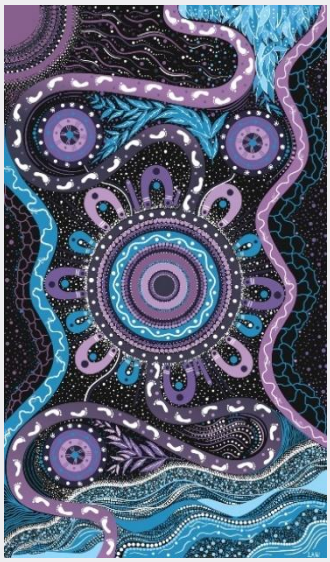
AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

WEM Annual Congestion Report

March 2026

Analysis of constraints in the Wholesale Electricity Market

For the period from 1st October 2024 to 1st October 2025



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 launched 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.

Important notice

Purpose

The purpose of this publication is to provide information about Network congestion to Rule Participants and other interested stakeholders to enable them to understand patterns of Network congestion and the market impact of Network congestion.

AEMO publishes the WEM Annual Congestion Report under clause 2.27B.6 of the ESM Rules. This publication is based on information available to AEMO as of 25th March 2026.

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Contents

1 Introduction

This Annual Congestion Report for the Wholesale Electricity Market (WEM) is prepared in accordance with ESM (Electricity System and Market) Rule 2.27B.6. It aims to provide information to Rule Participants and other interested stakeholders to enable them to understand patterns of Network congestion and the market impact of Network congestion.

This report contains a summary of Constraint Equations that bound or violated in the Central Dispatch Process for Primary Dispatch Intervals in the 2024-25 Capacity Year (8:00am 1st October 2024 to 8:00am 1st October 2025), as well as details of recent and future changes that could affect Network congestion.

In addition to the report, a data pack is provided that contains a complete record of constraint that bound or violated in the 2024-25 Capacity Year extracted from WEM Dispatch Engine (WEMDE) dispatch data[1] as of 25th March 2026. The data pack is designed to assist any interested stakeholders who would like to conduct further analysis on constraint results but is not designed to replace other sources of WEMDE dispatch data. Hence, in the case of any inconsistencies the WEM dispatch data should be considered the source of truth.

The remainder of the report is layout as follows:

- Section 2 provides background information to help interpret constraints and constraint results.
- Section 3 summarises thermal constraints that impacted dispatch, disaggregated by region.
- Section 4 summarises non-thermal constraints that impacted dispatch.
- Section 5 summarises the results of Defined Contingencies.
- Section 6 summarises all other library constraints that impacted dispatch.
- Section 7 summarises the results of Discretionary constraints.
- Section 8 outlines recent changes that may have affected Network congestion.
- Section 9 outlines future changes to the Network, to generation, and to load, that could affect Network congestion in the coming years.

[1] Case and solutions files are available to download from the AEMO Market Data website, or from the WEM Dispatch APIs.

2 Background

This section provides background information for understanding constraints and interpreting constraint results.

2.1 Network visualisations

Understanding the layout of the Network is useful for interpreting constraints and congestion. The following are publicly available network visualisations:

- **Western Power's Network Capacity Mapping Tool:** interactive mapping tool containing a layer for substations, terminals, and power stations and another layer for high voltage overhead transmission lines.
- **The AEMO Map:** interactive mapping tool containing a layer for transmission substations and a layer for transmission lines and functionality to search for objects within the selected layers.
- **The 2024 Transmission System Plan[2]:** a report containing simplified geographic diagrams of each region of the network with substations labelled.

2.2 Binding and violating constraints

A constraint is **binding** if the value of its left-hand side (LHS) and right-hand side (RHS) are equal. If a constraint is binding, it is likely that WEMDE adjusted dispatch to satisfy the constraint. However, this is not necessarily the case (for example: a Facility is constrained to 0 MW with a constraint but would not have been dispatched anyway due to a low Market Clearing Price).

A constraint is **violating** if WEMDE was unable to adjust dispatch to satisfy the constraint. For example, if a constraint of the form "LHS ≤ RHS" is violating, the LHS value is greater than the RHS. It is likely that WEMDE adjusted dispatch as much as possible to reduce the constraint's violation quantity (difference between LHS and RHS values).

2.3 Shadow price

The **shadow price** of a constraint is the change in WEMDE's objective function per unit increase of the RHS of the constraint. It can be used as an indicator for the relative impact of a constraint on the market. Shadow prices are calculated by WEMDE and published in the solution files.

Shadow prices cannot be interpreted as a "real" market cost in dollars. WEMDE's objective function is to minimise the total offered cost of dispatch, including any penalty[3] for violating any constraints. If any penalties are present in the objective function (or would be present for a unit increase of a constraint's RHS) then a constraint's shadow price can be influenced by the penalties, and hence no longer solely represents a change in the total market cost of dispatch.

[2] The 2025 Transmission System Plan is available here but does not contain network diagrams.

[3] Penalties are proportional to the Constraint Violation Quantity (how much a constraint was violated by) and the Constraint Violation Penalty (a multiplier that is fixed for each constraint). See Appendix B of WEM Procedure: Dispatch Algorithm Formulation for a table of Constraint Violation Penalty values.

Note that constraints of the form “LHS ≤ RHS” have a negative shadow price when violating, “LHS ≥ RHS” constraints have a positive shadow price when violating and “LHS = RHS” constraints can have either depending on how they impact dispatch. However, all shadow prices shown in this report are absolute values.

2.4 Constraint type

Every constraint has a constraint type which is used to determine how the constraint is handled in dispatch and settlements:

- **Formulation**: constraints that are included in WEMDE by default[4], such as a ramp rate limit or ESS (Essential System Service) enablement minimum/maximum. These constraints are not covered in this report.
- **Network**: constraints representing a network limit[5]. Refer to “Limit Type” for additional information.
- **Facility Risk / Network Risk**: constraints representing the size of a possible Largest Credible Supply Contingency associated with the loss of a single Facility or the disconnection of a section of the Network. Constraints with these two types are collectively called **Defined Supply Contingency Constraints** in this report and contain “[SupplyRisk]” (or previously “[LargestContingency]”) in the ID by convention.
- **Facility Load Risk / Network Load Risk**: constraints representing the size of a possible Largest Credible Load Contingency associated with the loss of a single Facility or the disconnection of a section of the Network. Constraints with these two types are collectively called **Defined Load Contingency Constraints** in this report and contain “[LoadRisk]” in the ID by convention. Defined Load Contingency Constraints were introduced in Oct 2025 so are not considered in this report.
- **RCS Provision**: constraints used to commit a Facility for the provision of RCS (RoCoF Control Service). RCS Provision constraints were introduced in Feb 2026 so are not considered in this report.
- **NCESS**: constraints relating to an NCESS (Non-Co-optimised Essential System Service) contract.
- **Other**: constraints that don’t meet the above criteria.

2.5 Limit type

Every network constraint (see section 2.4) has a **limit type**:

- **Thermal**: represents a Thermal Network Limit. These constraints contain “>” in the ID.
- **Voltage Stability / Transient Stability / Oscillatory Stability**: represents a Non-Thermal Network Limit that can be described by one of the named types of power system instability. Voltage stability constraints contain “^” in the ID, transient and oscillatory stability constraints would contain “:” (none have been created yet).
- **Other**: network constraints that do not meet the above criteria[6]. These constraints contain “*” in the ID. These constraints can be either thermal or non-thermal.

