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Thursday, 28 September 2023

Ms Anna Collyer
Chair Australian Energy Market Commission
GPO Box 2603
Sydney NSW 2001

Submitted online: www.aemc.gov.au

Dear Ms Collyer,

AEMC second directions paper on Improving security frameworks for the energy transition

Transgrid welcomes the opportunity to respond to the Australian Energy Market Commission's (AEMC) Improving security frameworks for the energy transition second directions paper, which was published on 24 August 2023.

Transgrid is responsible for ensuring the power system in NSW remains secure and safe, by maintaining specified levels of key system security services including system strength, inertia, and voltage control. The progressive retirement of Eraring, Vales Point and Bayswater power stations in the next decade will create gaps in generation, system strength, inertia and voltage frequency control and inertia. For system strength, we have already begun seeking a portfolio of solutions to best meet power system requirements at the lowest costs to consumers.

We welcome the work the AEMC is undertaking to improve the processes and frameworks within the national electricity market to bolster system security as the power system transitions to net zero. We believe that it is vital to have an appropriate framework in place to ensure inertia network services and system strength is procured and enabled at the least cost to consumers. This also includes aligning the existing frameworks for inertia and system strength.

Transgrid has significant concerns with the AEMC's proposal that TNSPs would be responsible for making enablement payments for system security services. We believe these payments will be substantial and unpredictable, and as a result will create significant cashflow risk for TNSPs, and highly variable and unstable prices for consumers. Modelling suggests it could more than double our regulatory operating expenditure, which would have significant impacts on the level and stability of network charges that would ultimately be passed on to consumers.


We encourage the AEMC to rescind this proposal and allocate the responsibility to AEMO, who is better positioned to manage these payments, as it aligns with their existing market settlement function.

We look forward to continuing to work with the AEMC to develop a framework that delivers the best outcome for consumers whilst minimising risk on TNSPs.

Transgrid's detailed response to the second directions paper is provided in the attached submission.

If you require any further information or clarification on this submission, please contact Zainab Dirani at Zainab.Dirani@transgrid.com.au

Yours faithfully



Maryanne Graham
Executive General Manager – Community and Policy



Improving security frameworks for the energy transition

Transgrid submission on the AEMC's second directions paper

Summary

This submission provides Transgrid's response to the Australian Energy Market Commission's (**AEMC**) *Improving security frameworks for the energy transition* second directions paper (**directions paper**), which was published on 24 August 2023.

Transgrid is responsible for ensuring the power system in NSW remains secure and safe, by maintaining specified levels of key system security services including system strength, inertia and voltage control.

The progressive retirement of Eraring, Vales Point and Bayswater power stations in the next decade will create gaps in generation, system strength, inertia and voltage control. For system strength, we have already begun seeking a portfolio of solutions to best meet power system requirements at the lowest costs to consumers, through our Regulatory Investment Test – Transmission (**RIT-T**) process. The range of possible technologies and services we are considering for this portfolio include:

- Existing synchronous generators dispatched in the energy market, such as coal, gas and hydro.
- Services outside the energy market, such as existing synchronous hydro units that may be able to operate in synchronous condenser mode, or generators considering converting their units into synchronous condensers.
- Synchronous condensers, which are synchronous motors that spin freely (with no fuel combustion or power generation), used specifically for the purpose of providing system security services.
- Emerging technologies, such as batteries, STATCOMs or renewable generation with grid-forming inverters. Grid forming inverter technology has significant potential to provide system strength support, in addition to other grid supporting services such as synthetic inertia, fast frequency response and voltage support.

Transgrid has significant concerns with the AEMC's proposal that TNSPs should be responsible for making enablement payments for system security services, which we believe will be very large and unpredictable, which could create **significant cashflow risks** for TNSPs. Transgrid considers that TNSPs are not best placed to manage payments for the enablement of system security contracts. In our opinion, we believe AEMO is better placed to facilitate these payments. This is aligned with their existing wholesale and ancillary services settlement function and capabilities.

