Clean Energy Investor Group

50 Camberwell Road Hawthorn East VIC 3123

10 June 2022

Ms Anna Collyer
Chair
Energy Security Board
Lodged by email to: info@esb.org.au

Dear Ms Collyer,

Response to *Transmission access reform – Consultation paper May 2022*

The Clean Energy Investor Group (CEIG) welcomes the opportunity to provide feedback on the Energy Security Board (ESB)'s *Transmission access reform – Consultation paper* (the paper) published on 5 May 2022.

CEIG represents domestic and global renewable energy developers and investors, with more than 11GW of installed renewable energy capacity across more than 70 power stations and a combined portfolio value of around $24 billion. CEIG members' project pipeline is estimated to be more than 18GW. CEIG strongly advocates for an efficient transition to a clean energy system from the perspective of the stakeholders who will provide the low-cost capital needed to achieve it.

KEY POINTS

CEIG supports investment timeframe access reform in the NEM:

- reform should rethink the operation of the open access regime in ways that:
  - incentivise generators to make improved locational decisions which will limit how much congestion happens in the first place;
  - deliver greater certainty for investors which will in turn lower the cost of capital (and therefore costs to consumers);
- CEIG's model delivers improved knowledge at FID of curtailment risk over the life of the asset: this is key to lowering the current risk premium on the cost of equity.

CEIG's preference is for its Transmission queue model (with Castalia's clarifications as detailed in Attachment 1, not the ESB's amended design) to be adopted in investment timeframes and for no LMP-based framework to be adopted in operational timeframes.

- CEIG would support further investigation of the introduction of a hybrid model combining the CEIG Transmission queue model and Edify's Congestion relief model.
- As an alternative model proponent, CEIG looks forward to regular engagement with the ESB team during detailed design.

The ESB's proposed amendments for how CEIG's queue number is used in dispatch are unlikely to deliver the revenue certainty required for investors to lower the cost of capital.

- Instead, as suggested by Castalia, the transmission queue should be considered before contribution factors in the dispatch algorithm when resolving tied bids behind a binding constraint;
  - This will reduce long-term costs to consumers by improving the locational signal in the investment timeframe; and
  - It will also improve operational efficiency by reducing the incentive to bid in a disorderly fashion caused by the very existence of the contribution factors - a problem acknowledged by the AER as early as 2012.

CEIG does not support the ESB's proposed Congestion zone model:

- despite paying the locational fee, generators would continue to be exposed to the risks of 'winner takes all';
- the fee would impose a new cost on generation projects without any concrete benefits;
- this new fee would need to be recovered from consumers through higher wholesale prices, negating the upfront decrease in TuoS charges.

CEIG does not support the ESB's proposed CMM model as it continues to retain key design features (including exposure to LMPs) that allocate excessive risks to investors.

- The introduction of the CMM would likely lead to a significant slowdown in new generation and storage investment, resulting in higher wholesale prices for consumers.
- Because of the difficulty to accurately forecast the level of rebates over the life of the project, financiers will be very hesitant to finance new developments which could result in either unavailable or very expensive debt.
- The CMM does not protect a project from a second generator connecting nearby causing more severe congestion and resulting in negative impacts on the level of rebates received.
- It is critical that industry concerns around CMM - which have now been voiced over many years when considering the earlier COGATI iterations - are both listened to and acted upon.

CEIG supports a robust, comparable, and transparent modelling of outcomes across all four models being considered by the ESB, in consultation with industry, before choosing which option(s) to proceed with.

- Modelling should include a detailed cost benefit analysis and an assessment of potential impacts on grid reliability and system security for all four options.

GENERAL COMMENTS

Continuing need for investment timeframe reform

CEIG agrees with the ESB on the continuing need for grid access reform, despite Labor's $20 billion "Rewiring the Nation" policy. More transmission investment delivered within shorter timeframes is welcome by CEIG, but there is still the need to ensure transmission investment is used efficiently.

Interestingly, in its paper, the ESB has reframed its rationale for operational timeframe reform by stepping away from the argument of needing to fix 'race to the floor' bidding and instead focusing on constraint equation contribution factors: the 'winner takes all' feature of the NEM. CEIG has previously noted that 'race to the floor' bidding is indeed not currently a material issue (nor is it expected to be in future).

CEIG notes that neither of the ESB's two proposed models (Congestion zone model and Congestion Management Model (CMM)) offer any physical solution to the 'winner takes all' issue. Instead, the CMM focuses on amending financial outcomes which will not limit the amount of congestion on the network while the Congestion Zone model introduces a new fee that sends a signal that, as the ESB recognises, may or may not be followed, and therefore may not successfully limit the amount of congestion on the network.

There is a need for reform to better coordinate the large renewable energy and transmission investment outlined in the Australian Energy Market Operator (AEMO)'s 2022 Integrated System Plan (ISP). As part of this, there is a need for long-term investment timeframe models to incorporate not only existing but also future transmission investment as Castalia has made clear in their vision of a future National Electricity Market (NEM) that will be dominated by renewable energy with near-zero short-run marginal cost (SRMC) cost in the generation mix[1].

Whilst CEIG agrees with the need for access reform to improve long-term investment timeframe signals, CEIG continues to disagree with the need for reform of short-term operational timeframe signals.

CEIG welcomes the ESB's recognition of investor issues

CEIG welcomes the ESB's recognition of investor issues throughout the consultation paper, including the acknowledgement that the current "extreme version of open access makes investing in the NEM riskier than other comparable markets".

CEIG agrees with the ESB's assessment of the consequences of failing to act on access reform highlighted in section 2.3 of the consultation paper. Access reform that does not focus on the long-term investment timeframe will result in a higher cost of capital, ultimately leading to higher overall system costs to consumers. CEIG therefore welcomes the importance the ESB has placed on solving access reform objectives for long-term investment timeframes.

[1] Castalia, *Rethink of open access regime* (section 2.2); download here.

CEIG is also pleased that the ESB has chosen to remove the CMM-REZ model for consideration as the ESB has noted - in line with CEIG's assessment - that it "could inefficiently stifle new entry outside Renewable Energy Zones (REZs)".

CEIG's preferred solution

At this stage of the process, CEIG's preference is for:

- the CEIG Transmission queue model (with Castalia's clarifications as detailed in Attachment 1, not the ESB's amended design) to be adopted in investment timeframes;
  - The transmission queue should be considered before contribution factors in the dispatch algorithm when resolving tied bids behind a binding constraint; and
- no LMP-based framework to be adopted in operational timeframes.

CEIG would support further investigation of the introduction of a hybrid model combining the CEIG Transmission queue model and Edify's Congestion Relief Model (CRM).

