Energy Security Target Monitor Report

October 2024

A report for the New South Wales Minister for Energy

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

This Energy Security Target Monitor report is provided to the New South Wales Minister for Energy by AEMO, the energy security target monitor appointed under section 59 of the *Electricity Infrastructure Investment Act 2020* (NSW), under section 13 of that Act. It is not intended to be used or relied on for any purpose other than as contemplated by that legislation.

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Modelling work performed as part of preparing this publication inherently requires assumptions about future behaviours and market interactions, which may result in forecasts that deviate from future conditions. There will usually be differences between estimated and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material.

This publication does not include all of the information that an investor, participant or potential participant in the National Electricity Market might require and does not amount to a recommendation of any investment.

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Version control

Version	Release date	Changes
1	28/10/2024	Confidential publication for the Minister for Energy
2	10/12/2024	Final publication for release

Executive summary

The Energy Security Target (EST) Monitor Report assesses whether forecast firm electricity generation capacity in New South Wales is sufficient to meet the energy security target (EST), which is calculated in accordance with the *Electricity Infrastructure Investment Act 2020* (NSW)[1] and the *Electricity Infrastructure Investment Regulation 2021* (NSW)[2] for each of the next 10 financial years.

The EST sets the target electricity generation capacity required to meet forecast New South Wales maximum consumer demand in summer, with a reserve to account for the unexpected loss of the two largest generating units in the state. The assessment used scenarios and sensitivities and inputs from AEMO's 2024 *Electricity Statement of Opportunities* (ESOO)[3], *2024 ISP Inputs and Assumptions workbook*[4], 2024 *Forecasting Assumptions Update*[5], and 2024 *Integrated System Plan* (ISP)[6].

Figure 1 shows the firm capacity projected against the EST for a combination of demand and supply resources identified in the 2024 ESOO, considering the firm capacity provided by each project. Firm capacity includes the capacity from generation, storage, interconnector, and demand flexibility sources likely to be available to supply New South Wales electricity customers during times of summer peak demand. The *Committed and Anticipated Investments* sensitivity examined in this assessment includes existing, in-commissioning, committed and anticipated generation, storage and transmission projects, as classified according to AEMO's commitment criteria, as well as committed investments in demand flexibility and consumer batteries that are coordinated to minimise investment needs in utility-scale solutions.

To reflect uncertainty in the commissioning schedule for anticipated projects, this assessment assumed a delay to the full commercial use date provided by participants[7]. It applies the Step Change demand scenario and was used for AEMO's reliability forecast and indicative reliability forecast in the 2024 ESOO, and is equivalent to the 'Central' scenario in the 2023 EST Monitor report.

The figure demonstrates that sufficient firm capacity is forecast to be available until 2027-28 following the advised retirement of Eraring Power Station but before key transmission projects are assumed to commission. Between 2028-29 and 2032-33, a surplus of firm capacity is again forecast due to the assumed commissioning of numerous new generators, storages and transmission projects. A second breach of the EST is forecast in the 2033-34 financial year following the advised retirements of both Vales Point and Bayswater power stations.

[1] At https://www.legislation.nsw.gov.au/view/html/inforce/current/act-2020-044#pt.3.

[2] At https:/legislation.nsw.gov.au/view/whole/html/inforce/current/sl-2021-0102.

[3] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf?la=en.

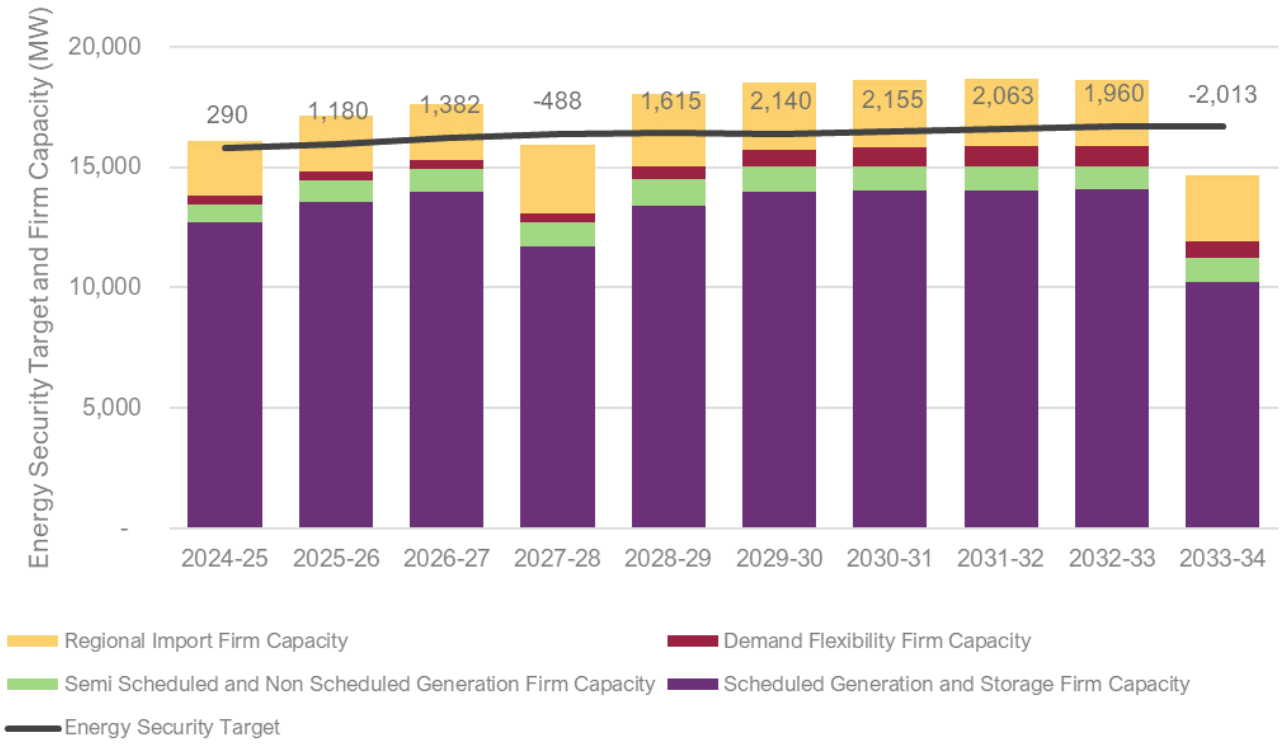
[4] At https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-isp-inputs-and-assumptions-workbook.xlsx?la=en.

[5] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-forecasting-assumptions-update-workbook.xlsx?la=en.

[6] At https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-integrated-system-plan-isp.pdf?la=en.

[7] See Section 4.1.1 at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf.

Figure 1 ***Committed and Anticipated Investments*** **sensitivity, assessment of the EST**



This 2024 EST Monitor Report includes a number of additional sensitivities to explore the impacts of alternative assumptions. These sensitivities demonstrate that the most impactful variable on the 2027-28 EST breach include:

- Demand growth (using alternative demand scenarios and/or growth in emerging data centre loads).
- Availability of flexible demand (with increased coordination of consumer energy resources, and demand side participation).
- Timing of the delivery of transmission projects.

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1 Introduction

The Energy Security Target Monitor Report explains how the EST is calculated in accordance with the *Electricity Infrastructure Investment Act 2020* (NSW)[8] (the EII Act) and the *Electricity Infrastructure Investment Regulation 2021* (NSW)[9] (the EII Regulation) for each of the next 10 financial years, and assesses whether forecast firm electricity generation capacity in New South Wales is sufficient to meet the EST over that period.

The EST is the target capacity required to meet forecast New South Wales maximum consumer demand for electricity in summer (measured using a 10% probability of exceedance[10] (POE)), with a reserve to account for the unexpected loss of the two largest generating units in the state.

AEMO produces this 2024 EST Monitor Report as the EST Monitor appointed under section 59 of the EII Act. The role and functions of the EST Monitor are defined in the EII Act and the EII Regulation. As EST Monitor, AEMO provides a forecast of the EST and any projected breach of the EST (target breach) for each of the next 10 financial years, calculated consistently with the EII Act and the EII Regulation.

For the purposes of section 14(2) of the EII Act, in AEMO's opinion, this report does not contain information the disclosure of which could reasonably be expected to:

(a) diminish the competitive commercial value of the information to the person who provided the information to AEMO, or

(b) prejudice the legitimate business, commercial, professional or financial interests of the person who provided the information to AEMO.

In September 2024 the EII Regulation was amended[11], resulting in some changes to how the EST is calculated:

- Clause 14(2)(a) of the EII Regulation has been amended to require *Anticipated* projects to be considered in EST assessments. Anticipated projects are projects reported in AEMO's Generation Information publication that have made progress towards at least three of AEMO's commitment criteria, and have provided to AEMO confirmation or an update of project status in the last six months. Anticipated projects were considered in all sensitivities included in this report.
- Clause 15(5) has been added to the EII Regulation, allowing the EST Monitor to consider a wider variety of factors when assessing the firm capacity of generation, storage and transmission projects. In this 2024 EST Monitor report, AEMO has applied lower firmness factors (see section 2.2.2) to short duration storage projects and interconnectors under certain conditions to reflect the probability that these technologies will not be able to be dispatched or be available at time of New South Wales maximum demand. These firmness factors were applied to all sensitivities included in this report.

[8] See https://www.legislation.nsw.gov.au/view/html/inforce/current/act-2020-044#pt.3.

[9] See https://www.legislation.nsw.gov.au/view/whole/pdf/inforce/2023-10-22/sl-2021-0102.

[10] Based on extreme conditions that could be expected to be exceeded one year in 10 (also called one-in-10-year)

[11] The EII Regulation was amended by the Electricity Infrastructure Investment Amendment (Firm Capacity) Regulation 2024: see https://legislation.nsw.gov.au/view/pdf/asmade/sl-2024-472.

2 Inputs and assumptions

For this EST assessment, AEMO adopted inputs and assumptions used to produce the 2024 *Electricity Statement of Opportunities* (ESOO)[12] and other relevant assumptions from AEMO's Forecasting Assumptions Update Workbook[13] and *2024 ISP Inputs and Assumptions workbook*[14], unless otherwise stated.

Key assumptions are outlined in the following sections.

2.1 Maximum demand

In calculating the maximum demand for a financial year consistent with section 12 of the EII Act and clause 13 of the EII Regulation, AEMO:

- Took into account the most recent forecast of maximum operational demand as sent out in New South Wales in summer, as published by AEMO in the 2024 ESOO. Consistent with the 2024 ESOO, AEMO considers the *Step Change* demand scenario to be most likely, and therefore used this in the *Committed and Anticipated Investments* sensitivity.
- Included generating unit auxiliaries to reflect auxiliary demand from generating units at the time of maximum operational demand in summer.
- Took into account the forecast use of consumer energy resources (CER) in New South Wales, consistent with each of the scenarios and sensitivities published in the 2024 ESOO.

Maximum operational demand means the highest level of electricity drawn from the grid in any 30-minute period in a financial year. In the 2024 ESOO, maximum operational demand is forecast to occur in summer in New South Wales for each of the forecast financial years included in this EST assessment. The 10% POE forecast indicates that the forecast is expected to be exceeded once in every 10 years.

Figure 2 explains AEMO's demand definitions. Further detail is provided in AEMO's 2024 ESOO[15].

The demand forecasts used to assess the EST incorporated assumptions around energy efficiency investments, uptake and operation of CER including rooftop solar systems (often referred to as distributed photovoltaic (PV)), battery storage systems, and electric vehicles (EVs), as well as projected generator auxiliary load.

The consideration of maximum demand for different sub-regions of New South Wales as described in EII Regulation 13 (2A) is described in Section 2.2.8.

[12] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf?la=en.