Furthermore, we believe that the proposed drafting does not provide sufficient timing, alignment or certainty of regulatory cost recovery. This concern can be split into three components:

- The **magnitude** of enablement costs within non-network contracts for system strength are expected to be significant. Analysis undertaken by Endgame Economics for Energy Networks Australia suggests that the estimated enablement cost of non-network contracts for NSW could be at least **\$250 million**

per year by FY2028. This could more than double our regulatory operating expenditure over this period.

- Enablement costs will be **highly variable** and uncertain – both because of forecast uncertainty about how much and frequently services will be enabled, and the potential for prices paid for services to be dynamic and difficult to forecast. Endgame Economics’ analysis estimates (on a conservative basis) that *average* non-network costs for system strength enablement could sit at \$21 million per month by FY2029, but this could increase two- or three-fold in some months, and even more so if current expectations about system security gaps prove to be incorrect.
- The **uncertainty and timing** of cost recovery. TNSPs would include forecasts of anticipated contract costs when setting TUoS prices on a year-ahead basis, but the TUoS entitlement adjustment to correct under/overs has an approximate 2-year lag, during which TNSPs would be required to carry these costs. Contract costs would also be subject to AER review and approval, but we wouldn’t have this until *after* contracts are executed. In addition, there is limited precedent for cost recovery of associated internal and financing costs.

These risks are inconsistent with the return profile of a regulated TNSP, particularly as TNSPs do not currently receive any incentive or compensation in return for managing non-network contracts. They also have the potential to create variability in Transgrid’s network pricing year-to-year, which is not consistent with customer and stakeholder expectations that pricing be stable and predictable.

We endorse Energy Networks Australia’s (**ENA**) submission on the AEMC’s directions paper and have identified several key issues which require further consideration as part of the AEMC’s work on improving the security framework. Our submission is structured under 4 key topics. These are:

1. Aligning inertia and system strength frameworks.
2. Transitional NMAS framework.
3. Empowering AEMO to enable security services.
4. Improving directions transparency and compensation.

1. Aligning inertia and system strength framework

The AEMC is proposing three main changes to the existing inertia framework that includes introducing a NEM-wide inertia floor, aligning procurement timeframes with the system strength framework, and removing restrictions on the procurement of synthetic inertia. The AEMC states that aligning the inertia and system strength framework will allow TNSPs to coordinate investment opportunities more efficiently.

Transgrid supports the intention of this proposal as this would deliver efficiencies to consumers through co-optimisation of solutions. Given inertia and system strength are not independent of each other, many of the solutions that can be implemented for system strength can also provide inertia at minimal additional costs. The co-optimisation of security services will ensure the system remains reliable and secure and, would be in the long-term interest of consumers given it would decrease cost of providing security services in the long term.

Three-year binding requirement

The AEMC is proposing that TNSPs would be required to ensure that sufficient inertia is continuously available, three years into the future. This is in line with the current system strength obligations.

Transgrid's view is that three years is not sufficient to meet the requirement while ensuring technology neutrality (for either inertia or system strength). The regulatory assessment process coupled with implementing a solution may take up to five to six years to execute. This is because:

- A RIT-T will take approximately 1.5 to two years to complete. Transgrid's existing RIT-T for system strength is expected to take at least two years given the complexity of technical and economic analysis required to deliver a large portfolio of required solutions.
- Following the conclusion of the RIT-T (and associated dispute period), a Contingent Project Application (**CPA**) (as these are contingent projects in our revenue determination) will take a further six to 12 months to complete and be assessed.
- On average a network solution (such as a new synchronous condenser) will take three to four years to procure and install (given current supply chain issues), whilst a greenfield non-network solution such as a grid forming battery may take two years to deliver. This could be further amplified in the future because of increasing global demand for the same infrastructure materials and equipment.