[4] See section 2.4 of WEM Procedure: Dispatch Algorithm Formulation for a description of all the formulation constraints.

[5] ESM Rule 7.7.8A allows for the creation of “Network” type constraints that do not represent network limits.

[6] Examples of this include network unavailability constraints (to prevent dispatch of a Facility when it is disconnected from the network), a constraint to prevent WEMDE altering a Facility’s dispatch if it’s operating in an islanded region separated from the SWIS, or a non-thermal constraint that is not categorised into voltage, transient, or oscillatory stability.

Note that constraints that do not have a constraint type of “Network” have also been given a limit type of “Other”.

2.6 Library vs discretionary constraints

Non-formulation constraints (i.e. constraints not automatically included by WEMDE) can be split into the following two categories:

- **Library constraint**: constraints that forms part of the Constraints Library[7].
- **Discretionary constraint**: temporary constraints created for the purpose of real-time operations[8].

2.7 System normal vs outage constraints

Network constraints can be split into the following two categories:

- **System normal**: constraints that apply to the normal state of the network, this is generally denoted with the label “NIL” in constraint IDs to indicate no Network outages.
- **Outage**: constraints that only apply during the outage (or reconfiguration) of certain Network equipment.

2.8 Constraint naming convention

The naming convention for thermal constraint ID is:

SYSCONFIG SYMBOL **{**CONTINGENCY**}** **[**OVERLOAD **(**DIRECTION**)]**

where the parts have the following meanings:

- **SYSCONFIG** describes the system configuration, typically which network equipment is on outage (NIL means no equipment is on outage).
- **SYMBOL** is “>” for a thermal constraint (see section 2.5).
- **CONTINGENCY** describes the network contingency, typically the trip of a line or transformer.
- **OVERLOAD** is the network equipment at risk of thermal overload.
- **DIRECTION** describes the direction of the thermal overload (RGN~ means “out of Regans” and RGN- means “into Regans”).

Other constraints follow this same naming convention where possible.

2.9 Network equipment naming convention

The naming convention for transmission lines is:

[7] Published on the WEM Congestion Information Resource.

[8] The ID of discretionary constraints starts with “#E” (or “DCCE” prior to 2nd May 2024).

AAA-BBB XY	(for two-ended lines)
AA-BB-CC XY	(for three-ended lines)
AAXY-ABC	(for a specific end of a three-ended line)

where the placeholders have the following meaning:

- **AAA**, **BBB**, and **CCC** are the names of the substations to which the line is connected.
- **ABC** is the abbreviation for a three-ended line (example “KCM” instead of “KW-CC-MED”).
- **X** is the voltage code (“9” for 330 kV, “X” for 220 kV, “8” for 132 kV, “7” for 66 kV).
- **Y** is a circuit number to ensure the line name is unique if there are multiple (typically “1”).

Other equipment is identified as follows:

- **Transformers** are identified using the substation code and a unique identifier separated by a space. For example, the “NBT T2” transformer is “Neerabup Terminal Transformer 2”.
- **Busbars** are identified using the substation code and a unique identifier separated with an underscore. The unique identifier starts with a voltage code. For example, the “PJR_8Y” busbar is the “Pinjar 132 kV Y” busbar.
- **Circuit breakers** are identified using the substation code and a unique identifier joined without any separation. The unique identifier starts with a voltage code. For example, “MUL810” is a 132 kV circuit breaker in the Mullaloo substation.
- **Special Protection Schemes** (also known as Network Reinforcement Schemes) are identified by a prefix of “SPS”. For example, “SPS_WWF” refers to the line-overload runback scheme of Walkaway Wind Farm. Short explanations of the schemes can be found within the constraint descriptions.

2.10 Grouping similar constraint IDs

For the purposes of this report, multiple constraint IDs have been grouped together if they represent the same Network Limit or one constraint is a renamed version of the other constraint. Reasons for multiple different IDs include:

- The name of a line changed. For example, “SHO-WLT 91” became “SHO-WLT-PMB 91” after PMB substation was commissioned and connected.
- The set of normally open points (Network equipment that is out-of-service in normal operation) changed. For example, MRT81-MNC was reclassified as a normally open point from Nov 2024 onwards so constraints with a system configuration of “MRT81-MNC” were renamed to have a system configuration of “NIL”.
- The “CVP0” version of a constraint (containing “CVP0”) also has a CVP of zero. These constraints don’t impact dispatch but indicate when an overload is typically managed by an action other than redispatch (for example, utilising network open points). If the appropriate action was determined in real-time to be redispatch, then the normal version of this constraint would have been invoked, or a discretionary constraint may have been created.
- The ordering of schemes is now alphabetical. For example, constraints containing “SPS_WWF, SPS_MGS” have been renamed to “SPS_MGS, SPS_WWF”.

3 Thermal constraints

This section summarises which thermal constraints bound and how frequently. The constraints are categorised into regions consistent with those used in the 2024 Transmission System Plan which contains transmission maps of each region. Only constraints that bound for at least 20 Dispatch Intervals have been included in this section.

3.1 North Region

The North Region covers the northern most part of the Perth metropolitan area, from Landsdale and Wangara in the south to Yanchep in the north, extending into northern rural areas via Pinjar and Muchea, and to Geraldton at the northern extremity of the Western Power transmission network.

Table 1 Top binding/violating thermal constraint in North Region

#	Constraint ID	System configuration	Binding/violating intervals	Total shadow price
1	NIL > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	System normal	2895	707637
2	NIL > {NBT-NT 91, SPS_MARNET} [JDP-WNO 81 (WNO~)]	System normal	422	344617
3	Off(SPS_MGS) > {MGA-TS 81} [TS-MBA 81 (MBA~)]	Network outage	415	65484
4	NIL > {PJR-ENB-EMD 81, PJR-CTB 81} [PJR-RGN 81 (RGN~)]	System normal[9]	259	50859
5	NIL > {NBT-NT 91, SPS_MARNET} [NBT-WNO 81 (NBT~)]	System normal	128	133882
6	MOR-MUC 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	Network outage	87	11286
7	NIL > {TS-MBA 81, SPS_MGS, SPS_WWF} [MGA-TS 81 (MGA~)] NIL > {TS-MBA 81, SPS_WWF, SPS_MGS} [MGA-TS 81 (MGA~)]	System normal	85	20068
8	NIL > {MGA-TS 81, SPS_MGS, SPS_WWF} [TS-MBA 81 (MBA~)] NIL > {MGA-TS 81, SPS_WWF, SPS_MGS} [TS-MBA 81 (MBA~)]	System normal	83	16374
9	NIL > {TST-TS 81} [PJR-RGN 81 (RGN~)]	System normal	56	3979
10	PJR-ENB-EMD 81, PJR-CTB 81 > {CTB-RGN 81} [ENB-TS 81 (ENB~)]	Network outage	54	9089
11	NIL > {PJR-CTB 81, PJR81-PEE} [PJR-RGN 81 (RGN~)]	Network outage[10]	51	1699
12	MOR-TS 81 > {PJR-CTB 81} [PJR-RGN 81 (RGN~)]	Network outage	43	13434
13	GLT-NT 91, NT T1, JDP-WNO 81, SPS_NTBUS > {NT-PJR 81, SPS_WWF} [HBK-MUC 81 (MUC~)]	Network outage	43	1578
14	PJR-YP 81 > {NBT-PJR 81, SPS_WWF} [HBK-MUC 81 (MUC~)]	Network outage	41	57533
15	MOR-TS 81 > {TST-TS 81} [PJR-RGN 81 (RGN~)]	Network outage	36	10849
16	NT T1, SPS_NTBUS > {NT T2} [NBT-WNO 81 (NBT~)]	Network outage	28	39360
17	PJR-YP 81 > {NBT-NT 91, SPS_MARNET} [NT-HBK 81 (HBK~)]	Network outage	26	2358
18	JDP-WNO 81 > {NT-PJR 81, SPS_WWF} [HBK-MUC 81 (MUC~)]	Network outage	22	333

