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Coordination of Generation and Transmission Investment

Engineers Australia submission to the AEMC Options Paper

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Introduction

About Engineers Australia

Engineers Australia is the peak body of the engineering profession. We are a member-based professional association with about 100,000 individual members, many being electrical power systems engineering experts. Established in 1919, Engineers Australia is a not-for-profit organisation, constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community. Our members are governed by our code of ethics, using our knowledge and skills for the benefit of the community, ahead of personal or sectional interests.

Engineering expertise

Power systems engineering experience is crucial to the success of Australia's electricity systems, as they have the technical ability to identify and support stable and secure power systems operation. Putting engineering design first is essential, supported by market frameworks.

Workforce planning is always required to maintain a stable and healthy economy, and workforce planning in our electricity system is essential, and this includes maintaining sufficient levels of engineering expertise in the electricity system. At a time when Australia's electricity system is facing increasing complexity, the engineering workforce that ensures a secure and stable system cannot afford to be stretched, and this includes at the decision-making levels of the market bodies.

The review paper

Engineers Australia commends the swift work by the Australian Energy Market Commission (AEMC) to make the Australian Energy Market Operator (AEMO) Integrated System Plan (ISP) actionable, articulating five potential options. While it is important to create stronger links between the ISP and actual investments in transmission and generation, Engineers Australia wishes to contribute to the discussion about the implementation of the ISP, and has identified three essential messages that the AEMC and subsequently the Energy Security Board (ESB) will need to consider:

- There needs to be appropriate collaboration, ongoing information sharing and critical evaluation.
- Inter-regional connections and enhancements have not been duly considered, and this may be a scope issue.
- Optimal design considerations are unclear, which may be locking out sound investment decisions for consumers.

The points above will be expanded and considered further in response to questions raised in the options paper.

Further discussion

Engineers Australia appreciates the opportunity to contribute to the discussion on generation and transmission investment and would like to extend to the AEMC the option of meeting with Engineers Australia to discuss any of the points raised in this submission. Contact can be made to the submission contact, Mark Stewart, on the contact details above.

Question 1: Questions arising from the ISP

Question 1 considers a number of questions about the implications of the ISP, and how it links to transmission investment decisions. Although Engineers Australia supports the ISP, it raises points about the community expectations of the ISP, and believes further consideration and on-going collaboration is required during its implementation.

Community expectations

Engineers Australia also believes that the objective of the ISP needs to be more clearly defined so that the relationship of the ISP to transmission investment decisions can be critically evaluated. If the main objective of the ISP is to be for the benefit of the consumers, but the design of the ISP is set around the market response, there can be some doubt whether the ISP will meet this objective.

Question 3: Strategic, national investments and regional investments

With this question, the review paper asks if the ISP should only focus on strategic, national investments. In reviewing this question, Engineers Australia looks at the inter-regional connections that may not have been considered as part of the scope.

Scoping issues and design considerations

The options paper clarifies that the national transmission planner must have regard to the National Electricity Objective (NEO), and the ISP Group 1 projects are listed in Figure 4.1 in the options paper. However, Engineers Australia has concerns about the lack of balance in the scope, and raises concerns about satisfying the NEO, in particular, the long-term interest of consumers.

Strategic planning must consider the change in Australia's generation profile in localised areas, and how this could potentially benefit other areas of the NEM. Planning must also look at the potential option to strengthen interconnector capacity (including meshing options), and how this can not only improve resilience, but could also take advantage of Renewable Energy Zones (REZ), and can avoid stranded assets.

The national generation profile

One of the biggest strategic issues facing the NEM is managing the remaining major coal-fired power stations as they transition to retirement. Many of these power stations that still have the longest remaining life-span (and currently the lowest-emitting of the national thermal power stations) are located in Queensland, while many of the older less-efficient stations approaching the end of their life-cycle are located in New South Wales and Victoria. It is also unlikely that new coal-fired power stations will be built in Australia in the future.

Inter-regional connections and enhancement considerations

Looking at a national strategic approach, interconnection warrants further consideration in the ISP so that the major states of New South Wales and Victoria can take advantage of the age profile of the newer thermal plants in Queensland, utilising a generation resource that has already been paid for. As the thermal plants in New South Wales and Victoria reach the end of their economic lives, significant investment will be required to replace the capacity that is lost. The capacity available in Queensland could become available to help meet this capacity short-fall in the other states of the NEM.