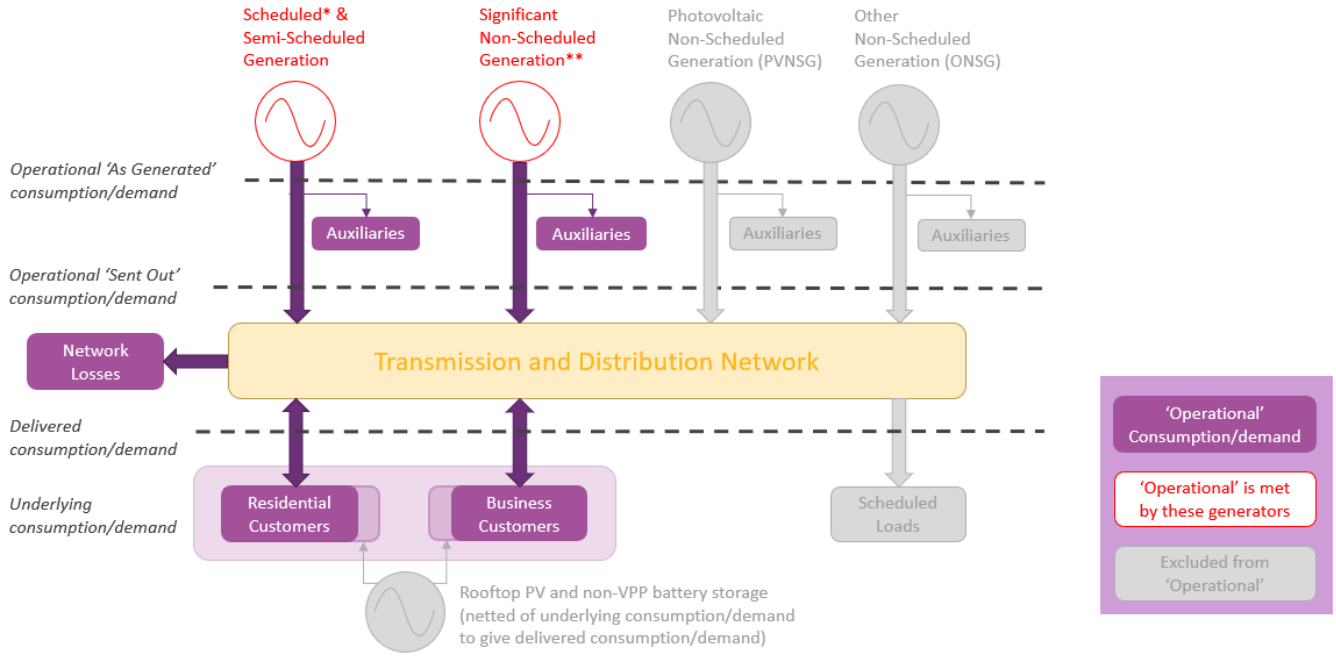
[13] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-forecasting-assumptions-update-workbook.xlsx?la=en.

[14] At https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-isp-inputs-and-assumptions-workbook.xlsx?la=en.

[15] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf?la=en.

The New South Wales Energy Savings Scheme, including the Peak Demand Reduction Scheme (PDRS)[16], are considered committed developments, and their impact on forecast demand is included in AEMO's demand forecasts. As such, they are captured in this EST assessment.

Figure 2 AEMO demand definitions



* Including virtual power plants (VPPs) from aggregated behind-the-meter battery storage.
** For definitions, see https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Demand-terms-in-EMMS-Data-Model.pdf.

2.2 Firm capacity

The EII Regulation, clauses 14 and 15, provide that the calculation of firm capacity for the EST must take into account scheduled (including storage), semi-scheduled, and appropriate non-scheduled generation from existing and new sources. AEMO consider all significant non-scheduled generation appropriate to include as it is consistent with the sources of generation that AEMO defines when referring to operational demand (see Figure 2). Firm capacity for an EST forecast year must also account for forecast interconnector capacity and demand flexibility, which is considered likely to be available during peak demand periods.

This section describes how AEMO determined each of these elements of the firm capacity calculation.

2.2.1 Existing scheduled generation capacity

The available firm capacity of scheduled generators was taken as the summer peak rating for each unit from the July 2024 Generation Information publication[17]. This incorporates temperature de-rating of the units based on their expected response to high temperatures during 10% POE demand conditions.

[16] See https://www.energy.nsw.gov.au/government-and-regulation/energy-security-safeguard/peak-demand-reduction-scheme.

[17] At https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

2.2.2 Existing storage capacity

The recent insertion of EII Regulation clause 15(5) allows the EST Monitor to consider a variety of factors when assessing the firmness of capacity. Consistent with this revised regulation, AEMO has developed a methodology to apply reduced firmness factors for short duration energy storages which better reflects the likely availability of these short duration storage units during periods of New South Wales maximum demand.

These factors:

- Were applied to storage units based on their duration.
- Were calculated based on analysis presented in the 2024 ESOO[18] which identified the additional battery capacity required to reduce expected USE to the Interim Reliability Measure (IRM) in New South Wales for the year 2027-28. Storage firmness factors were calculated as the ratio of the additional capacity required to meet the IRM relative to the estimated additional short duration storage capacity required to meet the IRM. The figures provided in the 2024 ESOO were further adjusted to remove the impact of unplanned outage rates, as outages are considered in the EST reserve margin and should not be included in this firmness assessment.

The assessment included in the ESOO identified the additional capacity required to reduced expected unserved energy in MWh to the relevant reliability standard for various technologies. The EST assesses firmness of various technologies in meeting summer maximum demand, in MW. While the basis of calculation for the analysis included in the 2024 ESOO is different to that required for the EST, AEMO considers it a reasonable proxy to calculate a firmness factor that the storage is able to dispatch to at time of maximum demand for the purposes of EST, given that shorter duration storages have a reduced probability of being able to dispatch at time of maximum demand.

The firmness factors used for the 2024 EST assessments are shown in Table 1.

Table 1 Storage firmness factors

Storage capacity (hrs)	Firmness factor
1	13%
2	38%
4	81%
6	97%
8+	100%

2.2.3 Existing semi-scheduled generation capacity

The EII Regulation, in clause 15(2), stipulates that the firm capacity of semi-scheduled generators (such as wind farms and large-scale solar farms) must be estimated considering:

- The amount of electricity produced at times of peak demand in summer over the past three financial years, and
- The amount of electricity likely to be produced at times of peak demand in summer by generating units forecast to be available.

[18] See Table 14 in the 2024 ESOO, at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf.

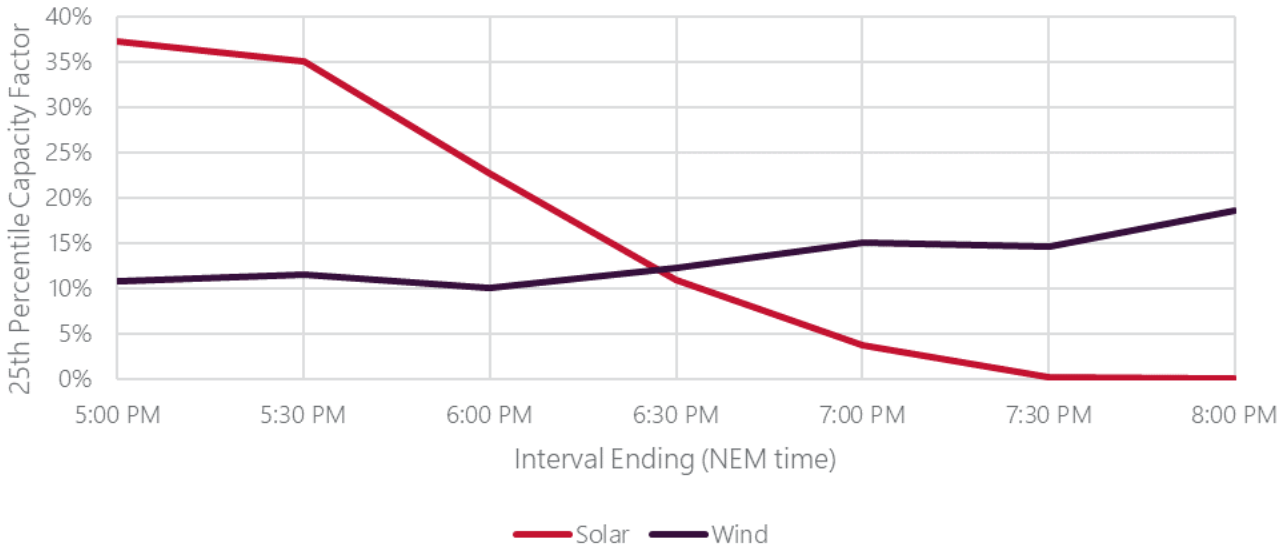
For this purpose, AEMO calculated peak contribution factors for wind and solar technologies in New South Wales representing the level of generation that can be relied on from semi-scheduled generators at times of peak demand. To have confidence that this capacity is firm, the peak contribution factors were based on a 25% POE calculation; that is, three times out of four, wind farms and large-scale solar farms could be expected to generate at or above the assumed firm capacity during peak demand periods.

To derive these peak contribution factors, AEMO calculated:

1. The top ten days for operational maximum demand during each of the last three summers (2021-22,2022-23 and 2023-24). Ten days were chosen for each year for the 2024 EST assessment to ensure a reasonable sample size of high demand days. For this purpose, summer was defined as the period from December to February.
2. Observed aggregate semi-scheduled and significant non-scheduled capacity factors (generation as a proportion of the summer typical rating) for wind and solar generators on these top ten days for operational maximum demand.
3. The 25th percentile of these observed aggregate capacity factors (meaning that 75% of observed aggregate capacity factors exceeded this percentile).

Figure 3 shows the calculated peak contribution factors derived using the above method for the typical times of peak demand across the collection of peak demand days. Factors derived for solar trend downwards to zero from 5.00 pm, showing the decrease in likely solar generation later in the evening as the sun sets. Factors derived for wind technologies trend slightly upwards between 5.00 pm and 8.00 pm, ranging from 10.8% to 18.6%.

Figure 3 Wind and solar 25th percentile capacity factors for top ten summer days



Note: NEM time is the same as AEST time.

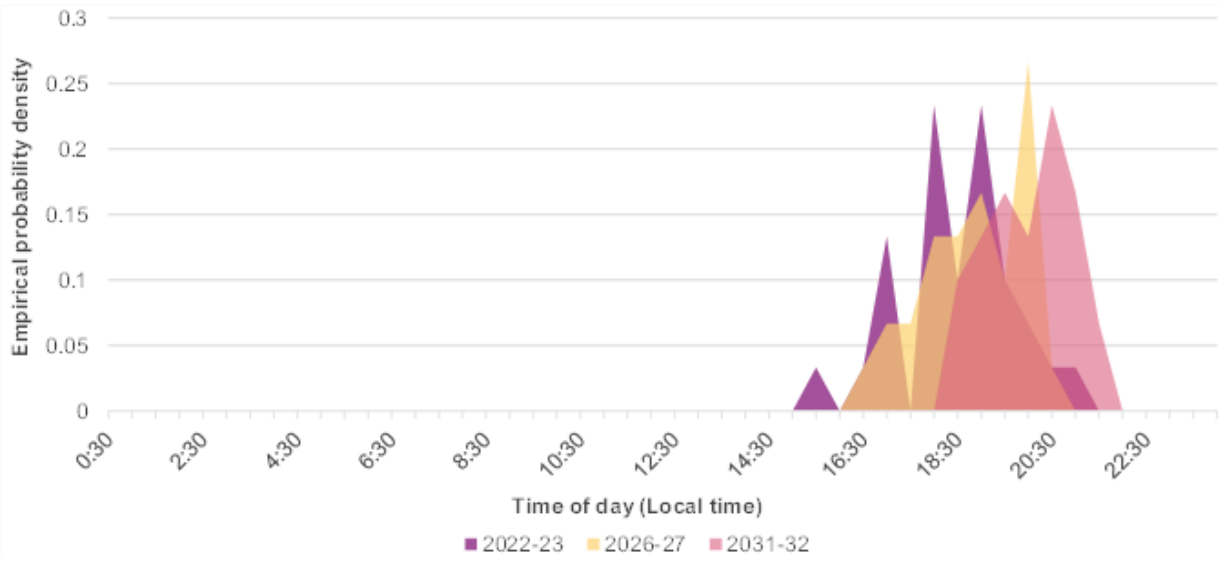
Figure 4 shows the probability distribution of forecast maximum demand for New South Wales summer, in local time. The timing of when maximum demand is expected to occur in future years remains a key uncertainty, influenced by the evolution of consumer demand trends including the contribution to peak demand from CER.

For the purposes of the 2024 EST assessment, AEMO selected the 6:30 pm National Electricity Market (NEM) time (7:30 pm local daylight savings time) interval to represent the maximum demand interval for the entire forecast horizon. This has not changed since the 2022 assessment.

Based on the above assumptions, the peak contribution factor applied in this 2024 EST Monitor report was estimated to be 12.3% for wind and 11.0% for solar. These factors are lower than those calculated in the 2023 EST Monitor report of 15.4% for wind and 13.5% for solar. The differences are occurring due to the dispatch of each technology observing different patterns in the last 3 historical summers (2021-22, 2022-23 and 2023-24), relative to the dispatch observed in the previous summers applied in the 2023 assessment (2020-21, 2021-22 and 2022-23). It is also noted that these capacity factors and contribution factors reflect any curtailment of generation which occurred during these periods; the current methodology does not take into account how curtailment may change in the future or how the current subregional limits impact curtailment of these generators.

These capacity factors were applied to the Summer Typical capacity from the July 2024 Generation Information publication[19] to determine the available equivalent firm capacity of existing semi-scheduled generators.