More information on CEIG's assessment of the shortlisted models is available in the rest of this submission.

CEIG welcomes a robust assessment process for all four shortlisted models

CEIG supports a robust, comparable, and transparent modelling of outcomes across all four models being considered by the ESB, including a detailed cost benefit analysis that considers the financial impacts such as the additional costs that might be incurred from changing existing contracts, particularly if the CMM model is implemented. This modelling needs to be undertaken in close collaboration with industry to make sure the inputs and assumptions are credible and accepted by industry as reasonable.

The ESB's comment that "it is unlikely that renegotiation [of contracts] would be required in most cases" is not supported by evidence from market participants currently engaged in financing activities. It is also unclear why the ESB made a different assessment that the "model may trigger re-opening of contracts and power purchase agreements" when discussing the not-too-dissimilar CMM-REZ model. In contrast, in the CEIG model, providing greater dispatch certainty would lead to an increase in liquidity as incumbent generators will be confident that they will have access to transmission capacity and will offer more and longer-term contracts without fear that curtailment will prevent them from meeting their contractual obligations

In its consideration of costs for operational timeframe models, the ESB has appeared to only factor in high-level implementation costs. CEIG believes that a thorough evaluation of costs should incorporate costs for all market participants.

Overall, a robust cost benefit analysis of the models will be required to effectively compare and assess all reform options.

Importance of consultation with market participants

CEIG welcomes the ESB's consultative process to-date and the collaboration with market participants that has occurred throughout the consultation process. CEIG commends the ESB for its work through the Advisory panel and Technical Working Group which ensures regular and deep engagement with a broad range of stakeholders.

As an alternative model proponent, CEIG looks forward to regular engagement with the ESB team, particularly in the next few months while detailed design for each shortlisted model is progressed further.

The ESB and market bodies should continue to aim to deliver an effective, long-lasting policy framework that is able to garner broad support across industry, consumer groups and other relevant stakeholders.

CEIG believes that regaining the trust and confidence of the clean energy investor community continues to be paramount as industry feels that its concerns have not been listened to previously. The ESB otherwise risks continuing to deliver policies that lack industry support, result in no substantive reform being achieved and consumers ultimately paying higher prices than necessary as a result.

CONSIDERATION OF INVESTMENT TIMEFRAME MODELS

ESB - Congestion zone with connection fees model

CEIG does not support the ESB's proposed congestion zone model.

Whilst the ESB's proposal incorporates notions of available transmission capacity – which CEIG believes are crucial to effective coordination of generation and transmission investment – it does not provide the improvements to revenue certainty that investors need to lower the cost of capital.

From an investor's perspective, the ESB's proposal has several critical downsides:

- The fee imposes a new cost on new generation projects without any concrete benefits: unlike the CEIG proposal, there is no guaranteed visibility on a project's curtailment risk over the life of the asset;

- Since the ESB is not proposing any physical solution to the 'winner takes all' problem, its model continues to leave generators exposed. A project that has paid the fee can still be congested by a nearby project with a coefficient 1/1000th better than theirs.

- The new fee would need to be recovered from consumers through higher wholesale prices, negating the upfront decrease in transmission use of system (TuoS) charges;

- Even if the fee provides a locational signal, it is unclear that it would be followed. The extent of that would probably vary depending on how material the fee would be compared to the rest of a project's cost. The Victorian West Murray zone provides a recent example of a signal not followed. The ESB makes the same point in section 3.2:

> *"Recent experience in the NEM suggests that congestion will not necessarily stop investors from investing. For instance, the problems arising the West Murray Zone are well publicised and yet there are still a substantial number of connections in progress. (...)*
> *We question whether it is prudent to design a market where efficient whole-of-system outcomes are dependent on the altruism of market participants to be willing to forego profitable opportunities."*

- Finally, the ESB has acknowledged that it would be difficult to calculate the fee accurately and that it also may be set too high or too low. This may negatively impact on the optimal NEM development outlined in AEMO's ISPs. There could also be unforeseen and unfair results (e.g. required fee payment, then unforeseen improvement in transmission availability a few years later).

CEIG - Transmission queue model

<u>Key features and overview of benefits</u>

The CEIG proposal rethinks the operation of the open access regime in ways that deliver greater certainty for investors which will in turn lower the cost of capital (and therefore costs to consumers).

CEIG is proposing an access regime[2] which is designed to apply across the NEM, and within the REZ framework, with the following key features:

- Importance of revenue certainty for investors: knowledge of curtailment risk at the time of Financial Investment Decision (FID) will lower the cost of equity and in turn lower costs for consumers;
- Maximises the efficient use of the transmission network;
- Ability to improve a generator's place in the queue by paying Deep Transmission Charges (DTCs); and
- Effective locational signal for storage.

A key factor for investors when considering whether to invest in a clean energy project is the relative certainty of future revenue streams associated with the project over the life of the proposed asset. The higher the revenue certainty, the lower the risk, and in turn, the lower the cost of capital for the project, and therefore a lower overall cost for consumers.

To assess the level of revenue certainty that a clean energy project is likely to receive over the life of the asset, investors review a broad range of project metrics and forecasts such as risk of curtailment, expected level of grid losses connection and commissioning delays and any protections that can be offered to mitigate these risks. Investors also consider closely the future energy policy landscape and potential impacts, positive or negative for future clean energy investment decisions. For projects in developing renewable energy zones (such as those proposed in NSW), investors will also consider

[2] More information is available at: CEIG's grid access reform proposal and Q&A document.

metrics such as the tenor and firmness of access rights to the transmission network and at what level the REZ hosting capacity is proposed to be capped.

A key element of the CEIG proposal is to send a locational signal to generators by creating a curtailment order if curtailment becomes necessary. The locational signal will provide investors with knowledge of curtailment risk, lowering the cost of equity and ultimately lowering the overall system cost to consumers.

Furthermore, the locational signal will maximise efficient use of the transmission network resulting in a significant reduction in curtailment by promoting efficient generation location.

In locations where there is no existing or planned transmission capacity, a generator can fund transmission investment to improve their position in the queue and protect the dispatch capacity of existing incumbent generators. Transmission charges provide an efficient locational signal to new entrants where there is limited transmission capacity. In addition to considering the benefits of a location with abundant resources, investors would be required to evaluate a less reliable position in the curtailment queue (e.g., '5') against the cost of transmission network enhancements to gain a more certain dispatch position (i.e., '0') in the queue.

Transmission projects paid for by transmission charges would not require Regulatory Investment Test for Transmission (RIT-T) approval, however if the project becomes RIT-T approved, the transmission charges would be refunded.

