Monthly Constraint Report

March 2024

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 March 2024. 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>NIL_94T	Out= Nil, avoid O/L Molong to Orange North (94T) on trip of Nil, Feedback	2316 (193.0)	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 [Note: swamped with 96M or 9UJ or 9UH is O/S]	2041 (170.08)	Thermal
V^^V_NIL_KGTS	Out= Nil, avoid voltage collapse for loss of Horsham - Murra Warra - Kiamal 220kV line. Murraylink VFRB disabled. Swamp if Murraylink VFRB enabled.	2030 (169.16)	Voltage Stability
N>NIL_9R6_991	Out= Nil, avoid O/L Wagga North to Wagga (9R6) 132kV line on trip of Wagga North to Murrumburrah (991) 132kV line, Feedback	1766 (147.16)	Thermal
S>NIL_MHNW1_MHNW2	Out= Nil, avoid O/L Monash-North West Bend #2 132kV on trip of Monash-North West Bend #1 132kV line, Feedback	1756 (146.33)	Thermal
SVML_ZERO	SA to Vic on ML upper transfer limit of 0 MW	1430 (119.16)	Interconnector Zero
N>NIL_PKTX_LV	Out= Nil, avoid O/L either Parkes 132kV/66kV Transformer on NIL trip, Feedback.	1142 (95.16)	Thermal
Q>NIL_EMCM_6056	Out= NIL, avoid thermal overload on Emerald to Comet (6056) 66 kV Feeder	1073 (89.41)	Thermal
N>N_LSDU_9U6_1	Out= one of Lismore 132 to Dunoon 132kV line (9U6 or 9U7), avoid O/L the remaining 132kV line, NSW to Qld limit	1030 (85.83)	Thermal
S>NIL_HUWT_STBG3	Out = Nil; Limit Snowtown WF generation to avoid Snowtown - Bungama line OL on loss of Hummocks - Waterloo line.[Note: Constraint Swamped when Wattle PT when generating >=60 MW)	741 (61.75)	Thermal

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	2,899,544	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 [Note: swamped with 96M or 9UJ or 9UH is O/S]	2,033,966	Thermal
V^^V_NIL_KGTS	Out= Nil, avoid voltage collapse for loss of Horsham - Murra Warra - Kiamal 220kV line. Murraylink VFRB disabled. Swamp if Murraylink VFRB enabled.	1,627,767	Voltage Stability
N>NIL_9R6_991	Out= Nil, avoid O/L Wagga North to Wagga (9R6) 132kV line on trip of Wagga North to Murrumburrah (991) 132kV line, Feedback	1,589,905	Thermal
S>NIL_MHNW1_MHNW2	Out= Nil, avoid O/L Monash-North West Bend #2 132kV on trip of Monash-North West Bend #1 132kV line, Feedback	1,114,957	Thermal
V^^V_MLNK_KGTS	Out= Murraylink, avoid voltage collapse for loss of Horsham - Murra Warra - Kiamal 220kV line	697,881	Voltage Stability
S>NIL_HUWT_STBG3	Out = Nil; Limit Snowtown WF generation to avoid Snowtown - Bungama line OL on loss of Hummocks - Waterloo line.[Note: Constraint Swamped when Wattle PT when generating >=60 MW)	656,424	Thermal
N>>NIL_970_051	Out= NIL, avoid O/L Burrinjuck to Yass (970) on trip of Wagga to Lower Tumut (051) line, Feedback	537,131	Thermal
N>NIL_PKTX_LV	Out= Nil, avoid O/L either Parkes 132kV/66kV Transformer on NIL trip, Feedback.	486,849	Thermal
N>NIL_901	Out= Nil, avoid O/L West Wyalong to Temora 132kV (901) line on trip of Nil, Feedback	422,983	Thermal

[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.

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 0.