Figure 4 Central forecast showing change in distribution of time of 50% POE summer maximum demand in New South Wales, 2022-23 to 2031-32



2.2.4 Existing significant non-scheduled generation capacity

The EII Regulation, in clause 14(1)(c), states the EST should consider appropriate non-scheduled generation. Significant non-scheduled generators typically refer to wind and solar non-scheduled generators with a capacity greater than or equal to 30 megawatts (MW)[20], these generators are included in 'operational' demand definition so are considered appropriate to include in the EST. Table 2 outlines the New South Wales generators that are defined to fall within this category and which were included in calculating this EST.

[19] At https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

[20] See https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/market-management-system-mms-data/generation-and-load for more detail on those generators included or excluded from the definition of operational demand.

Table 2 Existing significant non-scheduled generators in New South Wales

Generator	Nameplate capacity (MW)
Capital Wind Farm	141
Cullerin Range Wind Farm	30

The available firm capacity of significant non-scheduled generators was calculated using the peak contribution factors of the relevant semi-scheduled and non-scheduled technology as outlined in the above section. A single contribution factor was calculated for semi-scheduled and non-scheduled generators, given that contribution factor is expected to vary by technology type rather than registration category.

2.2.5 Generator closures

Expected closure years for all existing generators were taken from the July 2024 Generating unit expected closure year and Generation Information file[21]. Several power stations have advised they intend to close in the 10 year EST assessment, including:

- *Eraring Power Station* is advised to close in August 2027,
- Bayswater Power Station, Vales Point Power Station, Queanbeyan Battery Energy Storage System and Sapphire Wind Farm (battery) are all advised to be retired in advance of the 2033-2034 summer period.

2.2.6 Proposed generation and storage projects

The EII Act requires that the EST Monitor must consider whether proposed firm generation and storage capacity is likely to be available to supply New South Wales electricity customers at times of peak demand in the summer of each financial year of the assessment. Firm and equivalent firm capacity from proposed generation and storage projects was calculated using the same methodology as applied for existing projects.
The following proposed projects were included in the calculation of firm capacity for the EST assessment as required by the EII Regulation clause 14(2):

- Projects that have made a formal commitment to construct according to AEMO's Generation Information page.
  - AEMO has included all proposed projects that are classified as 'in commissioning', 'committed', 'committed*' or 'anticipated'[22] in the July 2024 Generation Information publication. Projects that are not yet 'in commissioning' are included with delays applied to the Full Commercial Use Date (FCUD) provided by the project proponent, to reflect typical delays historically observed in project commissioning. More information on this approach is described in the ESOO and Reliability Forecast Methodology Document[23].

[21] At https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

[22] For more information about these classifications see https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

[23] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2023/esoo-and-reliability-forecast-methodology-document.pdf?la=en.

- Projects that will be constructed and operated under a Long-Term Energy Service (LTES) Agreement. The projects in Table 3 have been awarded an LTES Agreement in tenders rounds 1-4 for generation and long duration storage infrastructure in New South Wales[24].

Table 3 Projects awarded an LTES Agreement

Project	Tender	Available date in EST	Nameplate capacity (MW)	Storage capacity (MWh)
Coppabella Wind Farm	Tender Round 1	Summer 2025-26	275	
New England Solar Farm	Tender Round 1	Summer 2025-26	720	
Stubbo Solar Farm	Tender Round 1	Summer 2025-26	400	
Limondale BESS	Tender Round 1	Summer 2025-26	50	400
Liddell BESS	Tender Round 2	Summer 2025-26	500	1,000
Orana BESS	Tender Round 2	Summer 2026-27	415	1,660
Smithfield BESS	Tender Round 2	Summer 2025-26	65	130
Virtual Power Plant (VPP)[A]	Tender Round 2	Not modelled explicitly	95	190
Uungula Wind Farm	Tender Round 3	Summer 2027-28	414	
Culcairn Solar Farm	Tender Round 3	Summer 2026-27	350	
Silver City Energy Storage	Tender Round 3	Summer 2027-28	200	1,600
Goulburn River BESS	Tender Round 3	Summer 2025-26	49	392
Richmond Valley BESS	Tender Round 3	Summer 2026-27	275	2,200
Flyers Creek Wind Farm	Tender Round 4	Currently In service	140	
Maryvale Solar and Energy Storage System	Tender Round 4	Summer 2028-29	172	372

A. This Virtual Power Plant project was not modelled explicitly as it is assumed that this is captured in the flexible demand forecast.

- Projects that will be constructed under funding programs run by, or on behalf of, a New South Wales Government or Commonwealth Government agency.
  - Table 4 includes details of the projects considered on this basis; two known projects listed here were not considered in the EST assessment on advice from the New South Wales Department of Climate Change, Energy, the Environment and Water that suggests they are insufficiently advanced.

[24] At https://aemoservices.com.au/tenders.

Table 4 Additional projects that will be constructed under New South Wales Government or Commonwealth Government funding programs

Project	Available date in EST	Nameplate capacity (MW)	Included in EST assessment
Waratah Super Battery	Summer 2025-26	150 MW during operation of System Integrity Protection Scheme (SIPS) (which assumes 910 MW) then 850 MW as commercial battery	Yes
Wallgrove Grid Battery	In service	50	Yes
Sapphire Wind Farm Battery Facility	Summer 2026-27	30	Yes
New England Solar Farm Battery	Summer 2027-28	200	Yes
Darlington Point Battery Energy Storage System (BESS)	In service	125	Yes
Goldwind Australia's hybrid project	To be determined	84	No
SolarHub's Smart Distributed Batteries	To be determined	6	No

Note: data is derived from https://energy.nsw.gov.au/renewables/clean-energy-initiatives/emerging-energy-program, https://arena.gov.au/projects/darlington-point-energy-storage-system/, https://www.energyco.nsw.gov.au/projects/waratah-super-battery.

Any additional projects which may be funded under the Capacity Investment Scheme (CIS) were not included in any of the EST scenarios or sensitivities.

2.2.7 Existing and proposed interconnector capacity

Interconnector import capacity, assumed to be operating under summer peak demand conditions, also contributes to firm capacity in the calculation of the EST.

This includes firm capacity from proposed interconnector augmentations, if considered likely to be available to supply electricity to New South Wales customers at times of peak demand in the summer of the financial year, including:

1. Interconnectors for which a revenue determination has been made under rule 6A.4 of the National Electricity Rules.
2. Interconnectors for which a determination has been made under section 38 of the EII Act.
3. Interconnectors under a priority transmission infrastructure project to which a direction under the EII Act, section 32(1)(b), relates.

The only project that meets the above requirements, is Project Energy Connect, a new 800 MW interconnector between southern New South Wales and South Australia.

Import capability for existing and applicable new interconnectors has been taken from the 2024 Forecasting Assumptions Update Workbook and is summarised in Table 5.

EII Regulation clause 15(5) permits the EST Monitor to take into account additional factors when applying ratings rather than using those published in the most recent ISP assumptions. In this EST assessment, AEMO did not apply any adjustments to the interconnector capacities published. While interconnector limits are found to vary significantly within a year, and over the forecast horizon, AEMO has identified that supply in neighbouring regions is forecast to be adequate, and that further changes to interconnector capacities from the values published in the 2023 IASR were unlikely to be material in this 2024 report.

Table 5 Import capabilities between sub-regions at peak demand

Interconnector	New South Wales import capability (MW)
NNSW – SQ (Terranora)	130
NNSW – SQ (Queensland – New South Wales Interconnector (QNI))	1,205
VIC – SNSW (Victoria – New South Wales Interconnector (VNI))	870
SNSW – SA (Project EnergyConnect)	800 (from 2027-28 once Project EnergyConnect fully commissioned)

2.2.8 Major transmission limits

Major intra-regional transmission limits can reduce the amount of electricity available to New South Wales customers from generation, storage, and interconnector capacity. Consistent with clause 15(4) of the EII Regulation, firm capacity for a financial year was calculated taking into account these constraints.

To capture intra-regional transmission limits, AEMO estimated the impact of intra-regional transmission limits on the ability for firm capacity to reach the majority of customer load in the Sydney – Newcastle – Wollongong areas, and discounted the firm capacity accordingly.

As the EST calculation is intended to be a simplified, deterministic calculation that is relatively easy to understand, a sub-regional representation of the New South Wales transmission network was used to estimate the major network constraints as defined in the 2024 IASR[25].

Transmission projects that increase intra-regional transfer capacity and that are sufficiently progressed consistent with AEMO's commitment criteria as applied in the 2024 ESOO, or those that would meet the criteria described in Section 2.2.7 are also included.

Projects included in the *Committed and Anticipated Investments* sensitivity that impact intra-regional transfer limits are:

- Waratah Super Battery and System Integrity and Protection Scheme, which is considered 'anticipated' by AEMO;
- Hunter Transmission Project, which is a priority transmission infrastructure project, and
- HumeLink, which is considered 'anticipated' by AEMO.

Other scenarios or sensitivities may include further developments as specified in the scenario description.

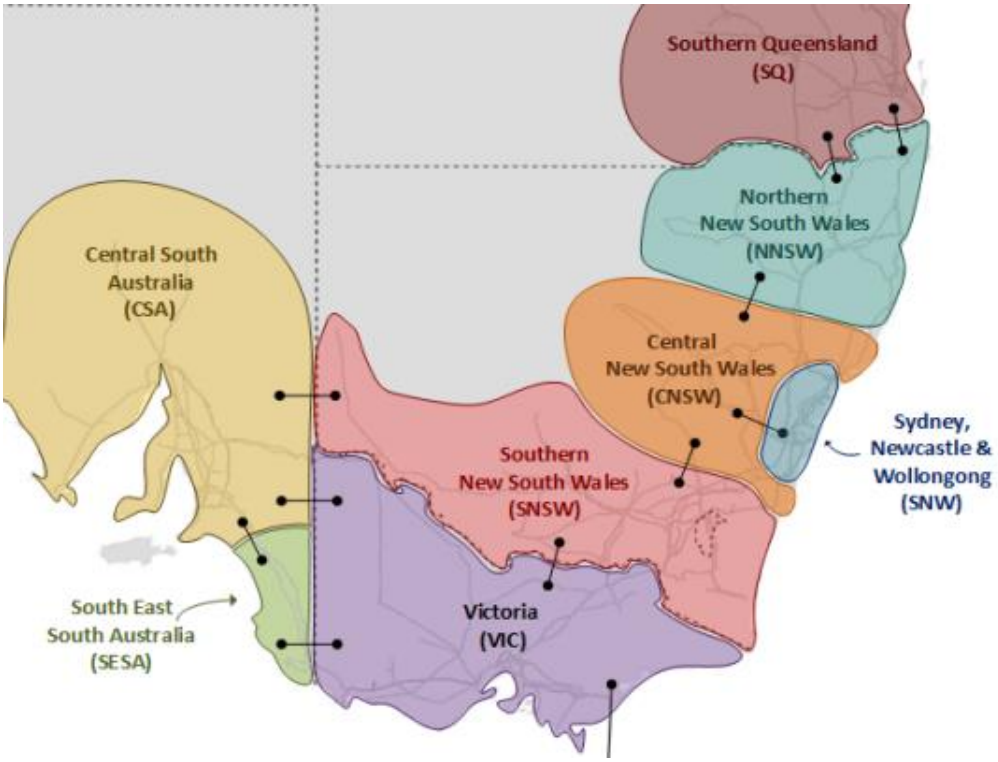
[25] At https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-isp-inputs-and-assumptions-workbook.xlsx?la=en.

The key New South Wales sub-regions are highlighted in Figure 5. The following intra-regional assessments were conducted to identify major network constraints:

1. **Sydney – Newcastle – Wollongong (SNW)** – this identifies any major transmission limits that may constrain supply from the Central New South Wales sub-region into the major demand centre for New South Wales.
2. **Central New South Wales and SNW (CNSW + SNW)** – this identifies any major transmission limits that may constrain supply from the Northern and Southern New South Wales sub-regions into the Central sub-region.
3. **Northern New South Wales, Central New South Wales and SNW (NNSW + CNSW + SNW)** – this identifies any major transmission limits that may constrain supply from Southern New South Wales sub-regions into the Central sub-region.

To test whether these major transmission limits impact the EST assessment, AEMO first assessed the EST against each relevant sub-region separately. AEMO assumed that sub-regional firm capacity plus imports up to the transmission limit must be sufficient to meet the maximum demand in that sub-region, even in the event that the single largest unit in the sub-region is unavailable. The failure of the single largest unit in each sub-region takes into account the more likely risk of a single unit failure in each sub-region rather than the more unlikely event of co-incident failures of two units in each sub-region. The regional (whole of New South Wales) assessment was still based on the event that the largest two units are unavailable.

Figure 5 Sub-regional model as documented in the IASR



Where the sub-regional reserve estimates resulted in a target surplus/breach that was lower/higher than the whole of the New South Wales EST surplus/breach, the difference was assessed as the impact of the major intra-regional transmission limit. If major intra-regional transmission limits were identified, all capacities were discounted evenly until the limitations evidenced by the sub-regional assessment were incorporated.