The Transmission Network Service Provider (TNSP) would need to offer a fair transmission charge to generators, and this could be regulated by the Australian Energy Regulator. Contracts between TNSPs and generators to complete the transmission upgrade would also need to include Service Level Agreements on par with those offered to incumbents through the queuing system.

The proposed transmission charges approach would provide greater certainty of dispatch and an incentive for storage to act as a substitute to local transmission, lowering the overall transmission investment needed.

<u>ESB treatment of constraint equation contribution factors</u>

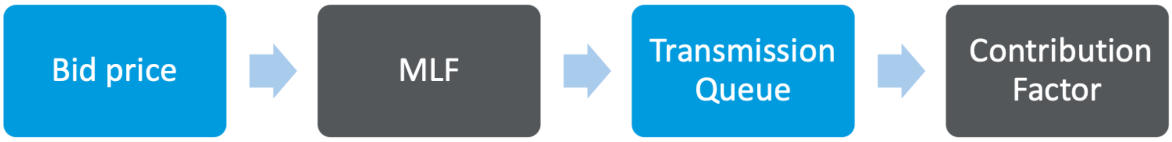
In its paper, the ESB has amended CEIG's original proposal for how the queue number is used in dispatch. This aspect of our model was critical in improving the long-term locational signal and the ESB's amendments are unlikely to deliver the revenue certainty required for investors to lower the cost of capital.

We agree with the ESB that the queue number in CEIG's proposed tie-breaking rule would not be used often due to the 'winner takes all' feature of the NEM. Instead, Castalia propose that the transmission queue should be considered before contribution factors in the dispatch algorithm when resolving tied bids behind a binding constraint.

Attachment 1 provides more information; it is summarised below for convenience:

> *(…) the transmission queue should be considered before contribution factors for resolving tied bids behind a binding constraint. Figure 2.1 shows the order in which we propose that the NEMDE should consider components of the algorithm.*

Figure 2.1: Proposed Placement of the Queue in the NEMDE Dispatch Algorithm



Source: Castalia

> *The figure above shows that the NEMDE should first determine the bid-stack by assessing all MLF weighted bids to determine the least cost generation mix to meet demand in a given five-minute interval.*
>
> *Next, where there are binding constraints within the NEM that NEMDE must resolve, NEMDE should curtail generators in descending order of the queue. This means that NEMDE would seek to resolve binding constraints by curtailing generators with a high queue number and then proceed down the generators in the queue until the constraint is resolved. If NEMDE cannot resolve the binding constraint using queue order, then NEMDE should resolve the constraint using contribution factors as it currently does. Thus, if NEMDE reaches generators with queue number 0 without resolving the constraint then it should resolve the constraint using contribution factors as it does now.*

We argue that our proposal would not increase costs for consumers in the short-term. As Castalia demonstrate:

> *In its consultation paper the ESB stated that "The ESB does not propose to change the role of contribution factors in dispatch. Alternative approaches would have the result that NEMDE dispatches (and customers pay for) more energy than is necessary, with the additional MW unable to reach load due to congestion."*
>
> *We do not believe that this is true. Our understanding is that contribution factors do not change the total amount of electricity dispatched to meet demand. Contribution factors change the amount of electricity required to relieve a constraint. Generation is merely shifted from one part of the NEM to another. The total envelope of required electricity does not change.*
>
> *NEMDE relieves binding constraints by shifting around the output of generators in the bid stack that it has already determined provide the least cost generation mix for a given generation interval. By definition all generators, bar the marginal generator, in the bid stack must be less than the marginal generator. As a result, shifting the output of generators in the NEMDE's generation stack cannot change the price that consumers*

pay unless the marginal generator changes because it is the marginal generator that sets the RRP that consumers actually pay.

We acknowledge it is possible that there is no way to relieve a constraint without changing the marginal generator and thus the RRP. As a result, to eliminate this possibility we propose a limit on the transmission queue such that NEMDE should only curtail generators in order of the queue to the point where it would require changing the marginal generator. If using the queue to resolve a constraint would result in increasing the cost of the RRP, then we propose that NEMDE revert to the use of contribution factors to resolve a binding constraint. This safeguard will ensure that customers do not pay extra due to the queue.

Our proposal can be expected to reduce the incentives for disorderly bidding currently caused by the contribution factors. The fact that the "winner takes all" feature of the NEM provides an incentive for disorderly bidding is a problem that was acknowledged by the AER[3] as early 2012:

Generators that are forecast to be constrained have an incentive to rebid their capacity in order to limit the impact of a binding constraint on their dispatch outcomes. Generators with a negative coefficient can rebid capacity into higher price bands and/or as unavailable to reduce the possibility (or the magnitude) of an increase in output as a result of being constrained-on. Generators with a positive coefficient can rebid capacity into negative price bands to reduce the extent to which their dispatch levels will be decreased. As NEMDE is seeking to manage the constraint most optimally (based on generator offer prices as a proxy for cost), rebidding capacity in this way will influence NEMDE's outputs.

A detailed explanation of how contribution factors are used in NEMDE provided by Mr Allan O'Neill in Watt Clarity[4] adds further background to this topic, beyond the ESB's description in its Consultation paper.

Finally, our proposal would also lead to a reduction in costs for consumers in the long run. As we have previously argued in our *CEIG Investor Principles*[5], there is an existing risk premium on the cost of equity. Improving locational signals in the investment timeframe is critical to lowering costs for consumers.

CEIG encourages the ESB to work closely with Castalia during the detailed design process to ensure the intent of our proposal is retained.

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[3] AER, Special Report: The impact of congestion on bidding and inter-regional trade in the NEM" (Dec-12) available at https://www.aer.gov.au/wholesale-markets/performance-reporting/special-report-the-impact-of-congestion-on-bidding-and-inter-regional-trade-in-the-nem

[4] Allan O'Neill, *Case Study – How to interpret a new NEM constraint and guess what it might do* (Mar-20) available at: https://wattclarity.com.au/articles/2020/11/casestudy-x5-constraint/

[5] CEIG, *CEIG Investor Principles*, (Aug-21) Available at: https://ceig.org.au/wp-content/uploads/2021/08/CEIG_Clean-Energy-Investor-Principles.pdf

ESB treatment of CEIG's DTC proposal

CEIG notes that the ESB is largely silent on our DTC proposal to improve on the generator-funded transmission investment framework.

CEIG believes that this part of our proposal should remain live as part of the ESB reform program. It provides an opportunity to improve on the current process for generator-funded transmission investment in ways that could make it more viable and lower costs for consumers.

Misrepresentations of CEIG proposal

As it continues to develop detailed design for our model, it would be useful for the ESB to refer to the list of clarifications prepared by Castalia on several misrepresentations of our model (see Attachment 1, Section 3).

