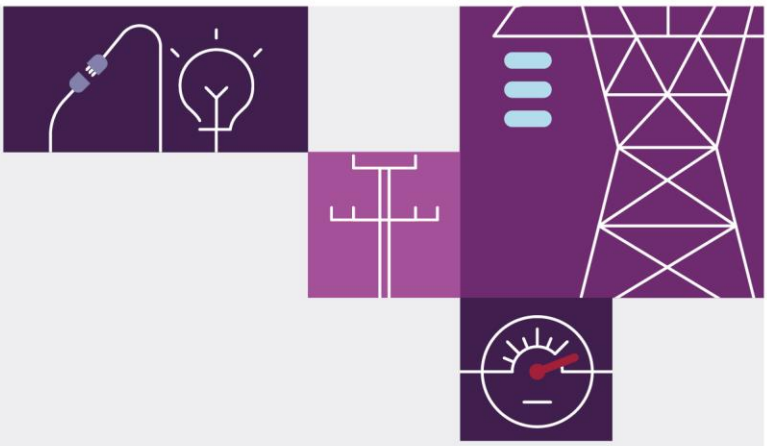
AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

# Monthly Constraint Report

## September 2022

A report for the National Electricity Market on Constraint results.



# Important notice

## Purpose

This publication has been prepared by AEMO to provide information about constraint equation performance and related issues, as at the date of publication.

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# 1 Introduction

This report details constraint equation performance and transmission congestion related issues for September 2022. Included are investigations of violating constraint equations, usage of the constraint automation and performance of Pre-dispatch constraint equations. Transmission and generation changes are also detailed along with the number of constraint equation changes.

# 2 Constraint Equation Performance

## 2.1 Top 10 binding constraint equations

A constraint equation is binding when the power system flows managed by it have reached the applicable thermal or stability limit or the constraint equation is setting a Frequency Control Ancillary Service (FCAS) requirement. Normally there is one constraint equation setting the FCAS requirement for each of the eight services at any time. This leads to many more hours of binding for FCAS constraint equations - as such these have been excluded from the following table.

**Table 1 Top 10 binding network constraint equations**

| Constraint Equation ID (System Normal Bold) | Description | #DIs (Hours) | Limit Type |
|---|---|---|---|
| N^N-LS_SVC | Out= Lismore SVC O/S or in reactive power control mode, avoid Voltage collapse on Armidale to Coffs Harbour (87) trip; Swamp out when three directlink cables are O/S; TG formulation only | 4254 (354.5) | Voltage Stability |
| SVML_ZERO | SA to Vic on ML upper transfer limit of 0 MW | 2378 (198.16) | Interconnector Zero |
| Q_KEP-HYB_25MW | Kennedy Energy Park upper limit of 25MW | 1638 (136.5) | Discretionary |
| **N>NIL_94T** | Out= Nil, avoid O/L Molong to Orange North (94T) on trip of Nil, Feedback | 1493 (124.41) | Thermal |
| **N>NIL_969** | Out= Nil, avoid O/L Gunnedah to Tamworth (969) on trip of Nil, Feedback. Metering is used as specified in OM520 | 1214 (101.16) | Thermal |
| **T::T_NIL_1** | Out = NIL, prevent transient instability for fault and trip of a Farrell to Sheffield line, Swamp if less than 3 synchronous West Coast units generating or Farrell 220kV bus coupler open or Hampshire 110kV line is closed. | 1140 (95.0) | Transient Stability |
| **Q>NIL_YLMR** | Out= Nil, avoid overload on 110kV feeders between Yarranlea and Middle Ridge(733/1 and 734/1), Feedback | 1092 (91.0) | Thermal |
| N_BROKENH1_ZERO | Broken Hill Solar Farm upper limit of 0 MW | 1053 (87.75) | Unit Zero |
| **Q>NIL_EMBW_EMLV_DS** | Out= Nil, limit Emerald SF to 40MW to avoid overload on Emerald - Lilyvale 66kV line on trip of Emerald - Comet - Blackwater 66kV line (6056 or 6011), swamp if Emerald CBs S612,S610 and Blackwater CB S605 are closed (DS only) | 1017 (84.75) | Thermal |
| **V_BANSF_BBD_60** | Out = Nil, Limit Bannerton SF upper limit to 60 MW if Boundary Bend (BBD) loading is less than 10 MW, DS only. Swamp out if BBD loading is 10 MW or above. | 907 (75.58) | Discretionary |

## 2.2 Top 10 binding impact constraint equations

Binding constraint equations affect electricity market pricing. The binding impact is used to distinguish the severity of different binding constraint equations.

The binding impact of a constraint is derived by summarising the marginal value for each dispatch interval (DI) from the marginal constraint cost (MCC) re-run[1] over the period considered. The marginal value is a mathematical term for the binding impact arising from relaxing the RHS of a binding constraint by one MW. As the market clears each DI, the binding impact is measured in $/MW/DI.

The binding impact in $/MW/DI is a relative comparison and a helpful way to analyse congestion issues. It can be converted to $/MWh by dividing the binding impact by 12 (as there are 12 DIs per hour). This value of congestion is still only a proxy (and always an upper bound) of the value per MW of congestion over the period calculated; any change to the limits (RHS) may cause other constraints to bind almost immediately after.