Table 3 Top 10 violating constraint equations

Constraint Equation ID (System Normal Bold)	Description	#DIs (Hours)	Limit Type
NC_N_BW02	Non Conformance Constraint for Bayswater 2 Power Station	23 (1.91)	Non-Conformance
N>>79_949_72	Out= Wollar West to Wellington (79) 330kV line or Wollar 500/330kV TX or Wollar to Wollar West (75) 330kV line, avoid O/L Mt Piper to Orange North (949) 132kV line on trip of Mt Piper to Wellington (72) 330kV line, Feedback	12 (1.0)	Thermal
F_T+RREG_0050	Tasmania Raise Regulation Requirement greater than 50 MW	10 (0.83)	FCAS
N>>79_944_72	Out= Wollar West to Wellington (79) 330kV line or Wollar 500/330kV TX or Wollar to Wollar West (75) 330kV line, avoid O/L Wallerawang to Orange North (944) 132kV line on trip of Mt Piper to Wellington (72) 330kV line, Feedback	6 (0.5)	Thermal
F_T+LREG_0050	Tasmania Lower Regulation Requirement greater than 50 MW	5 (0.41)	FCAS
N>79_998_72	Out= Wollar West to Wellington (79) 330kV line or Wollar 500/330kV TX or Wollar to Wollar West (75) 330kV line, avoid O/L on Cowra to Forbes North (998) on trip of Mt Piper to Wellington line (72), Feedback	4 (0.33)	Thermal
N>>79_94X_72	Out= Wollar West to Wellington (79) 330kV line or Wollar 500/330kV TX or Wollar to Wollar West (75) 330kV line, avoid O/L Wallerawang to Panorama (94X) 132kV line on trip of Mt Piper to Wellington (72) 330kV line, Feedback	4 (0.33)	Thermal
N>NIL_9R5_9R6_N	Out= NIL, avoid O/L Wagga330 to Wagga North (9R5) 132kV line on trip of Wagga132 to Wagga North (9R6) 132kV line, Feedback	2 (0.16)	Thermal
N>NIL_9R6_9R5_N	Out= NIL, avoid O/L Wagga132 to Wagga North (9R6) 132kV line on trip of Wagga330 to Wagga North (9R5) 132kV line, Feedback	2 (0.16)	Thermal
N_BHBESS_0INV	Broken Hill Battery inverter limit of zero. Constraint to violate if Broken Hill Battery inverter availability greater than zero. Swamp out otherwise. DS only	2 (0.16)	System Strength

2.3.1 Reasons for constraint equation violations

Table 4 Reasons for constraint equation violations

Constraint Equation ID (System Normal Bold)	Description
NC_N_BW02	Constraint equation violated for 23 consecutive DI between 21/03/2024 0655 hrs and 21/03/2024 0845 hrs with a max violation of 10 MW on 21/03/2024 0655 hrs, 21/03/2024 0705 hrs and 21/03/2024 0710 hrs. Constraint equation violated due to generator non-conformance of Bayswater Unit 2.
N>>79_949_72	Constraint equation violated for 2 consecutive DIs on 16/03/2024 1515 hrs to 16/03/2024 1520 hrs, 1 non-consecutive DI on 16/03/2024 1535 hrs and 9 consecutive DIs on 16/03/2024 1550 hrs to 16/03/2024 1630 hrs with a max violation degree of 157.48 MW on 16/03/2024 1630 hrs. Constraint equation violated because of conservative post-contingent redistribution factor on 72 Line. This equation was updated to manage future violation issues more accurately.
F_T+RREG_0050	Constraint equation violated for 2 consecutive DIs between 02/03/2024 0745 hrs to 02/03/2024 0750 hrs, for 4 non-consecutive DIs between 06/03/2024 1630 hrs to 07/03/2024 1830 hrs, for 2 consecutive DIs between 09/03/2024 1500 hrs to 09/03/2024 1505 hrs, and for 2 non-consecutive DIs on 11/03/2024 0035 hrs and 17/03/2024 2005 hrs with a max violation degree of 50 MW on 02/03/2024 0750 hrs. Constraint equation violated due to the Tasmania raise regulation service availability being less than the requirement.
N>>79_944_72	Constraint equation violated for 1 DI on 16/03/2024 1550 hrs and 5 consecutive DIs on 16/03/2024 1610 hrs to 16/03/2024 1630 hrs with a max violation degree of 79.24 MW on 16/03/2024 1630 hrs. Constraint equation violated due to conservative post-contingent redistribution factor on 72 Line. This equation was updated to manage future violation issues more accurately.
F_T+LREG_0050	Constraint equation violated for 5 non-consecutive DIs between 02/03/2024 0750 hrs to 18/03/2024 1540 a maximum violation degree of 50 MW at 02/03/2024 0750 hrs. Constraint equation violated due to the Tasmania lower regulation service availability being less than the requirement.
N>79_998_72	Constraint equation violated for 4 consecutive DIs on 15/03/2024 0615 hrs to 15/03/2024 0630 hrs with a max violation degree of 108.15 MW on 15/03/2024 0620 hrs. Constraint equation violated due to conservative post-contingent redistribution factor on 72 Line. This equation was updated to manage future violation issues more accurately.
N>>79_94X_72	Constraint equation violated for 4 consecutive DIs on 16/03/2024 1615 hrs to 16/03/2024 1630 hrs with a max violation degree of 45.75 MW on 16/03/2024 1630 hrs Constraint equation violated due to conservative post-contingent redistribution factor on 72 Line. This equation was updated to manage future violation issues more accurately.
N>NIL_9R5_9R6_N	Constraint equation violated for 2 consecutive DIs on 12/03/2024 1800 hrs and 12/03/2024 1805 hrs with a max violation degree of 21.17 MW on 12/03/2024 1800 hrs. Constraint equation violated due to Uranquinty GT units 1, 2, 3 and 4 being limited by their ramp down rate.
N>NIL_9R6_9R5_N	Constraint equation violated for 2 consecutive DIs on 12/03/2024 1800 hrs and 12/03/2024 1805 hrs with a max violation degree of 17.23 MW on 12/03/2024 1800 hrs. Constraint equation violated due to Uranquinty GT units 1, 2, 3 and 4 being limited by their ramp down rate.
N_BHBESS_0INV	Constraint equation violated for 2 consecutive DIs on 16/03/2024 0505 hrs and 16/03/2024 0510 hrs with a max violation degree of 0.001 MW on 16/03/2024 0505 hrs and 16/03/2024 0510 hrs. Constraint equation violated due to Broken Hill BESS exceeding its inverter limit.