For the purposes of the calculation of a target surplus/breach for each sub-region, the following inputs have been used:

- Sub-regional 10% POE maximum demand was calculated using the subregional demand factors published in the May 2024 Update to the 2023 ESOO[26]. The sub-regional maximum demands are summarised in Table 6.
- Auxiliaries were assumed as a ratio of maximum potential sub-regional aggregate auxiliaries to the maximum potential regional aggregate auxiliaries[27] based on the generator auxiliary load forecast for all years. The auxiliary load forecast was calculated by multiplying auxiliary rates published in the 2024 Forecasting Assumptions Update Workbook[28] by the firm available capacity for each generator, then summing them.
- Reserves were calculated as the largest generating unit in the sub-region, or the largest two generating units in the state-wide assessment.
- Firm and equivalent firm capacity as available in the sub-region.
- Intra-regional transmission import capabilities between sub-regions, as summarised in Table 7.

Table 6 Assumed sub-regional 10% POE maximum operational demand Step Change forecasts (MW, as generated)

	SNW	CNSW + SNW	NNSW + CNSW + SNW	All NSW
2024-25	10,902	12,124	12,902	14,063
2025-26	11,104	12,349	13,142	14,324
2026-27	11,319	12,588	13,396	14,602
2027-28	11,423	12,703	13,519	14,735
2028-29	11,470	12,755	13,575	14,796
2029-30	11,495	12,783	13,604	14,829
2030-31	11,583	12,881	13,708	14,942
2031-32	11,712	13,025	13,861	15,109
2032-33	11,778	13,099	13,940	15,194
2033-34	11,756	13,074	13,913	15,165

Table 7 Import capabilities between sub-regions at peak demand

Intra-regional limit	Intra-regional import capability (MW)
SNSW → CNSW	2,700 (plus an additional 250 MW from 2025-26 due to the operation and augmentations of the NSW SIPS associated with the Waratah Super Battery; and an additional 2,200 MW from 2027-28 due to HumeLink)
NNSW → CNSW	930 (plus an additional 660 MW between 2025-26 and 2029-30 due to the operation and augmentations of the NSW SIPS associated with the Waratah Super Battery)
CNSW → SNW	4,490 generation (Northern) and 2,179 (Southern) (plus an additional 910 MW between 2025-26 and 2029-30 and an additional 250 MW from 2030-21 due to operation and augmentations of the NSW SIPS, and an additional 4,340 MW from 2027-28 increasing to 5,000 MW from 2030-31 due to the Hunter Transmission Project)

Source: https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-isp-inputs-and-assumptions-workbook.xlsx?la=en

[26] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2023/may-2024-update-to-the-2023-electricity-statement-of-opportunities.pdf?la=en

[27] Forecast sub-regional auxiliaries are not published by AEMO, however technology aggregates are used to scale the maximum potential generator auxiliaries to the ESOO forecast for auxiliaries at time of maximum demand based on available generators in each sub-region.

2.2.9 Demand flexibility

The EII Regulation, in clause 14(1)(e), states the EST Monitor should consider capacity from demand response in calculating firm capacity. This section outlines the demand response assumed to occur over the ten-year horizon of the ESTs.

Demand side participation

Demand response and DSP are both considered as firm capacity in the calculation of the EST and were both included in AEMO's DSP forecast, as published in the 2024 ESOO. The amount of DSP assumed varies between demand scenarios. DSP increases, beyond those assumed committed, were included under growth sensitivities.

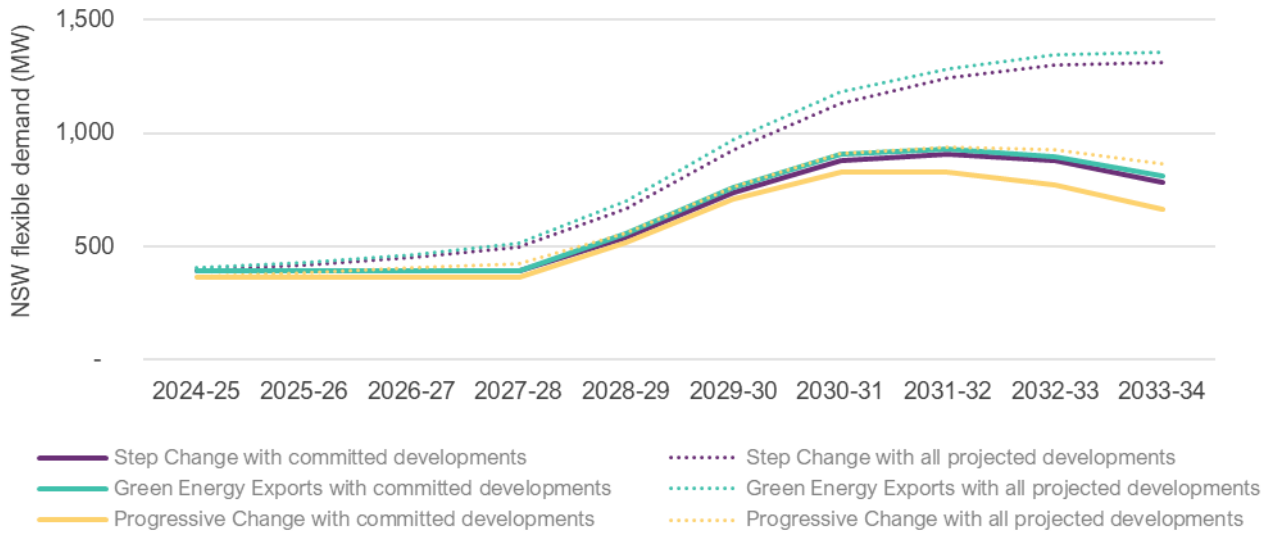
The committed New South Wales PDRS policy will create a financial incentive to reduce electricity consumption during peak times in New South Wales. AEMO included this scheme in all sensitivities, resulting in a DSP forecast which increases from 2027-28. The scheme will, in its current design, only provide additional DSP during summer.

Virtual power plant (VPP) and vehicle-to-grid (V2G) developments

Batteries which are coordinated through an aggregator or retailer under VPP and V2G developments are considered in the EST. However, AEMO assumed only batteries in existing or committed VPP and V2G programs will be available to provide a coordinated response at times of maximum demand for the purposes of the *Committed and Anticipated Investments* sensitivity. Projections from additional VPP and V2G developments which are not currently 'committed' may be included in other sensitivities. VPP and V2G also had a de-rating factor applied in their firm capacity factor value as per those used for other short-duration storages.

Figure 6 show values used for New South Wales flexible demand across all scenarios and sensitivities in this assessment.

Figure 6 Flexible demand applied in forecasts for the summer period in New South Wales, 2024-25 to 2033-34 (MW)



2.3 Reserve margin

The reserve margin was calculated to cover the loss of the two largest available New South Wales generating units, shown in Table 8 for each financial year. The two largest generating units in New South Wales in 2024-25 are Mount Piper Power Station Unit 1 (MP1, with 705 MW summer peak rating) and Eraring Power Station Unit 2 (ER02, with 680 MW summer peak rating). In 2027-28, when the Eraring Power Station is expected to retire, Mount Piper Power Station Unit 2 (MP2, with 705 MW summer peak rating) becomes the second largest unit due to an upgrade in firm capacity in this year.

Table 8 Assumed reserve margin (MW, summer peak capacity)

	Unit 1	Unit 2	Reserve
2024-25	MP1	ER01	1,385
2025-26	MP1	ER01	1,385
2026-27	MP1	ER01	1,385
2027-28	MP1	MP2	1,410
2028-29	MP1	MP2	1,410
2029-30	MP1	MP2	1,410
2030-31	MP1	MP2	1,410
2031-32	MP1	MP2	1,410
2032-33	MP1	MP2	1,410
2033-34	MP1	MP2	1,410

3 Scenarios and sensitivities

In preparing a report, EII Regulation clause 16(1) requires the EST Monitor to take into account each scenario and the sensitivities relating to each scenario, as specified in the most recent statement of opportunities, to the extent they relate to New South Wales.

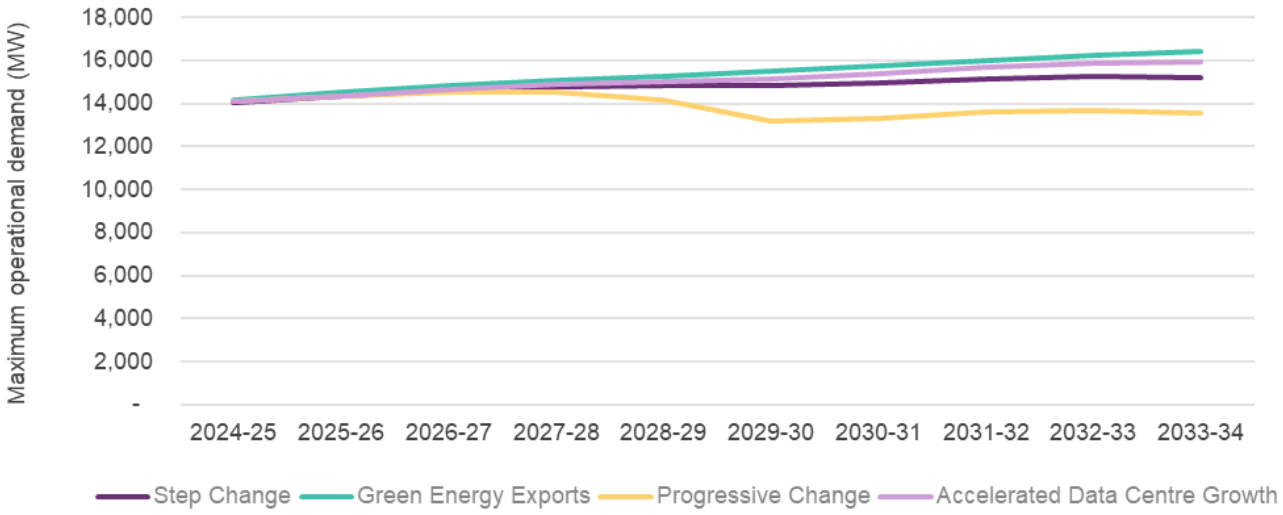
As such, AEMO has assessed each EST against each scenario and relevant sensitivity used in the 2024 ESOO, as applicable to New South Wales. Additional sensitivities have also been included at the request of the New South Wales Department of Climate Change, Energy, the Environment and Water to understand factors that might affect forecast variations consistent with EII Regulation 16(2)(b).

Three demand scenarios, summarised in Table 9 below, were considered in the 2024 ESOO, as well as a demand sensitivity to the *Step Change* demand scenario. Figure 7 shows the 2024 ESOO's 10-year maximum demand forecast for New South Wales for all four cases.

Table 9 Description of demand scenarios and sensitivity for the EST assessment

Scenario/Sensitivity	Description
***Step Change* (ESOO 2024 reliability forecast scenario)**	Achieves a scale of energy transformation that supports Australia's contribution to limiting global temperature rise to below 2°C compared to pre-industrial levels. The NEM electricity sector plays a significant role in decarbonisation and the scenario assumes the broader economy takes advantage of this, aligning broader decarbonisation outcomes in other sectors to a pace aligned with beating the 2°C abatement target of the Paris Agreement. The NEM's contribution may be compatible with a 1.5°C abatement level, if stronger actions are taken by other sectors of Australia's economy simultaneous with the NEM's decarbonisation. Consumers provide a strong foundation for the transformation, with rapid and significant continued investments in CER, including electrification of the transportation sector.
Green Energy Exports	Reflects very strong decarbonisation activities domestically and globally aimed at limiting temperature increase to 1.5°C, resulting in rapid transformation of Australia's energy sectors, including a strong use of electrification, green hydrogen and biomethane. The NEM electricity sector plays a very significant role in decarbonisation.
Progressive Change	Meets Australia's current Paris Agreement commitment of 43% emissions reduction by 2030 and net zero emissions by 2050. This scenario has more challenging economic conditions, higher relative technology costs and more supply chain challenges relative to other scenarios.
***Accelerated Data Centre Growth* (sensitivity to the *Step Change* demand scenario)**	Underlying assumptions the same as *Step Change* but assumes an increased in investment in data centres. The sensitivity was informed by 2024 Standing Information Request responses received from NSPs and other industry engagement on data centre application enquiries and non-committed loads.