**Table 2 Top 10 binding impact network constraint equations**

| Constraint Equation ID (System Normal Bold) | Description | ∑ Marginal Values | Limit Type |
|---|---|---|---|
| **N>NIL_94T** | Out= Nil, avoid O/L Molong to Orange North (94T) on trip of Nil, Feedback | 2,004,342 | Thermal |
| **N>NIL_969** | Out= Nil, avoid O/L Gunnedah to Tamworth (969) on trip of Nil, Feedback. Metering is used as specified in OM520 | 1,197,697 | Thermal |
| **N>NIL_997_99A** | Out= Nil, avoid O/L Corowa to Albury 132kV line (997/1) on trip of Finley to Uranquinty 132kV line (99A), Feedback | 936,330 | Thermal |
| N_BROKENH1_ZERO | Broken Hill Solar Farm upper limit of 0 MW | 877,487 | Unit Zero |
| **Q>NIL_YLMR** | Out= Nil, avoid overload on 110kV feeders between Yarranlea and Middle Ridge(733/1 and 734/1), Feedback | 803,050 | Thermal |
| **N>NIL_94K_1** | Out= Nil, avoid O/L Suntop Tee to Wellington (94K/1) on trip of Nil, Feedback | 686,670 | Thermal |
| **V>>V_NIL_18** | Out= Nil, avoid O/L Ararat to Waubra 220kV line on trip of Kerang to Bendigo 220kV line, Feedback | 641,255 | Thermal |
| **N^^N_NIL_3** | Out= Nil, limit power flow on line X5 from Balranald to Darlington Point (X5) to avoid voltage collapse at Balranald for contingency trip of any major 220kV line in NW Victoria | 553,135 | Voltage Stability |
| V^^V_MLNK_KGTS | Out= Murraylink, avoid voltage collapse for loss of either Crowlands - Bulgana - Horsham or Horsham - Murra Warra - Kiamal 220kV line | 524,806 | Voltage Stability |
| Q_CS_1100 | Qld Central to Qld South upper transfer limit of 1100MW (discretionary) | 505,089 | Discretionary |

## 2.3 Top 10 violating constraint equations

A constraint equation is violating when NEMDE is unable to dispatch the entities on the left-hand side (LHS) so the summated LHS value is less than or equal to, or greater than or equal to, the right-hand side (RHS) value (depending on the mathematical operator selected for the constraint equation). The following table includes the FCAS constraint equations. Reasons for the violations are covered in 2.3.1.

[1] The MCC re-run relaxes any violating constraint equations and constraint equations with a marginal value equal to the constraint equation's violation penalty factor (CVP) x market price cap (MPC). The calculation caps the marginal value in each DI at the MPC value valid on that date. MPC is increased annually on 1st July.

**Table 3 Top 10 violating constraint equations**

| Constraint Equation ID (System Normal Bold) | Description | #DIs (Hours) | Limit Type |
|---|---|---|---|
| NSA_Q_BARCALDN | Network Support Agreement for Barcaldine GT to meet local islanded demand for the planned outage of 7153 T71 Clermont to H15 Lilyvale or 7154 T72 Barcaldine to T71 Clermont 132kV line | 14 (1.16) | Network Support |
| N_GOONSF_11_INV | Limit Goonumbla Solar Farm upper limit to 0 MW if number of inverter available exceed 11. Dispatch only. swamped out if Inverters are within the limit. | 8 (0.66) | System Strength |
| **F_T+NIL_MG_RECL_R6** | Out = Nil, Raise 6 sec requirement for a Tasmania Reclassified Woolnorth Generation Event (both largest MW output and inertia), Basslink unable to transfer FCAS | 6 (0.5) | FCAS |
| **F_T_AUFLS2_R6** | TAS AUFLS2 control scheme. Limit R6 enablement based on loaded armed for shedding by scheme. | 4 (0.33) | FCAS |
| N_MOREESF1_40INV | Constraint to violate if Moree Solar Farm inverter availability greater than 40. Constraint swamp out otherwise. DS only | 4 (0.33) | System Strength |
| N_WR_57_WT-INV | Constraint to violate if White Rock wind/solar farm wind turbine + inverter availability greater than 57. Dispatch only. swamped out otherwise. DS only. | 4 (0.33) | System Strength |
| V_KIAMSF_40INV | Limit Kiamal Solar Farm upper limit to 0 MW if number of inverter available exceeds 40. Constraint swamps out otherwise. DS only | 4 (0.33) | System Strength |
| **F_T+NIL_WF_TG_R6** | Out= Nil, Tasmania Raise 6 sec requirement for loss of a Smithton to Woolnorth or Norwood to Scotsdale tee Derby, Waddamana to Cattle Hill or Pieman to Granville Harbour line, Basslink unable to transfer FCAS | 3 (0.25) | FCAS |
| F_S++HYSE_L6_1 | Out = (Heywood to South East) or (Heywood transformers) or (Heywood to Mortlake) or (Heywood to Tarrone) or (Moorabool to Mortlake) or (Moorabool to Sydenham) or (Moorabool to Tarrone), SA Lower 6 sec Requirement for risk of islanding, segment1 | 3 (0.25) | FCAS |
| S_ISLE_CRK_10 | Discretionary upper limit on Cathedral Rocks windfarm<=10 MW when 2-4 syn cons I/S for SA is at risk of islanding or in islanded mode(Note: this equation is swamped when 0-1 sync cons are I/S) | 1 (0.08) | Discretionary |