Given this, we propose that TNSPs be provided with six years to meet their respective obligation and ensure sufficient levels of system strength and inertia is available, so that the full range of network and non-network solutions can be considered credibly.

In short, a three-year period is not aligned to the overarching principle of technical neutrality (or provider neutrality), given that that many solutions cannot be delivered within the three-year period. This would skew results towards higher-cost and higher-emissions solutions that are more readily available in the short term (such as contracting with existing gas generators to operate out-of-merit-order to fill gaps in system security). This would not be in the best interests of consumers.

Commencement of inertia framework

Transgrid is supportive of co-optimising system strength and inertia.

The AEMC has stated that the proposed changes would commence on 1 December 2024. This would mean that the binding procurement of the mainland inertia floor would commence from 1 December 2027. This timing is unfortunately not consistent with efficiently harmonising system strength and inertia solutions. To meet the requirements of our new system strength obligations, Transgrid is already undertaking market modelling for the Project Assessment Draft Report (**PADR**) and will need to conclude our system strength RIT-T by ~Q4 2024, to enable solutions to be in place by July and December 2025. Hence, system strength solutions are likely to be selected before the new inertia frameworks are finalised.

Transgrid recommends that the AEMC consider:

- Allowing for flexibility to include "low regret" solutions to inertia to be incorporated within system strength solutions (e.g., including flywheels on synchronous condensers), without explicitly assessing inertia requirements as part of system strength RIT-Ts; and
- Including transitional arrangements to enable the fast-tracking of inertia requirements so they may be considered in current system strength RIT-Ts where possible. For example, mainland NEM inertia-floor requirements could be published early in draft form, TNSPs could be allowed to consider draft requirement as final for the purposes of ongoing system strength RIT-Ts, and TNSPs could incorporate inertia requirements directly into the Project Assessment Conclusions Report (**PACR**) stage (if time allows).

We believe this would be in the long-term interests of consumers given that all solutions assessed by Transgrid in our system strength RIT-T will also provide some level of inertia. We believe that non-network solutions are likely to be common for inertia and system strength, and therefore additional inertia-specific non-network solutions are unlikely to be identified through additional market engagement and expression of interest (**EOI**) processes.

The Draft Rule¹ proposes that an Inertia Service Provider's failure to meet the relevant allocations, thresholds and standards will attract a Tier 1 civil penalty. We would encourage the AEMC to reassess this proposal as this level of penalty does not align with those that apply to the current and proposed system strength obligations. Furthermore, the level of penalty is not consistent with a "reasonable endeavours" obligation.

Synthetic inertia

The AEMC proposes that TNSPs can procure synthetic inertia to meet minimum threshold levels, subject to AEMO's approval. AEMO would be required to consult on and publish a detailed specification of synthetic inertia providers.

Transgrid recognises the valuable potential that synthetic inertia could play, though the industry is relatively immature with regards to demonstrated synthetic inertia solutions. Transgrid suggests that synthetic inertia should only be considered to meet minimum threshold levels once AEMO publishes specifications, and providers are able to demonstrate compliance to these specifications.

2. Transitional NMAS framework

The AEMC has proposed the introduce of a new non-market ancillary services (**NMAS**) framework for transitional services (the 'transitional services framework'). This would allow AEMO to procure services, in the form of unit configurations, in order to provide system security throughout the transition which are not captured in existing planning frameworks (e.g., inertia, system strength and Network Support and Control Ancillary Services (**NSCAS**)).

Transgrid is supportive of this proposal as the system is undergoing a major transition at a scale and pace not experienced previously, which requires an appropriately flexible framework that can keep the system secure. Given the energy system is rapidly changing, and we will continue to experience power system challenges that are not yet fully understood (or known yet), we support providing the flexibility for AEMO to decide and declare the need for transitional NMAS services. Ongoing collaboration between AEMO and TNSPs will be essential.