[9] This constraint is a system normal constraint, but only invoked as part of "Cred(PJR-ENB-EMD 81, PJR-CTB 81)" set when the double contingency of PJR-ENB-EMD 81 and PJR-CTB 81 has been temporarily reclassified as credible, typically due to lightning in the vicinity.

[10] This is a constraint used during the network outage of circuit breaker PJR815, which caused the double contingency of PJR-CTB 81 and PJR81-PEE (PJR end of PJR-ENB-EMD 81 three-ended line) to be credible. This constraint has since been renamed to start with "PJR815" instead of "NIL" for clarity.

Constraints in rows #3, #7, and #8 are designed to manage southbound congestion through Three Springs. These constraints bind during periods of high generation in North Country. The remaining constraints manage to congestion from the North Region to the Metro North Region. These constraints bind during periods of high generation in the North Region, typically the result of high wind and solar availability.

3.2 South Region

The South Region covers the Great Southern and Southern West part of the Western Power transmission network. The west part of this region covers from Alcoa Pinjarra in the north to Augusta in south. The east part of the region extends from Muja Power Station to Manjimup and Beenup in the south-west, Albany to the south- east, Boddington to the north and Narrogin in the north-east.

Table 2 Top binding thermal constraints in South Region

#	Constraint ID	System configuration	Binding/violating intervals	Total shadow price
1	NIL > {MBR-ALB 81} [KOJ81-KAF (KOJ-)]	System normal	2369	389112
2	NIL > {WMK G501} [MU-NGS X1 (MU~)] MRT81-MNC > {WMK G501} [MU-NGS X1 (MU~)] MRT81-MNC > CVP0 {WMK G501} [MU-NGS X1 (MU~)] MRT-NOR-CNS 81 > {WMK G501} [MU-NGS X1 (MU~)]	System normal	650	8632312
3	NIL > {MRT-NOR-CNS 81} [MU-NGS X1 (MU~)] NIL > CVP0 {MRT-NOR-CNS 81} [MU-NGS X1 (MU~)]	System normal	610	460055
4	NIL > {MRS-MRT X1} [MU-NGS X1 (MU~)] MRT81-MNC > {MRS-MRT X1} [MU-NGS X1 (MU~)] MRT81-MNC > CVP0 {MRS-MRT X1} [MU-NGS X1 (MU~)] MRT-NOR-CNS 81 > {MRS-MRT X1} [MU-NGS X1 (MU~)]	System normal	602	2022338
5	NIL > {WMS G501} [MU-NGS X1 (MU~)] MRT81-MNC > {WMS G501} [MU-NGS X1 (MU~)] MRT81-MNC > CVP0 {WMS G501} [MU-NGS X1 (MU~)] MRT-NOR-CNS 81 > {WMS G501} [MU-NGS X1 (MU~)]	System normal	519	8485848
6	NIL > {PIC-PNJ-BSN-KEM 81} [PNJ-APJ 81 (APJ~)] NIL > CVP0 {PIC-PNJ-BSN-KEM 81} [PNJ-APJ 81 (APJ~)]	System normal	387	21315
7	NIL > {RO-WAI 81} [PNJ-APJ 81 (APJ~)] NIL > CVP0 {RO-WAI 81} [PNJ-APJ 81 (APJ~)]	System normal	159	29820
8	NIL > {BLD-WMS 81} [MU-NGS X1 (MU~)] MRT81-MNC > {BLD-WMS 81} [MU-NGS X1 (MU~)] MRT-NOR-CNS 81 > {BLD-WMS 81} [MU-NGS X1 (MU~)]	System normal	149	4272180
9	MU-NGS X1, MU BTT2, MU BTT3, Off(SPS_220TRIP), On(MRT81-MNC) > {MU BTT1} [PIC-MRR 81 (PIC-)]	Network outage	71	275414
10	NIL > {MU-KOJ 82} [MU-KOJ 81 (MU-)]	System normal	51	3002
11	NIL > {PKS GT3} [MU-NGS X1 (MU~)] MRT81-MNC > {PKS GT3} [MU-NGS X1 (MU~)]	System normal	35	1104000
12	MU-KOJ 81 > {MBR-ALB 81} [KOJ81-KAF (KOJ-)]	Network outage	35	1036
13	KW-KEM-OLY 91 > {PIC-PNJ-BSN-KEM 81} [PNJ-APJ 81 (APJ~)]	Network outage	23	8658

Constraints in rows #2, #3, #4, #5, #8, and #11 relate to the overload of MU-NGS X1 line. They limit power exported from Muja towards Eastern Goldfields (EGF) on the 220 kV line during periods of high EGF load and low wind and solar availability. The rating of this line was increased in May 2025; most intervals in which these constraints bound/violated

were prior the rating increase. Constraints for the prior outage of MRT-NOR-CNS 81 or MRT81-MNC (just the Merredin end of the same three-ended line) have been grouped with system normal constraints since MRT81-MNC was reclassified as a normally open point from Nov 2024 onwards.

Constraints in rows #1, #10, and #12 are associated with high wind generation in the Albany area.

Constraints in rows #6, #7, and #13 relate to overloads of PNJ-APJ 81 on loss of various lines. These constraints typically bind during high load around MH (Mandurah) and PNJ (Pinjarra) and limit the export of ALINTA_PNJ_U1 (and other Facilities to a lesser extent).

The constraint in row #9 limits flows from MRR (Marriot Road) towards PIC (Picton), which is associated with high regional loads. It typically limits the output of some regional generators but regularly violate due to low quantities of dispatchable generation in the region that could be used to relieve the overloads.

3.3 East Region

The East Region covers the network east of (and including) Sawyers Valley, through to Kondinin, Kalgoorlie and the Goldfields.

Table 3 Top binding thermal constraint in East Region

#	Constraint ID	System configuration	Binding/violating intervals	Total shadow price
1	NT-NOR 81 > {D-SVY 81} [MW-WUN 71 (WUN-)]	Network outage	41	794824
2	NOR-SVY 81 > {NT-NOR 81} [MW-WUN 71 (WUN-)]	Network outage	23	367995

Both constraints in Table 3 are invoked during outage of the 132kV network into Northam. The constraints manage southbound congestion through the 66kV network into Wundowie. This congestion can also be managed using an open point on the 66 kV subsystem between Cannington Terminal and Northam.

3.4 Metro North Region

The Metro North Region covers the northern extent of the Perth metropolitan area and is bound by coastal and western suburbs in the west, Malaga and North Beach in the north, and the eastern suburbs and foothills areas of Forrestfield and Darlington in the east.