CONSIDERATION OF OPERATIONAL TIMEFRAME MODELS

ESB - CMM with universal rebates

Overall, CEIG does not support the introduction of the CMM with universal rebates.

CEIG welcomes two elements of detailed design of the ESB's CMM:

- not changing current market design and retaining settlement at the regional reference price when a constraint is not binding; and
- the ability to influence how the rebate is allocated.

However, the proposed CMM continues to retain key design features that allocate excessive risks to investors:

- the material risk of intending generators paying unpredictable (and as yet undefined) rebates to all grandfathered generators in an area could have a chilling effect on new generator investment at the exact time coal-fired generator retirements are ramping up;
- no real incentives to build out inefficient congestion; instead, the CMM re-allocates funds differently amongst generators;
- exposure to locational marginal pricing;
- as the penetration of renewable energy increases and where new entrants locate in congested areas, rebates will be spread out more thinly across participants, providing a less effective tool against exposure to LMPs; and
- nodal pricing not allowing deep and liquid hedge markets, with no ability to complement the ineffective hedge provided through the rebate.

The ESB may also wish to test whether generators would be able to exercise market power in nodes through increased concentration.

Risk of a significant slowdown in new investment

CEIG believes that the introduction of the CMM would likely lead to a significant slowdown in new generation and storage investment, resulting in higher wholesale prices for consumers.

Our Members' feedback suggests that to protect their interests, financiers will tend to adopt very conservative approaches and use the most pessimistic assumptions when assessing whether to provide finance to a project or not. The difficulty to accurately forecast the level of the rebates over the life of the project is likely to create an unquantifiable risk, therefore bankers will be very hesitant to finance new developments. This could result in either unavailable or very expensive debt.

It will be critical for the ESB to detail how the rebates would function, including by providing examples of how a new entrant's project could remain financially viable. Even if a project went ahead and managed to stay solvent, there would be considerable risk remaining from the lack of protection from a second larger generator connecting nearby causing more severe congestion and resulting in negative impacts on the level of rebates received.

It is critical that industry concerns around the CMM model – which have now been voiced over many years when considering the earlier COGATI iterations – are both listened to and acted upon. Approaches that include LMPs should be avoided as they are demonstrated not to be an effective long-term locational signal – a conclusion that the ESB has itself reached in its paper

> *"this model does not provide a signal to locate in places where the generator does not increase congestion. (…) Hence this model needs to be complemented by an investment timeframe solution."*

Although CEIG does not support the CMM, for the purpose of progressing detailed design, CEIG's preference would be for the rebates to be allocated based on a metric that provides increased certainty for generators with priority access rights. CEIG notes that this answer was the second most popular at the ESB's May 2022 public webinar.

Edify - Congestion Relief model

Although CEIG does not advocate for access reform over the operational timeframe, if there is a short-term model then CEIG prefers the Edify CRM proposal as current pricing is retained.

CEIG also supports the voluntary nature of the CRM as there appears to be no disruption to the current due diligence processes for a project's investment decision.

The CRM proposal alone is unlikely to be sufficient in terms of providing a long-term locational signal. Due to this, CEIG would support the design of a hybrid model that incorporates CEIG's long-term investment signal with the CRM operational timeframe signals.

CEIG thanks the ESB for the opportunity to provide feedback on its Consultation paper and looks forward to continued engagement on those issues. Our Policy Director Ms.

Marilyne Crestias can be contacted at marilyne.crestias@ceig.org.au if you would like to further discuss any elements of this submission.

Yours sincerely,

Simon Corbell
Chief Executive Officer and Chairperson
Clean Energy Investor Group Ltd
w: www.ceig.org.au

Attachment 1

Castalia, *Castalia/CEIG Response to transmission access reform Consultation Paper May 2022,* (10 June 2022)

Castalia/CEIG Response to transmission access reform Consultation Paper May 2022

June 10, 2022

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1 Introduction

The Energy Security Board (ESB) has included a version of CEIG and Castalia's proposed Transmission Access Queue (the queue) as a model for consideration in its recently published Transmission Access Reform Consultation paper. ESB did this in response to our work preparing, presenting, and publishing our "Rethink of Open Access Regime" and the subsequent "Q&A Document Responding to CEIG's Proposal for Grid Access Reform," as well as our considerable stakeholder engagement.

While we are grateful for the ESB's decision to include a version of the queue in its consultation paper, the ESB has significantly altered our original proposal by removing the crucial locational signal of improved access to the transmission grid for incumbents in the event of tied bids.

The ESB has altered our proposal because it reasons that contribution factors will make the tie-breaking element of the queue ineffective. However, we believe that the queue can be integrated into NEMDE without any costs to customers *and* that doing so will eliminate the problem of "winner takes all" outcomes and its associated incentives to bid in a disorderly fashion that the ESB has noted are caused by contribution factors.

We agree that the system would not work if the queue were to be considered after contribution factors. However, we believe that the ESB should consider placing the queue into the dispatch algorithm before considering contribution factors. This will allow the queue to work and have its desired effect in investment timeframes of improving investment efficiency. Further, this will lead to a reduction in costs for customers by reducing the cost of capital for the energy transition without leading to higher prices paid by customers (Section 2.1).

In addition, we believe that placing the queue into the dispatch algorithm before considering contribution factors will help the ESB achieve its goal of increasing operational efficiency. Operational efficiency will be improved by reducing the incentive to engage in non-cost reflective bidding that contribution factors themselves create. (Section2.2).

Finally, we believe that there are other material misunderstandings of our proposal in the ESB's consultation paper which we would like to correct (Section 3).

2 Interaction between the Transmission Access Queue and Contribution Factors

The ESB has argued that our queue proposal "needs to be modified so that the queue mechanism does not apply to tie-breaker rules." The ESB proposal argues that that this must be done because:

> *an issue with* [the queue proposal] *is that tie-breaker rules rarely come into play due to the impact of generation coefficients (contribution factors). Instead, race to the floor bidding and precision of contribution factors gives rise to 'winner takes all' outcomes. As a result, it is not clear that the original design would be effective in protecting the access of generators, even those with low queue positions.*

Instead, the ESB proposes that the queue mechanism could be used to:

- Allocate rebates in a CMM model
- Determine the eligibility of generators to sell congestion relief in a CRM, or
- Confer access rights in jurisdictional REZ schemes.

This would significantly water down the locational signal, to the point where we do not believe that investors have the certainty required to lower the cost of capital and thus achieve the NEO of delivering electricity services at the lowest possible cost.