Figure 7 New South Wales 10% POE maximum summer demand forecast, operational sent out, in MW across scenarios



Each EST has been assessed under a range of sensitivities, which were included in the 2024 ESOO or are included at the request of the New South Wales Department of Climate Change, Energy, Environment and Water (NSW DCCEEW) to better understand potential variations to forecasts. These were assessed against the *Step Change* demand scenario and are described below:

- *Committed and Anticipated Investments* – this sensitivity included existing, in commissioning, committed and anticipated generation, storage and transmission projects, according to AEMO's commitment criteria, as well as committed investments in demand flexibility and consumer batteries that are coordinated to minimise investment needs in utility-scale solutions. To reflect uncertainty in the commissioning schedule of anticipated projects, the sensitivity assumed a delay to the full commercial use date provided by participants[29]. This sensitivity assumed the *Step Change* demand scenario. This is the sensitivity used for AEMO's reliability forecast and indicative reliability forecast in the 2024 ESOO, and is also equivalent to the 'Central' scenario in the 2023 EST Monitor report.
- *On Time Delivery* – this sensitivity applied committed and anticipated generation and transmission projects at the full commercial use date advised by the project developer. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.
- *Actionable Transmission and Coordinated CER* – this sensitivity applied committed and anticipated generation and transmission projects at the full commercial use date advised by the project developer, and also included transmission that is identified as anticipated or actionable in the 2024 ISP. This sensitivity also forecast growth in coordinated CER and flexible demand resources. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.
- *Federal and State Schemes* – this sensitivity included additional firming and renewable energy developments that have specific funding, development or contracting arrangements under federal, state and territory government schemes and programs. This sensitivity also included actionable transmission investments and forecast growth in coordinated CER and flexible demand resources. All new generation and transmission

[29] See section 4.1.1 at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2024/2024-electricity-statement-of-opportunities.pdf?la=en&hash=2B6B6AB803D0C5F626A90CF0D60F6374

projects used the full commercial use date advised by the project developer. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.

- *HumeLink Delay* – this sensitivity assumed a two-year delay in the completion of HumeLink. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.
- *No Hunter Transmission Project* – this sensitivity assumed that the Hunter Transmission project is not completed in the EST horizon. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.
- *Green Energy Exports* – this sensitivity used the *Green Energy Exports* demand scenario and corresponding flexible demand. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.
- *Progressive Change* – this sensitivity used the *Progressive Change* demand scenario and corresponding flexible demand. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.
- *Data Centre* – this sensitivity used the *Accelerated Data Centre Growth* demand projections and corresponding flexible demand. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity.

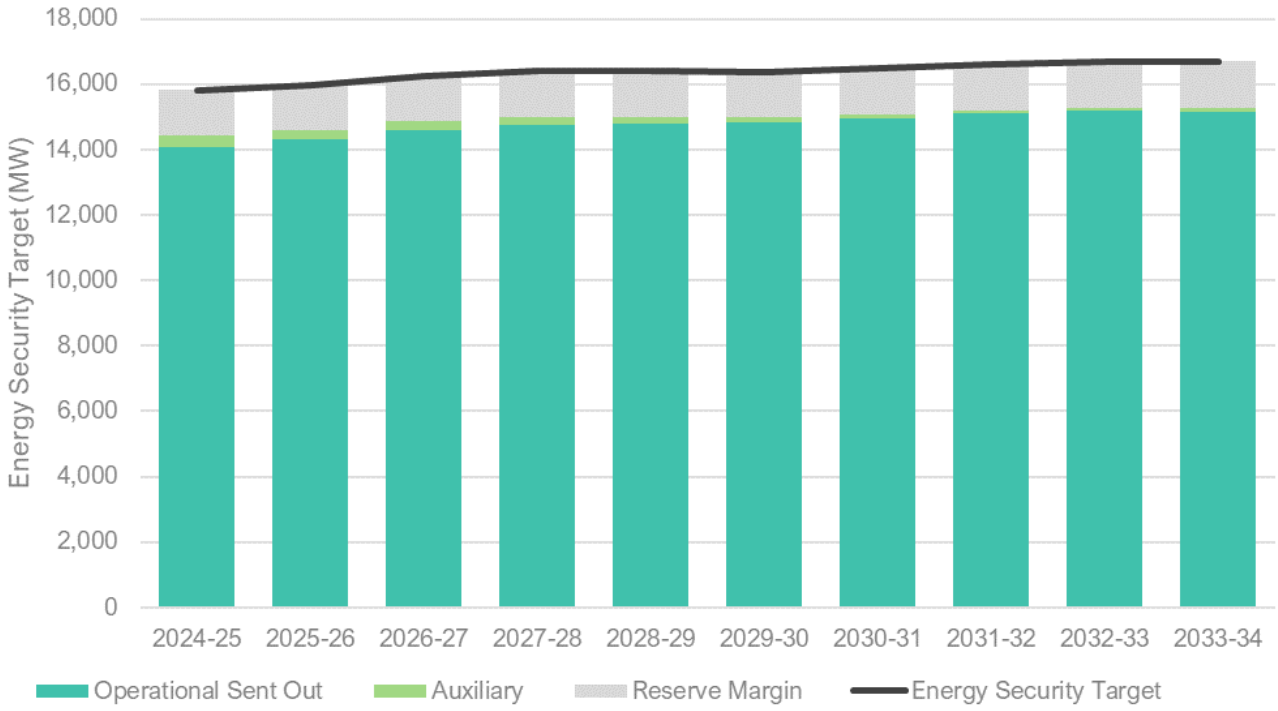
4 EST assessments

The EST assessments have been conducted for all sensitivities described in Section 3.

4.1 *Committed and Anticipated Investments*

The *Step Change* scenario, applied to this sensitivity, forecasts10% POE maximum demand to increase due to growing electrification and the expansion of large industrial loads (LILs). Auxiliaries at time of peak are forecast to decline, following the expected exit of numerous coal-fired generators. The reserve margin was assumed to increase from 1,385 MW to 1,410 MW in 2027-28 when the upgrade of Mount Piper Unit 2 is expected to be completed, as shown in Table 8 and outlined in Section 2.3. Collectively these components sum to the EST, as shown in Figure 8.

Figure 8 *Committed and Anticipated Investments* sensitivity, EST components



Expected changes to supply in New South Wales, considering committed, committed* and anticipated developments, and developments with LTES Agreements, are:

- Between summer 2024-25 and 2025-26, about 120 MW of additional variable renewable energy (VRE) firm capacity is expected to become operational, with a total of 308 MW of additional VRE firm capacity online by 2033-34.
- The EST assumed 82MW of additional storage firm capacity in the next two years, and a total of 4,100MW of additional storage firm capacity over the 10 year horizon, including Snowy 2.0.

- Prior to the summer of 2025-26, Hunter Power Station was assumed to become available, adding 660 MW of additional gas-fired firm capacity.
- The Waratah Super Battery was included and assumed to operate partly as transmission support for the NSW SIPS from 2025-26 to 2029-30 and then to operate as a commercial battery.
- The 2,880 MW Eraring Power Station is advised to retire in August 2027.

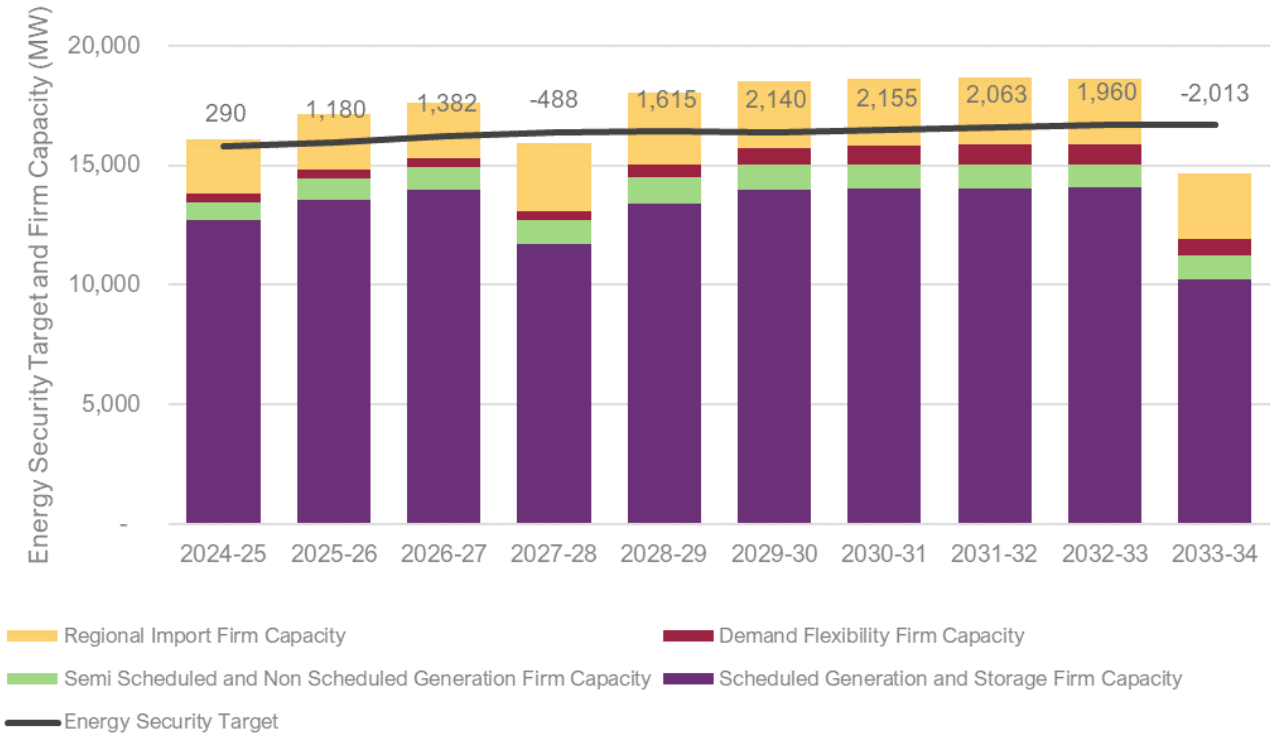
The capability of the transmission system is also expected to improve with the inclusion of the Hunter Transmission Project and HumeLink from 2028-29. HumeLink has recently been classified as an anticipated project while the Hunter Transmission Project is declared as a Priority Transmission Infrastructure Project.

Additional semi-scheduled and scheduled generation capacity is expected to become available, primarily in the SNSW sub-region, including the Snowy 2.0 project (2,200 MW, partially starting in 2028-29).

Bayswater, Vales Point, Queanbeyan BESS and Sapphire Wind Farm (battery) are all advised to be retired by the 2034 summer period.

Figure 9 shows the projected assessment of the EST for the *Committed and Anticipated Investments* sensitivity. A breach is forecast in 2033-34 following the exit of Bayswater and Vales Point power stations.

Figure 9 *Committed and Anticipated Investments* sensitivity, assessment of the EST



Key considerations and observations from the assessment are:

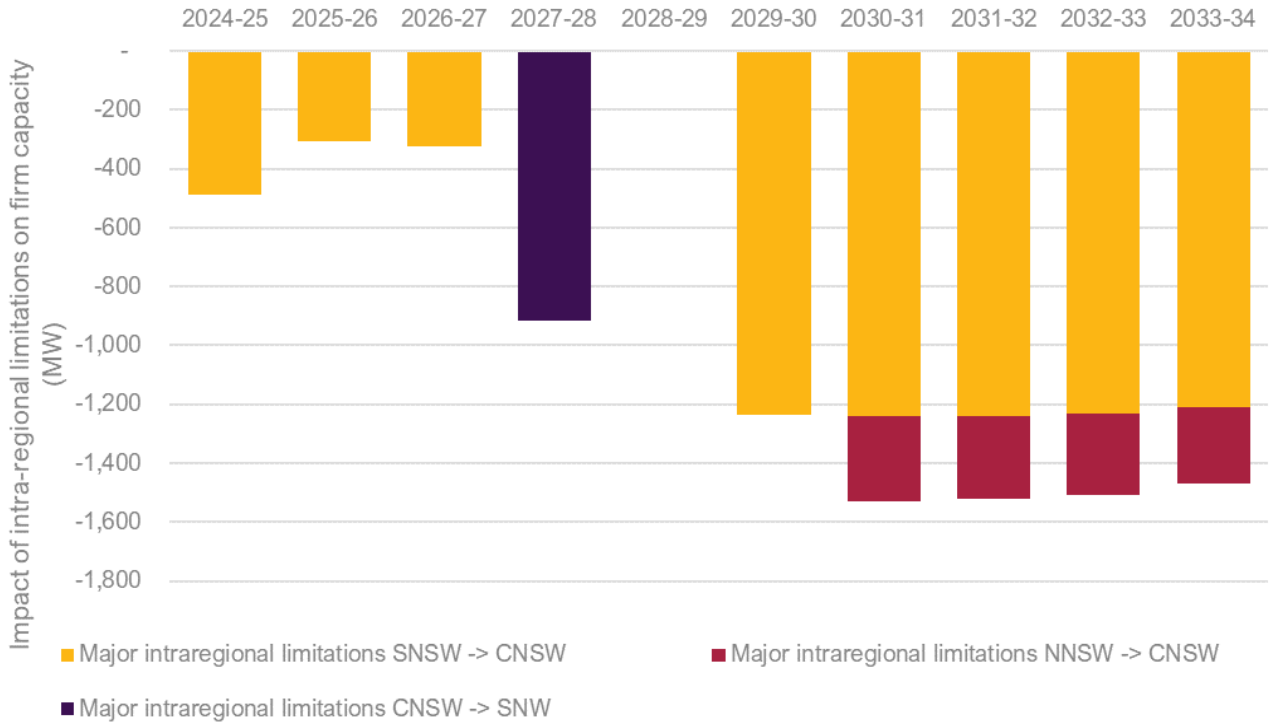
- Existing firm capacity is forecast to be sufficient to meet the EST at the start of the horizon.
- Project EnergyConnect import capacity is expected to become available over the horizon (150 MW from 2024-25 and 800 MW from 2027-28). However, forecast constraints on intra-regional transmission infrastructure between the outer and inner sub-regions of New South Wales, as shown in Figure 10, are

expected to constrain this proposed capacity from being fully available to consumers in the CNSW and SNW sub-regions during peak demand periods in most years.

