ABN 70 250 995 390
180 Thomas Street, Sydney
PO Box A1000 Sydney South
NSW 1235 Australia
T (02) 9284 3000
F (02) 9284 3456

Friday, 11 July 2025

Violette Mouchaileh
Executive General Manager Policy & Corporate Affairs
Australian Energy Market Operator

Dear Violette,

AEMO's Automation of Negative Residue Management Consultation

Transgrid welcomes the opportunity to provide feedback on the Australian Energy Market Operator's (**AEMO**) Automation of Negative Residue Management for the implementation of transmission loops consultation paper. The consultation is the first stage of the standard rules consultation process conducted by AEMO to amend the Automation of Negative Residue Management (**NRM**) document to include a process that is appropriate for transmission loops (proposal) in preparation for the inclusion of the Project EnergyConnect (**PEC**) interconnector in AEMO's dispatch processes.

Transgrid understands that AEMO is consulting on:

- The treatment of transmission loops, as arises from the implementation of the PEC interconnector.
- 'Cycling' issue in the existing clamping process.
- Other possible enhancements or changes to the existing NRM process and design.

PEC Stage 1 has been implemented in AEMO's NEM Dispatch Engine (**NEMDE**) using a 'micro-slice' configuration, which treats it as a radial interconnector. We understand that these arrangements will be retained until the 'PEC operational date' when AEMO cuts over from the 'micro-slice' model to the 'interconnector dispatch integration model' which will introduce the loop configuration in NEMDE. We expect that PEC Stage 2 will be energised in late 2026 but will then undergo an extended period of inter-network testing (up to 12 months) to progressively release its full capacity to market.

Transmission loops in the NEM

AEMO's consultation is related to, and dependent upon, the outcomes of the AEMC open rule change process on *Inter-regional settlements residue arrangements for transmission loops*. This rule change will determine how negative inter-regional settlement residues (**IRSR**) that arise on the transmission loop are to be allocated – when the loop has net positive residues and net-negative residues overall.

Transgrid welcomes the publication of the AEMC directions paper in June 2025 and supports the proposal for a 'netting off' approach for positive and negative IRSR that will arise on the transmission loop when the loop has net positive residues. We note that AEMC propose that net-negative residues should be allocated to Coordinating Network Service Providers (**CNSP**) in NSW, SA and Vic in proportion to regional demand. Net-negative residues have the potential to be large and unpredictable (although much less so than *gross* negative IRSR) and under these arrangements, NSW would be allocated approximately 55% of total costs.

We welcome AEMO's timely consultation on the automation of NRM and note that outcomes of this consultation will need to be reviewed for alignment following the AEMC's Final Determination expected in September 2025. For example, the introduction of logic to permit the accumulation of negative IRSR on directional interconnectors between NSW, SA and Vic, and the requirement for new information publication, will need to be consistent with any 'netting off' methodologies introduced. It may make sense to adjust AEMO consultation timeframes so that respondents can develop submissions to the Draft Report with regard to the AEMC Final Determination.

Transgrid supports AEMO applying NRM when loop-aggregate residues are negative. We consider that clamping will be very important in mitigating net negative IRSR exposures for CNSP (and consumers who bear costs in TUOS charges), and particularly the risk of extreme net negatives. Our feedback on the details of AEMO's proposals is:

- We consider that NRM processes and the cumulative negative residue threshold of -$100,000 per event should have regard to total net-negative IRSR accumulating on the loop, rather than on each individual directional interconnector within the loop (given the various 'arms' of the loop are related). The proposed process update may give rise to situations where multiple interconnectors accrue negative IRSR concurrently with aggregate totals exceeding the -$100,000 threshold.
- We understand that AEMO is proposing that transmission loop arrangements for negative IRSR will occur only when the loop is physically operating. If there is a complete outage of one or more of the alternating current (**AC**) interconnectors, then arrangements will revert to those applicable to linear interconnectors for those AC interconnectors that remain in service. It is unclear how arrangements will be managed if one of the AC interconnectors experiences an outage while the Loop NRM Flag is activated.
- We consider that interconnector clamping should begin when accumulated negative residues on the transmission loop are approaching (but have not yet reached) the -$100,000 threshold. This provides some 'headroom' for the continued (but slower) accumulation of negative IRSR as stepped constraint equations are applied, or during NRM periods (depending on which solutions are selected to reduce cycling, such as modification to minimum flow limits which would allow for the ongoing accumulation of small negative residues throughout NRM). The target should be for negative IRSR to not exceed the -$100,000 threshold per event.
- We consider that exit from a management period should not occur until it is clear that the underlying cause of net-negative loop residues has been resolved (see discussion on cycling below). In the examples provided in the consultation paper, the underlying 'event' could be a binding transmission constraint in an adjacent region. This may require dynamic periods to be considered, because at times, issues will persist for shorter or longer (or intermittently) than the end of a half-hour period following the cessation of negative residues on a directional interconnector within the loop. Exit from a management period must also have regard to any accumulation of negative residues on other arms of the transmission loop.
- It would make sense to align measurement periods and IRSR calculations with 5-minute settlement periods.
- The proposed NRM constraint step sizes for PEC appear to be a simple average of values used on other interconnectors, which may be workable, but it is unclear that this is the optimal approach. We suggest AEMO could also consider step sizes based on the capacity of the interconnector.

‘Cycling’ issues within the NRM process

Transgrid agrees that there is currently a problem with multiple NRM periods occurring, separated by short time intervals (‘cycling’). Each period is treated as a separate event, and this causes the buildup of negative residues to multiples of the -$100,000 threshold. We welcome AEMO’s acknowledgement that this is a challenge for CNSP (which are allocated negative IRSR), and ultimately consumers who bear these costs in TUOS charges. We appreciate the proactive approach being taken to address the issue. We consider that negative IRSR should be minimised as much as possible. Analysis presented in the consultation paper suggests that significant reductions in negative IRSR accrual can be achieved by addressing cycling issues, given the high proportion of NRM activations that are multiples (with recurrent negative residues experienced almost immediately in most cases).

AEMO has proposed two potential solutions to address cycling: changing minimum flow limits on directional interconnectors to a small non-zero value, and the introduction of a graduated release stage before exiting an NRM period. These modifications may be helpful to test whether negative residues are likely to immediately recommence and enable deferment of exit from NRM periods. Transgrid supports the fast implementation of simple solutions that will immediately reduce the volume of negative IRSR that will accrue on directional interconnectors. This should occur as soon as possible. However, we consider that other complimentary measures will also be required, and that more efficient longer-term solutions should be developed and implemented. For example:

- Clamping should immediately reoccur if negative residues recommence within a defined time period following the exit of an NRM period (e.g. 12 hours). This should be considered part of the same underlying ‘event’ and another -$100,000 of negative IRSR should not be allowed to accumulate before intervention.
- We recommend that parallel dispatch modelling be undertaken during NRM periods to assess counterfactual market outcomes if clamping had been removed, to demonstrate whether underlying conditions have alleviated the root cause of negative IRSR. We consider that this is the most logical solution to the identified issues and would prevent loop-level cycling which is likely to occur with the minimum flow limit approach.
- Further consultation and analysis may identify other potential solutions.

Our specific feedback on proposed solutions for cycling are as follows:

- **Changing minimum flow limits on directional interconnectors to a small non-zero value:** It is unclear that minimum flows should be set at 20 MW, it is possible that a 1 MW limit could achieve the same outcome. It is possible that low-level accumulation of negative residues could occur over an extended time period, which could materially exceed the -$100,000 threshold per event, and sum to millions of dollars over a year. We recommend AEMO quantify the accumulation of negative residues experienced during NRM periods simulated in pre-production testing, and loop-level cycling frequency, and consult with stakeholders on the results.
- **Graduated release stage before existing an NRM period:** Transgrid supports solutions that would reduce loop-level cycling, but it is not clear that this solution would be more efficient than other options such as parallel dispatch modelling.

