AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Level 12
171 Collins Street
Melbourne VIC 3000

Postal address
GPO Box 2008
Melbourne VIC 3001

T 1300 858 724
F 03 9609 8010
E info@aemo.com.au

23 February 2024

Anna Collyer
Chairperson
Australian Energy Market Commission
By online submission

Dear Ms Collyer,

Integration of Project EnergyConnect (PEC) into the National Electricity Market (NEM)

Project EnergyConnect (PEC) is a new 330kV electricity interconnector that is being constructed, which, on completion, will provide approximately 800 MW of transmission capacity between New South Wales and South Australia.

Since November 2022, AEMO has been engaging with stakeholders on the market integration for PEC Stage 1 and 2. The commissioning of PEC Stage 2 presents new challenges for NEM market integration due to the creation of a parallel transmission configuration between three adjacent regions.

This rule change request (Proposal) seeks to address certain market integration issues that would otherwise arise on the commencement of PEC Stage 2, currently expected to be delivered in 2026.

Proposed Changes

Changes in respect of NER 3.6.5 will need to be defined by 1 October 2024 for a PEC indicative commencement date of 1 January 2026. The proposed changes are:

- NER 3.6.5 - provide flexibility around the distribution of negative Inter-regional Settlement Residues (IRSR) by allocating negative settlement residues to the importing TNSPs from the flows on the parallel transmission configuration.

The proposed changes are:

- Required before significant flows become available on PEC (currently indicative of 1 January 2026).
- Pressing because:
  - NER 3.6.5 needs to be defined by 1 October 2024 for AEMO to implement through its NEM Procedures and IT systems prior to PEC commencement of 1 January 2026.
  - Uncertainty surrounding Settlement Residue Auction (SRA) unit value will become more difficult to manage once significant PEC flows commence.

Please contact Kevin Ly, GM Reform Development & Insights at kevin.ly@aemo.com.au in the first instance should you wish to discuss this Proposal.

Yours sincerely,

Violette Mouchaileh
Executive General Manager – Reform Delivery

Attachment: Electricity Rule Change Proposal – Integration of Project EnergyConnect (PEC) into the National Electricity Market (NEM)

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Electricity Rule Change Proposal

Integration of Project EnergyConnect (PEC) into the National Electricity Market (NEM)

February 2024

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New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia

Australian Energy Market Operator Ltd ABN 94 072 010 327

Contents

1. Summary

Investment in low-cost renewable energy, firming resources and essential transmission remains the best strategy to deliver affordable and reliable energy, protected against international market shocks. AEMO supports Australia's complex and rapid energy transformation towards net zero emissions, enabling low-cost firmed renewable energy and essential transmission to provide consumers in the NEM with reliable, secure and affordable power[1].

This includes the construction of Project EnergyConnect[2] (PEC), a new 330kV electricity interconnector between Robertstown, in South Australia, and Wagga Wagga, in New South Wales, with a short 220kV spur from Buronga, in New South Wales, to Red Cliffs in northwest Victoria.

Project EnergyConnect is designed to deliver a range of direct benefits for consumers in South Australia, New South Wales and Victoria including lower power prices and improved energy security.

This rule change request (Proposal) seeks to address certain market integration issues that would otherwise arise on the commencement of PEC Stage 2, currently expected to be delivered in 2026. At completion the project will provide approximately 800 MW of transmission capacity between New South Wales and South Australia.

This Proposal has proposed new definitions to describe the transmission configuration that will be formed with the commissioning of PEC. Previously, AEMO has used the term 'loop' to describe this new configuration, however in drafting this Proposal, AEMO has proposed the following:

(a) A **radial transmission configuration** means a transmission configuration between regions that is not a parallel transmission configuration.

(b) A **parallel transmission configuration** means a transmission configuration where the transfer of electricity between three adjacent regions can occur through regulated interconnectors that directly connect each of those regions to the other two adjacent regions (previously described as 'loop')

The commissioning of PEC Phase 2 presents new challenges for NEM market integration as a result of the creation of a parallel transmission configuration between three adjacent regions.

This new transmission configuration will cause more frequent accrual of negative inter-regional settlement residues (IRSR), with increased costs passed on to consumers via transmission use of system (TUOS) charges under the current frameworks.

The commissioning of PEC will create the first such parallel transmission configuration in the NEM, however AEMO acknowledges it is unlikely to be the last, and therefore a long-term sustainable solution is required to better facilitate the increased accrual of negative IRSR.

Since 2022, AEMO has engaged with wholesale electricity stakeholders, and members of the Settlement Residue Committee on the potential changes required for the market integration of PEC and the management and allocation of negative IRSRs. Factoring in this stakeholder input, AEMO has determined a preferred solution to these new challenges. This Proposal is a key enabling element of AEMO's preferred solution. AEMO considers its solution:

[1] 2022 AEMO Integrated System Plan

[2] Project EnergyConnect website: https://www.projectenergyconnect.com.au/

- is aligned with guiding principles[3]
- is aligned with existing negative residue management and market design
- manages the changing power flow dynamics of the new physical parallel transmission configuration in a future-proof manner
- contributes to the long-term interests of consumers by facilitating the utilisation of new transmission assets and supporting inter-regional trade associated with efficient dispatch of the electricity spot market

AEMO requests the AEMC to make changes to the National Electricity Rules (NER) as detailed in this Proposal, under section 91(1) of the National Electricity Law (NEL). AEMO describes the reasoning for its preferred approach at a high level in this document. For further context and detail on the broader solution into which this Proposal fits, AEMO directs readers to the PEC Market Integration page on its website[4].

1.1. Proposed Changes

Changes in respect of NER 3.6.5 to be defined by 1 October 2024 for PEC Stage 2's indicative commencement date of 1 January 2026. The proposed changes are:

- NER 3.6.5 - provide flexibility around the distribution of negative IRSR by allocating negative settlement residues to the importing TNSPs from the flows on the parallel transmission configuration.