However, we also acknowledge that there may be a risk that a new transitional NMAS framework could duplicate or distort roles and responsibilities for the procurement of system security services between TNSPs and AEMO, particularly where the assets that provide transitional services will also provide inertia, system strength and NSCAS. Transgrid therefore recommends that AEMO should demonstrate when services are enacted under the new NMAS framework, that the specified transitional needs cannot otherwise be met via the inertia, system strength or NSCAS frameworks (although assets already providing inertia, system strength and voltage support should be eligible if they are capable of providing additional services).

¹ See: <https://www.aemc.gov.au/sites/default/files/2022-09/OSM%20Draft%20determination.pdf>

3. Empowering AEMO to enable security services

Enablement

Transgrid supports the AEMC's recommendation that AEMO should be the party that enables system security services in the operational timeframe. This will include:

- Operational forecasting to identify when there is likely to be a gap present between system requirements and the level of system security provided by generators expected to be dispatched in the energy and ancillary services markets.
- Selecting and scheduling the lowest-cost mix of system security services to fill these gaps; and
- Sending dispatch instructions to service providers to operate (or stop operating) as required.

In principle we support AEMC's position that "AEMO would only enable contracts where there is a gap between the security outcomes of projected dispatch and the required levels for each security need." However, there is significant potential for unintended wholesale market interactions as market participants adjust to a new market and operational paradigm. For example, thermal generators withdrawing capacity from the wholesale market during predictable periods of negative prices (e.g. spring and autumn), which would in turn require them to be enabled for system security purposes. We encourage AEMC to consider if other protections could be strengthened to reduce this likelihood.

Settlement of enablement

It is implicit in the drafting of the directions paper that there are split responsibilities for contracting, enabling and paying for system security services between different parties. Our understanding is that TNSPs (or System Strength Service Providers) will be responsible for entering into contracts with system security service providers, AEMO would be responsible for activating contracts in the operational timeframe (i.e. enablement), and TNSPs (or SSSPs) will incur the enablement costs (paying for the service).

Transgrid recommends that the AEMC explicitly clarify these roles and responsibilities, noting that different choices are likely to have material implications for the range of solutions that will be possible, the costs incurred by consumers for these solutions, and the market and/or regulatory mechanisms that will be needed to make the process workable in practice. For example:

- **Clarifying which party is responsible for making enablement payments.** This will influence the nature and structure of payments that will be formalised in system strength (and other network support) contracts, and the allocation of market and other risks. This is discussed further below.
- **Clarifying the information that must be published (or provided) by AEMO** for each dispatch interval about the providers, quantity and duration of services that are enabled for system security, to allow the efficient settlement of enablement payments by TNSPs (if required).
- **Providing clarity and certainty of cost recovery for TNSPs contracting with non-network solutions.** Under the existing regulatory framework, passthrough applications for non-network solutions are not assessed until after commitments have been made in contracts and costs have already been incurred, and, where solutions span several revenue periods, approval may be subsequently revisited in future revenue determination processes. This uncertainty creates an unmanageable risk of stranded costs for TNSPs, and commensurate risks for service providers (counterparties), such as provisions for early contract termination if regulatory approval is not received, which is likely to increase the costs of service provision. These impacts are likely to be more pronounced for system strength services, given

the large (and network-wide) nature of the network need, and inherent uncertainty of forecasting the future dispatch of services. TNSPs require certainty that the full range of costs incurred in planning, contracting, managing and operating contracts will be recoverable.

Capacity to manage potentially volatile enablement payments

TNSPs (as System Strength Service Providers) do not currently have the capability to manage unpredictable cashflows that are likely to arise from:

- Enablement payments where the frequency and duration of operational enablement of services significantly exceeds forecasts; and
- Dynamic pricing and payment structures, such as the example provided in the directions paper where system strength settlement could involve the netting-off of wholesale market revenues (table 5.2 and table 5.3). While we note that the AEMC has stated that the given example should not be seen as prescriptive², we encourage greater clarification of expectations on this issue.