- A target breach is forecast in 2027-28 when Eraring Power Station is advised by the owner to retire.
- In 2028-29 a surplus is forecast when HumeLink and the Hunter Transmission project are assumed to commission, helping to remove transmission constraints between CNSW and SNW.
- An EST breach is forecast to occur in 2033-34, when Bayswater and Vales Point power stations retire.
- Potential solutions to mitigate the projected target breaches include:
  - The commitment of new generation or storage capacity in the SNW sub-region.
  - The commitment of new generation or storage capacity in sub-regions further away from SNW, with appropriate transmission investments.
  - Investments in demand-side solutions, including new flexible demand resources, energy efficiency investments, additional CER, and/or the increased coordination of these resources beyond the level forecast by AEMO in the *Step Change* scenario.
  - The commitment of new interconnector capacity, if supported with appropriate intra-regional transmission investments.

Figure 10 shows the projected reduction in generation, storage, and interconnector firm capacity due to these major constraints on intra-regional transmission infrastructure in this assessment. The chart shows that around 300 MW of firm capacity is limited between SNSW and CNSW in the first three years of the horizon until Eraring retires. In 2027-28, firm capacity is forecast to be constrained between CNSW and SNW, but this constraint is expected to alleviate in 2028-29 with the Hunter Transmission Project. In 2029-30, constraints between SNSW and CNSW are re-forecast, mainly due to the commissioning of Snowy 2.0 and other generator and storage projects in SNSW. Constraints between NNSW and CNSW also appear in the last four years of the horizon.

Figure 10 ***Committed and Anticipated Investments*** **sensitivity, estimated impact of transmission limits on firm capacity**



Changes from October 2023 EST Monitor report

The 2024 EST Monitor report has been updated with the latest assumptions from the 2024 ESOO and the most recent *ISP Methodology* and IASR. These changes have resulted in breaches occurring in 2027-28 and 2033-34, which is the final year of the horizon and when multiple generators are assumed to retire.

In the 2023 EST and 2023 ESOO, a Central scenario was modelled. The closest equivalent sensitivity is the *Committed and Anticipated Investments* sensitivity in both 2024 ESOO and 2024 EST Monitor report.

The material drivers affecting changes in the 2024 EST assessment are:

- Decreases in maximum demand due to lower EV and business consumption trends relative to 2023 forecasts.
- New factors used to calculate subregional demands.
- Lower flexible demand projected in the later years of forecast.
- Changes to generator new entrants, retirements and capacities, including the announced delay to the retirement of Eraring, and additional projects compared to the previous EST assessment as outlined in AEMO's July 2024 Generator Information publication.
- Changes to transmission limits including the inclusion of the anticipated Humelink transmission upgrade.
- Battery energy storage derating applied (the factors applied are discussed in Section 2.2.2).
- Inclusion of generation projects considered anticipated in the AEMO Generation Information publication, as per the recent amendment of EII Regulation clause 14(2)(a).

- Inclusion of more government-funded projects which were previously not included as they were awarded after the 2023 ESOO.

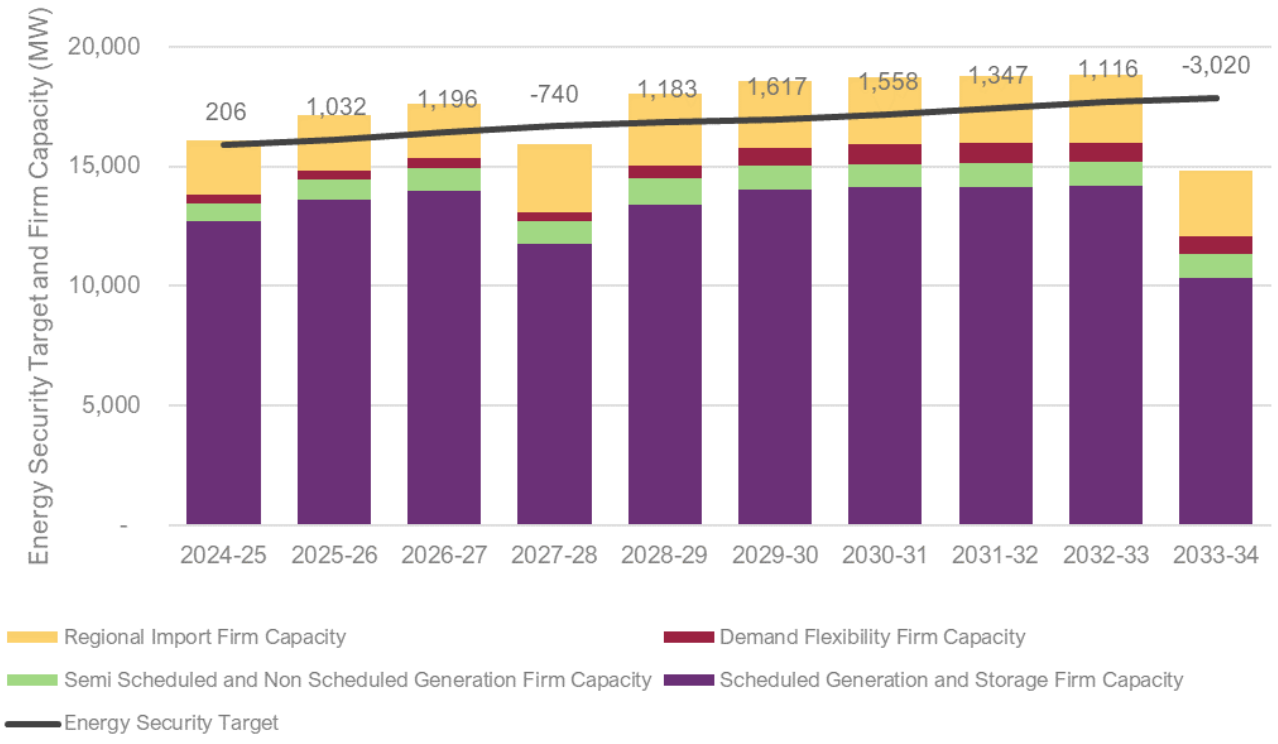
4.2 Alternative sensitivities

4.2.1 *Green Energy Exports*

The *Green Energy Exports* sensitivity used the *Green Energy Exports* demand scenario, which assumed a higher demand future than the *Step Change demand scenario*, with stronger population and economic growth, and stronger uptake of hydrogen. It also assumes a higher level of flexible demand.

The assessment under this sensitivity is shown in Figure 11. Like the *Committed and Anticipated Investments* sensitivity on *Step Change*, this sensitivity only has forecast breaches of the EST in 2027-28 and 2033-34. The forecast breaches in these years are larger in this sensitivity due to the higher demand forecast.

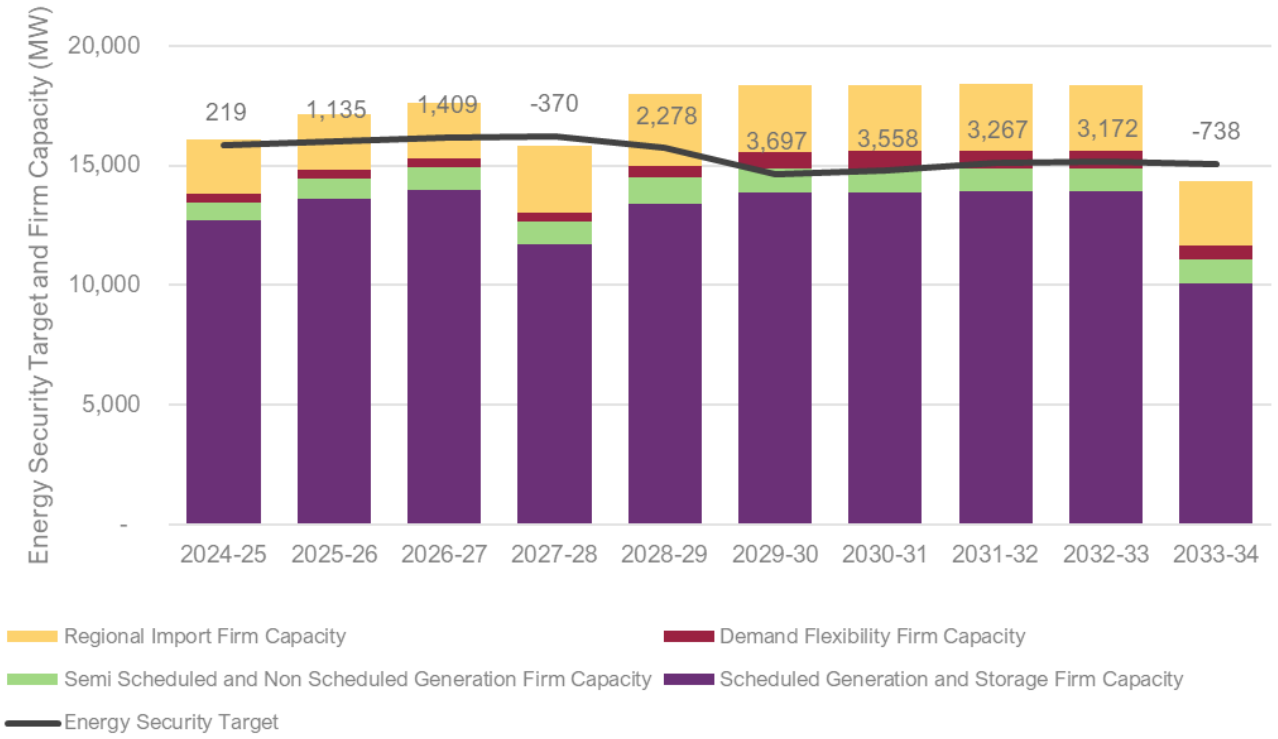
Figure 11 *Green Energy Exports* sensitivity, assessment of the EST



4.2.2 *Progressive Change*

The EST assessment for the *Progressive Change* sensitivity is shown in Figure 12.

Figure 12 *Progressive Change* sensitivity, assessment of the EST

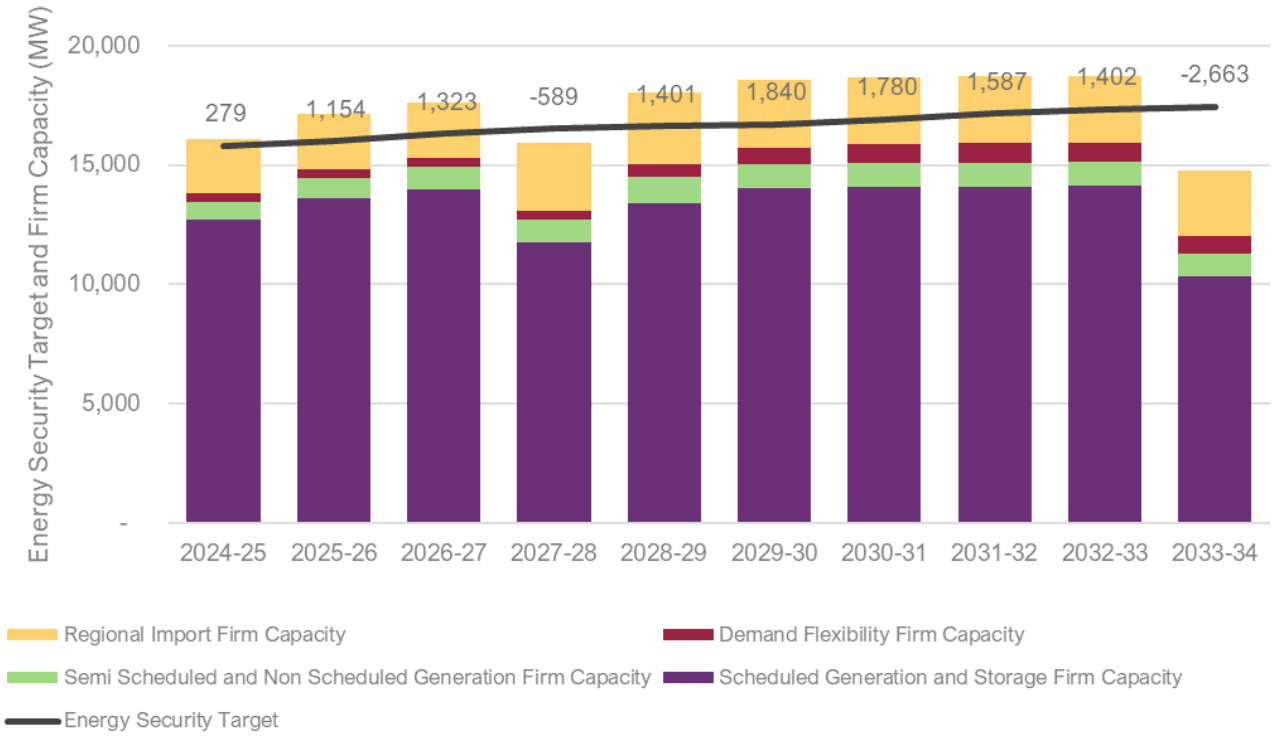


This sensitivity used the *Progressive Change* demand scenario, which assumed lower forecast demand than the *Step Change* demand scenario due to weaker economic conditions and more challenging domestic and international supply chain considerations affecting the evolution of consumer demand, and incorporated potential industrial closures of major industries across the NEM in the short to medium term. It also assumed a lower level of flexible demand. Like the *Committed and Anticipated Investments* sensitivity, this sensitivity has forecast breaches of the EST only in 2027-28 and 2033-34. The forecast breaches in these years are smaller in this sensitivity due to the lower demand forecast.