The proposed changes are:

- Required before significant flows become available on PEC (indicatively 1 January 2026).
- Pressing because:
  - NER 3.6.5 needs to be defined by 1 October 2024 for AEMO to implement PEC through its NEM procedures and IT systems prior to PEC commencement of 1 January 2026.
  - Uncertainty surrounding SRA unit value will become more difficult to manage once significant PEC flows commence

[3] AEMO PEC Market Integration Directions Paper November 2023, Guiding Principles Appendix A3 https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/pec-market-integration-paper/directions-paper-for-consultation/pec-market-integration---directions-paper-for-consultation.pdf?la=en

[4] Details of AEMO stakeholder engagement and supporting documentation: https://aemo.com.au/en/consultations/current-and-closed-consultations/project-energy-connect-market-integration-paper

2. Relevant Background

This section sets out the background to the PEC, its impending impact on the NEM, AEMO's implementation responsibilities and the subjects for this rule change proposal.

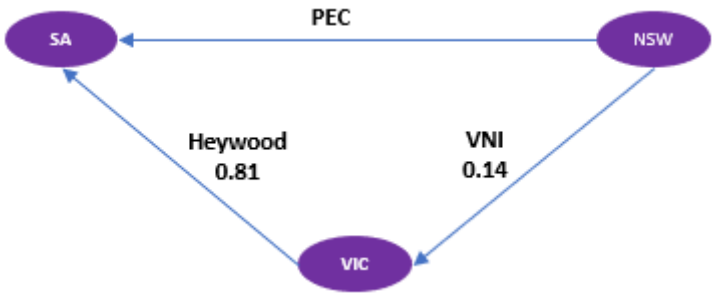
AEMO has established a Project Energy Connect Market Integration Reform project to carry out the required regulatory policy, procedure and system changes that are necessary to efficiently integrate the PEC into the NEM.

The commencement of PEC will combine the transfer limit across Heywood/Murraylink Interconnectors, VNI and PEC interconnectors. This will entail:

- a new major physical transmission connection between South Australia and New South Wales, with an additional interconnection between Buronga (New South Wales) and Red Cliffs (Victoria). The interconnection of these three regions will establish a parallel transmission configuration across these three NEM regions, which has not occurred since the start of the NEM in 1998.
- significant power flows between the regions from early 2026, which, without changes to existing arrangements, would result in significant disruption to the energy market and effective power system outcomes.
- ongoing challenges for managing inter-regional settlements residues and continued operation of the Settlements Residue Auction (SRA).

PEC will be implemented into NEMDE via a 'loop flow constraint' that governs flow between all three regions and models sharing between the AC components of the interconnectors. This 'loop flow constraint' is required to operate an equality constraint, that continuously binds in NEMDE.

Figure 1 Representation of PEC equality constraint



AEMO intends to reflect PEC in the network model for dispatch. This will create a parallel transmission configuration between the regional nodes of South Australia, Victoria and New South Wales.

2.1. Project EnergyConnect overview

PEC is an electricity transmission project to deliver a physical interconnection between South Australia and New South Wales electricity networks, to be constructed jointly by Electranet and Transgrid. At completion the project will provide approximately 800 MW of transmission capacity between New South Wales and South Australia power networks, delivered over two stages:

- **Stage 1** (150 MW bi-directional capacity): The first stage will comprise the connection between Robertstown and Buronga. Progressive capacity release is estimated from mid-2024.

- **Stage 2** (combined transfer limit across Heywood and PEC interconnectors: 1,300 MW import into South Australia and 1350 MW export). The second stage comprises the connection between Buronga and Wagga Wagga. Full capacity release is currently targeted to be released by 1 July 2026.

This proposal is required before significant flows become available on PEC (indicatively 1 January 2026). This requires NER 3.6.5 to be defined by 1 October 2024 for AEMO to implement through its NEM Procedures and IT systems prior to PEC commencement of 1 January 2026.

2.2. Current framework

2.2.1. Inter-regional settlements residue (IRSR)

Inter-regional settlements residue (IRSR) results from price differences between regions associated with power flows between regions across regulated interconnectors:

- Positive when electricity flows from a lower-priced region to a higher-priced region.
- Negative when electricity flows from a higher-priced region to a lower-priced region (counter-price flow).

Under some operating conditions, negative IRSR may occur. Under the NEM's current topology, the main causes of negative IRSR relate to system security constraints and dispatch process issues from out-of-merit generation. For example, a generator in one region may be cheaper than importing from another, and therefore negative IRSR can be part of efficient dispatch. However, counter-priced flows can also result from generator 'mispricing' in the presence of intra-regional constraints. NEMDE is required to dispatch sufficient generation to meet demand at lowest cost within the limits of constraints, with demand and the marginal price set at each regional reference node (RRN). Dispatching lowest cost generation during periods of intra-regional constraints can result in counterpriced flows as not all power dispatched within a region can reach the RRN. The local price at each generator transmission point within the region is different to the calculated regional reference price (RRP). This reflects the cost of the constraint at the transmission point. As the NEM is settled on the RRP but dispatched using local prices, generators are incentivised to bid lower than their unit's marginal cost to try to ensure they are dispatched to receive the higher RRP. The negative residues that arise from counter-priced flows are notionally allocated to the TNSP in the importing region for cost recovery. This results in customers in the importing regions, which is the lower priced region paying for the value of residues occurring. This allocation to customers in importing regions, aligns the costs for negative IRSR with customers who are realising the benefits of the counter-priced flow.