Accommodating these kinds of dynamic payments (and exposure to wholesale market outcomes, including the possibility for negative market prices) may be possible for AEMO, given their existing capability to manage settlements for the highly volatile wholesale energy market, but are unworkable for regulated TNSPs.

TNSPs require predictable cash flows to maintain credit ratings and receive revenues according to Transmission Use of System (**TUoS**) prices that are fixed annually in advance. We do not hold large liquidity buffers that would be required to manage large cashflow variations, and our customers and stakeholders expect that network charges will be as stable and predictable as possible. If TNSPs are to be responsible for making enablement payments, new mechanisms are likely to be needed to manage and compensate for this new risk exposure. Even so, Transgrid is highly unlikely to elect to enter into wholesale spot price-exposed contracts (if not explicitly directed to do so) given the significant cashflow risks involved.

System security services are likely to interact with the wholesale energy market for a number of reasons:

- Synchronous generators with minimum generation levels may be required to run during periods of negative spot prices (and forcing generators to run out of merit order may in fact cause negative spot prices). This will become increasingly common as the penetration of renewables increases.
- Non-network synchronous condensers, which consume energy, may be required to run at times of high or extreme wholesale prices.
- Grid forming batteries may need to reserve headroom (both in charging and discharging) to provide inertia and/or stable voltage waveform support. This means that the fees battery proponents would be expected to recover would be tied to the opportunity cost of not charging (at low/negative prices) or not discharging (at high prices), and forgone Frequency Control Ancillary Services (**FCAS**) revenues.

Transgrid considers that market participants and service providers are better placed to manage these market exposure risks than regulated TNSPs. We note that allocating these risks accordingly in service contracts may impact the costs/prices of services payable by TNSPs (to be either higher or lower), but that the more efficient allocation of risks overall would be in the long-term best interests of consumers.

² See P83 of the AEMC's Improving security frameworks for the energy transition second directions paper.

We recommend that AEMO, through their settlement function, would be better placed to manage enablement payments than TNSPs.

Aligning system strength revenues principles and system strength payment principles

The AEMC has noted that financial risk can be mitigated by TNSPs' ability to recover any extra costs through TUoS entitlement adjustments. We agree that these costs can be recovered by TUoS, however there is approximately a two-year lag to correct under/over recoveries.

The inherent uncertainty in accurately forecasting non-network contract enablement costs will drive significant cashflow risks for Transgrid. This is primarily driven by:

- The potential for system security payments to involve a 'netting off' of wholesale spot prices (which may include exposure to negative wholesale prices at times of high renewable penetration when system security gaps are most likely to emerge), and the inherent difficulty in forecasting wholesale spot prices.
- The uncertainty around the frequency of enablement of non-network contracts in the operational timeframe.

This is further exacerbated by the potential for market participants to change generation availability and bidding patterns in response to this market change, which may create unpredictable variability in both the need for, and price of system security services.

There is a difference in how system strength revenue is treated and how system strength payments are recovered.

Currently, system strength payments are to be treated equivalently to a network support allowance in a Revenue Determination. In this way, differences between the actual (i.e., ex-post) and expected (i.e., ex-ante forecast) system strength payments are network support pass through applications under the National Electricity Rules (NER)³. This means the positive/negative difference in system strength payments is recovered from/returned to customers through prescribed transmission charges in approximately 2 years' time via an adjustment to the Maximum Allowed Revenue with adjustments to account for the time value of money.

We encourage the AEMC to introduce a symmetric true-up mechanism for system strength payments. This would have the effect of allowing the adjustment mechanism in the Rules (6A.23.3A) to true up for both system strength revenues and payments to allow for more timely recovery.

Static cost of enablement and consideration of ancillary services prices

The directions paper implies that AEMO would consider the cost of enabling contracts as static, and that enablement would not be based on forecast energy or ancillary service prices. We note that the draft rule does not explicitly require the cost of enabling contracts to be static.