4.2.3 Data Centre

The EST assessment for the *Data Centre* sensitivity is shown in Figure 12. The *Data Centre* sensitivity used the *Accelerated Data Centre Growth* demand sensitivity on the *Step Change* demand scenario, which varies from *Step Change* due to the assumed increase in investment in data centres. Like the *Committed and Anticipated Investments* sensitivity, this sensitivity has forecast breaches of the EST only in 2027-28 and 2033-34. The forecast breaches in these years are larger in this sensitivity due to the higher demand forecast.

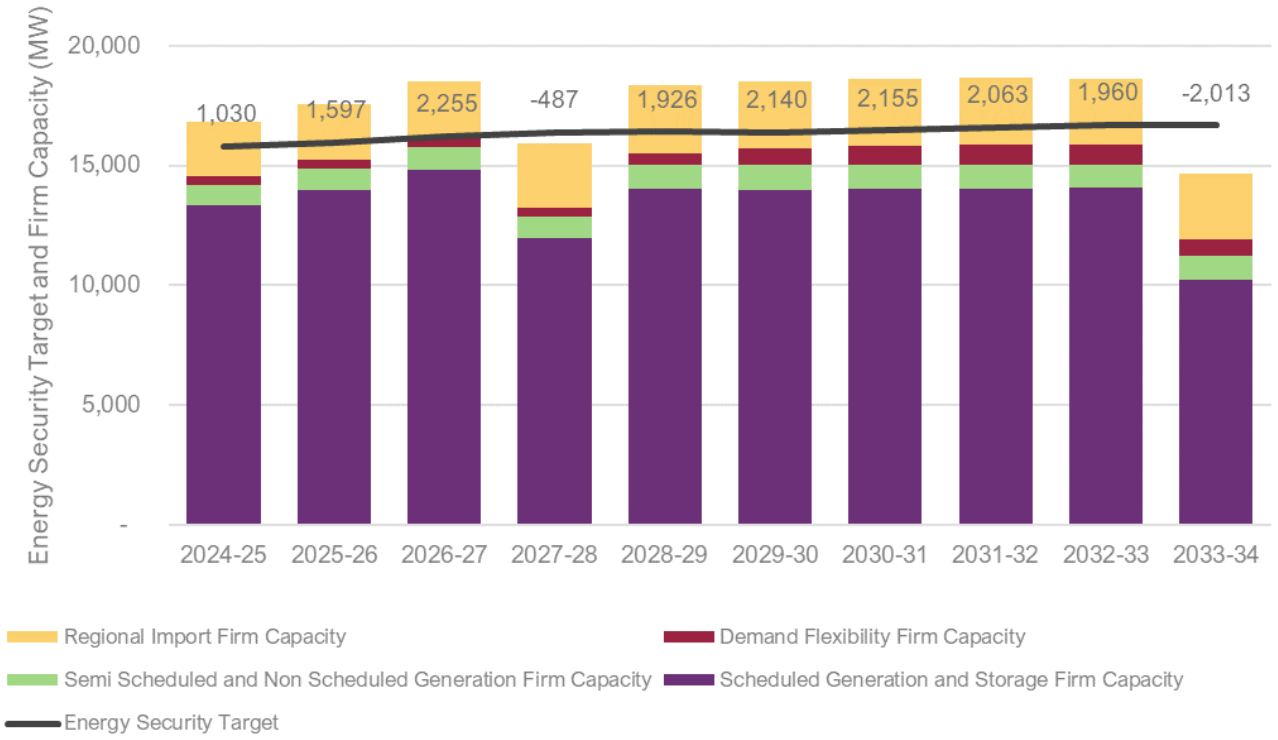
Figure 13 *Data Centre* sensitivity, assessment of the EST



4.2.4 *On Time Delivery*

The EST assessment under the *On Time Delivery* sensitivity is shown in Figure 14. Due to the assumed on-time delivery of generation and transmission, there is increased capacity in the first four years of the horizon relative to the *Committed and Anticipated Investments* sensitivity. Forecast breaches of the EST are still only forecast in 2027-28 and 2033-34, with little or no change to the breach value as the supply and the demand assumptions were the same in these years.

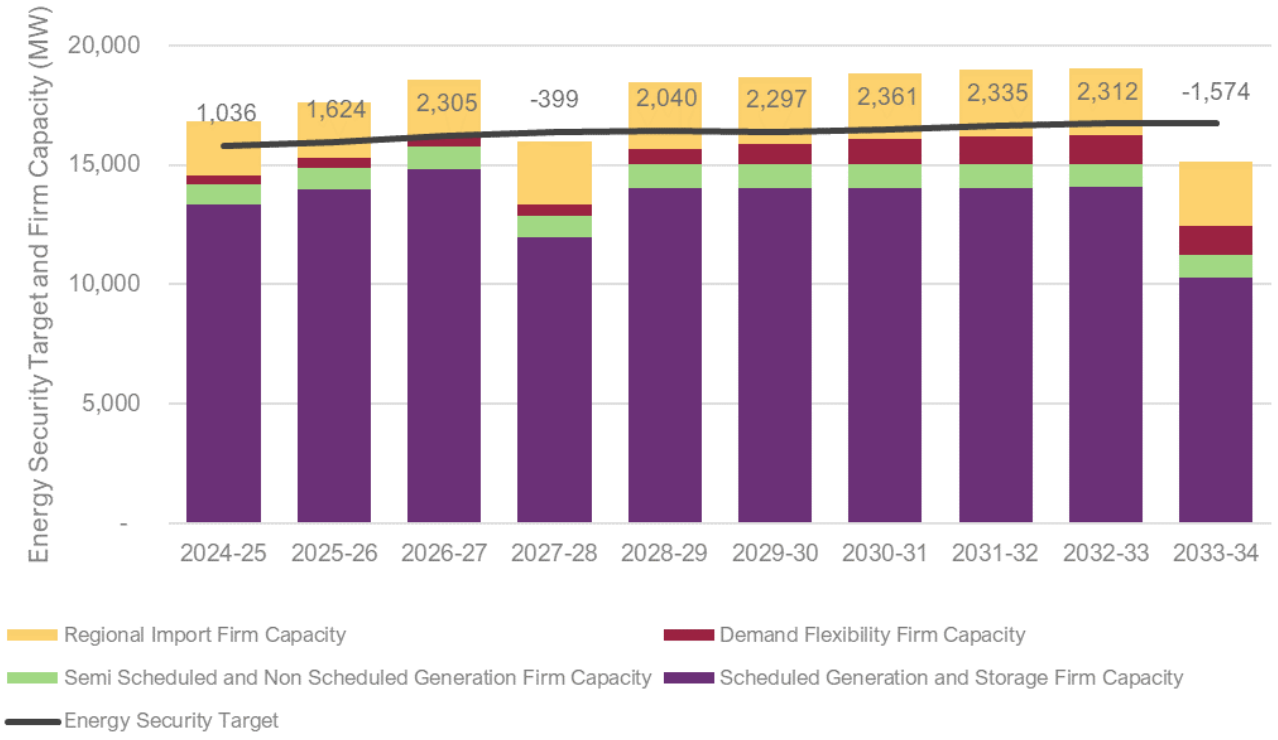
Figure 14 ***On time delivery*, assessment of the EST**



4.2.5 *Actionable transmission projects*

The EST assessment under the *Actionable transmission* sensitivity is shown in Figure 15.

Figure 15 ***Actionable transmission projects*, assessment of the EST**



Like the *Committed and Anticipated Investments* sensitivity, this sensitivity forecast breaches of the EST in 2027-28 and 2033-34. This sensitivity included transmission projects that were anticipated or deemed actionable in the 2024 ISP, and also included coordinated CER and DSP growth. Many of those projects are already considered in the *Committed and Anticipated Investments* sensitivity. Some additional projects are identified as actionable in the 2024 ISP, however these are not associated with increased intra-regional transfer limits, as they are associated with renewable energy zone developments, and therefore have limited impact on the EST assessment. The forecast breaches are slightly smaller than the *Committed and Anticipated Investments* sensitivity due to the higher level of coordinated CER and flexible demand.

4.2.6 Federal and state schemes

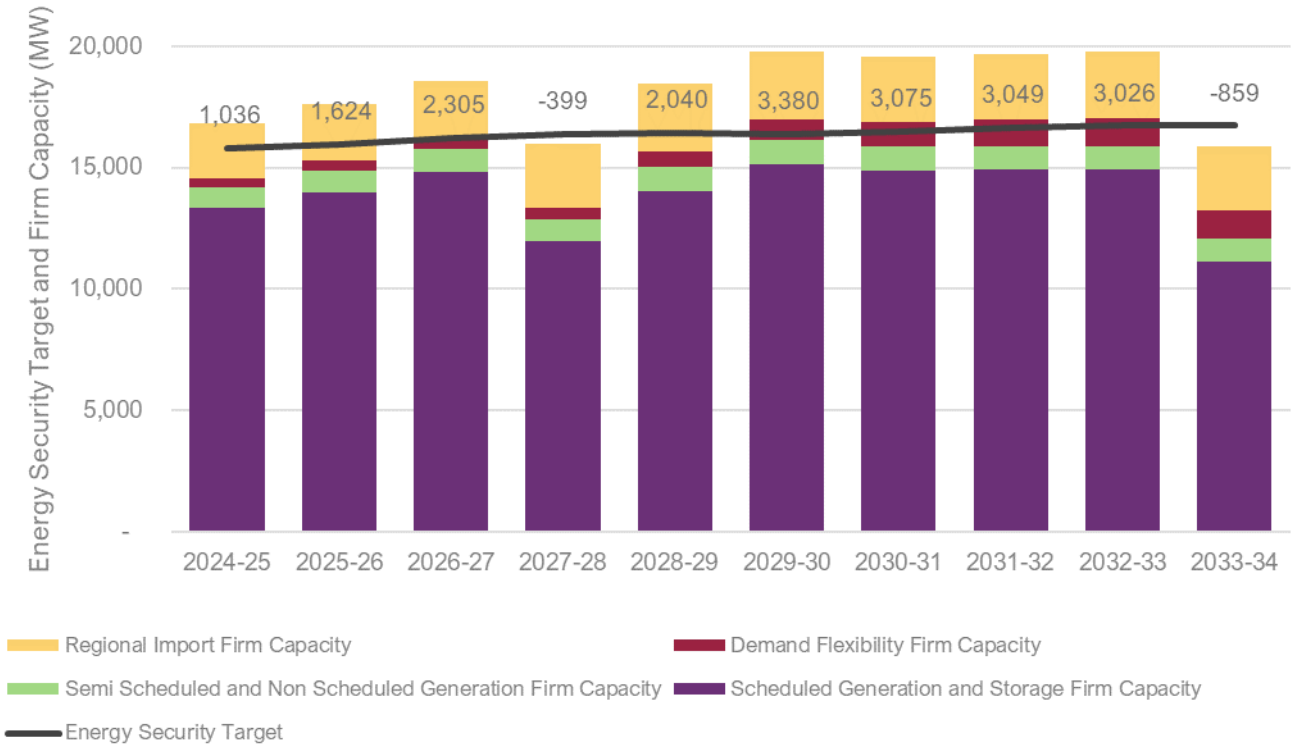
The *Federal and state schemes* sensitivity included additional projects that have been announced by the Federal Government or New South Wales Government but may not have sufficiently progressed to be classified as committed or anticipated. This included:

- Additional projects under the New South Wales Government's Infrastructure Investment Objectives (IIO) tender, which was assumed to be 1,426 MW of additional long duration storage from 2029-30.
- The sensitivity also included coordinated CER and DSP growth.