2.2.2. Managing Negative Settlement Residues

Negative settlement residues (NSR) are currently managed in the NEM by AEMO:

- Specifying the management of NSR in its Constraint Formulation Guidelines (NER 3.8.10) (which is now specified in SO_OP_3705 Dispatch Procedure)
- Specifying forecast and actual negative settlement residues through AEMO's Dispatch Procedure (SO_OP_3705)[5]. For actual negative settlement residues exceeding $100,000, AEMO applies a

[5] AEMO's Power system operating procedures are access via https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures

constraint (or “clamping constraint”) that caps the affected interconnector flows until the situation is relieved.

- recovering any negative settlement residues from the relevant TNSP (NER 3.6.5(a)). This is then recovered from consumers as part of TUOS charges.

The principles of allocation, distribution and recovery of the IRSR are set out in clause 3.6.5(a) of the NER and are relevant to interconnectors forming a radial model. AEMO’s process in the allocation and distribution of IRSR is:

- Assign IRSR attributable to a notional interconnector to a directional interconnector representing the direction of flow on the regulated interconnector.
- Aggregate the IRSR for each notional interconnector to;
- Determine the IRSR for the directional interconnector based on the direction of net energy flow between those regions. This applies where there is more than one notional interconnector between the same regions.
- Then notionally allocates all the IRSR calculated for a directional Interconnector to the TNSP responsible for the directional interconnector in the importing region.
- This is then distributed as follows:
  - Full effect given to jurisdictional derogations – Chapter 9 (NER) relating to settlement residues
  - Remaining IRSR distributed in accordance with the Settlement Residue Auction (SRA) - NER 3.18.3
  - Negative IRSR is recovered from the appropriate TNSP in accordance with (NER 3.6.5(a))

The current process for managing negative interregional settlement residues is designed:

- to reflect the current radial model;
- as a limited and abnormal part of dispatch driven primarily by intra-regional constraints;
- to recover amounts from TNSP in importing region as the region benefiting from the power flow;
- to limit the accumulation of Counter-Price Flows which are assumed to be inefficient and to limit the cash flow impact on those affected TNSPs.

The addition of PEC fundamentally changes these design elements.

2.3. Narrative of issue and proposed changes

This proposal relates only to inter-regional settlements residues on the regulated interconnectors; Heywood/Murray Link, VNI and PEC interconnectors. These interconnectors will form a **parallel transmission configuration**, different from the current **radial transmission configuration**. These are proposed to be defined as follows:

- A **radial transmission configuration** means a transmission configuration between *regions* that is not a parallel transmission configuration.
- A **parallel transmission configuration** means a transmission configuration where the transfer of electricity between three adjacent *regions* can occur through *regulated interconnectors* that directly connect each of those *regions* to the other two adjacent *regions*.

Under the options for the treatment of negative settlement residues, AEMO has encountered the following issues:

- PEC commencement of full capacity will result in more frequent accumulation of counter price flows and negative settlement residue (NSR) conditions. Negative settlement residues will become more common and form part of normal dispatch.
  - Without process change, this would result in more application of "clamping constraints". By continuing to constrain the interconnectors, they become underutilised and consumer benefit is lessened.
- If AEMO does not impose "clamping constraints" then from PEC commencement there will be additional recovery of negative settlement residues from TNSPs in importing regions. PEC introduces new interactions between flows across three NEM regional boundaries such that counter-priced flow across one boundary can support flow aligned with prices across another boundary.
  - In this context, the current process of assigning costs to importing TNSPs is not equivalent to assigning costs to beneficiaries of inter-regional power flow. Current process may therefore result in (unfair) significant wealth transfer between consumers in the different NEM regions.

Where negative IRSR is accruing on a single directional interconnector, but settlement is in aggregate surplus around the parallel transmission configuration, that negative IRSR is supporting the accrual and value of the positive IRSR into the other importing regions. Consumers in regions that are importing with positive IRSR accrue a positive cashflow (receive higher payments from the Settlement Residue Auction (SRA), or are credited the positive IRSR for unsold units) while consumers in importing regions with negative IRSR accrue a negative cashflow (debited via TUOS).

In determining its proposed solution, AEMO has considered the following factors:

- Negative IRSR becoming part of normal dispatch, as flow around the parallel transmission configuration will be governed by the physics of power systems in parallel lines;
- Consumers in more than one region being affected by power flow around the parallel transmission configuration;
- Negative IRSR being the result of 'efficient' dispatch, but potentially creating cash flow impacts on TNSPs;
- The inefficiency of applying clamping constraints where the IRSR in the parallel transmission configuration is positive in the aggregate;
- How power may flow through a 'transition' region towards an 'importing' region;
- Only reallocating negative IRSR rather than reallocating all positive IRSR to uphold the value of Settlement Residue Auction (SRA) units, recognising the importance of inter-regional trading in the NEM (refer section 2.3.1).

2.3.1. Implications for the Settlement Residue Auction

As discussed in section 7 of the Directions Paper[6] the implementation of PEC introduces significant variability and uncertainty of inter-regional flows. While the broader benefits of PEC are expected to be material, the firmness of SRA units as per the current design and their effectiveness to hedge inter-

[6] AEMO PEC Market Integration Directions Paper November 2023, https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/pec-market-integration-paper/directions-paper-for-consultation/pec-market-integration---directions-paper-for-consultation.pdf?la=en

regional price risk and promote competition in contracting markets will change by an increasingly meshed network. The relationship between the auction proceeds to the TNSP and unit holders' entitlement of IRSR means that where the value of SRA units as a financial hedge increase, auction proceeds should similarly increase to TNSPs. Increasing volatility in the market and the likelihood of price separation between regions would typically increase the value of IRSR distributions

This Proposal considers that by only reallocating negative IRSR to TNSPs rather than reallocating all positive IRSR to TNSPs, will uphold the value of SRA units. This notes the importance of inter-regional trading in the NEM.