### 2.3.1 Reasons for constraint equation violations

**Table 4 Reasons for constraint equation violations**

| Constraint Equation ID (System Normal Bold) | Description |
|---|---|
| NSA_Q_BARCALDN | Constraint Equation violated for 14 non-consecutive DI's from 20/09/2022 0855 hrs to 21/09/2022 1745 hrs with a max violation of 17.9 MW occurring at 0835 hrs on 21/09/2022. Constraint equation violated due to Barcaldine GT being unavailable during the restoration of planned Feeder 7154 outage. |
| N_GOONSF_11_INV | Constraint Equation violated for 8 non-consecutive DI's on 19/0/2022 from 1820 hrs to 2300hrs with a violation degree of 0 MW. Constraint equation violated due to Goonumbla exceeding its inverter limit. The constraint required Goonumbla SF to have 11 inverters online instead of 31 during outage of Parkes 2 XFMR. |
| **F_T+NIL_MG_RECL_R6** | Constraint Equation violated for 6 non-consecutive DI's from 06/09/2022 at 1135 hrs to 25/09/2022 1815 hrs with a max violation of 44.33 MW occurring at 0045 hrs 25/09/2022. Constraint equation violated due to the Tasmania raise 6 second availability being lower than the requirement. |
| **F_T_AUFLS2_R6** | Constraint Equation violated for 4 DI's from 08/09/2022 at 0425 hrs to 25/09/2022 at 1815 hrs with a ,ax violation of 20.7 MW occurring at 0045hrs on 19/09/2022. Constraint equation violated due to the Tasmania raise 6 second availability being lower than the requirement. |
| N_MOREESF1_40INV | Constraint violated for 4 DIs on 07/09/2022 between 0705 hrs to 0720 hrs with a violation degree max violation of 0.001 MW. Constraint equation violated due to Moree Solar Farm exceeding its inverter limit. |
| N_WR_57_WT-INV | Constraint violated for 4 non-consecutive DIs between 07/09/2022 at 0705 hrs and 08/09/2022 at 1440 hrs with a violation degree of 0.001 MW. Constraint equation violated due to White Rock Solar Farm exceeding its inverter limit. |

| Constraint Equation ID (System Normal Bold) | Description |
|---|---|
| V_KIAMSF_40INV | Constraint Equation violated for 4 DI's on 24/09/2022 between 0645 hrs to 0700hrs with a violation degree of 0 MW. Constraint Equation violated due to Kiamal Solar Farm exceeding its inverter limit. During outage of Kiamal syncon, Kiamal SF had 42 inverters online whilst it was limited to 40. |
| **F_T+NIL_WF_TG_R6** | Constraint equation violated for 3 DI's on 18/09/2022 between 0435 hrs and 0445 hrs with a max violation of 19.8 MW occurring at 0445 hrs. Constraint equation violated due to the Tasmania raise 6 second availability being lower than the requirement. |
| F_S++HYSE_L6_1 | Constraint equation violated for 3 consecutive DI's on 01/09/2022 between 1115 hrs and 1125 hrs with a max violation of 16.75 MW occurring at 1125 hrs. Constraint equation violated due to competing requirements with export limits on the Heywood interconnector which were set by V::S_NIL_MAXG_SECP_2. |
| S_ISLE_CRK_10 | Constraint violated for 1 DI on 07/09/2022 at 1110 hrs with a max violation of 6.09 MW. The constraint equation violated due to Cathedral Rock Wind farm exceeding the discretionary upper limits of 10MW. |

## 2.4 Top 10 binding interconnector limit setters

Binding constraint equations can set the interconnector limits for each of the interconnectors on the constraint equation left-hand side (LHS). Table 5 lists the top (by binding hours) interconnector limit setters for all the interconnectors in the NEM and for each direction on that interconnector.