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)
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	1740 (145.0)	165.09 (203.09)
V^^V_NIL_KGTS	V-S-MNSP1 Import	Out= Nil, avoid voltage collapse for loss of Horsham - Murra Warra - Kiamal 220kV line. Murraylink VFRB disabled. Swamp if Murraylink VFRB enabled.	1596 (133.0)	145.52 (-125.03)
F_MAIN++APD_TL_L5	T-V-MNSP1 Import	Out = Nil, Lower 5 min 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	1319 (109.92)	-423.17 (-441.01)
SVML_ZERO	V-S-MNSP1 Import	SA to Vic on ML upper transfer limit of 0 MW	1140 (95.0)	0.0 (0.0)
N>N_LSDU_9U6_1	N-Q-MNSP1 Export	Out= one of Lismore 132 to Dunoon 132kV line (9U6 or 9U7), avoid O/L the remaining 132kV line, NSW to Qld limit	946 (78.83)	33.86 (95.1)
F_MAIN++BIP_ML_L1	T-V-MNSP1 Import	Out = Nil, Lower 1 sec requirement for a Mainland Load Event, for loss of the largest Boyne Island potline, Basslink able transfer FCAS. Requirement capped at 125 MW	939 (78.25)	-439.45 (-441.0)
F_MAIN++LREG_0210	T-V-MNSP1 Import	Mainland Lower Regulation Requirement greater than 210 MW, Basslink able transfer FCAS	937 (78.08)	-429.28 (-441.0)
S>>RBTU_RBTU_WTTP	V-S-MNSP1 Export	Out= Robertstown-Tungkillo 275kV line 1 or 2, avoid O/L Waterloo to Templers 132kV line on trip of Robertstown to Tungkillo 275kV line 1 or 2, Feedback	620 (51.67)	-12.82 (169.04)
N>>NIL_970_051	VIC1-NSW1 Export	Out= NIL, avoid O/L Burrinjuck to Yass (970) on trip of Wagga to Lower Tumut (051) line, Feedback	580 (48.33)	62.37 (752.62)
N>>NIL_964_84_S	NSW1-QLD1 Import	Out= NIL, avoid O/L Port Macquarie to Herron Creek Tee (964/2) on trip of Tamworth to Liddell (84) line, Feedback	476 (39.67)	-771.37 (-1200.89)

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 6 Non-Real-Time Constraint Automation usage