While this Proposal does not propose changes to rule 3.18, AEMO recognises that both rule 3.6.5 and 3.18 make reference to each other. Therefore it is reasonable to conclude that whilst the purchase of SRAs is speculative, the introduction of PEC and any possible reallocation of negative IRSR and deduction from unit holders represents additional variability for participants bidding in the SRA.

2.3.2. Internal timeline of activities

Current timelines shows that there may be limited time for delivery of the market integration. To avoid delays in implementation and impacts on the commissioning of PEC and the operation of the parallel transmission configuration, this Proposal requests the AEMC prioritise timely consideration of these proposed changes to the National Electricity Rules (NER) under the National Electricity Law (NEL).

2.4. Alignment to current design principles and regulatory framework

This proposal has considered the following design principles and alignment with previous AEMC regulatory decisions for the recovery of negative IRSR from TNSPs in importing regions and the design of the Settlement Residue Auction (SRA). Detailed discussion of regulatory precedent is included in AEMO's Market Integration Directions Paper Section 2.4[7].

As such, AEMO has reflected the following principles in the preparation of this proposal:

- To preserve TNSP cashflow as far as practical
- Maintain, as currently managed, appropriate recovery of negative IRSR to importing consumers in the lower priced region
- Have regard to interests of electricity consumers, including in respect to electricity prices
- Continue the operation of SRA and protect the value of SRA units by keeping the positive and negative settlement residues separate in regards to inter-regional hedging

2.5. How the proposed changes best solve the problem

The proposed changes seek to reasonably reflect the changing dynamics of power flows within a meshed system and align the cost of negative IRSR with regions that receive increased positive IRSR from the occurrence of negative residues around the parallel transmission configuration.

The implementation of PEC and the resulting parallel transmission configuration between regions, creates an inextricable link between each directional interconnector around the parallel transmission

[7] AEMO, PEC Market Integration Directions Paper for Consulation, page 14 - https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/pec-market-integration-paper/directions-paper-for-consultation/pec-market-integration---directions-paper-for-consultation.pdf?la=en

configuration. Settlement outcomes, both positive and negative, are a product of each directional interconnectors' power flow. Where negative IRSR is occurring around the parallel transmission configuration but aggregate IRSR is in surplus, the proposed rule change seeks to reallocate the negative IRSR to directional interconnectors who are receiving positive residues during that trading interval. This approach reflects the role counter-priced flows are having in allowing the interconnectors to achieve those flows. It also acknowledges that in this scenario, the aggregate parallel transmission configuration flows have enough money to pay for negative IRSR on a subset of lines.

The proposed changes are limited to the reallocation of negative IRSR where aggregate parallel transmission configuration IRSR is in surplus. This proposal is relatively simple and limits its changes to NER 3.6.5 (a) specific to the PEC parallel transmission configuration (as defined above). While the proposed changes retain the current principle of directly recovering negative IRSR from consumers in importing regions, the reallocations spreads the costs of negative IRSR to customers in regions around the parallel transmission configuration. This approach spreads the impact of expected increases in negative IRSR resulting from the creation of the parallel transmission configuration while allowing AEMO to alter 'clamping' procedures to not apply when aggregate parallel transmission configuration IRSR is in surplus. The decreased application of clamping negative IRSR allows the parallel transmission configuration to maximise market outcomes and limit the extent to which intervention by clamping is required.[8]

Further, the proposed changes priortise retaining the value of Settlement Residue Auction (SRA) trading units as reallocated negative IRSR is not deducted from positive IRSR distributed to SRA unit holders under NER 3.18. By design, negative IRSR that is reallocated should generally be offset by increases in proceeds from the SRA with traders willing to pay more for units (because there is no deduction from reallocated negative IRSR).

[8] Clamping would only be required where aggregate parallel transmission configuration IRSR is in deficit i.e., the positive residues accumulated around the parallel transmission configuration are insufficient to cover the negative residues.

3. Rule Change Proposal

3.1. Issues to resolve in applying principles

As stated above, the current process for managing negative interregional settlement residues is designed:

- to reflect the current radial model;
- as a limited and abnormal part of dispatch driven primarily by intra-regional constraints;
- to recover amounts from TNSPs in importing regions as they benefit from the power flow; and
- to limit the accumulation of counter-price flows which are assumed to be inefficient and to limit the cash flow impact on those affected TNSPs.

The addition of PEC fundamentally changes these design elements. The incidence of negative residues will be governed by the physics of the parallel transmission configuration with the coefficiencts of the parallel transmission configuration constraint governing the targets for interconnectors limits and the sharing of flow around the parallel transmission configuration. As power will naturally balance around the parallel transmission configuration to maintain this relationship, it can reasonably be expected that the occurrence of negative IRSR will increase[9].

The current design of negative residue management (NRM) via constraint automation is not operationally efficient if negative IRSR occurs normally and frequently impacts interconnectors in adjacent regions. In order to maxmise the value of PEC and increased power flows around the three regions, clamping should seek to be minimised where negative IRSR occurs as an expected outcome of loop topology. While removing NRM where negative IRSR optimises dispatch around the parallel transmission configuration, the increased negative IRSR would result in significant increase of negative IRSR distributed to TNSPs in importing regions under the current framework.

The current allocation of negative IRSR to a single directional interconnector does not align with the meshed nature of loop topology nor consider the value of the positive IRSR around the loop that is enabled by the increase in negative IRSR from counter-priced flow.

3.2. NER 3.6.5(a) – explicitly allow allocation of negative IRSR to importing TNSPs around the parallel transmission configuration

Background

The current NER[10] provides for IRSR to be allocated to regulated interconnectors, and distributed to or recovered from the appropriate TNSP in the importing region.