It also leaves in place the "winner take all" outcomes which ESB has identified as leading to undesirable outcomes and as attributable to the role of contribution factors in the NEMDE. In particular, leaving contribution factors in their current place in the NEMDE will continue to encourage race to the floor bidding in operational timeframes and continue to encourage investors to locate inefficiently in investment timeframes in an attempt to force out existing generation through gaming the contribution factors.

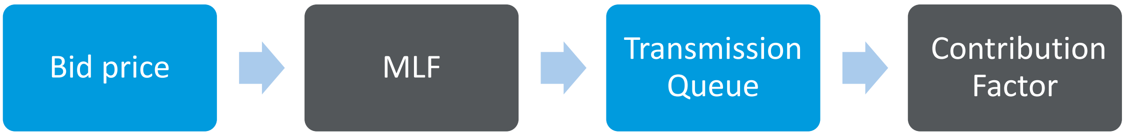
Further, we note that the ESB's other proposed option for investment timeframes "Congestions Zones with connection fees" would also continue to leave generators exposed to the "winner takes all" nature of the contribution factors despite having paid a yet to be enumerated connection fee.

Instead of altering our proposal, we urge the ESB to attack the underlying problem of the "winner takes-all" outcomes caused by contribution factors. ESB can do this by integrating our queue proposal into the dispatch algorithm so that it will be considered before contribution factors. We believe that this will provide the locational signal required to achieve efficient outcomes in the investment timeframe and will not lead to an increase in the cost of electricity for consumers. Furthermore, we believe that placing the transmission queue in front of contribution factors will reduce the incentive to bid in a disorderly fashion in the operational timeframe. In summary, we believe that that contribution factors do not provide a barrier to our queue proposal; on the contrary, we believe that integrating the queue into the dispatch algorithm can relieve the problems caused by contribution factors that the ESB has noted in its consultation paper.

2.1 Adding the Queue to the Dispatch Algorithm to Encourage Efficient Location

The ESB has correctly pointed out that if the transmission queue is considered after contribution factors, the queue will have limited ability to resolve ties between generators with equal MLF weighted bids due to the granular calculation of contribution factors.[1] However, we do not believe this means that the queue should be altered. Instead, we propose that the transmission queue should be considered before contribution factors for resolving tied bids behind a binding constraint. Figure 2.1 shows the order in which we propose that the NEMDE should consider components of the algorithm.

Figure 2.1: Proposed Placement of the Queue in the NEMDE Dispatch Algorithm



The figure above shows that the NEMDE should first determine the bid-stack by assessing all MLF weighted bids to determine the least cost generation mix to meet demand in a given five-minute interval. Next, where there are binding constraints within the NEM that NEMDE must resolve, NEMDE[2] should curtail generators in descending order of the queue. This means that NEMDE would seek to resolve binding constraints by curtailing generators with a high queue number and then proceed down the generators in the queue until the constraint is resolved. If NEMDE cannot resolve the binding constraint using queue order, then NEMDE should resolve the constraint using contribution factors. Thus, if NEMDE reaches generators with queue number zero without resolving the constraint then it should resolve the constraint using contribution factors as it does now.

Binding constraints that cannot be resolved through the queue will likely only occur in places in the NEM that already experience congestion. Further, the likelihood of not being able to resolve a constraint using the queue will gradually ease over time as the queue proposal comes into full effect. The reason is that our queue proposal gives a queue number of zero to all existing generators when it is implemented to avoid an unfair and likely unworkable process of retroactively giving queue numbers to existing generators. This will have the effect of freezing in place the status quo for all existing generators, including freezing in place existing congestion. Thus, there will continue to be areas of the NEM where the existing generators with a queue number of zero will continue to experience congestions that must be resolved

[1] Note that we also propose blunting the granularity of MLFs to allow for more ties that can be broken by the queue. We are concerned that the level of granularity in calculating MLFs is unwarranted and differentiates generation plants when there is extremely limited or no real differentiation. As such, we propose that the level of granularity of MLFs be reconsidered to allow for plants which have a near identical losses to tie and allow the transmission queue to serve as the tiebreaker.

[2] Note that we expect that as the energy transition progresses, and greater amounts of zero-SRMC VRE are located in REZs we would expect that the likelihood of tied bids with the same MLF will become a more common occurrence.

through contribution factors. As such, existing generators will be no better or worse off than they currently are, and their situation cannot deteriorate over time.

In fact, existing generators in locations in the NEM currently experiencing congestion should see their congestion begin to alleviate over time as existing generators retire. This is because new entrants that join the NEM after the implementation of the queue system will only receive a queue number of zero if they are deemed not to have a material impact on congestion.

Any new entrant that joins the NEM in an area where they will have a material impact on congestion will receive a queue number greater than zero. This means they will be curtailed before the existing generators when there is congestion. Thus, over time as existing generators retire it will become increasingly unlikely that a generator with a queue number of zero can be the cause of congestion. As a result, the need to resolve constraints through contribution factors will become less and less common.

Similarly, a generator that has received a queue number greater than zero would, by definition, have caused a constraint to become binding. Therefore, it is logical and fair that this generator be curtailed first.

Box 2.1: Queue Allocation and Constraint Management Example

To illustrate our proposal, consider an example where a REZ is developed that has 2,000MW of export capacity to the shared network. This means that in normal circumstances capacity will only be less than 2,000MW if there are constraints in the shared network downstream and external to the REZ.

The transmission capacity within the REZ would be auctioned with the result that there are ten generators with a maximum output of 2,000MW being constructed. Those generators are given a queue position of zero. Then, a further five generators also locate in the REZ—or nearby it using the same transmission infrastructure—and are given queue numbers 1 to 5 in sequence of construction. Their rationale for locating in or near the REZ is that the high-quality resource (wind/solar) offsets the risk that they will be curtailed. These subsequent five generators may have assessed the risk of curtailment to be low and decided to build anyhow because:

- The queue zero generators will not always be operating at maximum capacity (for example, at times where the wind or solar resource is low)
- There may be a mix of solar and wind generators with non-coincident peak output, and
- The additional generators may have invested in local storage to time-shift their output from the local peak.

If all 15 generators bid their marginal costs—we assume that marginal cost for VRE is zero—and their combined targeted dispatch in the least cost bid stack exceeds 2,000MW, NEMDE would constrain off generators in reverse order of their queue position. This means that the generator with queue position five is curtailed first, then four and so on until the flow on the line to the shared grid is less than or equal to 2,000MW.

If NEMDE reaches queue position zero without a solution, then the queue zero generators are constrained off according to their contribution factors. We note that in this example, this will only occur if the line limit has been reduced below 2,000MW or the constraint is "downstream" of the REZ connection to the shared network. This must be the case because in this example the REZ would be a new development without existing congestion when the queue system is introduced.

