

Stakeholder information session – Constraints for PEC

Project Energy Connect (PEC) –
Market Integration (PEC-MI)

6 August 2026



1. Welcome

Chris Muffett

We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country; and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO Group is proud to have delivered its first Reconciliation Action Plan in May 2024. 'Journey of unity: AEMO's Reconciliation Path' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation - a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Read our
RAP



Agenda

#	Time (AEST)	Topic	Presenter/s
1	10:30 -10:40 am	Welcome and today’s session	Chris Muffett
2	10:40 - 11:00 am	Timeline for PEC-2 changes	Ben Blake
3	11:00 - 11:15 am	Loop flow constraints	
4	11:15 - 11:25 am	Constraint changes and examples	
5	11:25 – 11:50 am	Q&A	Chris Muffett
6	11:50 – Midday	Important dates and milestones	
	Meeting Close		

General Housekeeping

1. Please mute your microphone.



2. We look forward to your feedback and questions.

- Use the 'Q&A' function to ask any questions or comments throughout the session.
 - We also have the chat function enabled.
 - AEMO SMEs are on the call, who will attempt to respond in the chat.



- Each agenda item will have dedicated Q&A time, during which we will welcome you raising your hand and come on camera for the discussion.

3. We will share the slides with you via email after this meeting.

4. In attending this meeting, you are expected to:

- Contribute constructively.
- Be respectful, both on the call and in the chat.
- Participants are asked to familiarise themselves with AEMO's [Competition Law Meeting Protocol](#) as outlined in Appendix A and at AEMO's website.



5. This meeting will be recorded by AEMO and may be accessed and used by AEMO for the purpose of notetaking.

Scope of today's session

The commissioning of PEC introduces a loop flow between NSW, SA and VIC that requires AEMO to use a new type of constraint equation: loop flow constraints. At this session AEMO will provide an update on the formulation of these new constraints, and overview of changes to other constraints.

In scope

Loop flow constraint equations and their formulation.

Constraint changes more broadly. Examples of changes, concepts to apply, including how they will be managed moving forward. Includes changes to security constraints.

Out of scope

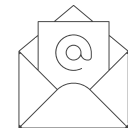
Settlement residue auction and negative settlement residue arrangements.

Digital / project / program delivery.

Network testing and capacity release timing.

Commercially sensitive matters.

Questions outside of today's scope can be directed to:

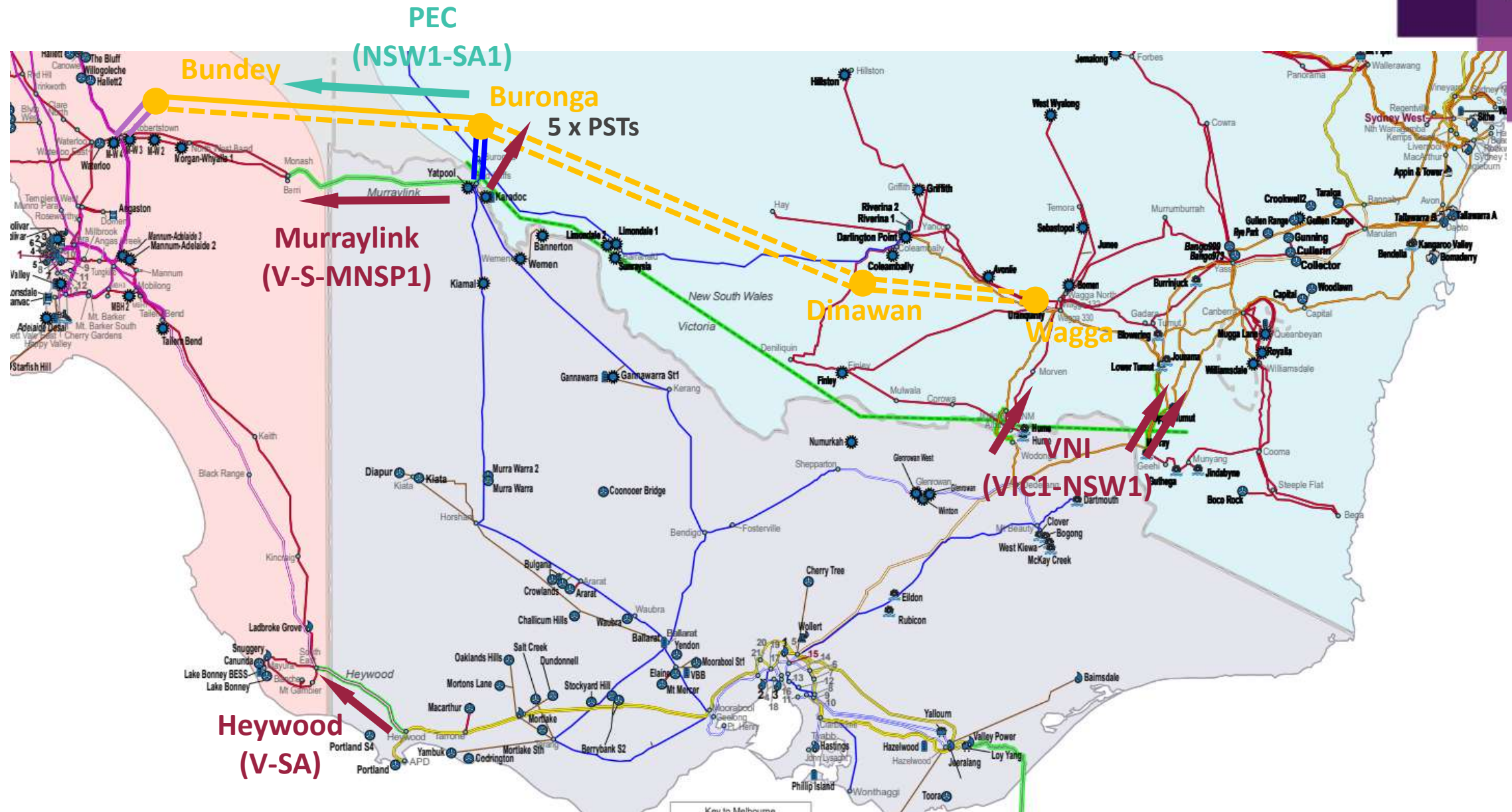


NEMReform@aemo.com.au

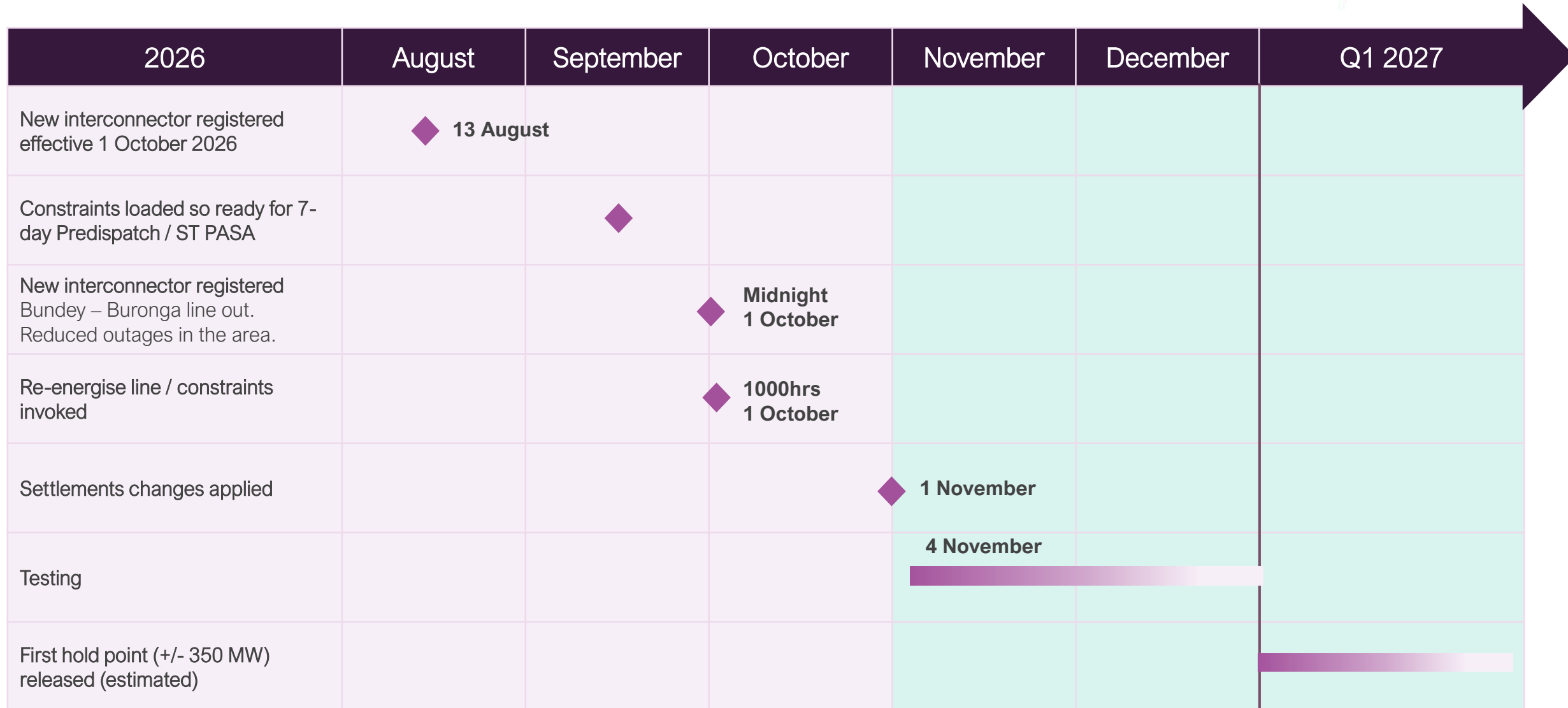
2. Timeline for PEC-2 changes

Ben Blake

PEC Geographic Overview and Interconnectors



Timeline for PEC-2 changes



Transition to new interconnector

Preparation

- No NSW/SA outage bookings during transition
- Change freeze on system normal constraints in NSW, Vic and SA (starts 21 Sep)
- PD/ST PASA cutover confirmation
- EMS / Constraints data load
- Invoke PEC 1 outage constraints
- Switch Line 6F out of service 0700 29th Sep

Go-Live

Midnight

- Pre-dispatch cutover
- Market / Registration changes are effective
- Remove micro slice on Heywood and VNI

1000hrs

- Switch Line 6F into service
- Loop constraints operational

Monitoring

- Review operation
- Outages with PEC-1 and new interconnector
- PEC stage 2 testing



Photo: PEC under construction near Wagga

Timeline for PEC-2 changes

Constraint Sets	21 Sep	29 Sep	30 Sep	1 October	4 November	Details
N-NIL S-NIL V-NIL	Changes loaded			Changes effective		System Normal
N-X_BDBU_BUDW						Outage of 6F and 6C, 6G and 6H
N-X_6C_6G_6H						Outage of 6C, 6G and 6H
NRM_NIL_ALL						Negative Residue Management
L-PEC_X_6C_6G_6H						Loop Flow for PEC-1
L-PEC_NIL						Loop Flow for PEC-2
I-NS_350 I-SN_350						Hold Point of +/- 350 MW

Changes to interconnector limit setters

System changes are being introduced to improve reporting of which constraint sets interconnector limit.