For each direction of flow for each notional interconnector the IRSR is the difference in value between the energy entering the interconnector in the exporting region and the value of the energy leaving the interconnector in the importing region, as determined at the regional reference nodes.

[9] ACIL Allen, Modelling the settlement effects of PEC, accessed via https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/pec-market-integration-paper/directions-paper-for-consultation/modelling-the-settlement-effects-of-pec---final-report.pdf?la=en

[10] NER 3.6.5(a)

While NER 3.6.5(a) provides that settlements residue will be allocated and distributed or recovered by AEMO in accordance with principles including that "*the portion of the settlements residue attributable to regulated interconnectors…will be distributed or recovered in accordance with rule 3.18*"[11], in fact only positive settlements residue is distributed under NER 3.18; negative settlements residue is to be recovered by AEMO from the appropriate TNSP in the importing region[12].

As PEC introduces the possibility that negative residues would arise on certain directional interconnectors in the ordinary course of dispatch, the recovery of the cost of negative IRSR should reflect efficient dispatch in the parallel transmission configuration. Where aggregate IRSR in the parallel transmission configuration is positive, AEMO needs the flexibility to allocate negative IRSR to the regions where an opposing cashflow can pay for them, rather than only allocating them to the importing TNSP.

AEMO requires the flexibility in the rules to change this allocation method to better identify the benefiting region.

AEMO is aware that a significant increase in negative residues is likely to create financial and cash flow issues for TNSPs as regulated entities and while this proposal aims to preserve cash flow implications, TNSPs may be unlikely to be able to manage or mitigate these risks sufficiently.

AEMO has recognised that by only allocating negative IRSR to TNSPs rather than reallocating all positive IRSR to TNSPs will uphold the value of Settlement Residue Auction (SRA) units, noting the importance of inter-regional trading in the NEM.

Issue

The current rules allow for the negative IRSR to be recovered from the appropriate TNSP of the importing region in a radial transmission configuration, but are silent on the allocation of negative IRSR for a parallel transmission configuration.

AEMO's view is that:

- Negative IRSR under a parallel transmission configuration model is required to be allocated to the approriate TNSP, who have positive settlement residues driven in part by the occurrence of negative settlement residues in adjacent regions
- AEMO can facilitate the allocation of negative residues for interconnectors to the appropriate TNSPs in a parallel transmission configuration model
- Specifically, in the case of inter-regional settlements residue:
  - There will be a greater amount of negative settlement accruing on the interconnectors *per trading interval* as part of normal dispatch mechanisms
  - the settlements residue "attributable" to a regulated directional interconnector needs to consider the direction of flow and the ideal region, with the inter-regional settlements residue calculated in respect of the direction of flow for the corresponding notional interconnector in accordance with AEMO's Methodology for the Allocation and Distribution of Settlements Residue

The current rules:

[11] NER 3.6.5(a)(2)

[12] NER 3.6.5(a)(4)

- Will not allow AEMO to allocate negative settlement residues to an other importing TNSP with positive residues between the PEC, Heywood/Murray Link Interconnector or VNI interconnectors

Change

The change to NER 3.6.5 wiill explicitly allow flexibility in the allocation of negative residues to importing Transmission Network Service Providers around the parallel interconnectors forming loop flows.

Change Benefits

The changes will:

- Reduce the amount of dispatch clamping that will be required on the interconnectors as part of the normal occurence of negative settlement residues from the commencement of PEC
- Improve market confidence to allow participants to trade for interregional hedging
- Align to the key NEM power system design principles[13]
- Reduce levels of network congestion and provide a solution to negative settlement residues accruing through flexible allocation to the benefiting TNSPs around the parallel interconnectors
- Align with current design principles and regulatory framework (as set out in this proposal)

Change Costs

The relevant change costs include

- AEMO's settlement systems will need to be updated. AEMO estimates this to take 6-9 months.
- Procedure changes to AEMO's Procedures and guidelines that cover settlement residue allocation methodology. AEMO estimates this to take 6 months.

Contribution to the NEO

The changes will contribute to the long-term interests of consumers through the efficient operation of electricity services with respect to the price of electricity, by providing consumers in all regions around the parallel interconnectors with efficient outcomes.

Description of the proposed rule

AEMO's view is that the rule changes required to give effect to the Proposal can be dealt with by amendments contained fully within clause 3.6.5 of the NER. A summary of the proposed amendments based on version 204 of the NER is set out in the **Table 1 below**, and a draft of the proposed rule amendments (in the form of a mark-up of clause 3.6.5) is set out in **Appendix A**.

[13] NER 4.2.6 outline general principles that guide AEMO's obligations to maintain power system security

