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18/05/2018

Mr John Pierce
Chair
Australian Energy Market Commission
PO Box A2449
Sydney NSW 1235

Lodged online via: www.aemc.gov.au

Dear John,

Coordination of generation and transmission investment review – Discussion paper

TransGrid welcomes the opportunity to respond to the AEMC's discussion paper in relation to its coordination of generation and transmission investment review.

TransGrid is the operator and manager of the high voltage transmission network connecting electricity generators, distributors and major end users in New South Wales and the Australian Capital Territory. TransGrid's network is also interconnected to Queensland and Victoria, and is instrumental to an electricity system that allows for interstate energy trading.

Australia is in the midst of an energy transformation. This is primarily driven by changing community expectations and choices, advances in renewable energy technologies, retirement of existing generation, and the adjustments required in Australia's economy to meet our international climate change commitments. These changes raise complex issues in relation to the design of the National Electricity Market (NEM) which must adapt to these changes and provide the basis for low emissions, reliable supply at the lowest cost to consumers over the long run.

TransGrid supports the AEMC's review given the transformation of energy markets and associated reforms. In particular, there is a strong link between the AEMC's coordination of generation and transmission investment review, the Australian Energy Regulator's (AER) RIT-T application guidelines and the development of the Integrated System Plan by the Australian Energy Market Operator (AEMO).

We appreciate the opportunity to comment on this discussion paper and look forward to engaging with the AEMC and other stakeholders further on this project. If you would like to discuss this submission, please contact Caroline Taylor, Manager, Regulation Policy on 02 9284 3715.

Yours faithfully

Anthony Meehan

Executive Manager, Regulation

Coordination of generation and transmission investment review

Submission to AEMC Discussion Paper

TransGrid

1. Introduction

TransGrid welcomes the opportunity to respond to the Australian Energy Market Commission's (AEMC) coordination of generation and transmission investment discussion paper.

TransGrid is the operator and manager of the high voltage transmission network connecting electricity generators, distributors and major end users in New South Wales and the Australian Capital Territory. TransGrid's network is also interconnected to Queensland and Victoria, and is instrumental to an electricity system that allows for interstate energy trading.

Australia is in the midst of an energy transformation. This is primarily driven by changing community expectations and choices, advances in renewable energy technologies, retirement of existing generation, and the adjustments required in Australia's economy to meet our international climate change commitments. These changes raise complex issues in relation to the design of the National Electricity Market (NEM) which must adapt to these changes and provide the basis for low emissions, reliable supply at the lowest cost to consumers over the long run.

TransGrid understands that the discussion paper presents the AEMC's initial views on three developments which may necessitate changes to the current transmission framework in the National Electricity Rules (NER), these being:

- Likely future congestion on transmission networks as more generators seek to connect to the grid in places where there is not substantial spare capacity.
- New types of generator capability such as large scale battery storage connecting directly to the transmission network.
- Renewable energy zones (REZs).

TransGrid supports a review of these issues given the transformation of energy markets and associated reforms. In particular, there is a strong link between the AEMC's coordination of generation and transmission investment review, the Australian Energy Regulator's (AER) RIT-T application guidelines and the development of the Integrated System Plan by the Australian Energy Market Operator (AEMO).

In this regard, it may be appropriate for the AEMC to take into account AEMO's first Integrated System Plan to finalise any recommendations on REZs. The Integrated System Plan will provide information on the nature and extent of REZs which is integral to the AEMC's analysis.

The AEMC's review should also be considered in the context of the development of the National Energy Guarantee by the Energy Security Board and reforms to reliability frameworks in the NEM being considered by the AEMC.

This submission sets out TransGrid's views on the issues canvassed by the AEMC, in particular:

- Chapter 2 sets out our views on the scale of the problem being considered by the AEMC.
- Chapter 3 discusses our views on how grid scale storage should be treated in the regulatory framework.
- Chapter 4 sets out how the regulatory framework should facilitate the efficient delivery of renewable energy zones.
- Chapter 5 sets out our views on a clustering approach for coordinating generation and transmission investment proposed by the AEMC in its discussion paper.