If enablement payments are required to be wholesale spot price-linked, we believe that enablement decisions should consider forecast energy and ancillary service prices. In this case, the costs of contracts would not be static. We also note that additional complexity may be desired by some non-network option proponents, for example some gas generators may want to link their prices to wholesale gas prices.

³ NER clause 6A.7.2.

Enablement principles (also include 12-hour window)

The AEMC states that AEMO should aim to achieve system security at least-cost for consumers, but it should also have some flexibility in how it makes and communicates enablement decisions. We agree with the AEMC that AEMO should aim to achieve system security at least-cost for consumers.

We note that the overarching reason for moving away from the original OSM was that it was “too costly and complex to implement” and that the “commission considers that a focus on simplicity and flexibility, rather than complex mechanisms for operational procurement, could result in greater benefits and less costs for consumers”.

We believe that the enablement principles and enablement levels (specifically, projecting IBR based on pre-dispatch bids, forecasts of projected Inverter Based Resource, ST PASA, effect of network constraints and operational demand) will require an extremely sophisticated and complex scheduling engine, akin to the original OSM.

We also question whether this expectation is beyond current industry understanding. We don't believe Transgrid nor the industry has undertaken sufficient analysis (and has sufficient real-world experience) to establish how the requirements for stable voltage waveform change in real time as a function of varying levels of IBR generation. For example, our current industry understanding is that the requirements for system strength is dependent on whether IBR's inverters are online or not. Initial studies suggest that some variable levels of system strength may be required depending on generation output, however this hasn't been clearly established.

We suggest that AEMC should give AEMO the flexibility to make further simplification to enablement principles, as appropriate, at least for the initial few years following 2 December 2025.

We note that the AEMC is proposing that AEMO is restricted from enabling contracts more than 12 hours ahead of time. Having the 12-hour exclusion window will eliminate certain generators. We note, some generators, including coal generators and biomass, may require more than 12 hours to perform cold (or warm) starts. Therefore, this requirement would effectively rule out these generators from being enabled if they were not already generating power. We would encourage the AEMC to provide greater clarity on this and whether this principle is intended to preclude services that, once started up, have a minimum run time exceeding 12 hours.

Timing of enablement guidelines

The AEMC has proposed that AEMO enablement guideline that would outline how AEMO forecasts system security requirements, how it makes and communicates enablement decisions, and the timing of its enablement decisions. This would need to be published by 2 December 2025.

We support an enablement guideline that outlines key roles and responsibilities as that would provide clarity and certainty ahead of time for both TNSPs and security service providers.

However, we believe the suggested timing of the guideline is problematic as TNSPs are currently undertaking RIT-Ts and are in the early stages of preparing and negotiating non-network option contracts. In our view, a workable arrangement needs to be finalised by the start of 2024 so that TNSPs can negotiate contracts that contain enablement requirements (and associated payment terms) during 2024 and 2025. This will require TNSPs and AEMO to start collaborating as soon as possible to ensure this arrangement is in place at the start of 2024.

We suggest these principles be included in the final determination, or more preferably in a standalone document published in draft by AEMO in late-2023, whilst the final rule on this initiative is finalised.

If this is not feasible, we would encourage the AEMC to include transitional arrangements, that go beyond December 2025, in which TNSPs' proposed contracts are deemed to be consistent with enablement procedures (to be developed by AEMO).

We look forward to working collaboratively with AEMO to urgently progress enablement requirements.

4. Improving directions transparency and compensation

The AEMC is proposing to clarify and streamline enablement arrangements to improve security, efficiency and transparency by placing certain responsibilities on AEMO including publishing guidelines and enablement outcomes.

We strongly support the ability of AEMO to make directions as a necessary backstop for the preservation of system security and reliability. We also support an appropriately priced directions framework to ensure incentives are in place for generators to be available for direction with suitable cost recovery mechanisms, to ensure there are no unintended outcomes. This would include fair compensation for services delivered.

<ENDS>