Table 1 Proposed Drafting with Commentary

Clause	Proposed Drafting	Commentary
Substantive amendments		
3.6.5(a0)	**parallel transmission configuration** means a transmission configuration where the transfer of electricity between three adjacent *regions* can occur through *regulated interconnectors* that directly connect each of those *regions* to the other two adjacent *regions*. **radial transmission configuration** means a transmission configuration between *regions* that is not a parallel transmission configuration.	Clause 3.6.5(a0) is amended to introduce new defined terms for **parallel transmission configuration** and **radial transmission configuration**. These terms are used to distinguish between the current transmission model in the NEM and the model that will exist between New South Wales, Victoria and South Australia on completion of PEC Phase 2.
3.6.5(a)(4B)	(4B) for the purposes of subparagraphs (3), (4) and (4A)~~, the appropriate Transmission Network Service Provider is~~: (i) in the case of *inter-regional settlements residue* that accrues in a radial transmission configuration, the appropriate *Transmission Network Service Provider* is the *Transmission Network Service Provider* in the importing region; ~~(A) if there is more than one Transmission Network Service Provider in the importing region, the Co-ordinating Network Service Provider; or~~ ~~(B) if there is no Co-ordinating Network Service Provider in the importing region, the Transmission Network Service Provider to which a transmission determination currently applies in that region;~~ (iA) in the case of *inter-regional settlements residue* that accrues in a parallel transmission configuration: (A) if the aggregate *inter-regional settlements residue* arising in the *trading interval* is a negative number, the appropriate *Transmission Network Service Provider* is each *Transmission Network Service Provider* in an importing region; (B) if the aggregate *inter-regional settlements residue* arising in the *trading interval* is a positive number, the appropriate *Transmission Network Service Provider* is each *Transmission Network Service Provider* in an importing region in respect of which positive *inter-regional settlements residue* accrued in the same proportions as the value of the positive *inter-regional settlements residue* that accrued in respect of its importing region bears to the sum of the positive *inter-regional settlements residues* that accrued in all importing regions forming part of the parallel transmission configuration; [Note: This subparagraph (a)(4B)(iA) does not affect the distribution of positive inter-regional settlements residue, which is dealt with under subparagraph (a)(2).]	Clause 3.6.5(a)(4B) is amended to introduce two new subparagraphs that deal with the recovery of negative IRSR in a parallel transmission configuration. The new subparagraphs provide (in summary) that: • In circumstances where the aggregate IRSR across all regulated interconnectors forming part of the parallel transmission configuration is negative, AEMO will recover the negative IRSR that accrues on each regulated interconnector in the trading interval from the relevant TNSP in the importing region. This corresponds with the way in which negative IRSR is currently recovered by AEMO and will continue to be recovered in radial transmission configurations. • In circumstances where the aggregate IRSR across all regulated interconnectors forming part of a parallel transmission configuration is positive, AEMO will recover any negative IRSR that accrues in the trading interval from the TNSP or TNSPs in those regions where positive IRSR accrued. If there is more than one such region, each relevant TNSPs will share responsibility for recovery of the negative IRSR in the same proportion as the value of the positive IRSR that accrues in its own region bears to the total value of positive IRSR accruing in all regions forming part of the parallel transmission configuration. – To illustrate, suppose that, in a trading interval, aggregate IRSR around the loop is positive but SANSW is the single directional interconnector accruing negative residues. The importing TNSPs for SAVIC and VICNSW would be allocated the costs of these negative residues and charged the following amounts, respectively: $Negative\ IRSR(SAVIC) = \left[\frac{IRSR(SAVIC)}{IRSR(SAVIC) + IRSR(VICNSW)}\right] * negative\ IRSR(SANSW)$ $Negative\ IRSR(VICNSW) = \left[\frac{IRSR(VICNSW)}{IRSR(SAVIC) + IRSR(VICNSW)}\right] * negative\ IRSR(SANSW)$

Clause	Proposed Drafting	Commentary
		– Detailed explanation of this approach can be found in example 2, section 6.3 of AEMO's Directions Paper. The allocation and distribution of positive inter-regional settlements residue remains unchanged – this is dealt with in clause 3.6.5(2), which provides for positive IRSR to be dealt with through the settlements residue auction process in accordance with rule 3.18. A clarifying change has been made to clause 3.6.5(a)(2) to indicate that this clause is only dealing with positive IRSR, as only positive IRSR can be managed through rule 3.18. **This change will impact AEMO, TNSPs and distribute negative IRSR to benefiting customers**.
Consequential and clarifying amendments		
3.6.5(a0)	**aggregate *inter-regional settlements residue*** means the sum (which may be a positive or negative number) of the *settlements residue* in a *trading interval* attributable to all *regulated interconnectors* in a parallel transmission configuration.	Clause 3.6.5(a0) is amended to introduce new defined term for **aggregate *inter-regional settlements residue***. This term is used to allow for the different treatment of negative IRSR depending on whether the aggregate IRSR in the trading interval across all interconnectors forming part of the parallel transmission network is positive or negative, as outlined in the amendment to clause 3.6.5(a)(4B) above.
3.6.5(a0)	**importing region** means ~~the~~ a *region* to which electricity is transferred during the relevant *trading interval* from another *region* through *regulated interconnectors*.	The definition of **importing region** in clause 3.6.5(a0) is revised to reflect the fact that there may be more than one importing region in a parallel transmission configuration.
3.6.5(a0)	A reference to the *Transmission Network Service Provider* **in a region** or **in an importing region** means: (1) if there is more than one *Transmission Network Service Provider* in the *region* or importing region, the *Co-ordinating Network Service Provider*; or (2) if there is no *Co-ordinating Network Service Provider* in the *region* or importing region, the *Transmission Network Service Provider* to which a *transmission determination* currently applies in that *region* or importing region.	Clause 3.6.5(a0) is amended to include an interpretative provision to explain which TNSP in a region will be the 'appropriate' TNSP where there is more than one TNSP in the region. This provision replicates language that is already included in clause 3.6.5, but has been moved to clause 3.6.5(a0) as an interpretative provision to simplify the drafting in the body of the clause.
3.6.5(a)(2)	~~the portion of the~~any positive settlements residue attributable to regulated interconnectors (as adjusted to take into account the effect of any applicable jurisdictional derogations referred to in subparagraph (1)) will be distributed ~~or recovered~~ in accordance with rule 3.18;	Clause 3.6.5(2) currently provides that, after giving effect to any applicable jurisdictional derogations contained in Chapter 9, settlements residue attributable to regulated interconnectors is distributed or recovered in accordance with rule 3.18. As noted above, this clause 3.6.5(a)(2) is amended to clarify that it is only dealing with the distribution of positive IRSR, as the settlements residue auction process in rule 3.18 only deals with the distribution of positive IRSR.
3.6.5(a)(4B)(i)	for the purposes of subparagraphs (3), (4) and (4A)~~, the appropriate Transmission Network Service Provider is~~:	Consequential drafting changes are made to clause 3.6.5(a)(4B)(i) to reflect the introduction of the new defined term 'radial transmission configuration' to describe the current transmission model and the new interpretative provision in