No constraints bound for more than 20 intervals in this region.

3.5 Metro South Region

The Metro South Region covers a large area, including most of the urban Perth metropolitan networks south of the river, from the Cannington Terminal in the east to the Southern and South Fremantle Terminal towards the west. The region also covers the southern metropolitan coastal strip from Kwinana through to Rockingham and Mandurah and extends east to encompass the Pinjarra Substation.

Table 4 Top binding thermal constraint in Metro South Region

#	Constraint ID	System configuration	Binding/violating intervals	Total shadow price
1	EP-BTY 81 > {SF-AMT 81} [ST-EP 82 (ST~)]	Network outage	39	82389
2	NIL > {KW-CC-MED 81} [WM81-RWA (WM~)]	System normal	38	236850
3	KW-BIB 81, KW-SF 82 > {KW-ST 81} [CC81-KCM (CC-)]	Network outage	37	793
4	KW-SF 82 > {ST-SF 81} [KW-BIB 81 (KW~)]	Network outage	25	11215
5	KW-ST 81 > {KW-CC-MED 81} [KW-BIB 81 (KW~)]	Network outage	22	2721
6	ST-BTY 81, ST-EP 82 > {NT-EP-BEL 81} [SF-AMT 81 (SF~)]	Network outage	21	551887

Only the constraint in row #2 is applicable to system normal operation. All these constraints are driven by high generation in the Kwinana 132 kV and Mason Road areas.

3.6 East Perth/CBD Region

The East Perth and CBD Region covers the Perth CBD, the City of Subiaco and the City of Vincent.

No constraints in this region bound/violated for 20 intervals.

4 Non-thermal constraints

This section summarises which non-thermal constraint bound and how frequently. These constraints are designed to prevent WEMDE from issuing dispatch instructions that exceed Limit Advice provided by Western Power. Only constraints that bound for at least 20 Dispatch Intervals have been included in this section.

Table 5 Top binding non-thermal constraints

#	Constraint ID	System configuration	Binding/violating intervals	Total shadow price
1	MRT SR1-2 * LA28-LE84 {NIL} [Limit(INVESTEC_COLLGAR_WF1)]	Network outage	4453	519803
2	MRT SR1-2 * LA28-LE85 {NIL} [Limit(MERSOLAR_PV1)]	Network outage	4062	476534
3	NIL ^ LA3-LE8 {GTN-WWF 81} [TST-TS 81 (TS-), ENB-TS 81 (TS-), MOR-TS 81 (TS-)] NIL ^ LA3-LE8 {WWF-GTN 81} [TST-TS 81 (TS-), ENB-TS 81 (TS-), MOR-TS 81 (TS-)]	System normal	656	584731
4	SHO-PMB 91 ^ {LWT-SHO-KEM 91} [On(COLLIE_G1)] SHO-PMB 91 ^ {LWT-SHO-KEM 91} [VoltCollapse(BOD)]	Network outage	89	100047
5	NIL ^ LA3-LE9 {MGA-GTN 81} [TST-TS 81 (TS-), ENB-TS 81 (TS-), MOR-TS 81 (TS-)]	System normal	42	151451

Constraints in rows #1 and #2 limit INVESTEC_COLLGAR_WF1 and MERSOLAR_PV1 during an outage of one of the two saturated reactors at Merredin Terminal (MRT SR1 and MRT SR2). See Limit Advice #28 for more details.

Constraints in rows #3 and #5 are used to control the risk of post contingent short term voltage instability in North Country. When binding/violating they push up generation north of Three Springs. See Limit Advice #3 for more details.

Constraints in row #4 kept COLLIE_G1 on during a network outage.

5 Defined contingencies

5.1 Defined Supply Contingency Constraints

Defined Supply Contingency Constraints are constraints that allow WEMDE to calculate the size of the Largest Credible Supply Contingency (LCSC). WEMDE co-optimises LCSC and the Contingency Raise requirement, meaning the largest supply contingencies are curtailed if it's more cost efficient than procuring more Contingency Raise service.

Table 6 Summary of Defined Supply Contingency Constraints

Facility or Constraint ID	Constraint type	Intervals as largest contingency		Max contingency size[11] (MW)	Average[12] contingency size (MW)
NEWGEN_KWINANA_CCG1	Facility risk	49542	47.1%	404	293
COLLIE_G1	Facility risk	21198	20.2%	375	307
NIL * {NBT-NT 91, SPS_MARNET} [LargestContingency][13]	Network risk	17582	16.7%	434	282
BW2_BLUEWATERS_G1	Facility risk	11532	11.0%	330	252
BW1_BLUEWATERS_G2	Facility risk	9860	9.4%	330	249
COCKBURN_CCG1	Facility risk	8780	8.4%	330	251
BLW-SHO 91 * {MU-BLW 91} [LargestContingency][14]	Network risk	1898	1.8%	424	347
KWINANA_ESR2	Facility risk	1155	1.1%	353	271
ALINTA_WGP_U2	Facility risk	1096	1.0%	301	261
YANDIN_WF1	Facility risk	1056	1.0%	307	240

Table 6 shows Defined Contingencies that set the LCSC for at least 1% of intervals. Note that for about 20% of intervals multiple Defined Contingencies were equal largest, hence the percentage column totals to more than 100%.

5.2 Defined Load Contingency Constraints

Defined Load Contingency Constraints are constraints that allow WEMDE to calculate the size of the Largest Credible Load Contingency (LCLC). From 30th Oct 2025 onwards WEMDE co-optimises LCLC and the Contingency Lower requirement[15], meaning the largest load contingencies are curtailed if it's more cost efficient than procuring more Contingency Lower service.

Defined Load Contingency Constraints were not used until 30th Oct 2025 and there are none to report for the 2024-2025 Capacity Year.

[11] The contingency size includes the distributed photovoltaic (DPV) and loads expected to trip off following a fault at the location of the Facility, not just the output of the relevant Facility. For more information see the factsheet titled *Estimating Voltage-dependent DPV and Load Loss During Network Faults* available here.

[12] Averaged over the intervals in which the contingency was setting the Largest Credible Supply Contingency.

[13] The Facilities affected by this network contingency are YANDIN_WF1 and WARRADARGE_WF1.

[14] The Facilities affected by this network contingency are BW2_BLUEWATERS_G1 and BW1_BLUEWATERS_G2, the loss of both Facilities is credible during an outage of BLW-SHO 91.

[15] Release notes for WEMDE 3.2.0 are available at https://www.aemo.com.au/energy-systems/market-it-systems/it-change-and-release-management

6 Other constraints

This section summarises all library constraints that are not covered in the previous sections.

6.1 Network unavailability

These constraints set a Facility's setpoint to 0 MW to ensure WEMDE does not dispatch Facilities that are disconnected during network outages or are otherwise not allowed to generate such as due to risk of protection maloperation. Only Facilities constrained for at least 20 intervals are shown.