Constraint Set ID	Date Time	Description
CA_BRIS_54F2ABFD	29/02/2024 16:15 to 01/03/2024 18:30	CA_BRIS_54F2ABFD was built to manage the overloading of 3L Line for NIL trip.
CA_BRIS_54F2D1C0	29/02/2024 18:55 to 01/03/2024 17:10	CA_BRIS_54F2D1C0 was built to manage the overloading of 7 Line for the loss of 3 Line. Constraint automation was invoked and binding.
CA_SYDS_5505D0BC	15/03/2024 04:45 to 15/03/2024 05:10	CA_SYDS_5505D0BC was created to manage the overloading of Waterloo – Templers 132 kV Line for the trip of Blyth West – Munno Para 275 kV Line, with multiple outages of Robertstown – Tungkillo 275 kV Line 1 and Line 2 and the Mintaro – Waterloo 132 kV Line. The constraint was built following ElectraNet notifying of the need to set Robertstown – Tungkillo 275 kV Line 2 out of service at 15/03/2024 0420 hrs within the next 15 to 20 minutes to manage a fire at Tungkillo.
CA_SYDS_5505D516	15/03/2024 05:00 to 15/03/2024 05:10	CA_SYDS_5505D516 was created to manage the overloading of Waterloo – Templers 132 kV Line for NIL trip, with multiple outages of Robertstown – Tungkillo 275 kV Line 1 and Line 2, the Mintaro – Waterloo 132 kV Line and Tungkillo – Para 275 kV Line 1. The constraint was built following ElectraNet notifying of the need to set Tungkillo – Para 275 kV Line 1 out of service in addition Robertstown – Tungkillo 275 kV Line 2 at 15/03/2024 0420 hrs to manage a fire at Tungkillo.
CA_SYDS_5505DC4C	15/03/2024 06:05 to 15/03/2024 12:15	CA_SYDS_5505DC4C was created to manage the overloading of Waterloo – Templers 132 kV Line for the trip of Blyth West – Munno Para 275 kV Line, with multiple outages of Robertstown – Tungkillo 275 kV Line 1 and Line 2, the Mintaro – Waterloo 132 kV Line and Tungkillo – Para 275 kV Line 1. The constraint was built to manage the violations previously handled by CA_SYDS_5505D0BC and CA_SYDS_5505D516.

2.5.1 Further Investigation

CA_BRIS_54F2ABFD: Constraint automation equation was invoked and binding. CA_BRIS_54F2ABFD was built due to the base case showing >100% violation for 3L Line, coupled with an unsuccessful rerating of 3L Line due to high daily temperatures. Constraint automation equation was revoked with the constraint N>>NIL_3L built to manage future violation issues.

CA_BRIS_54F2D1C0: Constraint automation equation was invoked and binding. CA_BRIS_54F2D1C0 was revoked once the AEMO control room was advised no constraint changes were required.

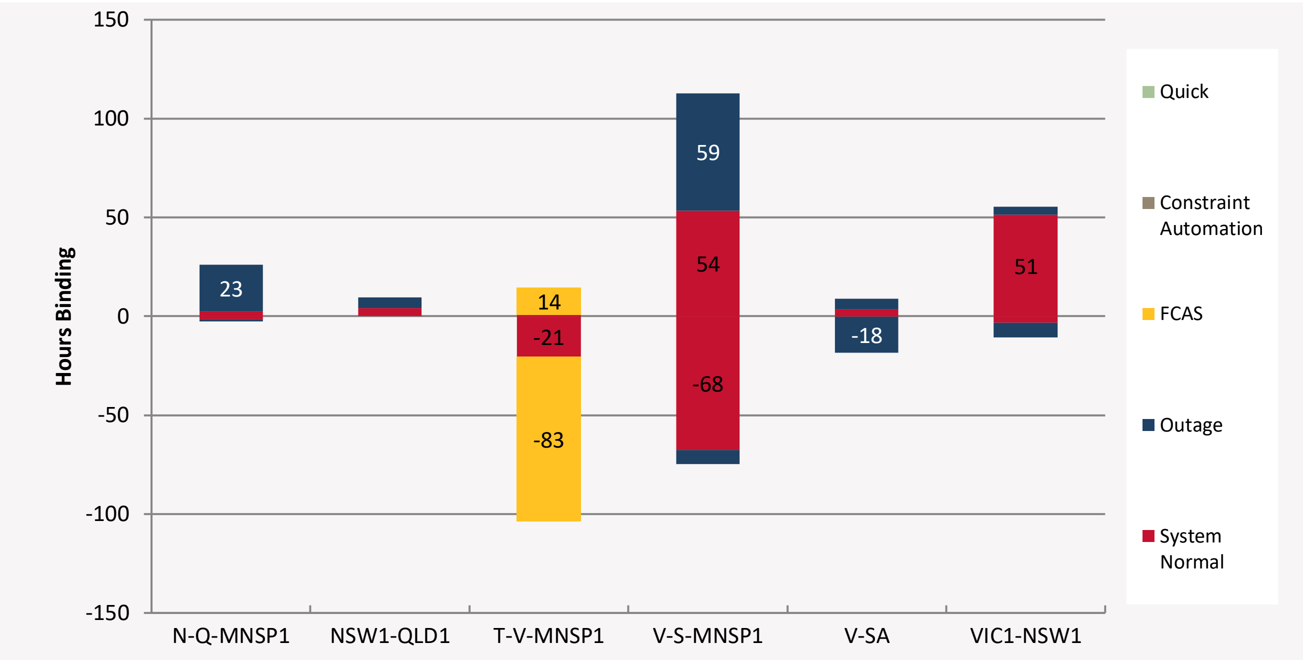
CA_SYDS_5505DC4C: Constraint automation equation was invoked and intermittently binding. CA_SYDS_5505DC4C was built which replaced CA_SYDS_5505D0BC and CA_SYDS_5505D516 after additional studies were performed to reflect the latest system condition. . The constraint automation equation was revoked at 1215 hrs. The constraint set S-X_RBTU+MNWT was built to manage future violation issues.