In developing our views we have been particularly informed by our experience attempting to facilitate the connection of REZs in New England in NSW as summarised in the case study in Chapter 4 of this submission. We have also contributed to the development of the submission by Energy Networks Association to the AEMC's direction paper and broadly support the views in that submission.

2. Network congestion

TransGrid understands that the AEMC engaged Ernst and Young to assess patterns and costs of congestion in the NEM to estimate the scale of the problem being considered by the AEMC.

The AEMC reports that the Ernst and Young work demonstrates that there are limited amounts of congestion in the NEM at the moment and that which occurs is largely between regions. However, the AEMC also notes that AEMO has identified that there is over 45,000 MW of proposed new generation which has expressed interest in connecting across the NEM and therefore there could be significant congestion in the future.

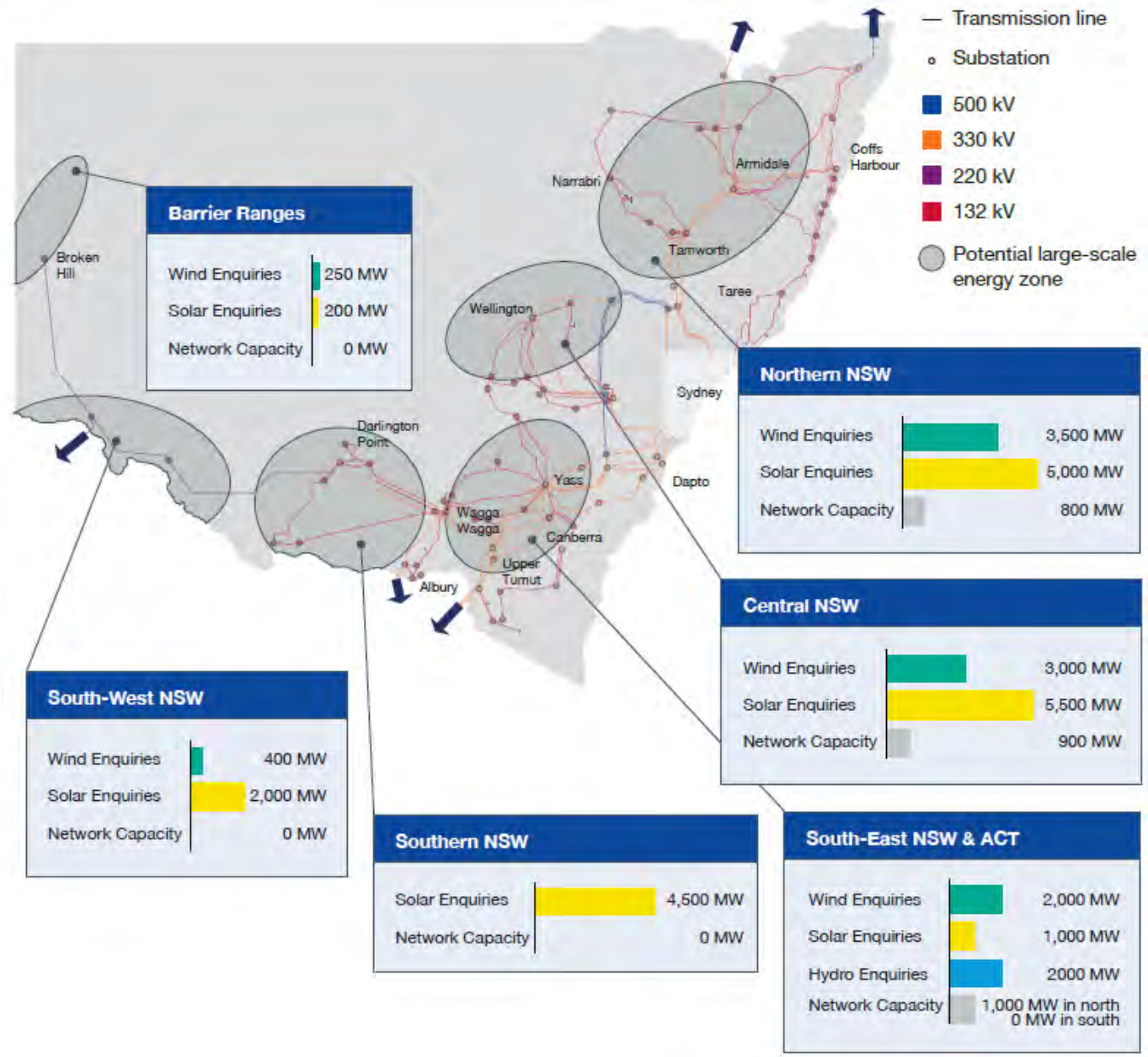
TransGrid considers that the current state of constraints binding in the network is not a good measure of the current scale of the problem being considered by the AEMC.