Clause	Proposed Drafting	Commentary
	(i) in the case of *inter-regional settlements residue* that accrues in a radial transmission configuration, the appropriate *Transmission Network Service Provider* is the *Transmission Network Service Provider* in the importing region; ~~(A) if there is more than one Transmission Network Service Provider in the importing region, the Co-ordinating Network Service Provider; or~~ ~~(B) if there is no Co-ordinating Network Service Provider in the importing region, the Transmission Network Service Provider to which a transmission determination currently applies in that region;~~	relation to the meaning of 'appropriate Transmission Network Service Provider' described above.
3.5.6(a)(4B)(ii)	in the case of intra-regional settlements residue, the appropriate Transmission Network Service Provider is the Transmission Network Service Provider in the region in which the intra-regional settlements residue accrued;~~:~~ ~~(A) if there is more than one Transmission Network Service Provider in the region, the Co-ordinating Network Service Provider; or~~ ~~(B) if there is no Co-ordinating Network Service Provider in the region, the Transmission Network Service Provider to which a transmission determination currently applies in that region;~~	Consequential drafting changes are also made to clause 3.6.5(a)(4B)(ii) to reflect the introduction of the new interpretative provision in relation to the meaning of 'appropriate Transmission Network Service Provider' described above.

4. Stakeholder engagement

AEMO has engaged with stakeholders on the changes contemplated in this Proposal, and received relevant feedback during 2022-2023. Detailed feedback and response is included in the consultation Final Report[14], along with the decisions for implementation. AEMO considers there was some consensus amongst stakeholders as to the chosen allocation approach for negative IRSR. In response, the priority of stakeholders was the separation of negative from positive residues to preserve the value of the SRA for hedging interregional trade.

Table 1 PEC market integration consultation timeline

Deliverable	Indicative Timeline
AEMO Market Integration Consultation	
Market Integration Paper published	15 November 2022
Stakeholder submissions received	19 January 2023
Update on Market Integration Paper published	18 May 2023
Technical Report – Phase 1 PEC Integration	9 June 2023
AEMO Directions Paper Consultation	
Engagement through Settlement Residue Committee (SRC) meeting	1 September 2023
Directions Paper published	1 November 2023
Engagement through Settlement Residue Committee (SRC) meeting	3 November 2023
Industry briefing	14 November 2023
Project Energy Connection (PEC) Industry Quarterly meeting	23 November 2023
Submissions due on Directions Paper	1 December 2023
Final Report published	9 February 2024

Table 2 PEC broader stakeholder engagement

Stakeholders	AEMO Engagement	Forum type	Timing & occurrence rate	Website Link
Market Participants, Settlement Residue Committee	Project Energy Connect Market Integration Paper	Consultation Paper	11 November 2022 – 10 February 2023	https://www.aemo.com.au/consultations/current-and-closed-consultations/project-energy-connect-market-integration-paper
Market Participants, Settlement Residue Committee	PEC Implementation update on Market Integration	Information Paper and Technical report Phase 1	18 May 2023 – 9 June 2023	https://www.aemo.com.au/consultations/current-and-closed-consultations/project-energy-connect-market-integration-paper
Market Participants, Settlement Residue Committee	Directions Paper for consultation	Consultation Paper	1 November 2023 – 21 December 2023	https://www.aemo.com.au/consultations/current-and-closed-consultations/project-energy-connect-market-integration-paper
Settlement Residue Committee	Regular Cadence	Committee meeting	Quarterly	https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/market-operations/settlements-and-payments/settlements/settlements-

[14] https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/pec-market-integration-paper/february-2024/final-paper-pec-market-integration.pdf?la=en

Stakeholders	AEMO Engagement	Forum type	Timing & occurrence rate	Website Link
				residue-auction/settlement-residue-committee
EWCF	Regular Cadence	Consultative Forum	Monthly	https://www.aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/electricity-wholesale-consultative-forum
Project EnergyConnect System Integration paritcpants	Regular update with Industry Update	Public/Industry wide	Quarterly	https://www.projectenergyconnect.com.au/moreInformation.php

4.1. AEMO Procedure changes

Dispatch Procedure (SO_OP_3705) – Specifies the negative residue management approach, including the operational response from AEMO where the accumulation of counter-price flows is forecast to reach the threshold value of $100,000. The NRM process is maintained in AEMO's Dispatch (SO_OP_3705) operational procedure and is delegated to AEMO in NER 3.8.10(c)(5) requiring AEMO to manage the accrual of negative residues in accordance with constraint formulation guidelines.

Brief of automation of negative residue management – Provides information on the automated constraint processed used in NEMDE to limit further accumulation of settlement residues once the threshold value is reached.

Methodology for the allocation and distribution of settlements residues – Describes the methodology used by AEMO to allocate settlements residue in accordance with NER 3.6.5(a), including allocation to the directional interconnector and recovery of negative IRSR from the TNSP.

NEM Transmission Network Service Provider Negative Settlements Residue Procedure – Sets out information and procedure for the recovery of negative settlement residues under NER 3.6.5(a)(4), including the settlement cycle and payment process.

Appendix A. Proposed NER Drafting

3.6.5 Settlements residue due to network losses and constraints

Definitions

(a0) In this clause 3.6.5:

aggregate *inter-regional settlements residue* means the sum (which may be a positive or negative number) of the *settlements residue* in a *trading interval* attributable to all *regulated interconnectors* in a parallel transmission configuration.

importing region means ~~the~~ a *region* to which electricity is transferred during the relevant *trading interval* from another *region* through *regulated interconnectors*.

parallel transmission configuration means a transmission configuration where the transfer of electricity between three adjacent *regions* can occur through *regulated interconnectors* that directly connect each of those *regions* to the other two adjacent *regions*.

radial transmission configuration means a transmission configuration between *regions* that is not a parallel transmission configuration.