**Table 5 Top 10 binding interconnector limit setters**

| Constraint Equation ID (System Normal Bold) | Interconnector | Description | #DIs (Hours) | Average Limit (Max) |
|---|---|---|---|---|
| N^N-LS_SVC | N-Q-MNSP1 Export | Out= Lismore SVC O/S or in reactive power control mode, avoid Voltage collapse on Armidale to Coffs Harbour (87) trip; Swamp out when three directlink cables are O/S; TG formulation only | 4054 (337.83) | -55.63 (96.84) |
| SVML_ZERO | V-S-MNSP1 Import | SA to Vic on ML upper transfer limit of 0 MW | 2005 (167.08) | 0.0 (0.0) |
| **F_MAIN++NIL_MG_R6** | T-V-MNSP1 Export | Out = Nil, Raise 6 sec requirement for a Mainland Generation Event, Basslink able transfer FCAS | 772 (64.33) | -123.09 (-27.55) |
| **N^^N_NIL_3** | VIC1-NSW1 Export | Out= Nil, limit power flow on line X5 from Balranald to Darlington Point (X5) to avoid voltage collapse at Balranald for contingency trip of any major 220kV line in NW Victoria | 656 (54.67) | 247.87 (904.73) |
| S>RBTX1_RBTX2_WEMWP4 | V-S-MNSP1 Import | Out= Robertstown 275/132kV TX1, avoid O/L MWP4-Robertstown 132kV line on trip of Robertstown 275/132kV TX2, | 545 (45.42) | -115.23 (-149.74) |
| **S>NIL_MHNW1_MHNW2** | V-S-MNSP1 Export | Out= Nil, avoid O/L Monash-North West Bend #2 132kV on trip of Monash-North West Bend #1 132kV line, Feedback | 481 (40.08) | 158.56 (181.84) |
| **V>>V_NIL_18** | V-S-MNSP1 Import | Out= Nil, avoid O/L Ararat to Waubra 220kV line on trip of Kerang to Bendigo 220kV line, Feedback | 421 (35.08) | 115.96 (-113.36) |
| **F_MAIN++APD_TL_L60** | T-V-MNSP1 Import | Out = Nil, Lower 60 sec Service Requirement for a Mainland Network Event-loss of APD potlines due to undervoltage following a fault on MOPS-HYTS-APD 500 kV line, Basslink able to transfer FCAS | 397 (33.08) | -190.64 (-439.0) |
| N>>N-DP_TIETX_D | V-S-MNSP1 Import | Out= DarlingtonPt tie Tx(#3 or #4), avoid the remaining tie Tx O/L (220 KV to 330 kV) on Kerang-Bendigo trip; Feedback | 391 (32.58) | 25.52 (-137.13) |
| S:V_PA_SVC_470 | V-SA Import | Out= one Para SVC, Oscillatory stability limit for SA to VIC on Heywood upper transfer limit of 470 MW | 349 (29.08) | -470.0 (-470.0) |

## 2.5 Constraint Automation Usage

The constraint automation is an application in AEMO's energy management system (EMS) which generates thermal overload constraint equations based on the current or planned state of the power system. It is currently used by on-line staff to create thermal overload constraint equations for power system conditions where there were no existing constraint equations or the existing constraint equations did not operate correctly.

The following section details the reason for each invocation of the non-real time constraint automation constraint sets and the results of AEMO's investigation into each case.

**Table 1 – Non-Real-Time Constraint Automation usage**

| Constraint Set ID | Date Time | Description |
|---|---|---|
| **CA_BRIS_52460E76** | 28/09/2022 09:10 to 28/09/2022 10:35 | Constraint CA_BRIS_52460E76 was created to manage the overload of the Robertstown 275/132kV transformer 2 on trip of Waterloo – Waterloo East 132 kV line with prior outage of Robertstown 275/132kV Transformer 1 and Robertstown to Para 275 kV line. |
| **CA_BRIS_5233A5C6** | 14/09/2022 10:05 to 14/09/2022 14:15 | Constraint CA_BRIS_5233A5C6 was invoked to avoid overload of Darlington Point No. 3 330/220/33 kV transformer on trip of Bendigo – Kerang 220 kV line during planned outage of Darlington Point No. 4 330/220/33 kV transformer |
| **CA_SYDS_5233E05E** | 14/09/2022 14:15 to 14/09/2022 14:35 | Constraint CA_SYDS_5233E05E was invoked to avoid overload of the Robertstown No 2 275/132 kV transformer on loss of Robertstown – Tungkillo 275 kV line. |

### 2.5.1 Further Investigation

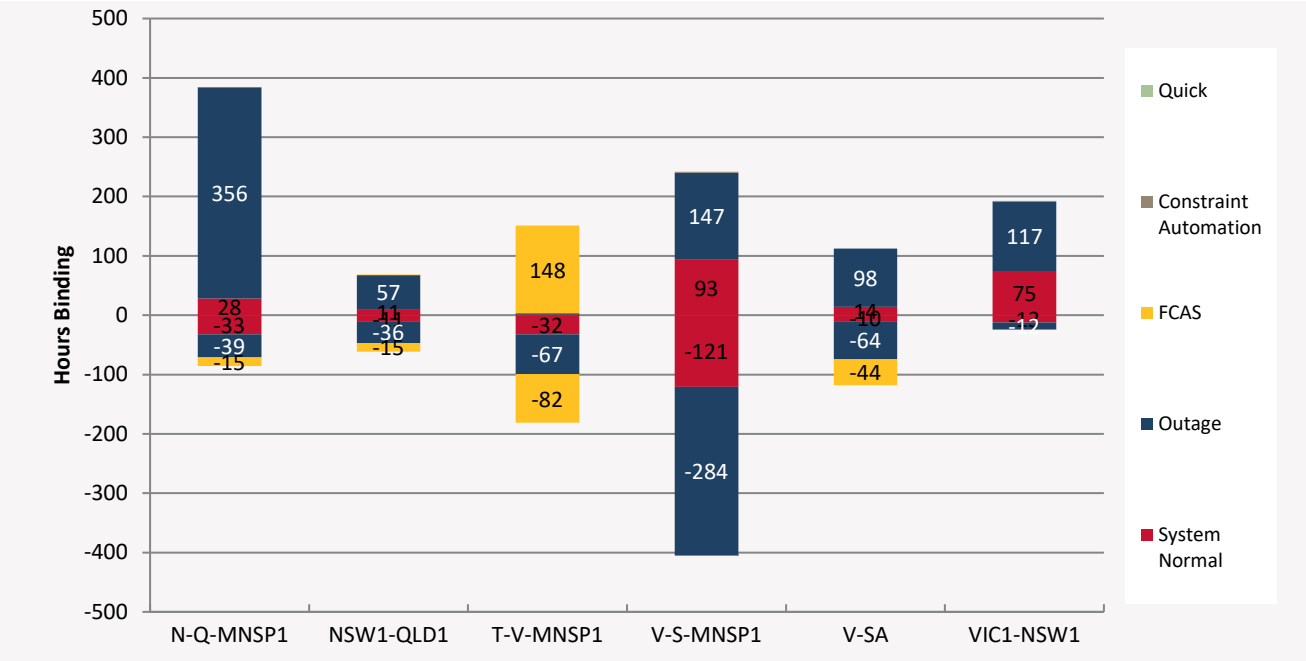
**CA_BRIS_52460E76:** At 1035 hrs, Auto constraint was revoked and S>>X_RBPA+RBTX2_23 was created and invoked to manage the ongoing and future violation issues.**CA_BRIS_5233A5C6:** Constraint was revoked after a new constraint, N>>N-DP_TIETX_D, was built to manage contingency. **CA_SYDS_5233E05E:** Constraint was revoked after confirming that Murraylink's runback scheme would manage the contingency.