The queue mechanism thus allows for commercially driven efficient overbuild of generation. The queue zero generators invest on the basis that generators built after the initial auction will not result in any reduction in their transmission capacity by competing with them on arbitrary and random factors such as MLFs and contribution factors. Additional generators invest based on their commercial assessment of the capacity available to them and that subsequent entrants will not materially impact that availability.

Importantly, there is no incentive for any generator to bid to the floor. For all bids that are less than the marginal generator there will be no difference in dispatch, curtailment, or financial flows under the queuing proposal if the REZ constraint binds. For example, queue position five will be first to be curtailed even if its bid is -$1000. As a result, generators will have an incentive to bid their marginal cost.

While the example in Box 2.1 focuses on a REZ, the concept can be applied to any part of the network. Queue positions for new generators are assigned based on their contribution to local congestion on the parts of the network where they would have a material impact on congestion. Further, there would be a relationship between contribution factors and the determination of queue numbers. To determine queue numbers would require consideration of:

- What are the segments of the transmission network that the new generator may constrain and what is the new generators contribution to that constraint? This could be expressed by analysing the modelled contribution factors of the new entrant for each segment of the transmission network
- What existing generators will be materially impacted by those constraints? This could be determined by assessing the modelled changes in the contribution factors of existing generators.

Of course, there would need to be a cut-off to determine materiality in impact on congestion or an individual generator and which segments of transmission are impacted. However, the materiality threshold will need appropriate modelling and analysis.

Thus, there would be a relationship between the assignment of queue numbers and contribution factors. However, queue numbers cannot change and, therefore, generators cannot be unfairly impacted by the locational decisions of future generators.

2.1.1 Placing the transmission queue before contribution factors will not lead to an increase in costs for customers in the short run

In its consultation paper the ESB stated that "The ESB does not propose to change the role of contribution factors in dispatch. Alternative approaches would have the result that NEMDE dispatches (and customers pay for) more energy than is necessary, with the additional MW unable to reach load due to congestion."

We believe this is not true. Our understanding is that contribution factors do not change the total amount of electricity dispatched to meet demand. Instead, contribution factors change the amount of electricity required to relieve a constraint. When this happens, generation is merely shifted from one part of the NEM to another. The total envelope of required electricity does not change.

NEMDE relieves binding constraints by shifting around the output of generators in the bid stack that it has already determined provide the least cost generation mix for a given generation interval. By definition, all generators, in the bid stack must be less expensive than or equal to the marginal generator. As a result, shifting the output of generators in NEMDE's generation stack cannot change the price that consumers pay unless the marginal generator changes. This is because it is the marginal generator that sets the RRP that consumers actually pay.

We acknowledge there is a possibility that a constraint could not be relieved without changing the marginal generator and, thus, the RRP. To eliminate this possibility, we propose to limit NEMDE to only curtailing generators in order of the queue where it would not change the marginal generator. If using the queue to resolve a constraint results in increasing the RRP, then we propose that NEMDE revert to the use of contribution factors to resolve a binding constraint. This safeguard will ensure that customers do not pay extra because of the queue.

It is also possible that using the queue instead of contribution factors would result in dispatching generators that are farther from load. However, generator bids are already weighted by MLF meaning that losses are already accounted for in generator bids. MLFs are imprecise a small increase in generation may be required. However, there may similarly be a decrease. Even if the grid does require a small increase in generation, the increase in cost resulting from this will be more than offset by the savings from a reduction in the cost of capital.

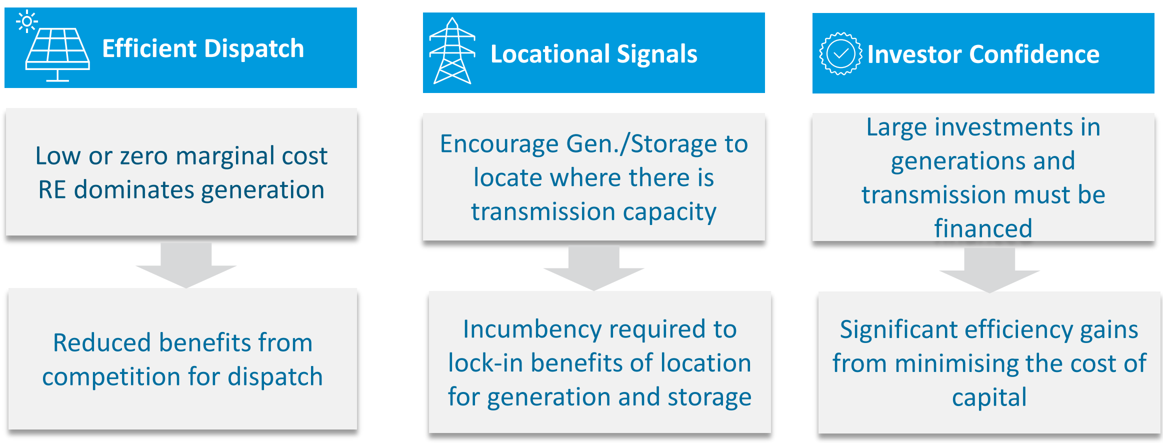
Further, the price of bids behind a binding constraint is unlikely to reflect actual marginal cost. As explained in Section 2.2, using contribution factors to determine tie-breaks incentivizes generators to race to the floor to ensure dispatch. This means that increasing or decreasing the amount of generation to resolve a constraint is unlikely to change whether the least cost generation mix is used to meet demand.

2.1.2 Placing the transmission queue before contribution factors will lead to a reduction in costs for consumers in the long run

Allowing the queue system to function as we designed it will remove the incentive for generators to locate in congested areas of the NEM in an attempt to force out existing generators by gaming the dispatch algorithm. As we have explained in our previous submissions, this will reduce the risk faced by investors, which in turn will reduce the cost of capital required to finance the large capital investments required to achieve the energy transition. Reducing the cost of capital will then lower the cost of electricity for consumers. As we have also previously argued, our view is that reducing the cost of capital will have a much larger impact on the costs that customers pay than any increase that may arise from reduced competition for dispatch.

Figure 2.2 shows the relationship between the key changes caused by the energy transition and their impact on reducing the cost of electricity.