A reference to the *Transmission Network Service Provider* **in a region** or **in an importing region** means:

(1) if there is more than one *Transmission Network Service Provider* in the *region* or importing region, the *Co-ordinating Network Service Provider*; or

(2) if there is no *Co-ordinating Network Service Provider* in the *region* or importing region, the *Transmission Network Service Provider* to which a *transmission determination* currently applies in that *region* or importing region.

(a) *Settlements residue* will be allocated, and distributed or recovered by *AEMO* in accordance with the following principles:

(1) full effect is to be given to the *jurisdictional derogations* contained in Chapter 9 relating to *settlements residue*;

(2) ~~the portion of the~~any positive *settlements residue* attributable to *regulated interconnectors* (as adjusted to take into account the effect of any applicable *jurisdictional derogations* referred to in subparagraph (1)) will be distributed ~~or recovered~~ in accordance with rule 3.18;

(3) the remaining *settlements residue*, including the portion of *settlements residue* due to *intra-regional loss factors*, will be

distributed to or recovered from the appropriate *Transmission Network Service Providers* (which will not include *Market Network Service Providers*);

(3A) **[Deleted]**

(4) if the *settlements residue* arising in respect of a *trading interval*, after taking into account any relevant adjustment in accordance with clauses 5.7.7(aa)(3) or (ab), is a negative amount then, in respect of the *billing period* in which the negative *settlements residue* arises then:

(i) *AEMO* must recover the amount from the appropriate *Transmission Network Service Provider* at a payment time, interval, and by a method, determined by *AEMO* following consultation with *Transmission Network Service Providers*. *AEMO* may determine that the appropriate *Transmission Network Service Provider* is to pay the negative *settlements residue* amount by a date prior to the date for payment of *final statements* under clause 3.15.16;

(ii) the appropriate *Transmission Network Service Provider* must pay the negative *settlements residue* amount in accordance with *AEMO's* determination under subparagraph (4)(i);

(4A) if interest costs are incurred by *AEMO* in relation to any unrecovered negative *settlements residue* amount referred to in subparagraph (4), then, in respect of the *billing period* in which the negative *settlements residue* arises then:

(i) *AEMO* must recover the interest costs from the appropriate *Transmission Network Service Provider* at a payment time, interval, and by a method, determined by *AEMO* following consultation with *Transmission Network Service Providers*. *AEMO* may determine that the appropriate *Transmission Network Service Provider* is to pay the interest cost amount by a date prior to the date for payment of *final statements* under clause 3.15.16; and

(ii) the appropriate *Transmission Network Service Provider* must pay the interest cost amount in accordance with *AEMO's* determination under subparagraph (4A)(i);

(4B) for the purposes of subparagraphs (3), (4) and (4A)~~, the appropriate *Transmission Network Service Provider* is~~:

(i) in the case of *inter-regional settlements residue* that accrues in a radial transmission configuration, the appropriate *Transmission Network Service Provider* is the *Transmission Network Service Provider* in the importing region;

(A) if there is more than one *Transmission Network Service Provider* in the importing region, the *Co-ordinating Network Service Provider*; or

(B) if there is no *Co-ordinating Network Service Provider* in the importing region, the *Transmission Network Service Provider* to which a *transmission determination* currently applies in that *region*;

(iA) in the case of *inter-regional settlements residue* that accrues in a parallel transmission configuration:

(A) if the aggregate *inter-regional settlements residue* arising in the *trading interval* is a negative number, the appropriate *Transmission Network Service Provider* is each *Transmission Network Service Provider* in an importing region;

(B) if the aggregate *inter-regional settlements residue* arising in the *trading interval* is a positive number, the appropriate *Transmission Network Service Provider* is each *Transmission Network Service Provider* in an importing region in respect of which positive *inter-regional settlements residue* accrued in the same proportions as the value of the positive *inter-regional settlements residue* that accrued in respect of its importing region bears to the sum of the positive *inter-regional settlements residues* that accrued in all importing regions forming part of the parallel transmission configuration;

[Note: This subparagraph (a)(4B)(iA) does not affect the distribution of positive *inter-regional settlements residue*, which is dealt with under subparagraph (a)(2).]

(ii) in the case of *intra-regional settlements residue*, the appropriate *Transmission Network Service Provider* is the *Transmission Network Service Provider* in the *region* in which the *intra-regional settlements residue* accrued;:

(A) if there is more than one *Transmission Network Service Provider* in the *region*, the *Co-ordinating Network Service Provider*; or

(B) if there is no *Co-ordinating Network Service Provider* in the *region*, the *Transmission Network Service Provider* to which a *transmission determination* currently applies in that *region*;

(4C) **[Deleted]**

(4D) **[Deleted]**

(5) **[Deleted]**

(6) any portion of *settlements residue* distributed to a *Network Service Provider* or amount paid on that portion under clause 3.15.10A (if any), or rule 3.18 to a *Network Service Provider*, including any such payments as adjusted by a *routine revised statement* or *special revised statement* issued under rule 3.15, net of any portion of *settlements residue* recovered from the *Network Service Provider* in accordance with clause 3.6.5(a)(4), will be used to offset *network service* charges.

(b) A *Transmission Network Service Provider* or its jurisdictional delegate is a *Market Participant* for the purposes of clause 3.3.1 and rule 3.15 (excluding clause 3.15.1(b)) but not otherwise.

(c) In relation to *settlements residue* that accrue on *designated network assets*, the *Primary Transmission Network Service Provider* will calculate the relevant amounts to be distributed to or recovered from the owners of *designated network assets* in accordance with clause 3.6.2B(f).