## 2.6 Binding Dispatch Hours

This section examines the number of hours of binding constraint equations on each interconnector and by region. The results are further categorized into five types: system normal, outage, FCAS (both outage and system normal), constraint automation and quick constraints.

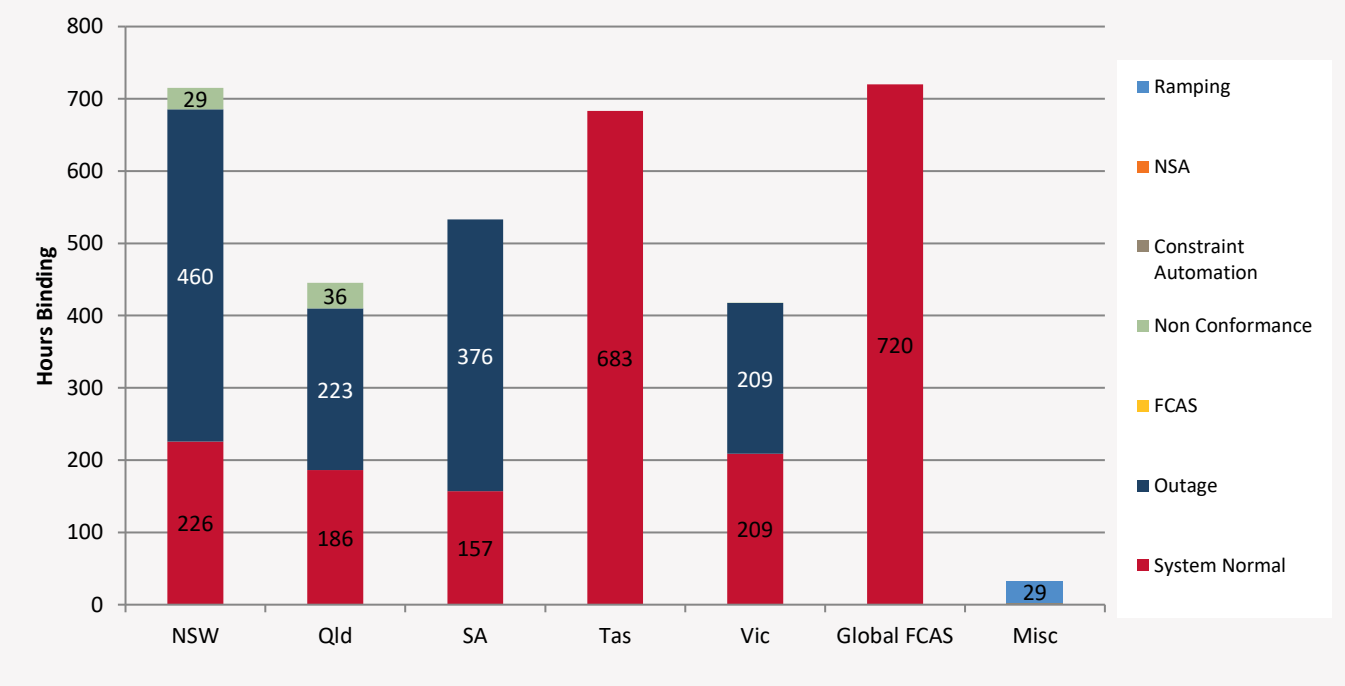
In the following graph the export binding hours are indicated as positive numbers and import with negative values.

**Figure 1 Interconnector binding dispatch hours**




The regional comparison graph below uses the same categories as in Figure 1 as well as non-conformance, network support agreement and ramping. Constraint equations that cross a region boundary are allocated to the sending end region. Global FCAS covers both global and mainland requirements.