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.

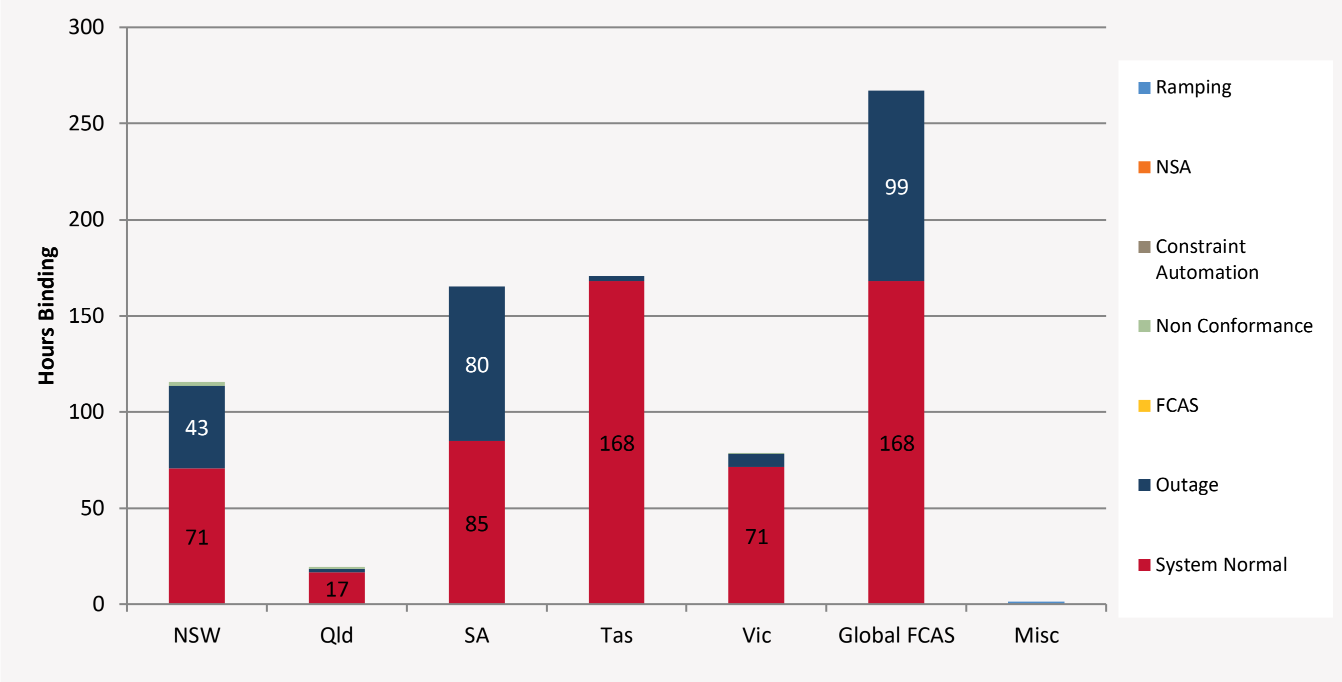
In the following graph the export binding hours are indicated as positive numbers and import with negative values.