- By design, loop constraints will always be binding, and if not ignored, would always set both the export and import limits. The way the constraints that set the interconnector limits will therefore need to change from the existing design:
 - Loop flow equations (which will start with "L") will not be used in the calculation.
- AEMO are also changing which constraint sets the limit if there are multiple equations – will be based on highest marginal value – [example on 03/03/2026 12:10](#)
 - **N^^N_NIL_X5_BESH** has highest marginal value, then **N^^N_NIL_WGLT** and V^^N_NIL_1

	ID	Import Limit	Import Constraint	Export Limit	Export Constraint ID
Current	V-S-MNSP1	146.09	N^^N_NIL_WGLT	146.09	V^^N_NIL_1
Current	VIC1-NSW1	-592.14	N^^V_NIL_1	906.25	V^^N_NIL_1
Future	V-S-MNSP1	146.09	N^^N_NIL_X5_BESH	146.09	V^^N_NIL_1
Future	VIC1-NSW1	-592.14	N^^V_NIL_1	906.25	N^^N_NIL_WGLT

3. Loop Flow Constraints

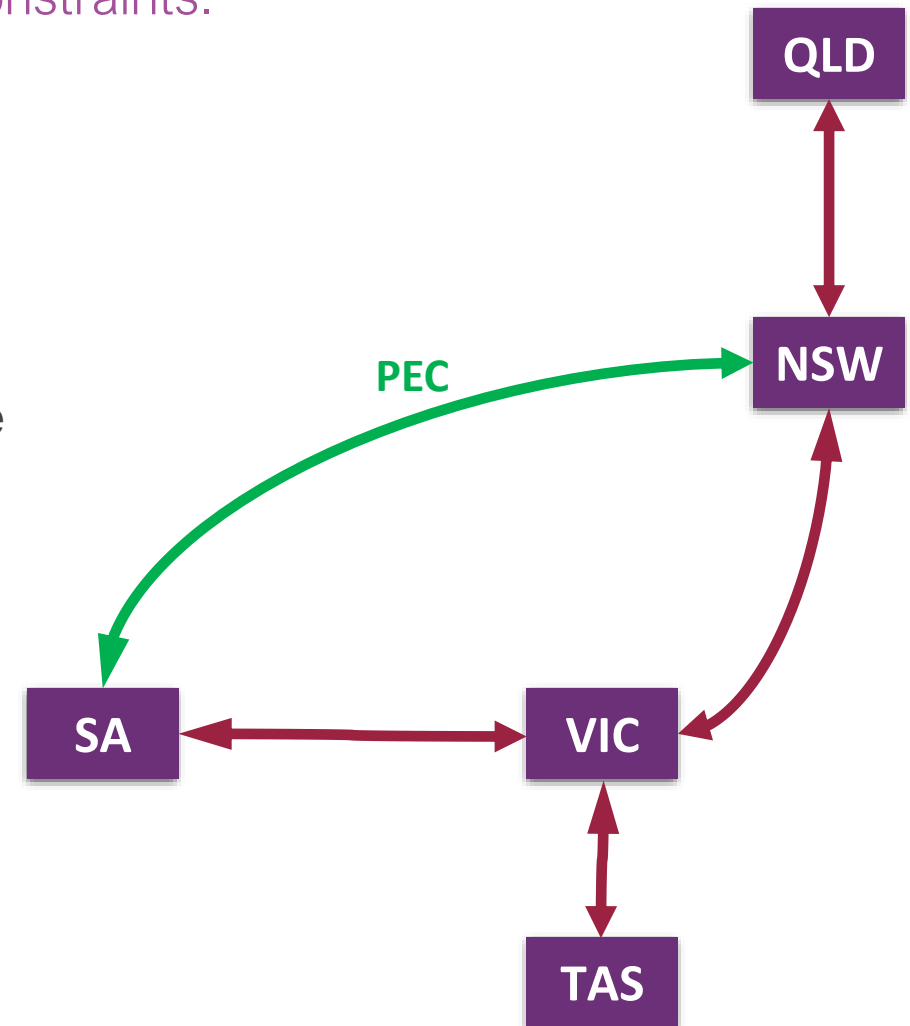


Photo: Bundey 330/275 kV substation

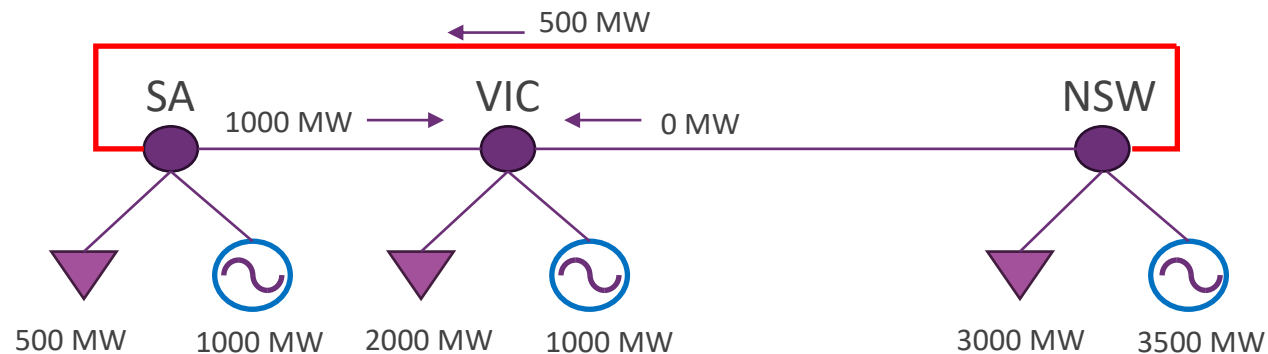
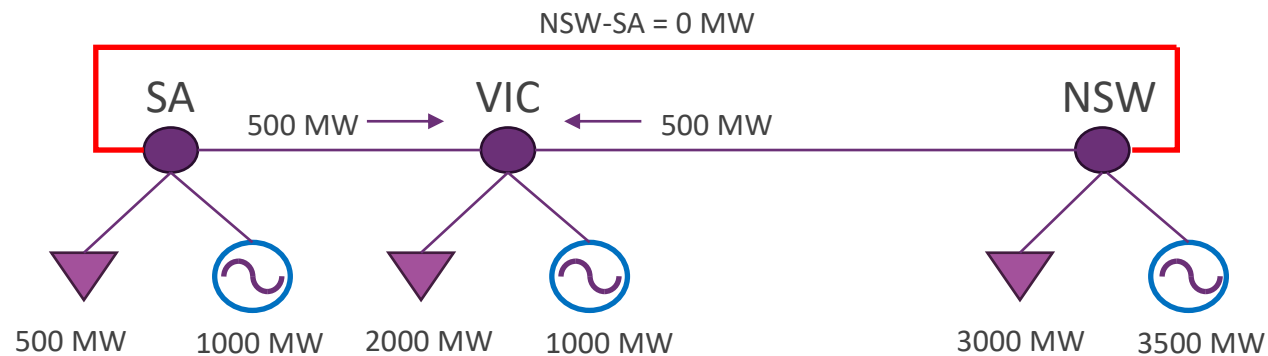
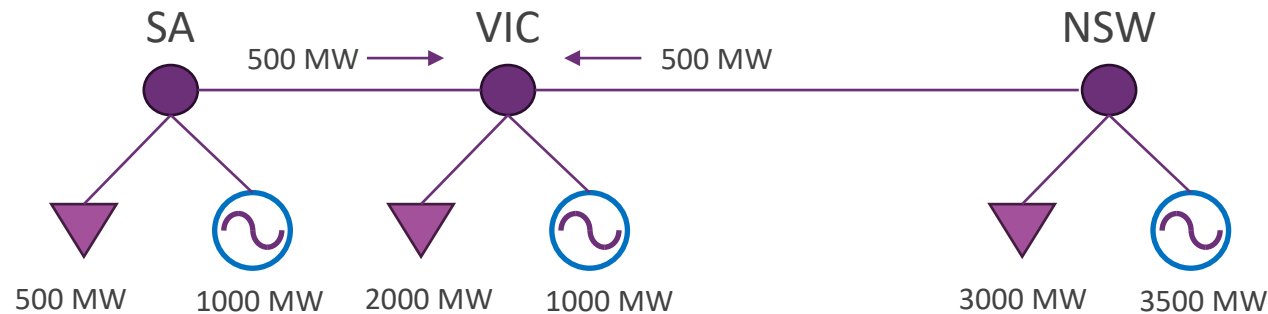
Concept of loop flow equations

The commissioning of PEC introduces a loop flow between NSW, SA and VIC that requires AEMO to use a new type of constraint equation: loop flow constraints.