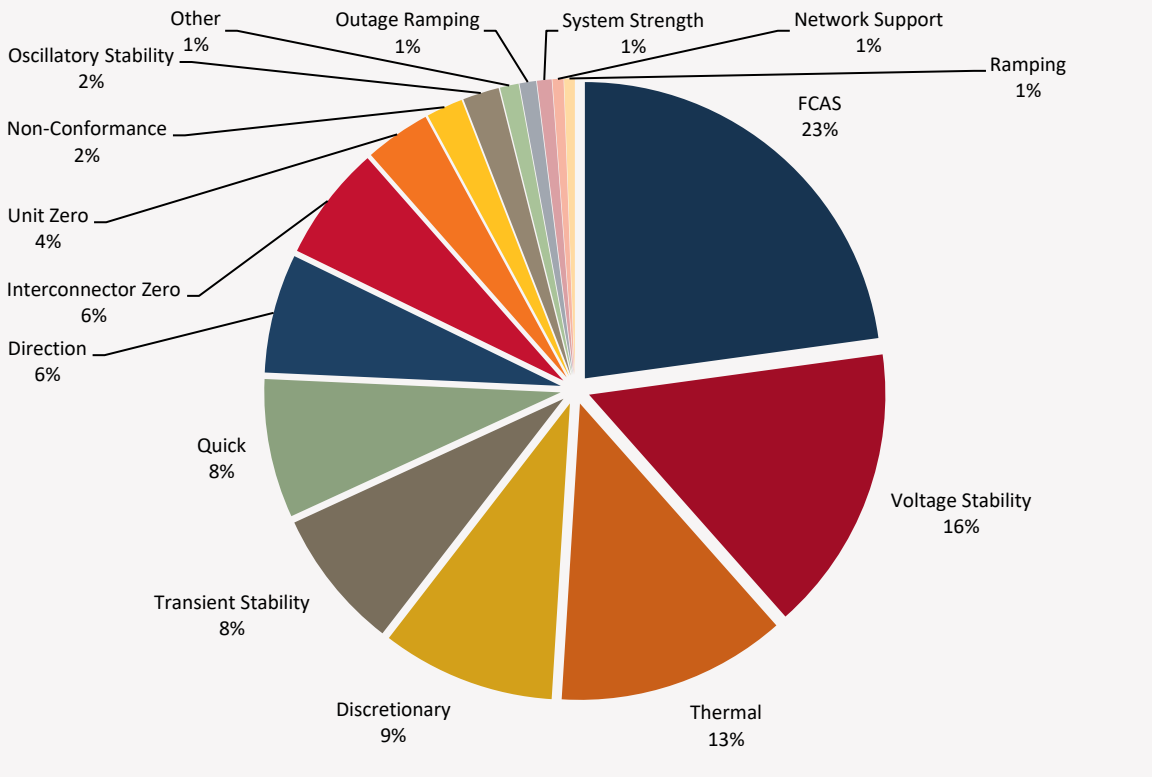
**Figure 2 Regional binding dispatch hours**



## 2.7 Binding Constraint Equations by Limit Type

The following pie charts show the percentage of dispatch intervals for September 2022 that the different types of constraint equations bound.