Table 7 Top binding network unavailability constraints

Facility	Constraint ID	Binding/ violating intervals	Total shadow price
ALINTA_WGP_GT	WGP-LWT 91 * {NIL} [Off(ALINTA_WGP_GT)]	6133	783322
SBSOLAR1_CUNDERDIN_PV1	MRT-NOR-CNS 81 * {NIL} [Off(SBSOLAR1_CUNDERDIN_PV1)] MU-NGS X1, MU BTT2, MU BTT3, Off(SPS_220TRIP), On(MRT81-MNC) * {NIL} [Off(SBSOLAR1_CUNDERDIN_PV1)] NIL, On(MRT81-MNC) * {NIL} [Off(SBSOLAR1_CUNDERDIN_PV1)] NOR-SVY 81, NOR T5, NOR T1, NOR-WUN 71, NOR808 * {NIL} [Off(SBSOLAR1_CUNDERDIN_PV1)] On(MRT81-MNC) * {NIL} [Off(SBSOLAR1_CUNDERDIN_PV1)]	5498	1108433521
COLLIE_G1	CPS-SHO 91 * {NIL} [Off(COLLIE_G1)]	5005	1347789
NAMKKN_MERR_SG1	MDP-MRT 81 * {NIL} [Off(NAMKKN_MERR_SG1)] MU-NGS X1, MU BTT2, MU BTT3, Off(SPS_220TRIP), On(MRT81-MNC) * {NIL} [Off(NAMKKN_MERR_SG1)]	3873	1049582400
KWINANA_ESR1	KW-KWB 92 * {NIL} [Energy(KWINANA_ESR1)]	3866	1274791065
GREENOUGH_RIVER_PV1	MGA-MGS 81 * {NIL} [Off(GREENOUGH_RIVER_PV1)]	3325	33662961
PERTHENERGY_KWINANA_GT1	MSR-KND 81 * {NIL} [Off(PERTHENERGY_KWINANA_GT1)]	1633	398307814
YANDIN_WF1	NBT-YDT 91, SPS_MARNET * {NIL} [Off(YANDIN_WF1)] YDW-YDT 91 * {NIL} [Off(YANDIN_WF1)]	1304	430320000
INVESTEC_COLLGAR_WF1	MU-NGS X1, MU BTT2, MU BTT3, Off(SPS_220TRIP), On(MRT81-MNC) * {NIL} [Off(INVESTEC_COLLGAR_WF1)]	1276	421080000
WARRADARGE_WF1	NBT-YDT 91, SPS_MARNET * {NIL} [Off(WARRADARGE_WF1)]	1023	337590000
COLLIE_BESS2	SHO-WLT-PMB 91, SPS_BGM * {NIL} [Energy(COLLIE_BESS2)]	932	108794
TESLA_NORTHAM_G1	MRT-NOR-CNS 81, NOR-SVY 81 * {NIL} [Off(TESLA_NORTHAM_G1)] MRT-NOR-CNS 81, NT-NOR 81 * {NIL} [Off(TESLA_NORTHAM_G1)] NOR-SVY 81, NOR T5, NOR T1, NOR-WUN 71, NOR808 * {NIL} [Off(TESLA_NORTHAM_G1)]	416	22401497
TESLA_GERALDTON_G1	WWF-GTN 81, GTN-RAN 81 * {NIL} [Off(TESLA_GERALDTON_G1)]	405	133650000
COLLIE_ESR1	SHO-PMB 91 * {NIL} [Off(COLLIE_ESR1)]	207	45388289
KEMERTON_GT11	KMP-KEM 91 * {NIL} [Off(KEMERTON_GT11)]	179	80418
KEMERTON_GT12	KMP-KEM 91 * {NIL} [Off(KEMERTON_GT12)]	179	101481
MUNGARRA_GT1	MGA T1 * {NIL} [Off(MUNGARRA_GT1)]	168	87445
BADGINGARRA_WF1	BGA-ENB 81, CTB-EMD-BGA 81 * {NIL} [Off(BADGINGARRA_WF1)]	127	28117800

Facility	Constraint ID	Binding/ violating intervals	Total shadow price
ALINTA_WGP_U2	WGP-LWT 92 * {NIL} [Off(ALINTA_WGP_U2)]	100	16371
MERSOLAR_PV1	MU-NGS X1, MU BTT2, MU BTT3, Off(SPS_220TRIP), On(MRT81-MNC) * {NIL} [Off(MERSOLAR_PV1)]	90	29700000

Table 7 shows the longest duration of outage was associated with Alinta Wagerup which was disconnected for a total of 21 days due outage of a 330kV circuit between Wagerup and Landwehr Terminal.

6.2 Island constraints

These constraints prevent WEMDE from adjusting a Facility's dispatch when the Facility is operating in an island. They effectively allow a Facility's dispatch to be managed manually or through isochronous control, hence "Manual" in the constraint ID. Further constraints prevent WEMDE from procuring ESS from islanded Facilities (only required if the Facility is accredited for ESS).

Table 8 Top binding island constraints

Constraint ID	Binding/violating intervals	Total shadow price
MSR-KMK 81 * {NIL} [Manual(TIWEST_COG1)]	7012	1167758619
MSR-KMK 81 * {NIL} [RegLower(TIWEST_COG1)]	7012	7315873200
MSR-KMK 81 * {NIL} [RegRaise(TIWEST_COG1)]	7012	7315873200
Island(EGF) * {NIL} [Manual(STHRNCRS_EG)]	1417	53248350
Island(EGF) * {NIL} [Manual(PRK_AG)]	1417	486002709
Island(EGF) * {NIL} [Manual(WEST_KALGOORLIE_GT2)]	1417	17336143
Island(EGF) * {NIL} [Manual(WEST_KALGOORLIE_GT3)]	1417	5637167584

The "Island(EGF)" constraints bound during islanding of Eastern Goldfields (disconnected at West Kalgoorlie substation). "MSR-KMK 81" constraints were used during islanding of the Tiwest Pigment Plant (disconnected between Mason Road and Kerr McGee Kwinana substations).

6.3 Anti-islanding constraints

These constraints turn off Facilities due to the risk of a single contingency causing an uncontrolled island. There is no risk of uncontrolled island where a Facility has adequate anti-islanding protection, which is typical of newer Facilities. Only Facilities that were constrained for at least 20 intervals are reported in this section.

Table 9 Top binding anti-islanding constraints

Facility	Constraint ID	Binding/violating intervals	Total shadow price
NAMKKN_MERR_SG1	MRT T2 * {MRT T1} [Island(NAMKKN_MERR_SG1)]	20489	1343657866
ALINTA_WWF	MGA-GTN 81 * {MGA-WWF 81} [Island(ALINTA_WWF)] MGA-MBA 81 * {MGA-TS 81} [Island(ALINTA_WWF)] MGA-WWF 81 * {MGA-GTN 81} [Island(ALINTA_WWF)] TS-MBA 81 * {MGA-TS 81} [Island(ALINTA_WWF)]	3296	1241997440

Facility	Constraint ID	Binding/violating intervals	Total shadow price
ALCOA_WGP	SNR-WGP-APJ 81 * {WGP-WOR 81} [Island(ALCOA_WGP)]	101	22470000

Table 9 shows NAMKKN_MERR_SG1 was curtailed for a total of 71 days due to an extended transformer outage at Merredin Terminal. ALINTA_WWF was curtailed for a total of 11 days due to various outages in North Country. The curtailment of ALCOA_WGP was applied during a short outage of the SNR-WGP-APJ three ended line.