It is unclear if the ISP considered the national imperative and benefits to the NEM of strengthening the interconnections between Queensland and New South Wales. The interconnections would mitigate stranding risk and prevent early closure of these power station. If it was considered, the reasoning is unclear and should be made transparent[1].

The cost of transmission should be justified through the RIT-T process, but to do so, the benefits of achieving the full technical life of Queensland's power stations needs to be included through in investing in additional transmitting capacity to Queensland. With the predicted uptake of renewable energy in the state there is a high risk that these benefits will not be achieved without this interconnection. However, if there is a change in emission reduction policies in the sector, analysis to compare supply from different generator types would need to be reconsidered.

Meshing considerations

Further consideration must also be given to investment in interconnection, including Meshing the NEM, as this also seems to have been missing from the scope. Many overseas examples have been built to include meshing of networks so that there is added resilience built into the system.

Australia's grid is characterised by being long and stretched, and this creates questions of resilience in the system. The risks are exacerbated with weather events expected to be a common occurrence. Meshing options in the NEM can help to reduce this risk, as well as help direct flows and to minimise transmission losses. These benefits flow to all of the states in the NEM.

Meshing the NEM by closing the NEM interconnections via a Queensland to South Australia interconnection and the use of HVDC VSC technology should be considered at a localised level. Such technology could be integrated into the existing market systems without causing looping effects as HVDC can be bid to manage the directional flows, the same as for Basslink.

Renewable energy zones

The scoping of options must be broad so that a full transmission plan must compliment planning of Renewable Energy Zones (REZ). The options must be in a way that optimises these zones to service the entire country, not just a particular state where they are located.

This includes REZ's that are yet to be developed. In particular, the ISP has rejected the establishment of a REZ in central Australia where some of Australia's best undeveloped renewable energy resources are located. The lack of development is owing to the associated high transmission costs, but costs must be looked at alongside the added benefit to the development of a REZ in central Australia, and that includes the added benefits in creating a meshing link between Queensland and South Australia.

The relatively small incremental cost by an intermediate HVDC connection could be justified by the much greater energy production from solar power in central Australia. An example of this occurring in the National Electricity Market (NEM) is the development of seven new power stations (Callide C, Tarong North, Millmerran, Kogan Creek, Braemar 1, Braemar 2 and Darling Downs). These power stations developed within just five years following the commissioning of QNI which was already justified from the benefits of interconnecting Queensland to the NEM. The power stations were then able to utilise previously undeveloped coal and gas resources along the route of the QNI.

[1] AEMO Integrated System Plan section 2.3 page 20 "Transmission development options".

Question 4: Risk allocation

With this question, the review paper asks about risk allocation for consumers, TNSPs and generators under the proposed actions. Engineers Australia believes that the most optimal way to mitigate the current risk is though appropriate information sharing.

The AEMO plan for transmission investment will have to be considered by the local transmission companies which will decide whether to pursue the investment driven by their future view of the energy markets, and then go through a rigorous RIT-T. Engineers Australia understands that TNSPs have an objective to maintain and control their assets not just for the customer benefit. Engineers Australia believes additional sharing may not add additional risk, and could still benefit consumers. This would then enable the transmission plan to continue with consumer-benefit as its main objective.

This may require TNSPs to appropriately coordinate with each other when considering the different stages of the investment process (as outlined in Table 4.2). This could occur when two TNSPs are required to jointly agree for an optimal solution.

Question 21: Storage and TUOS

Under this question, the review paper asks if stakeholders agree with the way the AEMC has framed the issue of whether storage should pay transmission use of system charges.

Storage will provide network support services if embedded. Otherwise, it is likely to provide valuable energy shifting service which will help reduce peak prices for customers and as such, it supports the price efficiency objective of the NEO. Storage behind the generator's connection point must be treated as an integrated part of the generating system.

Even if prices are negative and the connection point is drawing power, it is providing a load service to the system to enable thermal plant to remain operational during technical minimums. It is therefore supporting the efficient control of the power system.

As storage and batteries can act as both a generator and a load, significant thought needs to be given to the appropriate recovery of TUOS when operating in both modes. Charging TUOS to storage could increase barriers to earlier adopters of the technology.

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