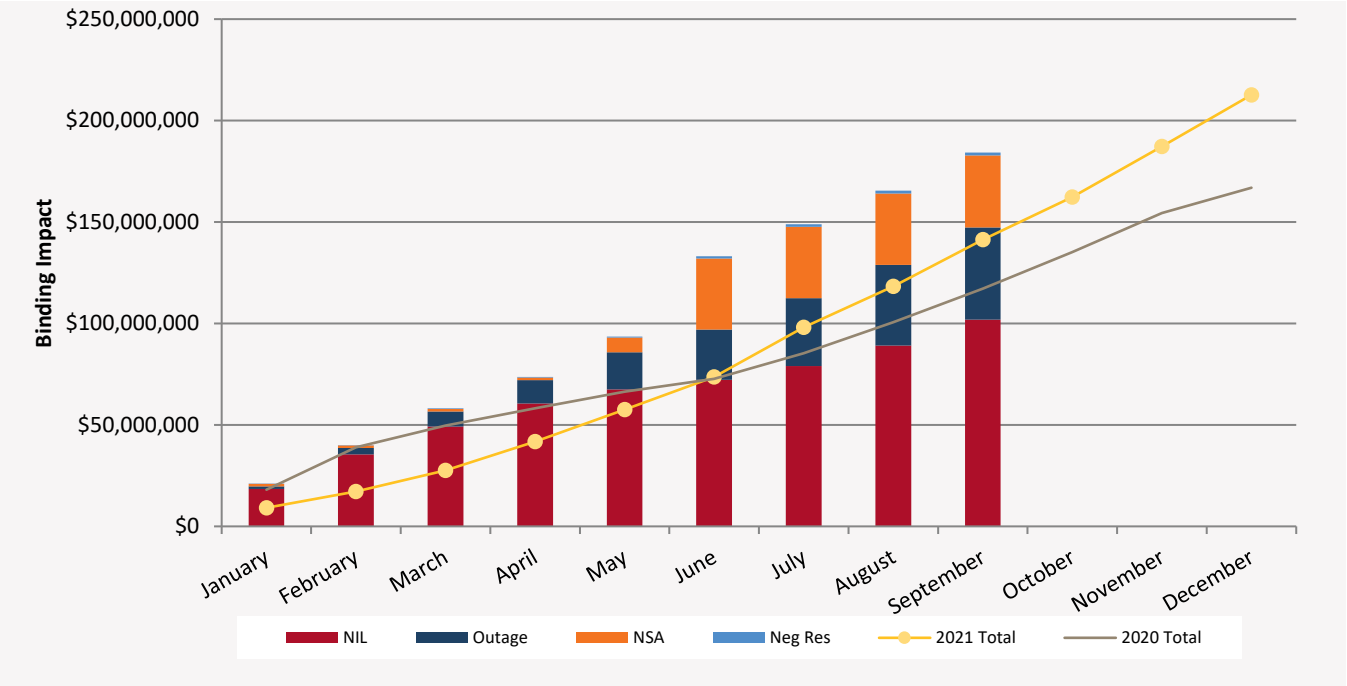
**Figure 3 Binding by limit type**




## 2.8 Binding Impact Comparison

The following graph compares the cumulative binding impact (calculated by summating the marginal values from the MCC re-run – the same as in section 2.2) for each month for the current year (indicated by type as a stacked bar chart) against the cumulative values from the previous two years (the line graphs). The current year is further categorised into system normal (NIL), outage, network support agreement (NSA) and negative residue constraint equation types.

**Figure 4 Binding Impact comparison**




## 2.9 Pre-dispatch RHS Accuracy

Pre-dispatch RHS accuracy is measured by the comparing the dispatch RHS value and the pre-dispatch RHS value forecast four hours in the future. The following table shows the pre-dispatch accuracy of the top ten largest differences for binding (in dispatch or pre-dispatch) constraint equations. This excludes FCAS constraint equations, constraint equations that violated in Dispatch, differences larger than ±9500 (this is to exclude constraint equations with swamping logic) and constraint equations that only bound for one or two Dispatch intervals. AEMO investigates constraint equations that have a Dispatch/Pre-dispatch RHS difference greater than 5% and ten absolute difference which have either bound for greater than 25 dispatch intervals or have a greater than $1,000 binding impact. The investigations are detailed in 2.9.1.

**Table 6 Top 10 largest Dispatch / Pre-dispatch differences**

| Constraint Equation ID (System Normal Bold) | Description | #DIs | % + Max Diff | % + Avg Diff |
|---|---|---|---|---|
| N^N-LS_SVC | Out= Lismore SVC O/S or in reactive power control mode, avoid Voltage collapse on Armidale to Coffs Harbour (87) trip; Swamp out when three directlink cables are O/S; TG formulation only | 921 | 25,367% (155.93) | 176% (29.31) |
| V::N_X_SMSC_V1 | Out = both South Morang 330 kV series capacitor banks, prevent transient instability for fault and trip of a HWTS-SMTS 500 kV line, VIC accelerates. Yallourn W G1 on 220kV. | 79 | 6,532% (219.35) | 251% (56.09) |
| **V_S_HEYWOOD_UFLS** | Out= Nil, Limit Heywood flows when SA under frequency load shedding (UFLS) is insufficient (i.e. when UFLS blocks in SA <1000 MW) to manage for double-circuit loss of Heywood IC. Note: Constraint is swamped if UFLS blocks >= 1000 MW. | 31 | 1,879% (9,495) | 339% (1,851) |
| V::N_X_SMSC_O1 | Out = both South Morang 330 kV series capacitor banks, prevent transient instability for fault and trip of a HWTS-SMTS 500 kV line, Other than VIC accelerates. Yallourn W G1 on 220kV. | 79 | 1,872% (267.02) | 123.05% (76.17) |

| Constraint Equation ID (System Normal Bold) | Description | #DIs | % + Max Diff | % + Avg Diff |
|---|---|---|---|---|
| V::N_X_SMSC_V2 | Out = both South Morang 330 kV series capacitor banks, prevent transient instability for fault and trip of a HWTS-SMTS 500 kV line, VIC accelerates. Yallourn W G1 on 500kV. | 78 | 992% (219.35) | 129.27% (65.83) |
| V::N_ROSM_O2 | Out = Rowville to South Morang 500kV line, prevent transient instability for fault and trip of a HWTS-SMTS 500 kV line, Other than VIC accelerates. Yallourn W G1 on 500kV. | 3 | 405% (99.78) | 159% (45.39) |
| V::N_X_SMSC_O2 | Out = both South Morang 330 kV series capacitor banks, prevent transient instability for fault and trip of a HWTS-SMTS 500 kV line, Other than VIC accelerates. Yallourn W G1 on 500kV. | 65 | 354% (244.24) | 67.18% (64.81) |
| **V::S_NIL_MAXG_SECP_1** | Out = Nil(NOTE: with both Black Range series capacitors I/S); Vic to SA transient stability limit (South East Capacitor OOS or not available for switching) for loss of SA largest generator. | 15 | 235% (112.5) | 32.42% (54.44) |
| N^^V_CNCW_1 | Out = Canberra-Capital (6) or Kangaroo Valley to Capital (3W) or Dapto-Kangaroo Valley (18), avoid voltage collapse at Darlington Point for loss of the largest Vic generating unit or Basslink | 7 | 188% (392.74) | 77.83% (173.89) |

### 2.9.1 Further Investigation

The following constraint equation(s) have been investigated:

**N^^V_SM_SCAP:** Investigated and no improvement can be made to the constraint equation at this stage.

**N^N-LS_SVC:** Investigated and constraint equation was updated on 27/08 to improve PD performance.

**V::N_X_SMSC_V1:** Investigated and no improvement can be made to the constraint equation at this stage.

**V_S_HEYWOOD_UFLS:** Investigated and no improvement can be made to the constraint equation at this stage. Changes to the status of the reactive devices between DS/PD contributes to the PD accuracy.