6.4 Communication outage constraints

These constraints prevent WEMDE from adjusting the setpoint of a Facility during a communication outage (similar to the "Manual" constraints in section 6.2). Further constraints prevent WEMDE from procuring Regulation Raise/Lower from the Facilities during the communicates outage (only required if the Facility is accredited for regulation). Only constraints that bound for at least 20 Dispatch Intervals have been included in this section.

Table 10 Top binding communications outage constraints

Constraint ID	Binding/violating intervals	Total shadow price
NoComms(TIWEST_COG1) * {NIL} [Manual(TIWEST_COG1)]	20489	3673
NoComms(TIWEST_COG1) * {NIL} [RegLower(TIWEST_COG1)]	24	7920000
NoComms(TIWEST_COG1) * {NIL} [RegRaise(TIWEST_COG1)]	24	7920000

The constraint in Table 10 were invoked to manage the outage communications with Kerr McGee Kwinana substation.

6.5 Commitment constraints

Table 11 shows library constraints used to direct a Facility to:

a) synchronise for the purpose of providing RoCoF Control Service (RCS)[16], or

b) to ensure a minimum level of Injection from a Facility[17].

Constraint for (a) were initially labelled with "RCS" but renamed to "NetworkCommit". Constraints for (b) are either labelled with "NetworkCommit" if used to direct a single Facility to synchronise or "AvoidDecommit" if used to ensure every synchronised Facility remains online during a Low Reserve Condition Declaration.

Table 11 Top binding commitment constraints

Facility	Constraint ID	Binding/ violating intervals	Total shadow price
PINJAR_GT11	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT11)] NetworkCommit(PINJAR_GT11) * {NIL} [On(PINJAR_GT11)]	5342	203879321
PINJAR_GT9	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT9)] NetworkCommit(PINJAR_GT9) * {NIL} [On(PINJAR_GT9)]	2810	95704531

[16] See ESM Rule 7.7.8A(a)

[17] See ESM Rule 7.7.8A(b)

Facility	Constraint ID	Binding/ violating intervals	Total shadow price
ALINTA_WGP_GT	NetworkCommit(ALINTA_WGP_GT) * {NIL} [On(ALINTA_WGP_GT)] RCS(ALINTA_WGP_GT) * {NIL} [On(ALINTA_WGP_GT)]	2139	88257832
PINJAR_GT10	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT10)] NetworkCommit(PINJAR_GT10) * {NIL} [On(PINJAR_GT10)]	2039	20505479
ALINTA_WGP_U2	AvoidDecommit(WetCompression) * {NIL} [On(ALINTA_WGP_U2_WetCompression)] NetworkCommit(ALINTA_WGP_U2) * {NIL} [On(ALINTA_WGP_U2)] RCS(ALINTA_WGP_U2) * {NIL} [On(ALINTA_WGP_U2)]	1768	35833461
NEWGEN_KWINANA_CCG1	NetworkCommit(NEWGEN_KWINANA_CCG1) * {NIL} [On(NEWGEN_KWINANA_CCG1)] NetworkCommit(NEWGEN_KWINANA_CCG1_SteamBypass) * {NIL} [On(NEWGEN_KWINANA_CCG1)] RCS(NEWGEN_KWINANA_CCG1) * {NIL} [On(NEWGEN_KWINANA_CCG1)] RCS(NEWGEN_KWINANA_CCG1, SteamBypass) * {NIL} [On(NEWGEN_KWINANA_CCG1)]	1303	11932719
PINJAR_GT4	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT4)] NetworkCommit(PINJAR_GT4) * {NIL} [On(PINJAR_GT4)] RCS(PINJAR_GT4) * {NIL} [On(PINJAR_GT4)]	499	19214158
PINJAR_GT1	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT1)] NetworkCommit(PINJAR_GT1) * {NIL} [On(PINJAR_GT1)]	420	11961020
PINJAR_GT3	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT3)] NetworkCommit(PINJAR_GT3) * {NIL} [On(PINJAR_GT3)]	386	17730970
PRK_AG	AvoidDecommit(SWIS) * {NIL} [On(PRK_AG)] NetworkCommit(PRK_AG) * {NIL} [On(PRK_AG)]	362	117403579
PINJAR_GT7	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT7)] NetworkCommit(PINJAR_GT7) * {NIL} [On(PINJAR_GT7)]	331	11312582
KEMERTON_GT11	NetworkCommit(KEMERTON_GT11) * {NIL} [On(KEMERTON_GT11)]	261	21469200
PINJAR_GT2	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT2)] NetworkCommit(PINJAR_GT2) * {NIL} [On(PINJAR_GT2)] RCS(PINJAR_GT2) * {NIL} [On(PINJAR_GT2)]	225	7905563
PINJAR_GT5	AvoidDecommit(SWIS) * {NIL} [On(PINJAR_GT5)] NetworkCommit(PINJAR_GT5) * {NIL} [On(PINJAR_GT5)]	200	4494913
NAMKKN_MERR_SG1	AvoidDecommit(SWIS) * {NIL} [On(NAMKKN_MERR_SG1)] NetworkCommit(NAMKKN_MERR_SG1) * {NIL} [On(NAMKKN_MERR_SG1)]	147	36345488
TESLA_PICTON_G1	AvoidDecommit(SWIS) * {NIL} [On(TESLA_PICTON_G1)]	121	38672035
KWINANA_GT2	AvoidDecommit(SWIS) * {NIL} [On(KWINANA_GT2)] NetworkCommit(KWINANA_GT2) * {NIL} [On(KWINANA_GT2)]	80	4087090
KWINANA_GT3	AvoidDecommit(SWIS) * {NIL} [On(KWINANA_GT3)] NetworkCommit(KWINANA_GT3) * {NIL} [On(KWINANA_GT3)]	70	4087218
KEMERTON_GT12	NetworkCommit(KEMERTON_GT12) * {NIL} [On(KEMERTON_GT12)]	49	7993220
ALCOA_WGP	AvoidDecommit(SWIS) * {NIL} [On(ALCOA_WGP)]	29	24162128
NEWGEN_NEERABUP_GT1	NetworkCommit(NEWGEN_NEERABUP_GT1) * {NIL} [On(NEWGEN_NEERABUP_GT1)]	29	4217624
TESLA_GERALDTON_G1	AvoidDecommit(SWIS) * {NIL} [On(TESLA_GERALDTON_G1)]	20	9947

6.6 Miscellaneous constraints

Table 12 shows library constraints that bound/violated but do not fit in any of the above categories. A description of the intent of the constraint is included in the table. Only constraints that bound for at least 20 Dispatch Intervals have been included in this section.