TransGrid currently has over 30,000 MW of potential solar, wind and hydro projects at various stages of development and only a fraction of these projects can be accommodated in the spare capacity of the current network. In some regions of New South Wales with high quality renewable resources, TransGrid's network is already 'full' with no spare capacity to connect additional generators. This is resulting in new generation projects not being progressed. A summary of current connection enquiries in TransGrid's transmission network is provided in Figure 1.

TransGrid recommends the AEMC analysis is broadened to include forecasts of future network congestion, including committed and likely generation developments. As it stands, the AEMC's approach to understanding congestion in the network is flawed and appears to significantly understate the scale of the problem to be addressed.

TransGrid agrees that there are currently constraints on the interconnectors noting that ElectraNet has commenced a RIT-T on an interconnector from South Australia to other regions.

Figure 1: Current connection enquiries to TransGrid's network



Source: TransGrid data.

3. Treatment of storage

The AEMC notes that AEMO considers that battery storage is able to be registered as both a generator and market customer and that this view is consistent with a previous AEMC view on this topic.

Following on from this, the AEMC considers there is a lack of clarity about how transmission use of system (TUOS) charging for storage is currently treated. TransGrid understands that the AEMC is also interested in views on how hybrid facilities are treated for the purpose of registration – according to the AEMC the current arrangements do not allow an entity to use a battery to smooth out its wind output.

As recognised by the AEMC, storage has the potential to provide a number of benefits and services throughout the electricity supply chain, including to wholesale and retail markets, ancillary services, network support and system security. These benefits can provide greater reliability and lower costs for consumers.

To recognise the range of benefits that storage can provide, TransGrid recommends that a separate registration category for grid scale storage be provided for in the NER rather than the current approach of classifying storage as generation.

TransGrid considers having a separate registration category for grid scale storage would allow TNSPs to

provide the full range of services offered by this technology. In turn, this would promote efficient investment in grid scale storage resulting in a lower cost, reliable and secure electricity supply.

Any concerns from allowing TNSPs to efficiently provide the range of services offered by batteries can be addressed through the application of the AER's Cost Allocation Guideline and Shared Asset Guideline. The Cost Allocation Guideline defines the allocation of costs between prescribed, negotiated and unregulated transmission services. The Shared Asset Guideline defines how costs for a particular asset are split if the asset provides both regulated and unregulated services.

4. Renewable energy zones

The AEMC is focussing on REZs as a means of coordinating generation and transmission investment in the NEM given the Finkel review sought to progress this model.

TransGrid supports the strategically planned connection of large scale energy zones, supported by greater interconnection, to provide consumers with the lowest priced energy and system security as ageing coal power stations retire from the market.

The benefits include:

- Connection of the lowest-cost generation in regions with the best quality renewable resources. These large scale generators can operate at higher capacity factors and are able to supply electricity at lower unit costs than generation in lower quality renewable resource areas.
- Efficient transmission connection through economies of scale.
- Geographic diversity of renewables across the NEM to provide lowest cost intermittency firming.
- Sharing of energy and ancillary services across regions to provide system security and resilience.

This is consistent with the role of transmission networks to provide the platform for the lowest cost electricity generation to be connected and dispatched, enhancing energy market competition.