Figure 2.2: Nature of the Energy Market Post Energy Transition



The dominance of RE with near-zero SRMC cost in the generation mix will dramatically reduce the benefits achieved from encouraging competition for dispatch. In a near-zero SRMC environment, there will be many periods where all bidders have near-zero SRMC and so there is no social benefit to dispatching any particular unit ahead of another, even though the dispatch order—or rather the risk of non-dispatch—will of course be important to each investor. Further, this does not mean, at least not in the short term, that there will not continue to be periods where thermal generation and RE will compete; however, as the energy transition advances instances where thermal generation and RE compete will reduce as a result of:

- The simple fact that there will be less thermal generation in the NEM as made clear by the step-change scenario
- The location of most VRE in REZs far from remaining thermal generation means there will be very limited competition between thermal generators and VRE for transmission capacity
- The remaining thermal generation will mostly be firming or peaking capacity. By its very nature firming and peaking units are intended to run when RE is not able to meet demand. Thus, it is very unlikely that these units would be generating at a time when they would be competing with RE for transmission capacity

If there are no efficiency gains from competition for dispatch during each bidding period, then it becomes more important to provide generation and storage investors with greater certainty about their future ability to dispatch at the time of the investment decision.

To illustrate the point that allowing the queue system to work will result in a reduction in costs for customers in the long run: the Clean Energy Investors Group (CEIG) estimated that the current 100-250bps premium on the cost of equity caused by significant uncertainty and risk in the market will cost an additional $7bn that generators must recover and customers, therefore will have to pay. This is close to 10 percent of the estimated A$70bn NPV in wind and solar investment CEIG estimates is required to achieve the energy transition[3]. This is a significant cost, meanwhile, there is no benefit to allowing Zero-SRMC VRE generators compete for dispatch. As a result, we are confident that considering the queue before contribution factors will decrease costs for customers.

2.2 The transmission queue will reduce the incentive to bid in a disorderly fashion

Contribution factors do not determine who gets dispatched despite race to the floor bidding. Contribution factors encourage race to the floor bidding because NEMDE considers bid price combined with contribution factors when determining which generator to curtail in the event of a binding constraint.

Considering the queue before contribution factors would dramatically reduce the incidence of contribution factors being used to determine curtailment. As a result, the incentive to bid in a disorderly fashion would be greatly reduced. On the contrary, generators will have an

[3] Clean Energy Investor Principles August 2021 Unlocking low-cost capital for clean energy investment

incentive to bid their actual marginal costs because they know that they will be curtailed in order of queue as long as their bid is less than the marginal generator and if their bid were to be higher than the marginal generator they would not want to be dispatched. Thus, considering the queue before contribution factors will also improve operational efficiency by reducing disorderly bidding, helping to achieve the ESB's stated goal in operational timeframes.

The ESB's consultation paper states that "While tie-breaker rules are relevant, insofar as they explain why market participants engage in 'race to the floor' bidding, they rarely drive dispatch outcomes in practice. Instead, generator coefficients tend to determine who gets dispatched." However, this does not fully explain how NEMDE determines tie-breaks using a combination of contribution factors and bid prices. Consider the following example provided in *Watt Clarity* by Allan O'Neill wherein NEMDE is trying to determine which solar farm to curtail:

> *NEMDE will seek to alter targets in a way which minimises the incremental cost to the dispatch solution. Let's suppose that the three solar farms with [contribution factors] of +1.000 have all offered their energy at **$5/MWh** while the Broken Hill Solar Farm, coefficient +0.6665, has offered energy at **$40/MWh**. We'll also need to know the spot price in NSW so let's suppose that is **$50/MWh**.*
>
> *Now, a 1 MW reduction in dispatch target (away from what would otherwise be least cost) at Limondale or Sunraysia farms would reduce the LHS value by 1 MW (coefficient +1). NEMDE's cost function views this as a "saving" (because it's taking less energy from this source) of*
>
> *$5/MWh (offer price) * 1 MW i.e., $5 per hour.*
>
> *To have the same effect on the LHS (reducing its value by 1) NEMDE could instead reduce the output target at Broken Hill Solar with its lower constraint coefficient by **1 MW / 0.6665 = 1.5 MW**. This would **reduce** NEMDE's cost function by*
>
> *$40/MWh (offer price) * 1.5 MW per hour or $60 per hour.*
>
> *But NEMDE also has to keep supply and demand balanced, so if it reduces targets at one of the solar farms in NSW, it has to increase NSW supply somewhere else by the same amount. Now the $50/MWh NSW spot price comes into play, because the spot price is the marginal cost of supplying extra energy in NSW by definition.[4] If NEMDE winds back Limondale or Sunraysia by 1 MW, the spot price tells us that hourly cost of making up the output from elsewhere must be*
>
> *$50/MWh * 1 MW = $50 per hour*
>
> *whereas winding back Broken Hill Solar by 1.5 MW (to achieve the same 1 MW change in constraint LHS) will require another 1.5 MW of supply from elsewhere, costing*
>
> *$50/MWh * 1.5 MW per hour = $75 per hour*
>
> *Netting these changes in offer costs and "make-up" energy, we see that the net additional cost of reducing the constraint LHS by 1 MW by changing output at Limondale or*

[4] Note however that this is not the actual marginal cost of the make-up electricity; however, this is how the NEMDE calculates the cost of make-up energy.

Sunraysia, versus changing output at Broken Hill ***given their relative offer prices and constraint coefficients*** *is*

-$5 (offer saving) + $50 (make-up energy) = ***$45 per hour*** *for Limondale or Sunraysia*

-$60 (offer saving) + $75 (make-up energy) = ***$15 per hour*** *for Broken Hill*

so, in this case NEMDE would not wind back output at Limondale or Sunraysia, despite their larger coefficient, but instead prefer to wind back Broken Hill Solar's more expensive output because this yields a smaller increase in NEMDE's cost of dispatch.

Mr. O'Neill goes on to point out that:

generators with positive coefficients that do not want their output wound back might choose to offer their energy more cheaply, by rebidding at low or negative prices, because this will give NEMDE less incentive to reduce their output – in fact, it sees reducing output at a negative offer price as a cost not a saving.

Following this logic, all generators with positive coefficients under a binding constraint may end up rebidding to the market floor price of negative $1,000/MWh to give NEMDE the maximum disincentive to wind their output down. In this case NEMDE will revert to choosing the generator(s) with the largest positive coefficient(s), since these require the smallest change in MW output to impact the constraint LHS by a given amount and hence the smallest cost to dispatch.[5]

It has been recognized for some time that the 'winner takes all' nature of constraint coefficients increases the incentive for generators to engage in disorderly bidding. In 2012, the AER noted that:

Generators that are forecast to be constrained have an incentive to rebid their capacity in order to limit the impact of a binding constraint on their dispatch outcomes. Generators with a negative coefficient can rebid capacity into higher price bands and/or as unavailable to reduce the possibility (or the magnitude) of an increase in output as a result of being constrained-on. Generators with a positive coefficient can rebid capacity into negative price bands to reduce the extent to which their dispatch levels will be decreased. As NEMDE is seeking to manage the constraint most optimally (based on generator offer prices as a proxy for cost), rebidding capacity in this way will influence NEMDE's outputs.[6]

Thus, we believe that adding the queue to the dispatch algorithm will significantly reduce incentives for non-cost reflective bidding in addition to its improvement in investment efficiency.