Table 12 Top binding miscellaneous constraints

Constraint ID[18]	Description	Binding/ violating intervals	Total shadow price
NIL * {NIL} [InjectionLimit(KWINANA_ESR1)]	Avoid system security issues associated with clearing for energy and ESS that cannot be met based on current state of charge of KWINANA_ESR1.	11981	1776884069
NIL * {NIL} [WithdrawalLimit(KWINANA_ESR1)]		9013	938952
NIL * {Partial(SIMCOA_IPT_LD_01)} [ContingencyRaise]	Limit Contingency Raise cleared by SIMCOA_IPT_LD_01 based on its current withdrawal.	4033	518546
NIL * {SHO-WLT-PMB 91, SPS_BGM} [LoadContingency] NIL * {SHO-WLT-PMB 91} [LoadContingency]	Prevent load contingency from exceeding the allowable limit for the Largest Credible Load Contingency (LCLC).	2456	724054
NIL * {KWINANA_ESR2} [LoadContingency]		2358	604629
NIL * {SHO-WLT-PMB 91, SPS_BGM} [RocofLimit]	Prevent load contingency from exceeding the RoCoF Safe Limit.	1684	44493
NIL * {KWINANA_ESR2} [RocofLimit]		186	4716
NIL * {KWINANA_ESR1} [SelfCovering]	Prevent batteries from providing Contingency Lower service to cover their own load contingency by limiting the battery's withdrawal when it's close to being the Largest Credible Load Contingency.	10551	116079729
NIL * {KWINANA_ESR2} [SelfCovering]		16862	370129324
NIL * {COLLIE_ESR1} [SelfCovering]		4958	481350346
Manual(MGA) * {NIL} [Manual(MUNGARRA_GT1)]	Prevent WEMDE from adjusting the setpoint of Mungarra units when they are under manual control.	430	11334731
Manual(MGA) * {NIL} [Manual(MUNGARRA_GT3)]		430	11316449
NIL * {NIL} [HoldPt0Withdrawal(KWINANA_ESR2)]	Apply limits to KWINANA_ESR2 to assist with commissioning.	49	15188
NIL * {NIL} [HoldPt1Injection(KWINANA_ESR2)]		45	25015
NIL * {NIL} [HoldPt1Withdrawal(KWINANA_ESR2)]		60	23877
NIL * {NIL} [HoldPt2Injection(KWINANA_ESR2)]		22	19795
NIL * {NIL} [HoldPt2Withdrawal(KWINANA_ESR2)]		23	12193

Constraints with "[LoadContingency]", "[RocofLimit]", and "[SelfCovering]" are no longer relevant; version 3.2.0 of WEMDE[19] released on 30th Oct 2025 dynamically co-optimises the Largest Credible Load Contingency with the Contingency Lower requirement.

[18] Refer to the Constraints Library on the Congestion Information Resource for a description of each constraint.

[19] Release notes are available at https://www.aemo.com.au/energy-systems/market-it-systems/it-change-and-release-management

7 Discretionary constraints

Discretionary constraints are temporary constraints created by AEMO's control room in real-time. Such constraints typically affect a single Facility (for example "PRK_AG >= 1 MW")[20]. Only Facilities that were constrained for at least 20 intervals are reported in this section.

7.1 Facilities constrained up

There are two instances where a Facilities is constrained **up** by discretionary constraints:

- applying a lower limit (FACILITY.energy.setpoint >= VALUE); or
- setting a Facility's setpoint to a specific value (FACILITY.energy.setpoint = VALUE) in intervals where the Facility would have been dispatched lower.

Table 13 Facilities commonly constrained up with discretionary constraints

Facility	Binding/violating intervals	Number of discretionary constraints created	Total shadow price
MUJA_G6	1140	7	94291025
PRK_AG	289	11	68920982
NAMKKN_MERR_SG1	223	13	91459240
TESLA_KEMERTON_G1	128	3	122311484
TESLA_PICTON_G1	125	4	113634419
ALINTA_WGP_U2	63	3	50601
COLLIE_G1	57	2	874671
TESLA_GERALDTON_G1	49	2	26502480
KEMERTON_GT12	47	2	1025889
KWINANA_GT2	45	2	628
KEMERTON_GT11	43	2	8745526
TESLA_NORTHAM_G1	28	1	23346027
KWINANA_ESR1	26	3	2270882
KWINANA_ESR2	25	7	7288472
ALINTA_WGP_GT	24	5	9956170

7.2 Facilities constrained down

There are two instances where a Facilities is constrained **down** by discretionary constraints:

[20] Discretionary constraints that affect multiple Facilities (for example "KEMERTON_GT12 + KEMERTON_GT11 <= 0MW") have been counted towards the totals of each Facility.

- applying an upper limit (FACILITY.energy.setpoint <= VALUE); or
- setting a Facility's setpoint to a specific value (FACILITY.energy.setpoint = VALUE) in intervals where the Facility would have been dispatched higher.

Table 14: Facilities commonly constrained down with discretionary constraints

Facility	Binding/violating intervals	Number of discretionary constraints	Total shadow price
GRASMERE_WF1	1615	6	136062316
BW1_BLUEWATERS_G2	1070	4	460097
MERSOLAR_PV1	991	2	5208505189
TESLA_KEMERTON_G1	971	1	3582990000
PINJAR_GT5	663	1	3646500000
GREENOUGH_RIVER_PV1	625	9	2945190407
SBSOLAR1_CUNDERDIN_PV1	600	13	2223209503
MWF_MUMBIDA_WF1	529	8	2552049335
ALBANY_WF1	481	7	256864907
BW2_BLUEWATERS_G1	446	4	261013908
TESLA_GERALDTON_G1	397	4	2183500000
PINJAR_GT2	352	1	1298880000
KWINANA_ESR2	261	12	252839272
ALCOA_WGP	233	3	1180500000
ALINTA_WWF	147	5	583001345
KWINANA_GT2	114	9	245857528
ALINTA_PNJ_U1	109	4	49563158
INVESTEC_COLLGAR_WF1	104	6	360941596
TESLA_NORTHAM_G1	73	2	376500000
MUNGARRA_GT3	61	3	140018209
KWINANA_GT3	54	8	177138958
MUNGARRA_GT1	53	2	140018097
NORTHAM_SF_PV1	50	1	250000000
ALINTA_PNJ_U2	47	3	242210000
STHRNCRS_EG	45	1	57171910
PINJAR_GT4	43	2	160480000
COLLIE_BESS2	39	4	1131451
COCKBURN_CCG1	38	6	79667618
WARRADARGE_WF1	27	1	2843
ALINTA_WGP_U2	25	5	48357026
WEST_KALGOORLIE_GT3	24	2	99006923
NEWGEN_KWINANA_CCG1	23	1	19350360

8 Recent changes

This section summaries changes that have occurred since the beginning of this reporting period (Oct 2024) to help explain changes in the patterns of Network congestion observed during the 2024-25 Capacity Year.

8.1 Changes to the Network

8.1.1 Clean Energy Link – East Enhancements

Western Power has upgraded several lines to increase the transfer capacity on the 220 kV line between Muja and West Kalgoorlie. The following dates specify when the increased line ratings were operational in constraints:

- Increased rating of the Muja to Narrogin South 220 kV line in May 2025
- Increased rating of the Narrogin South to Kondinin 220 kV line in June 2025
- Increased rating of the Kondinin to Merredin Terminal 220 kV line in July 2025
- Increased rating of the Merredin Terminal to Collgar Terminal 220 kV line in Oct 2025

8.1.2 Open point at Merredin Terminal

Since November 2024, the Merredin end of the 132 kV between Merredin Terminal, Northam, and Cunderdin (MRT-NOR-CNS 81) has been used as an open point (disconnected) to facilitate the connection of SBSOLAR1_CUNDERDIN_PV1[21]. This open point contributes to Network congestion on the 220 kV line between Muja and Narrogin South (MU-NGS X1) if used during periods of low wind and solar availability, since all the Eastern Goldfields' load must be supplied solely via the MU-NGS X1 line.