This Chapter sets out TransGrid's views on:

- The definition of a REZ and the types of transmission assets that would be required to connect one.
- The challenges with the current regulatory framework that prevent the delivery of a transmission network to support the transition to a low cost, low emissions and reliable electricity supply and how these should be addressed.
- The REZ options canvassed by the AEMC.

4.1 Defining REZs and the transmission assets required to connect them

As identified by the AEMC in its discussion paper, before deciding on the appropriate regulatory arrangements, a key issue in considering the regulatory framework for connecting REZs is defining what a REZ is and the types of transmission assets that would be required to connect one.

The REZs that TransGrid has identified as a priority in its submission to AEMO's Integrated System Plan have been proposed to maximise value for consumers.

They feature:

- High-quality renewable resources.
- Strategic optionality for network development. That is, transmission investments that both facilitate regional interconnection and the connection of high capacity-factor renewable generation.
- Close proximity to load centres and the existing transmission network so that existing infrastructure can be reused where possible and augmentation costs can be minimised.

To deliver these REZs, two types of transmission network investment would need to be provided:

1. An expansion of the capacity of, and extension of, the existing shared network to strengthen electricity flow pathways between population centres and from priority large scale renewable energy zones.
2. The building of transmission assets to connect generators to the shared network.

Different regulatory arrangements should apply to each types of investment as discussed in in section 4.3 below.

4.2 Challenges with the current regulatory framework in delivering REZs

The existing market was developed at a time of a mature generation fleet and transmission system. As such, the regulatory framework was established to support incremental investment in energy infrastructure. However, this framework is not suitable to deliver strategic transmission investments such as the connection of renewable energy zones.

In particular, the existing regulatory investment test for transmission (RIT-T) represents a barrier for delivering strategic transmission projects. For example, the RIT-T typically requires new generation to lead network expansion, creating a 'chicken and egg' dilemma: new generation projects in areas with high quality renewable energy resources cannot be committed without transmission access, but proactive transmission expansion is not supported. Investors will only commit to generation once they have assurance of a network they can reasonably connect to, and which will provide sufficient capacity to deliver their generation (i.e. they will not be 'constrained off').

In addition, the current rules have not delivered scale efficient network investment as intended. The Scale-Efficient Network Extensions (SENE) rule was made by the Australian Energy Market Commission (AEMC) in 2011. The purpose of the rule was to capture the benefits of scale economies by building capacity for a cluster of expected future generation connections. TransGrid's experience in following the SENE process highlights the issues with the current regulatory framework. This is outlined in the case study below.

Case study: New England Renewable Energy Hub

With support from the Australian Renewable Energy Agency (ARENA) and the NSW Government, TransGrid conducted a feasibility study for developing a Renewable Energy Hub in the New England area (REHub). TransGrid facilitated the cooperative framework between generators within the existing connections framework.

At the time, three wind farm projects in the region were in separate negotiations with TransGrid seeking connection to the network. The development of individual, stand-alone connections for the wind farms was found to be possible, but at a cost estimated to be 18% higher than through a shared connection (a REHub). TransGrid considered that establishing a REHub may also attract further energy projects to the region in future.

During this process, a number of commercial challenges were encountered:

- Asset stranding risk: Once the SENE becomes fully subscribed then the economies of scale for the development will deliver cost benefits, however if all connections do not eventuate as forecast the oversized asset may not be fully utilised, resulting in sub-optimal returns.
- First-mover disadvantage: Generators connecting early may be expected to fund a greater share of the REHub, bearing excess connection costs and giving rise to cross-subsidies in future connections. All generators would expect that the costs of connecting to the REHub would not be greater than the cost of connecting individually.
- Timing: It is unlikely that all potential generators will be in a position to commit to be connected at the time that the REHub is initially built.
- Competitive considerations: Under a cooperative framework for sharing connection assets, each generator is essentially facilitating the connection of a competitor at a lower price than they would otherwise pay. Broader considerations may tend to make generators less willing to cooperate with their competitors, or share information, despite the benefit of a lower connection cost and better financial project outcome for themselves.
- Regulatory classification of services: The REHub would primarily provide 'contestable' services (cost recovery via commercial negotiation) and 'negotiated' services (for which price must reflect the cost of providing the service), rather than forming part of the 'shared network' in TransGrid's regulated asset base. Upgrades to the shared network to accommodate the REHub and relieve congestion would be subject to a RIT-T. It is unclear whether regulatory frameworks would enable a reasonable rate of return to be earned on the REHub investment, commensurate with the risks.