- NEMDE and PASA have a simple “hub and spoke” model that the loop must be represented within.
- To ensure that the physical flows are represented
 - Loop flow constraints are **always applied/invoked** when the loop is in place
 - Different network configurations may require different equations
 - Constraint equation IDs start with “L” Ignored in interconnector limit setters.
- These equations are complex to create and test.



Representing physical flows



- ❑ With new NSW-SA interconnector added, there is an infinite range of potential interconnector flows that would fit this generation dispatch, yet only one correct physical solution.
- ❑ Physical flows are dependent on the network configuration/impedances.
- ❑ The Loop Flow equations are therefore established to align NEMDE/PASA with the physical flows – much like the Supply/Demand balance equation.

Constraint formulation of loop flow equations

The general form of this constraint equation is:

$$\begin{aligned} & a \times \text{Interconnector} + \\ & b \times \text{Interconnector} \\ & = \\ & \text{RHS terms} \end{aligned}$$

The right-hand side (RHS) of the constraint equation can consist of:

- Generator MW
- Phase shifting transformer tap position
- Regional or sub-regional demand.

Example 1

PEC-1 Loop Flow - L_PEC_X_6C_6G_6H

$$\begin{aligned} & 1 \times \text{PEC} \\ & - 0.2543 \times \text{V-SA} \\ & + 0.0229 \times \text{VNI} \\ & = 4.98 \times \text{PST taps} \\ & + 0.129 \times \text{Balranald gens} \\ & + 0.012 \times \text{SA gens} \\ & + \dots \\ & -23.55 \end{aligned}$$

Example 2

PEC-2 Loop Flow – L_PEC_NIL

$$\begin{aligned} & 1 \times \text{PEC} \\ & - 0.66 \times \text{V-SA} \\ & + 0.15 \times \text{VNI} \\ & = 1.81 \times 7 \times \text{PST taps} \\ & + 0.41 \times \text{Balranald gens} \\ & + 0.13 \times \text{SA gens} \\ & + \dots \\ & +57.53 \end{aligned}$$

4. Constraint changes and examples



Photo: Dinawan 330kV substation

High volume of constraint changes required

For both NSW1-SA1 registration and PEC-2 commissioning there will be a large volume of constraint changes

- Up to 4500 constraints added, updated, or removed. 400 for system normal.

Updates are also required for thermal constraints in SA, NSW and Vic

- As a guide if there are V-SA, Murraylink, Broken Hill Solar terms on the LHS of current constraints, they will need to be reviewed and potentially updated.

Other changes required:

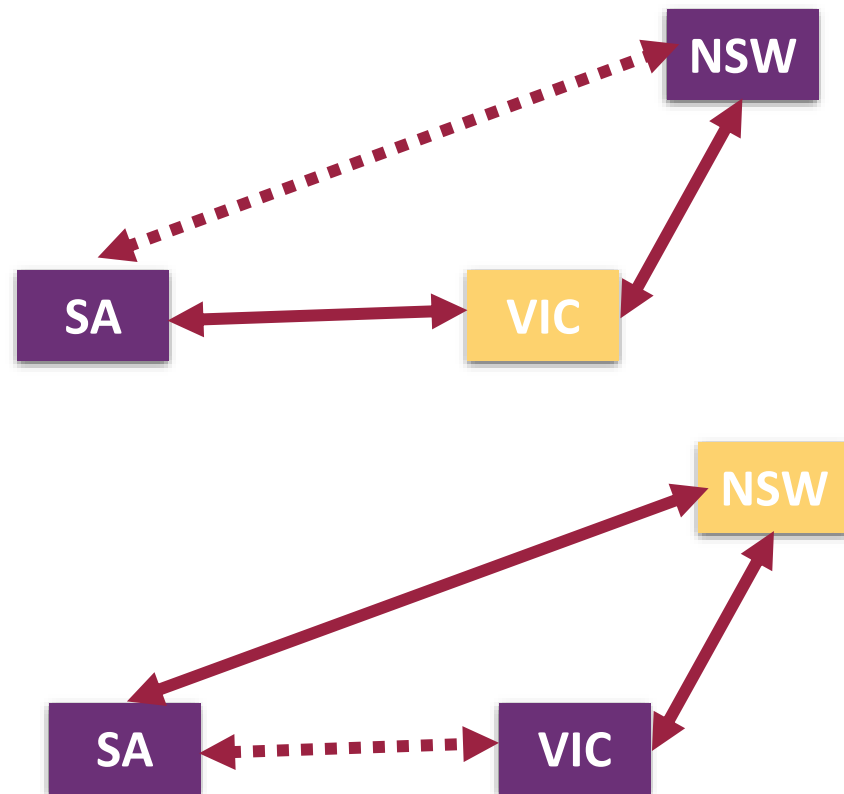
- Updated Wagga voltage limit and for both directions.
- Removal of FCAS limits for Heywood outages, X5 limits.
- Changes to outages in SW NSW and Nth Vic.



Photo: Wagga 330kV substation

Determining interconnector coefficients

A modification is needed to AEMO's practice for calculating the constraint coefficients on interconnectors to accommodate the loop.



- ❑ Currently, interconnector factors* are calculated as by placing a dummy generator at the remote region's reference node.
- ❑ With the PEC loop in place, interconnector contributions now have two transfer paths, meaning that application of the existing factor calculation process would not be feasible.
- ❑ The modified approach is as per AEMO's existing practice, except that the factors are calculated with one of the interconnectors open (or disconnected).

This modified approach applies for both thermal and cut-set constraints.

Example 1 – 060 overload for 51 trip

The system normal constraint equation $N \gg \text{NIL_060_051}$ is for managing the overload of the 060 line on trip of 51 line. It bound for 772 hours in 2026.

Current

$1 \times \text{Glenellen solar}$
 $+ 0.995 \times \text{Walla Walla}$
 $+ 0.992 \times \text{Culcairn}$
 $+ 0.947 \times \text{Wagga gens}$
 $+ 0.879 \times \text{Darlington Pt gens}$
 $- 0.207 \times \text{Murraylink}$
 $+ \dots$
 $\leq \text{RHS terms}$

PEC-1 (October)

$1 \times \text{Glenellen solar}$
 $+ 0.995 \times \text{Walla Walla}$
 $+ 0.993 \times \text{Culcairn}$
 $+ 0.953 \times \text{Wagga gens}$
 $+ 0.892 \times \text{Darlington Pt gens}$
 $- 0.291 \times \text{Murraylink}$
 $- 0.329 \times \text{PEC}$
 $+ \dots$
 $\leq \text{RHS terms}$

PEC-2 (from 4 Nov)

$1 \times \text{Glenellen solar}$
 $+ 0.989 \times \text{Walla Walla}$
 $+ 0.984 \times \text{Culcairn}$
 $+ 0.914 \times \text{Wagga gens}$
 $+ 0.885 \times \text{Darlington Pt gens}$
 $- 0.562 \times \text{Murraylink}$
 $- 0.684 \times \text{PEC}$
 $+ \dots$
 $\leq \text{RHS terms}$

Example 2 – Moorabool to Geelong

V>>NIL_MLGT_MLGT is for managing the overload of the Moorabool to Geelong line on trip of the parallel line. It bound for 106 hours in 2026 and 71 in 2025.