**V::N_X_SMSC_O1:** Investigated and no improvement can be made to the constraint equation at this stage.

**V::N_X_SMSC_V2:** Investigated and no improvement can be made to the constraint equation at this stage.

**V::N_X_SMSC_O2:** Investigated and no improvement can be made to the constraint equation at this stage.

**V::S_NIL_MAXG_SECP_1:** Investigated and no improvement can be made to the constraint equation at this stage.

**N^^V_CNCW_1:** Investigated and no improvement can be made to the constraint equation at this stage.

# 3 Generator / Transmission Changes

One of the main drivers for changes to constraint equations is from power system change, whether this is the addition or removal of plant (either generation or transmission). The following table details changes that occurred in September 2022.

**Table 7 Generator and transmission changes**

| Project | Date | Region | Notes |
|---|---|---|---|
| Port Augusta Renewable Energy 99 Mw Park Solar Farm (Mw) | 6 September 2022 | SA | New Generator |
| Kaban Wind Farm 1 | 26 September 2022 | Qld | New Generator |
| West Wyalong Solar Farm | 27 September 2022 | NSW | New Generator |
| St Leonards Schedule Load | 28 September 2022 | Tasmania | Deregistered Generator |
| Torrens Island A Unit 3 | 30 September 2022 | SA | Deregistered Generator |

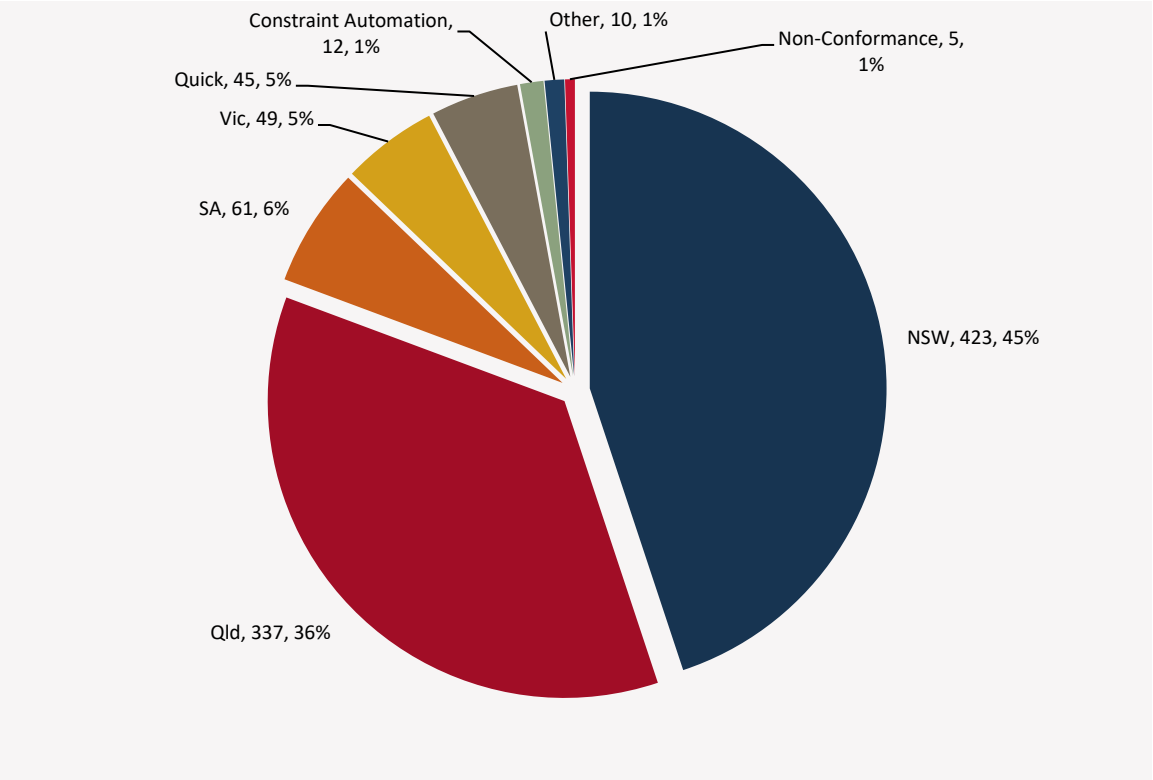
## 3.1 Constraint Equation Changes

The following pie chart indicates the regional location of constraint equation changes. For details on individual constraint equation changes refer to the Weekly Constraint Library Changes Report[2] or the constraint equations in the MMS Data Model[3].

[2] AEMO. *NEM Weekly Constraint Library Changes Report.* Available at: http://www.nemweb.com.au/REPORTS/CURRENT/Weekly_Constraint_Reports/

[3] AEMO. *MMS Data Model*. Available at: https://www.aemo.com.au/energy-systems/market-it-systems/nem-guides/wholesale-it-systems-software

**Figure 5 Constraint equation changes**




The following graph compares the constraint equation changes for the current year versus the previous two years. The current year is categorised by region.

**Figure 6 Constraint equation changes per month compared to previous two years**