (RRP_{NEM}) or bids into the CRM (RRP_{CRM}). Each of the design choices had various pros and cons.

Submissions to the Directions Paper revealed a strong preference for the design choices that were oriented towards maintaining the optional nature of the CRM. In addition, further work by the ESB and AEMO's technical experts has not identified clear additional benefits associated with the alternative choices. Consequently, the ESB's current thinking is more aligned with the version of the CRM put forward by the Clean Energy Council.

In investment timeframes, stakeholder submissions did not reveal a clear preference for either priority access or congestion fees. Priority access has the following advantages over congestion fees:

- it corrects the features of the NEM that make it riskier for investors than other comparable markets
- it is highly complementary with REZ schemes, by creating a valuable incentive for generators to join a REZ that can be incorporated into the REZ tender process
- it avoids the need to develop and apply an administrative process for setting congestion fees (which is likely to be contentious).

The ESB does not support the introduction of priority access as a standalone option as it needs to be implemented in conjunction with the CRM to avoid adverse impacts on dispatch efficiency.

Within these design choices, the ESB's current thinking is to adopt a priority access model whereby new connecting generators are allocated queue numbers which are classified into tiers for the purposes of dispatch. When congestion occurs, generators in the primary tier



would be prioritised in dispatch (and would have the option to sell some or all of their dispatch entitlement in the CRM).

This approach creates a mechanism that enables the framework to adapt in line with evolving system conditions over time. We envisage that priority queue positions – i.e. primary tier positions – will be made available as part of REZ tender processes and in locations that do not contribute excessively to congestion.

A key question going forward is whether incumbent generators are entitled to priority access over the existing network. The ESB will consult closely with stakeholders and governments to find the right balance between the interests of new entrants and existing investors. A related matter is the duration of priority access rights. The rights could have a limited duration or could continue for the life of the assets. In developing a position on this matter, the ESB proposes to have regard to the timeframes required to support low-cost finance for investors and relevant jurisdictional schemes.

Finally, given the dynamism of the energy transition and the widespread impact of the proposed reforms, we propose that the any reform package includes an inbuilt review mechanism to ensure that the reforms deliver maximum benefits for consumers.

Process going forward

Enhanced information

Reforms to provide enhanced information could include, among other things, changes to the content of the Transmission Annual Planning Reports, Congestion Information Resource and Integrated System Plan database. We will work with stakeholders to establish precisely what information should be made available, and the regulatory changes required to give effect to the new framework.

Hybrid model for transmission access reform

Prior to submitting its final recommendations in mid-2023, the ESB proposes to:

- develop in detail the prototype of the model based on the CRM and priority access
- publish a draft model including detailed design choices for consultation, together with a cost benefit analysis
- establish an education workstream to familiarise stakeholders with the changes (including work to present technical information in an accessible way, and measures to help stakeholders become familiar with the proposed reforms) establish an education workstream to familiarise stakeholders with the changes (including work to present technical information in an accessible way and measures to help stakeholders become familiar with the proposed reforms)
- continue to seek input from stakeholders, including the Congestion Management Technical Working Group and the ESB's Advisory Group
- engage with jurisdictions on the specific design of the priority access regime and how it should apply in each region, including as part of state REZ schemes.

The ESB proposes to engage with stakeholder on the detailed design of the hybrid model using a combination of formal consultation documents, public webinars and stakeholder briefings. We will also seek advice from the Technical Working Group. This group, which is comprised of representatives of each of the key stakeholder groups, including customers, generators, storage providers and network representatives, acts as a sounding board for the ESB's thinking on the detailed design of the hybrid model.



To take the hybrid model forward, the ESB will consult on a draft detailed design in Q2 2023, with a view to submitting final policy recommendations to Energy Ministers in mid-2023. If Ministers accept the ESB's recommendations, the next step would be consult on draft amendments to the National Electricity Rules later in 2023.

Given that access reform goes to the heart of the market design and affects several key market systems, the ESB expects that several years would be required to implement the reforms. The changes are complex, rigorous testing is required with market participants' systems, and there is a substantial portfolio of concurrent systems changes. Based on currently available information and the existing reform pipeline, our best estimate for the earliest implementation date of the CRM is the end of 2027. The final outcome will be influenced by a range of factors including:

- the detailed design of the final models
- any unforeseen technical challenges that may emerge as part of the detailed design and implementation process
- interdependencies with other decision-making processes required to implement the reforms.

Given the long life of electricity assets, market participants can be expected to change their investment decision making process as soon as the rules are finalised given this will provide certainty about the new market design – i.e. before the associated systems changes are implemented. The timelines outlined above assume that the Rule changes are finalised by no later than mid-2024.

An extended transition period can also help to smooth the impact of the reforms on market participants' contractual arrangements. As old contracts expire and new contracts are entered, market participants can update their arrangements in response to the new rules. The CRM, in particular, has been designed to accommodate existing contractual arrangements as much as possible.