8.2 Changes to generation

- **SBSOLAR1_CUNDERDIN_PV1:** 100 MW solar and battery project between Merredin Terminal and Northam, completed commissioning during 2024-25 Capacity Year.
- **KWINANA_ESR2:** 225 MW battery at Kwinana 330 kV, completed commissioning during 2024-25 Capacity Year.
- **PHOENIX_KWINANA_WTE_G1:** 43 MW Waste to Energy project in Kwinana, completed commissioning during 2024-25 Capacity Year.
- **COLLIE_BESS2:** 300 MW battery at Palmer BESS substation near Shotts substation, completed commissioning during 2024-25 Capacity Year.
- **MUJA_G6:** 194 MW coal Facility, retired during the 2024-25 Capacity Year.
- **COLLIE_ESR4 and COLLIE_ESR5:** Two 250 MW batteries near Shotts substation, both have completed commissioning this Capacity Year (2025-26).

[21] See Non-Thermal Limit Advice #32

9 Future changes

This section summarises future changes that are likely to affect Network congestion, such as Network augmentations, the commissioning of new Facilities, decommissioning of retiring Facilities, and changes to the demand profile.

9.1 Changes to the Network

9.1.1 Clean Energy Link – North

Clean Energy Link – North Region[22] is a collection of several committed transmission network projects that increase transmission capacity in the Wheatbelt and Mid-West. The program's target completion date is 2027, however the various components of the program each have their own timelines and staging with complex interdependencies.

- **Upgrades to strengthen the 330 kV connection from North Terminal to Three Springs Terminal**. This will significantly increase the capacity to transfer power from north to Perth metro.
- **Reconfigure the 132 kV network around Three Springs**. This includes decommissioning the 132 kV line to Eneabba and commissioning a second line to Three Springs. This reduces the amount that Facilities north of Three Springs contribute to the north-to-south congestion on the 132 kV network around Eneabba, Cataby, and Badgingarra.
- **Reconfigure the 132 kV network such that Mullaloo, Edgewater, Joondalup, and Wanneroo are supplied radially from Neerabup Terminal**. This prevents any generation contributing to congestion in the area, particularly Facilities in North Region during periods of high wind availability.
- **Reconfigure network around Regans so that it's supplied radially from the 330 kV network**. This prevents congestion on the 132 kV lines supplying Regans, such as PJR-RGN 81.
- **Upgrades to the 132 kV network between NBT and ENT**. This strengthens the network in the area.

9.1.2 Clean Energy Link program

Phase One, Phase Two, and Phase Three of Western Power's Clean Energy Link program contain a series of uncommitted projects at various stages of planning and scoping. Phase One projects focus on connecting new generation capacity and includes the following projects:

- **Clean Energy Link – East Stage One:** creation of a new terminal substation linked with new double circuit 330 kV lines to both Muja Terminal and Shotts Terminal.

[22] More information can be found here: https://www.westernpower.com.au/resources-education/our-network-the-grid/future-of-the-grid/clean-energy-link-program/clean-energy-link-north/.

- **Clean Energy Link – Kwinana Strengthening Stage One:** creation of Mason Road Terminal, a new substation adjacent to Mason Road, and new double circuit 132 kV lines from the substation to Medina and to Rockingham, and a new double circuit 132 kV line between Medina and Rockingham.
- **Clean Energy Link – Kwinana Strengthening Stage Two:** new double circuit 330 kV lines from the new Mason Road Terminal substation to the existing Kwinana-Kemerton-Oakley 330 kV line and the existing Kwinana-Northern Terminal 330 kV line.
- **Augmentation – Coolangatta Industrial Estate (Collie Just Transition):** a new 330 kV line from Shotts Terminal to a new Terminal near Coolangatta to connect industrial loads.
- **Augmentation – Kemerton Strategic Industrial Area:** expansion of the existing Kemerton Terminal substation, including a transformer replacement and the creation of a new substation linked with new double circuit 132 kV lines to both Kemerton Terminal and Bunbury Harbour substation.

Further details of Phase One projects and information about Phase Two and Phase Three can be found in the 2025 Transmission System Plan.

9.1.3 Open point at Merredin Terminal

The open point at Merredin Terminal is scheduled to be replaced by a dynamic decoupling scheme whereby the Merredin end of the MRT-NOR-CNS 81 line will be closed by default but will automatically open when flow on either the Merredin or the Northam end reaches the line rating.

9.1.4 Dynamic Line Ratings

AEMO is aware that Western Power is in the process of implementing Dynamic Line Ratings (DLR). This is likely to reduce congestion during evening periods (after sunset) when the lower ambient temperatures and lower direct solar irradiance allow for higher power flows.

9.2 Changes to Generation

The following are future changes to generation that are expected to occur in the next two years. This list is not comprehensive but is provided as a guide for projects to consider when modelling future Network congestion. Projects with a nameplate capacity under 9 MW have been excluded.

- **ALINTA_WGP_ESR1:** New battery at Landwehr Terminal, holds 100 MW of Capacity Credits for the 2026-27 Capacity Year.
- **ARROWSMITH_EAST_G1:** New gas plant between Three Springs and Mumbida substations, holds 85 MW of Capacity Credits for the 2026-27 Capacity Year.
- **MERREDIN_ESR1:** New battery at Merredin Terminal, holds 94.5 MW of Capacity Credits for the 2026-27 Capacity Year.
- **PERTHENERGY_KWINANA_GT2:** A new gas generator at Kwinana Donaldson Road substation (connected to Mason Road substation), holds 176 MW of capacity Credits for the 2027-28 Capacity Year.
- **MUCHEA_ESR1:** A new battery connected at Muchea, holds 150 MW of Capacity Credits for the 2027-28 Capacity Year.

- **WAROONA_PV1:** A new solar and battery hybrid Facility connected at Landwehr Terminal, holds 88 MW of Capacity Credits for the 2027-28 Capacity Year.
- **WADDI_WF1:** A new approximately 100 MW wind farm connected on the 132 kV three-ended line between Pinjar, Emu Downs and Eneabba, holds 18 MW of Capacity Credits for the 2027-28 Capacity Year.
- **KING_ROCKS_WF1:** A new approximately 100 MW wind farm connected on the 132 kV line between Kondinin and Bounty substations, holds 17 MW of Capacity Credits for the 2027-28 Capacity Year.
- **NOR_ESR1:** A new battery connected at Northam substation, holds 9.9 MW of Capacity Credits for the 2027-28 Capacity Year. It replaces TESLA_NORTHAM_G1, an existing 10 MW distillate Facility at the same location.
- **GER_ESR1:** A new battery connected at Geraldton substation, holds 9.999 MW of Capacity Credits for the 2027-28 Capacity Year. It replaces TESLA_GERALDTON_G1, an existing 10 MW distillate Facility at the same location.
- **TESLA_KEMERTON_G2 and TESLA_KEMERTON_G3:** Two new distillate Facilities at Marriott Road substation, each hold 9.999 MW of Capacity Credits for the 2027-28 Capacity Year.

9.3 Changes to Load

The 2025 WEM Electricity Statement of Opportunities (WEM ESOO) has forecast a significant growth in peak demand over the next few years, from an observed peak demand of 4,486 MW in the 2024-25 Capacity Year to a forecast peak (10% POE) of 4,938 MW in the 2028-29 Capacity Year. The higher peak loads are likely to contribute to Network congestion, particularly in areas where the congestion is primarily driven by load.