Ultimately, these challenges could not be overcome, and no investor (including TransGrid, the connecting generators or a third party) was willing to fund the REHub and accept the risks involved. Only two of the three projects have been able to individually connect to the network.

In summary, relying on the existing market-led approach to generation and transmission planning will not deliver a reliable or low cost outcome for consumers in the timeframes in which existing thermal generation will retire.

4.3 Our proposed regulatory arrangements for REZs

To address the current challenges to delivering a reliable and low cost outcome for consumers, TransGrid proposes changes to the regulatory framework.

Our proposals are set out for each type of transmission investment identified in section 4.1 above, those being:

> Expansions of the capacity of, and extension of, the existing shared network to strengthen electricity flow pathways between population centres and from priority large scale renewable energy zones. (See section 4.3.1).
> The building of transmission assets to connect generators to the shared network. (See section 4.3.2).

4.3.1 Proposed regulatory arrangements for expansions and extensions of the shared network

To address the current barriers to delivering strategic transmission investments, including REZs, TransGrid recommends that:

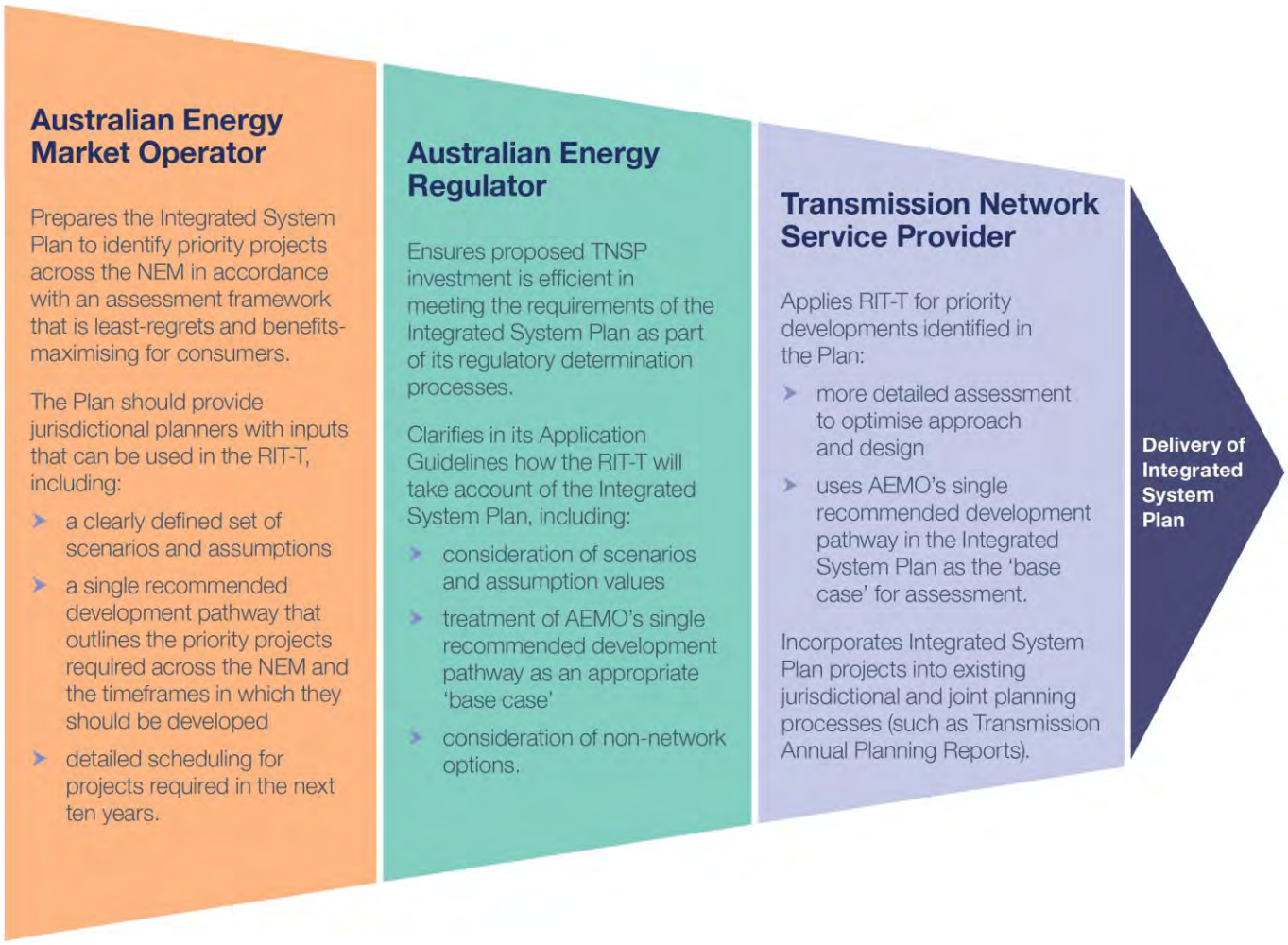
> AEMO provide a single recommended development pathway that outlines priority projects, including REZs, required across the NEM and the timeframes in which they should be developed.
> TNSPs apply the RIT-T to individual projects using AEMO's single recommended development pathway in the Integrated System Plan as the "base case" for assessment.