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.

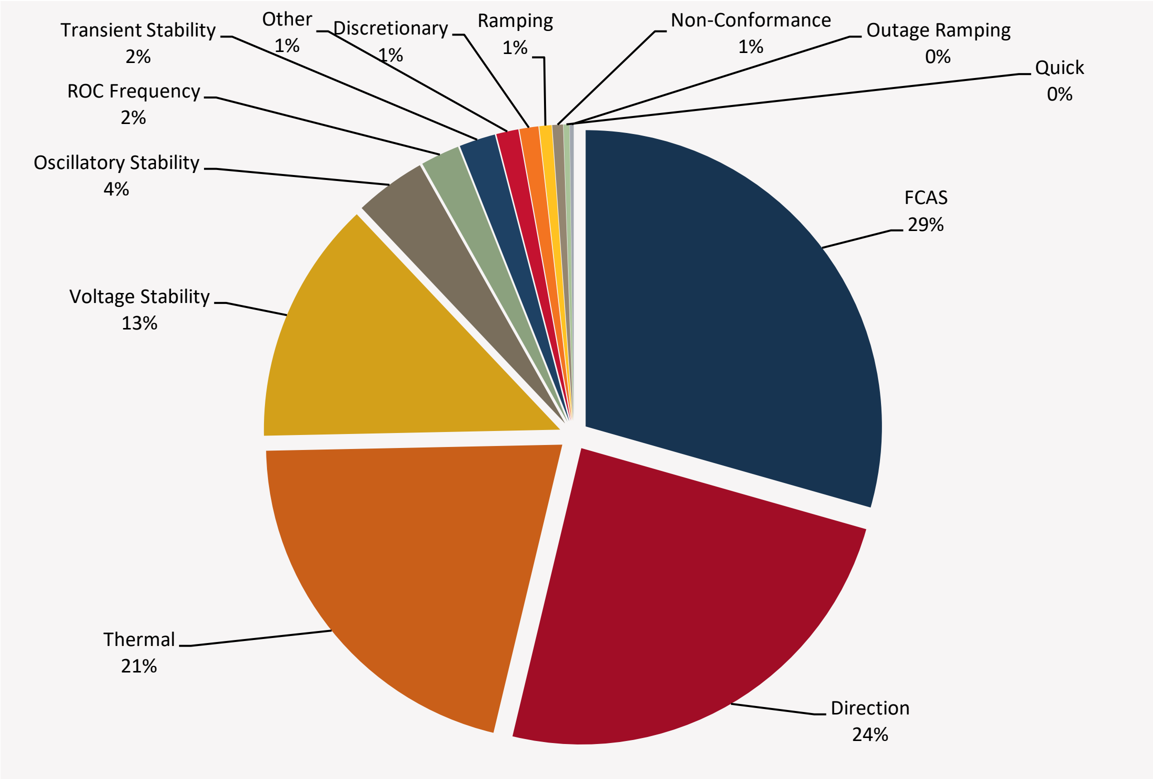
Figure 2 Regional binding dispatch hours



2.7 Binding Constraint Equations by Limit Type

The following pie charts show the percentage of dispatch intervals for March 2024 that the different types of constraint equations bound.