- **Review:** Transgrid considers that the implementation of any solution should be reviewed for effectiveness and unintended consequences once it has been operational for six months (and also following the introduction of the PEC transmission loop).

Other enhancements

Transgrid's feedback on the other matters raised in the consultation paper are as follows:

- **IRSR calculations for NRM process:** We support aligning NRM calculations with 5 minute settlement periods but agree testing will be required to ensure effective implementation and no unintended consequences.
- **Use of predispatch estimates in NRM process:** Transgrid considers that predispatch estimates could be subject to a trial removal if other changes have been implemented and cycling outcomes have been successfully arrested. We note that even if predispatch estimates are often unreliable, their removal altogether from the NRM process may increase the occurrence of cycling and accumulation of negative residues.
- **NRM constraining pro-price flows:** Transgrid would support amending NRM processes such that clamping is immediately removed to allow pro-price flows to occur, particularly during extreme price events as described in the consultation paper. In this case, the underlying market issues leading to negative residues would have clearly ceased. The use of dynamic NRM periods rather than a fixed 30 min period, and monitoring of market conditions would eliminate this issue.
- **Energy-FCAS co-optimisation:** Transgrid recognises energy-FCAS co-optimisation may produce efficiencies. However, we consider that the allocation of positive and negative exposures related to these efficiencies must be aligned and symmetrical – i.e. where negative residues would accumulate to deliver market benefits (e.g. lower FCAS prices) the cost of the associated negative residues should be allocated to relevant market participants who benefit, rather than CNSP (and consumers). We do not consider that it is reasonable for consumers (via CNSP) to be fully exposed to downside risks in negative IRSR while only receiving partial and indirect benefits via the energy market. This principle has been upheld by the AEMC directions paper whereby negative IRSR arising on the PEC transmission loop are to be 'netted off' against positive IRSR while the loop has overall net-positive residues.
- **Treatment of NRM constraints as 'hard' vs 'soft' constraints:** We consider that the allocation of costs and benefits arising from softening NRM constraints must be carefully considered (as described above). Transgrid supports the continued investigation of efficiency opportunities and we consider that rule changes may be needed to ensure they are achieved in a fair and equitable way. This could be considered as part of the AEMC's proposed future review of IRSR arrangements (if it proceeds).

Transgrid supports the continuous improvement of this process until negative residue accumulation becomes non-material, and then to resume if materiality re-emerges. While the value of the benefits to be gained exceeds the costs of investigating improvements, the investigations should continue.

Concluding remarks

Transgrid notes that AEMO is also working concurrently on other matters related to the introduction of the PEC transmission loop and the AEMC rule change, including: arrangements for SRD unit holders who wish to refund purchased units for VIC-NSW and SA-VIC interconnectors due to the impacts of the AEMC rule

change, the timing of any re-auction of these units, and the timing of auctions for SRD units on the NSW-SA interconnector which have not yet commenced.

These issues represent material cash flow risks for Transgrid and other impacted CNSP during the upcoming transitional period. TUOS charges for FY27 will be finalised in March 2026, and any changes occurring after that time will give rise to revenue variances over the course of the year. Cash flow variability is very difficult for CNSP to manage and can negatively impact credit metrics and financeability, and the costs of managing volatility would ultimately need to be recovered from consumers. We estimate that the combined value of Transgrid's settlement residue auction (and related) revenues that are subject to considerable uncertainty could exceed $100m in FY27. Jurisdictional CNSP in Victoria and SA would have equivalent exposures.

We would welcome the opportunity to explore options for transitional measures with AEMO and the AEMC to mitigate volatility and negative consumer bill impacts.

Please do not hesitate to contact us should you require any further clarification or supporting information. For any questions, feel free to reach out to Michael Bradbery, Operations Analysis Manager at Michael.Bradbery@transgrid.com.au. or myself at Fiona.Orton@transgrid.com.au.

Yours faithfully

Fiona Orton
General Manager of Innovation and Energy Transition