In order for this to occur, AEMO will need to provide precise and actionable recommendations in its Integrated System Plan, and the AER will need to provide clarification on how the Integrated System Plan should be treated in a RIT-T in its RIT-T application guidelines.

This proposal is set out at a high level in Figure 2. More detail in our submission to AEMO's consultation on its Integrated System Plan and the AER's RIT-T/D application guidelines.[1]

[1] TransGrid submission to AEMO's Integrated System Plan consultation paper, February 2018; TransGrid submission to AER's regulatory investment test application guidelines review issues paper submission, 6 April 2018.

Figure 2: TransGrid's proposed pathway for efficient delivery of the Integrated System Plan



This proposal adopts the existing framework in the NER for transmission investment where investment is supported by rigorous cost/benefit analysis. Transmission development would only be supported if the projected market benefits exceed the cost of the network investment, or where required for the safe and secure operation of the electricity system.

TransGrid considers this to be a practical solution to removing the current gridlock in the coordination of generation and transmission investment such as renewable energy zones. There would not need to be significant changes to the NER to accommodate this proposal as it uses the existing framework as a basis.

Given the important role it will play in facilitating a low cost, low emissions and reliable electricity supply, we also consider that AEMO's Integrated System Plan should be given the appropriate authority in the National Electricity Law and NER.

4.3.2 Proposed regulatory arrangements for transmission assets that connect generators to the shared network

As set out in section 4.1 above, in addition to investment in the shared network through increasing its capacity or extending it, there is also a need for investment in assets to connect generators to the shared network.

These connections can be optimised where there are several generators seeking to connect in an area.

As set out in the case study above, our experience of the Renewable Energy Hub in New England shows that the current regulatory framework does not facilitate the optimisation of generator connection assets as generators do not coordinate.

To facilitate the optimisation of generator connection assets, TransGrid recommends the regulatory framework adopts the following principle:

> Connection assets to be initially funded as a prescribed service until generators pay to connect.

This is consistent with the approach set out in the SENE rule proposed by the COAG Energy Council.[2] We recognise that this proposal would require changes to the NER.

4.4 TransGrid assessment of renewable energy zone options identified by the AEMC

The AEMC has developed four possible definitions or types of REZ which it considers are indicative of a range of options that would sit along this spectrum. These are outlined in Table 1.