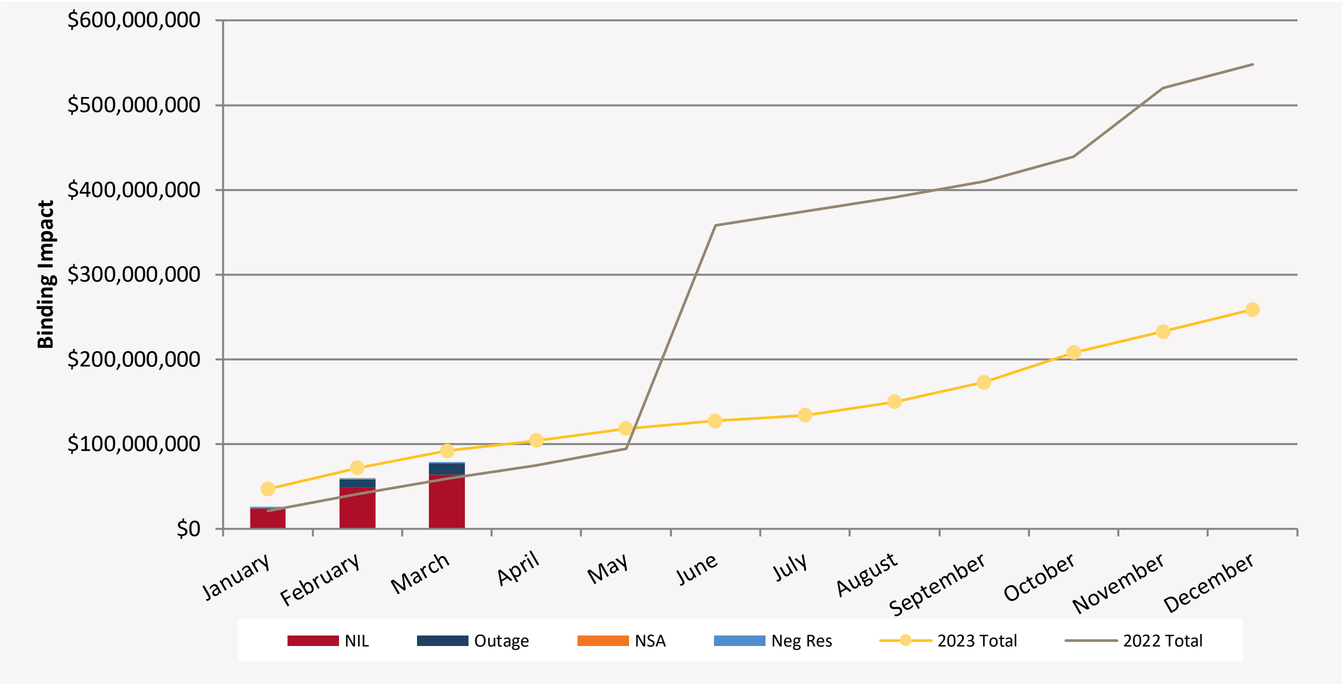
Figure 3 Binding by limit type



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 0.

Table 7 Top 10 largest Dispatch / Pre-dispatch differences

Constraint Equation ID (System Normal Bold)	Description	#DIs	% + Max Diff	% + Avg Diff
V>>MLSY_KTDPT_SYML	Out = Moorabool to Sydenham 500 kV line, Emergency Moorabool Transformer Tripping (EMTT) scheme disabled, avoid O/L Keilor to Deer Park 220 kV line on trip of remaining Moorabool to Sydenham 500 kV line, feedback	7	18,029% (765)	3,001% (221.36)
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.	8	1,819% (9,479)	1,233% (7,090)
N>N_LSDU_9U6_1	Out= one of Lismore 132 to Dunoon 132kV line (9U6 or 9U7), avoid O/L the remaining 132kV line, NSW to Qld limit	232	600% (65.37)	58.46% (21.18)
N_X_MBTE_3B	Out= all three Directlink cables, Terranora_I/C_import <= Terranora_Load	12	313% (18.1)	125.36% (10.02)
N>79_94T_72	Out= Wollar West to Wellington (79) 330kV line or Wollar 500/330kV TX or Wollar to Wollar West (75) 330kV line, avoid O/L Molong to Orange North (94T) 132kV line on trip of Wellington to Mt Piper (72) 330kV line, Feedback	49	145.15% (331.55)	25.93% (61.3)
N>9U6/9U7_8507_9U7	Out= one of Lismore 132 to Dunoon 132kV line (9U6 or 9U7), avoid O/L Balina to Astonville (8507) 66kV line on trip of other 9U7 or 9U6 132kV line, Feedback	45	144.56% (127.54)	70.23% (63.9)
V^^SML_NSWRB_2	Out = NSW Murraylink runback scheme, VIC to SA transfer limit on Murraylink to avoid voltage collapse at Red Cliffs for the loss of either the Darlington Point to Balranald (X5) or Balranald to Buronga (X3) 220kV lines	102	136.48% (281.7)	72.91% (162.56)
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.	99	112.25% (269.07)	55.95% (163.03)
V^^SML_NIL_3	Out = Nil, avoid voltage collapse for loss of Bendigo to Kerang 220kV line	32	86.86% (240.07)	52.81% (138.3)

2.9.1 Further Investigation

The following constraint equation(s) have been investigated:

N>NIL_9R5_9R6_N: Investigated and no improvement can be made to the constraint equation at this stage.