[5] Allan O'Neil "Case Study – How to interpret a new NEM constraint and guess what it might do." Watt Clarity Accessed at: https://wattclarity.com.au/articles/2020/11/casestudy-x5-constraint/

[6] "Special Report: The impact of congestion on bidding and inter-regional trade in the NEM." Australian Energy Regulator. December 2012

3 Misrepresentations of Our Transmission Access Queue in the Consultation Paper

In addition to clarifying our view that the queue should be considered before contribution factors, we would also like to correct several apparent misunderstandings of our model by the ESB. The table below provides clarifications to several misunderstandings.

Table 3.1: Misunderstandings of our model in the consultation paper

ESB Question	ESB Answer	Clarification
How does the model incentivise efficient investment decisions/ disincentivise inefficient investment decisions?	When congestion occurs, generators with tied bids and identical participation factors are dispatched in the queue order. When the coefficients of the congested generators are not identical, for example in the presence of a loop on the transmission network, dispatch reverts to the status quo, with generators being dispatched in order of contribution factor by the dispatch engine.	We are proposing that the queue would take effect before participation factors, provided that system stability is maintained. Therefore, contribution factors would only take effect for generators with the same number in the queue.
How does the model determine which parts of the network should be subject to incentives/ disincentives to connect?	The model applies to existing and future transmission networks as per the ISP. Efficient connection locations are identified based on the transmission capacity available.	This is partially accurate, though it would be more accurate to say that our proposal requires that a new generator that wants to connect to the transmission network to go through a regulated process (possibly by the TNSP) to determine its impact on congestion. This process would determine the material impact of a new generator on the congestion in the local area and the system's stability overall. We note that the ESB's connection fee proposal would also assume that a similar approach is taken to calculating connection fees.
How does the model maximise the potential hosting capacity of the network by encouraging investments that enhance hosting capacity?	Option for new generators to fund investment to increase transmission hosting capacity in return for an improved position in the queue.	This is not correct. To ensure that transmission investments made through the RIT-T process are utilized efficiently, our proposal allows for the efficient overbuild of generation capacity. The queue will lead to an efficient utilization of transmission capacity because it is likely that VRE generators will be willing to build capacity that will be constrained off during peak generation periods, but which is able to utilize unused transmission capacity during periods of lower generation—commonly referred to as economic curtailment.

		Our proposal does allow for generators to fund transmission investment in an area where they would like to receive a zero position in the queue. However, this is a separate issue.
How does the model create incentives for demand side and two-way technologies to locate where they provide the most benefits to the system?	Opportunity for generators to improve their position in the queue through transmission charges (to augment local transmission capacity or install storage and seek the right to dispatch during periods when there is no shortage of transmission capacity). Energy storage is subject to same queuing terms as generators	This is the incentive that the queuing model provides for generators to co-locate storage behind transmission constraints to relieve congestions. Standalone storage investments will also be incentivized to locate behind transmission constraints because they will be allowed to sign bilateral agreements to purchase electricity from local generators that would otherwise expect to be constrained off. This would likely be at agreed prices below the RRP during the periods of expected curtailment. The power would then be sold when the transmission network is not constrained. Further, we note that we did not propose that energy storage would be subject to the same queuing terms as generators all the time. We proposed that energy storage be treated differently depending on what service it is providing. We proposed that: ▪ **Storage acting as dispatchable Energy**—Energy storage would enter the queue and dispatch on the same terms as any other generation project when serving as a generator. This is because an energy storage project entering the queue and receiving a high number means that it can only dispatch when other generators are not dispatching. This will be key to encouraging energy storage to locate in a way that eases congestion. If energy storage providers were exempt from the queue, they could attempt to discharge during congested periods which would worsen congestion rather than relieving it ▪ **Storage Acting as Load.** Energy storage would be treated as a load when charging. Storage providers will be allowed to sign bilateral contracts with generators that cannot dispatch due to congestion to purchase electricity at an agreed price rather than the RRP. This, in turn, would alleviate the congestion and allow generators to sell produced electricity instead of spilling it ▪ **Storage proving Ancillary services.** Storage providers would be exempt from the queue when providing ancillary services. The ancillary services market is separated from the energy market. For this reason, we believe it is reasonable to separate the

		energy and ancillary market incentives. This means that encouraging storage participation in the ancillary market should be addressed under the ancillary market regulations, not through the transmission access queue.
How does the model support jurisdictional REZ schemes?	Priority queue positions could be made available to REZ generators. Outside REZs, the NEM-wide access regime could support REZs by allocating low priority queue positions to generators who wish to connect in locations that would undermine the access of REZ generators.	This is partially correct, but it would be more accurate to say that the queue system supports REZs because any new entrant that sought to free ride off of a REZ infrastructure by locating just outside of it would receive a higher number in the queue by virtue of the fact that the transmission capacity set aside to serve the REZ is already fully utilized. Thus, any new entrant seeking to free-ride would by definition be breaching transmission capacity, receive a number in the queue higher than zero and be curtailed before generators located in the REZ.
Effective Wholesale Competition (1)	There is a risk that queueing may limit or damage contract market liquidity.	We anticipate that our proposal would not limit or damage the contract market liquidity On the contrary, providing greater dispatch certainty to incumbent generators would lead to an increase in liquidity of contract markets as incumbent generators, confident that they will have access to transmission capacity, will offer more and longer-term contracts without fear that curtailment will prevent them from meeting their contractual obligations.
Effective Wholesale Competition (2)	Further consideration is required of EOI eligibility criteria to ensure that advantageous queue Positions are not awarded to generators that won’t reach financial close, which could deter other genuine investment.	We propose that the EOI phase will be designed to eliminate bidders who do not have the technical or financial backing to deliver a project. Requirements for project proponents should be calibrated to be tight enough to prevent unserious bidders from being considered, but not so onerous that they deter interest or prevent smaller or innovative applicants from being considered.
Implementation Considerations	A queue position may be allocated but held in limbo while proponent works to complete grid studies and finalise the connection agreement.	We proposed, to maintain the place in the queue, the project proponent must commence construction within two years of receiving their place in the queue. If the generator has not commenced operations within that time-period, then the project proponent will lose their spot in the queue and all deposits and fees paid will be lost.

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