Current

$1 \times \text{Vic Big Battery}$
 $+ 0.932 \times \text{Moorabool}$
 $+ 0.869 \times \text{Berrybank}$
 $+ 0.358 \times \text{Broken Hill}$
 $- 0.529 \times \text{Murraylink}$
 $- 0.433 \times \text{V-SA}$
 $+ \dots$
 $\leq \text{RHS terms}$

PEC-1

$1 \times \text{Vic Big Battery}$
 $+ 0.934 \times \text{Moorabool}$
 $+ 0.872 \times \text{Berrybank}$
 $+ 0.413 \times \text{Broken Hill}$
 $- 0.587 \times \text{Murraylink}$
 $- 0.376 \times \text{V-SA}$
 $- 0.578 \times \text{PEC}$
 $+ \dots$
 $\leq \text{RHS terms}$

PEC-2

$1 \times \text{Vic Big Battery}$
 $+ 0.927 \times \text{Moorabool}$
 $+ 0.863 \times \text{Berrybank}$
 $+ 0.205 \times \text{Broken Hill}$
 $- 0.419 \times \text{Murraylink}$
 $- 0.376 \times \text{V-SA}$
 $- 0.371 \times \text{PEC}$
 $+ \dots$
 $\leq \text{RHS terms}$

Example 3 – Wagga voltage collapse

$N^{\wedge}N_NIL_WGLT$ is for managing voltage collapse on trip of 51 line. It bound for 794 hours in 2026 and 176 in 2025.

Current

$1 \times \text{Darlington Pt gens}$
 $+ 0.939 \times \text{Wagga gens}$
 $+ 0.698 \times \text{Balranald gens}$
 $+ 0.54 \times \text{Broken Hill}$
 $- 0.156 \times \text{Murraylink}$
 $- 0.376 \times \text{VNI}$
 $+ \dots$
 $\leq \text{RHS terms}$

PEC-1

$1 \times \text{Darlington Pt gens}$
 $+ 0.934 \times \text{Wagga gens}$
 $+ 0.734 \times \text{Balranald gens}$
 $+ 0.594 \times \text{Broken Hill}$
 $- 0.217 \times \text{Murraylink}$
 $- 0.366 \times \text{VNI}$
 $- 0.592 \times \text{PEC}$
 $+ \dots$
 $\leq \text{RHS terms}$

PEC-2

$1 \times \text{Darlington Pt gens}$
 $+ 0.91 \times \text{Wagga gens}$
 $+ 0.904 \times \text{Balranald gens}$
 $+ 0.849 \times \text{Broken Hill}$
 $- 0.428 \times \text{Murraylink}$
 $+ 0.4 \times \text{VNI}$
 $- 0.885 \times \text{PEC}$
 $+ \dots$
 $\leq \text{RHS terms}$

Next steps

- Constraint equations are now represented in AEMO's preproduction environment.
 - This includes loop flow constraints and key system normal constraints.
 - Participants are encouraged to observe their operation and provide any questions or feedback to AEMO via NEMReform@aemo.com.au.
 - AEMO are holding a Q&A session regarding PEC system updates **tomorrow, Friday 7th August** at 10AM. To register please email NEMReform@aemo.com.au.
- AEMO will continue testing constraints in our simulator and major changes will be added to preproduction in the lead up to loop operations commencing in dispatch.
- Further detail regarding arrangements nearer to loop operations state date is available in [AEMO's Go Live plan](#).

5. Q&A



For more information visit



NEMReform@aemo.com.au



[AEMO | NEM Reform initiatives | IPRR](#)

Appendix A – AEMO Competition Law Meeting Protocol

...

AEMO Competition Law - Meeting Protocol

AEMO is committed to complying with all applicable laws, including the Competition and Consumer Act 2010 (CCA). In any dealings with AEMO, all participants agree to adhere to the CCA at all times and to comply with appropriate protocols where required to do so.

AEMO has developed meeting protocols to support compliance with the CCA in working groups and other forums with energy stakeholders. Before attending, participants should confirm the application of the appropriate meeting protocol.

Please visit: <https://aemo.com.au/en/consultations/industry-forums-and-working-groups>