N>NIL_901: Investigated and no improvement can be made to the constraint equation at this stage.

N>NIL-BHTX_BHTX_NIL: Under investigation and will be improved if possible.

N>N_LSDU_9U6_1: Investigated and no improvement can be made to the constraint equation at this stage.

N>79_94T_72: Investigated and no improvement can be made to the constraint equation at this stage.

N>9U6/9U7_8507_9U7: Investigated and no improvement can be made to the constraint equation at this stage.

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

V^^SML_NIL_3: Investigated and no improvement can be made to the constraint equation at this stage.

V^^V_MLNK_KGTS: Investigated and no improvement can be made to the constraint equation at this stage.**V^^SML_NSWRB_2:** Investigated and no improvement can be made to the constraint equation at this stage.

T::T_NIL_1: Investigated and no improvement can be made to the constraint equation at this stage.

NRM_NSW1_VIC1: 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 March 2024.

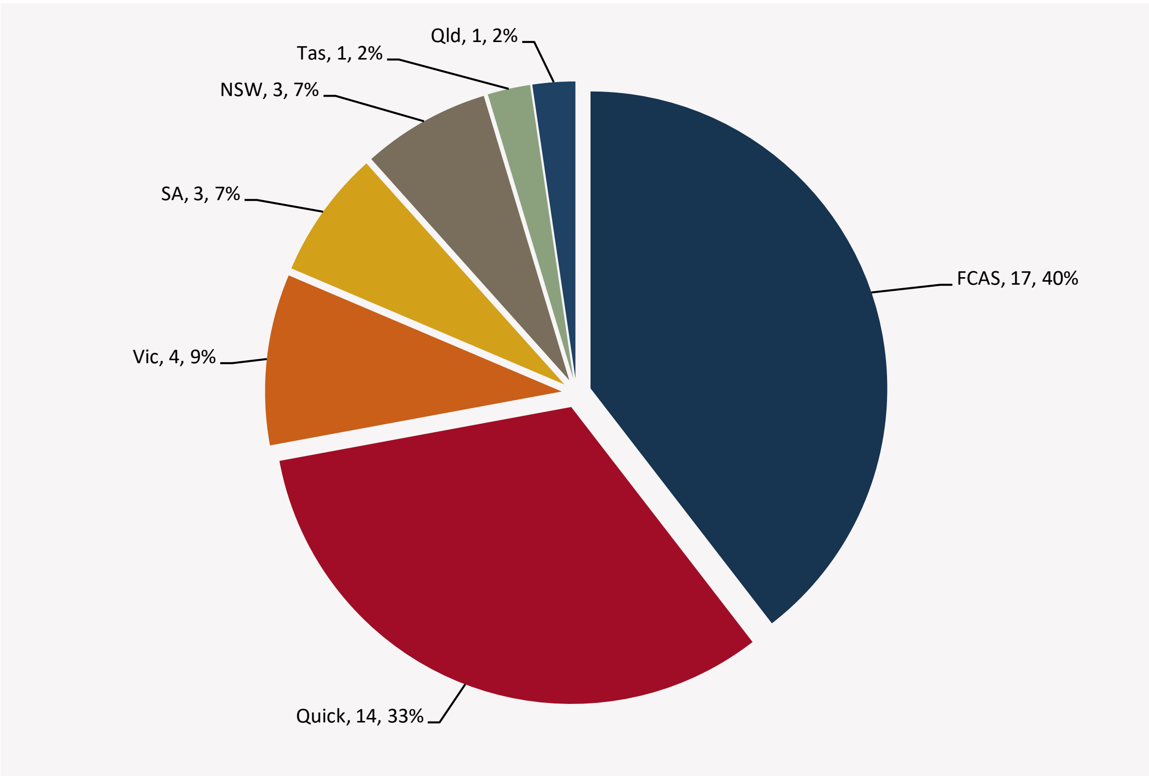
Table 8 Generator and transmission changes

Project	Date	Region	Notes
NIL			

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].

Figure 5 Constraint equation changes



[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

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