Table 1: REZ options identified by the AEMC

Option	Option 1: Enhanced information provision	Option 2: Generator coordination	Option 3: TNSP speculation	Option 4: TNSP prescribed service
Features	Enhanced AEMO and TNSP coordinated planning to signal (i.e provide information to market participants) on potential REZs for development by the market	Generators connecting in the same area work together to coordinate the connection process (similar to the SENE process)	TNSPs undertake speculative investment to build the REZ, i.e. the investment is not undertaken as a prescribed service	TNSPs build infrastructure in anticipation of generators connecting to a REZ, with this being constructed as a prescribed service
Who pays?	Same as now (generators if these are connection services; consumers via TNSPs if the REZ can be justified as a prescribed service)	Generators	TNSPs - if generators connect to these assets in the future then TNSPs would be allowed to roll the infrastructure into the regulated asset base and so consumers would pay for this	Since these are constructed as a prescribed service, consumers pay for this infrastructure
Who bears the risk?	Same as now (generators and consumers as per the above)	Generators	TNSPs - TNSPs would be rewarded for their increased risk if generators connect to these assets in future	Consumers - including facing the stranded asset risk
Implications for changes required to the existing framework	Minimal	Minimal - but larger coordination issues exist	Moderate	Substantial

Source: AEMC 2018, Coordination of generation and transmission investment, Discussion paper, 13 April 2018, Sydney.

TransGrid's proposal for delivering strategic transmission investments, outlined in section 4.2 above, is consistent with elements of a combination of the AEMC's options 1 and 4. We believe that our proposal would

[2] Ministerial Council on Energy, *Rule change request – scale efficient network extensions*, 15 February 2010.

help deliver the energy transformation to meet the long-term interests of consumers. The transmission network has the important role of providing the platform for the lowest cost electricity generation to be connected and dispatched, enhancing energy market competition which is in the interest of consumers.

Under this proposal, expanding the capacity of the existing shared network and extending the existing shared network to deliver REZs would be recovered from prescribed transmission charges, and this would allow consumers to realise the associated benefits of enhanced market competition and the connection of lower cost electricity generation. Transmission development would only be supported if the projected market benefits exceed the cost of the network investment, or where required for the safe and secure operation of the electricity system.

Expansions of and extensions to the shared network would be subject to extensive analysis and consultation through the development of the ISP by AEMO and the undertaking of a RIT-T by the TNSP as under the current requirements in the NER for network investment.

Our proposal for optimised generator connection assets to be funded as a prescribed service and to require generators to pay for these connections as they connect does not fit into any one of the AEMC's options.

The remainder of this section now considers the REZ options two and three identified by the AEMC.

The AEMC's option 2 is currently available under the NER. Our experience of the Renewable Energy Hub in New England shows that it does not work currently as generators do not coordinate. However, this option should not be removed from the NER as there may be future possibilities where investors may seek to coordinate generators and speculatively build transmission connections, or where governments might choose to fund them directly.

TNSPs would need to be appropriately remunerated for the additional risk they would be exposed to if option 3 was adopted in the same way that other non-regulated businesses receive a return commensurate with the increased commercial risk. However, it remains unclear that the scale of investment required for system transformation would be delivered under this model, and the higher risk-rated financing costs would ultimately be recovered from consumers.

5. Clustering approach

Given its similarity to the REZ model, the AEMC also identifies another option to address the challenge of coordinating generation and transmission investment – the clustering approach.

TransGrid understands that under this approach a TNSP:

- Would establish a time window or 'season,' for connection applications
- Assess all applications received up to that point as a group, planning the system and providing connection offers on a jointly optimised basis.
- Is able to delay or refuse a connection if it does not fit within an efficient augmentation.

Our experience of the Renewable Energy Hub in New England shows the challenges in coordinating competitors and projects being at different stages of development. This approach may also result in delays for generators that want to connect.

However, TransGrid supports further exploration of adopting this approach in conjunction with the other measures we have identified. In particular, we support any accompanying approach to our proposed measures which may mitigate the risks for under-utilised assets.