This sensitivity did not include any additional projects which may be funded by the CIS.

The EST assessment under this sensitivity is shown in Figure 16. Under this sensitivity there are still forecast breaches of the EST in years 2027-28 and 2033-34, but these are smaller than those in the *Committed and Anticipated Investments* sensitivity.

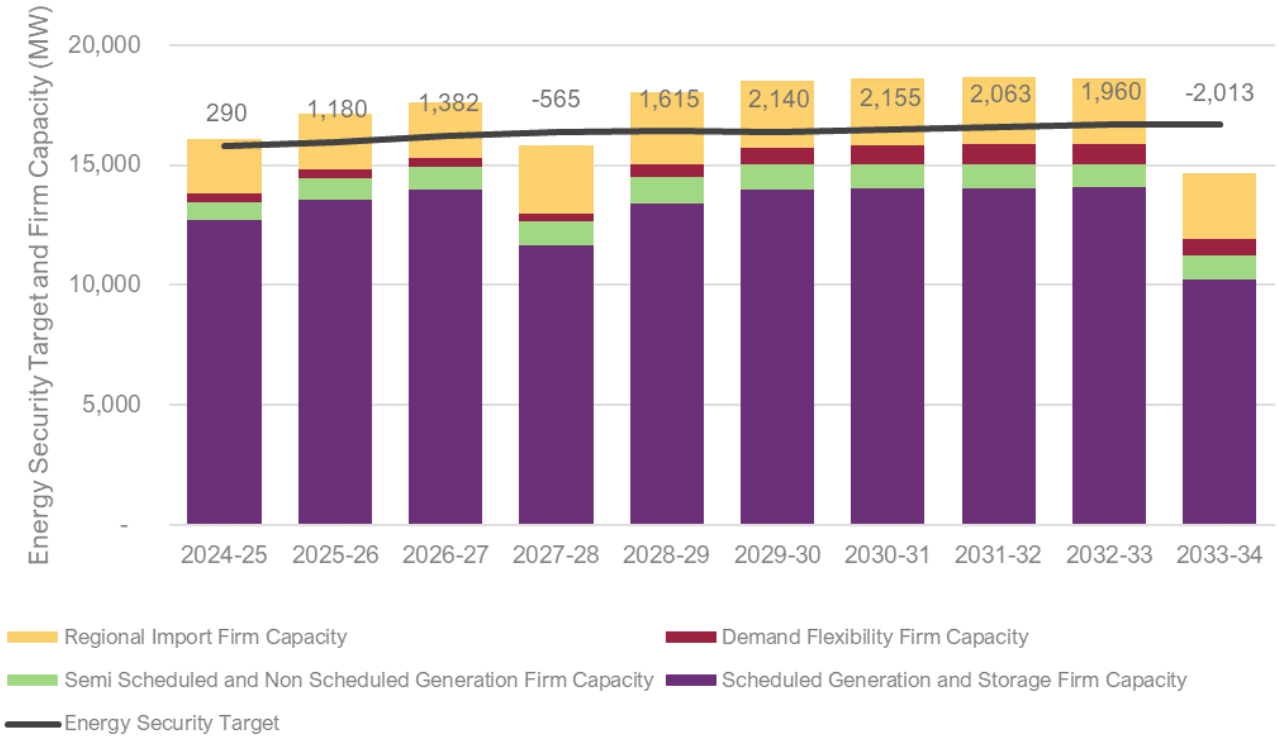
Figure 16 ***Federal and state schemes, assessment of the EST***



4.2.7 *HumeLink Delay*

This sensitivity assumed a 2 year delay in the completion of HumeLink. All other assumptions were as per the *Committed and Anticipated Investments* sensitivity. The assessment under this sensitivity is shown in Figure 17. Like the *Committed and Anticipated Investments* sensitivity, this sensitivity forecasts breaches of the EST in 2027-28 and 2033-34. The forecast breach in 2027-28 is slightly higher, due to HumeLink not being available in this year.

Figure 17 *Humelink Delay* sensitivity, assessment of the EST



4.2.8 *No Hunter Transmission Project*

This sensitivity assumes that the Hunter Transmission Project is not completed during the EST horizon. All other assumptions are as per the *Committed and Anticipated Investments* sensitivity.

The assessment under this sensitivity, shown in Figure 18 shows forecast breaches from 2027-28 onwards. These breaches arise due to limitations on the transmission network, particularly between CNSW and SNW, which can be seen in Figure 19. The EST breaches between 2028-29 and 2032-33 were not forecast in the *Committed and Anticipated Investments* sensitivity, due to the inclusion of the Hunter Transmission project which allows greater transfer from CNSW to SNW.

Figure 18 ***No Hunter Transmission Project*** **sensitivity, assessment of the EST**

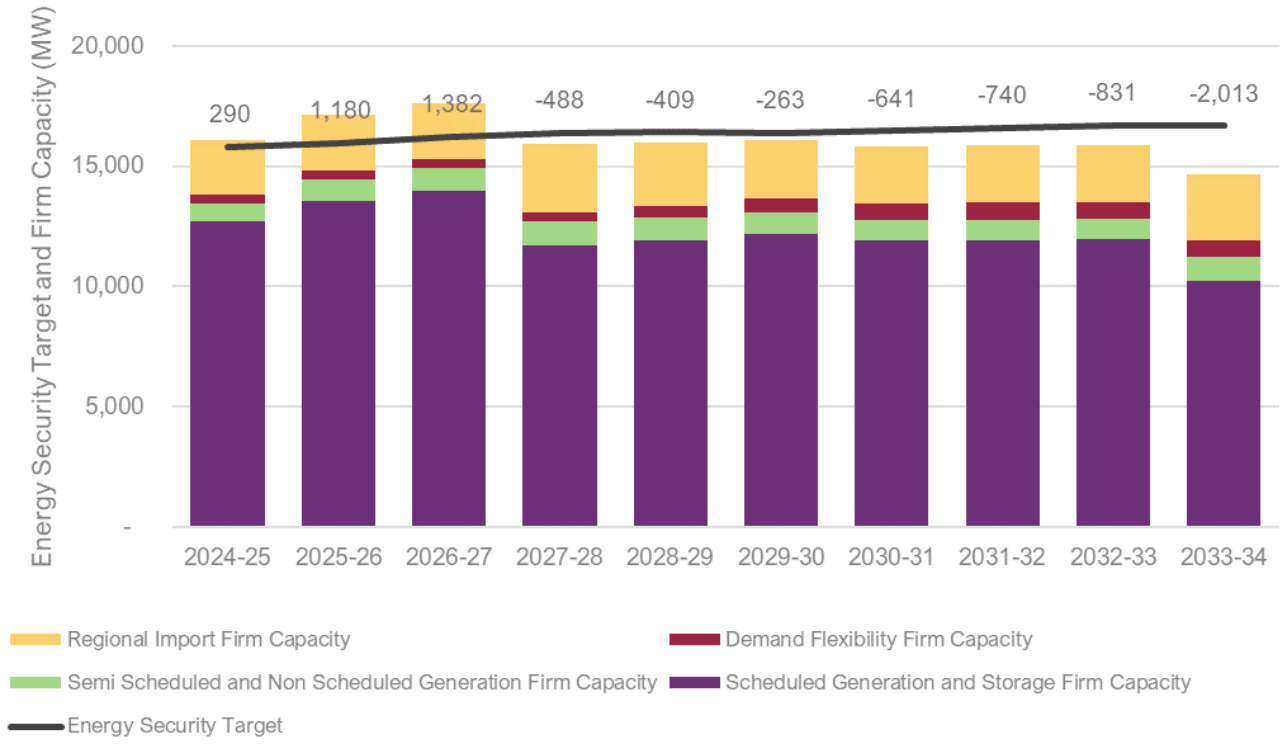
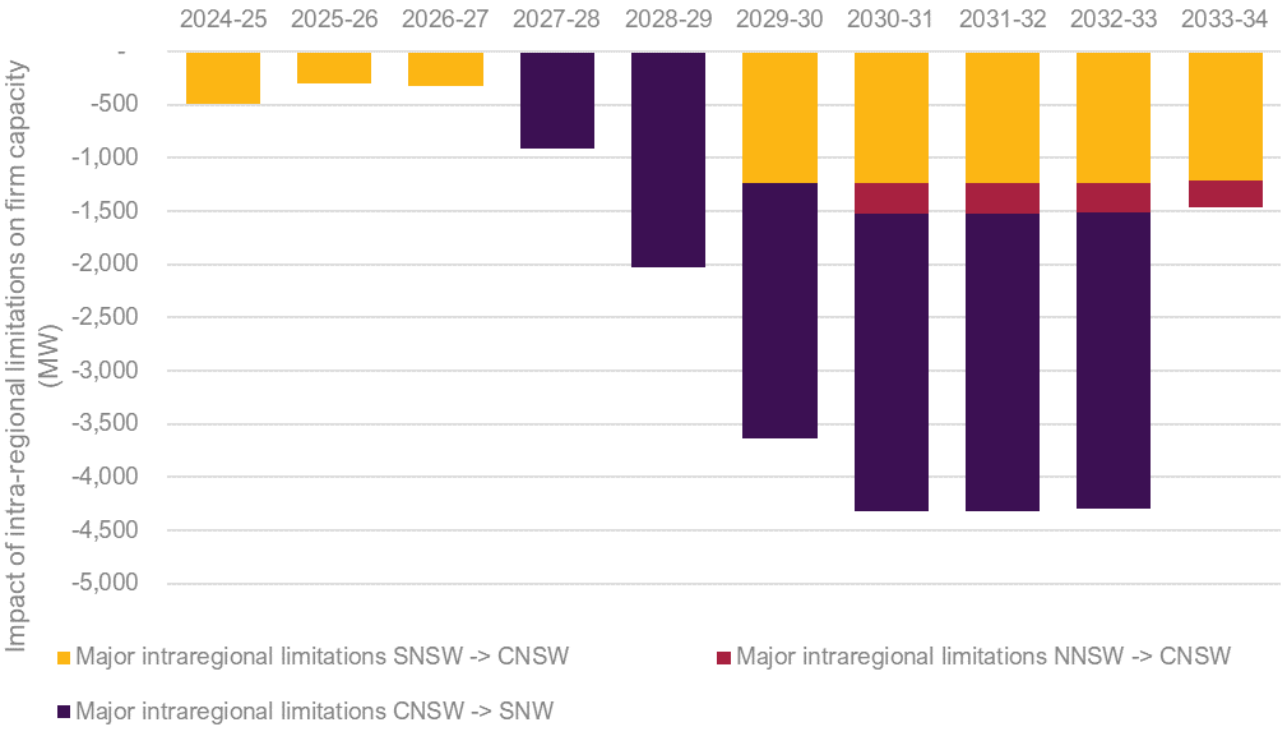


Figure 19 ***No Hunter Transmission Project*** **sensitivity, estimated impact of transmission limits on firm capacity**



5 Target breach analysis

For any financial year in which AEMO considers the firm capacity will not meet the EST, and a target breach is identified, both the size of the breach (in megawatts) and the expected duration of the breach must be reported.

To estimate the duration of any target breach, AEMO compared the projected firm capacity in the *Committed and Anticipated Investments* sensitivity against AEMO's 10% POE demand trace[30], and counted how many times operational sent out demand for a thirty-minute interval exceeded the following threshold in a given reference year:

$$Threshold = (Firm\ Capacity - Auxiliaries\ at\ Peak - Reserve)$$

If demand exceeded the threshold, this was considered 'an incident', meaning that reserves were below target. Under the *Committed and Anticipated Investments* sensitivity, there are incidents forecast only in the year 2033-34. Table 10 shows the size of the forecast EST breaches and thresholds calculated for the horizon. The surplus breach is calculated as the firm capacity available minus the EST and is measure in megawatts.

Table 10 Size of EST breach and threshold (MW), *Committed and Anticipated Investments* sensitivity

Year	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2025-26	2033-34
EST surplus/ breach	290	1,180	1,382	- 488	1,615	2,140	2,155	2,063	1,960	- 2,013
Threshold	No breach	No breach	No breach	14,248	No breach	No breach	No breach	No breach	No breach	13,152

The below figures provide additional detail about the timing and extent of projected incidents:

- Figure 20 shows the monthly distribution of the periods that exceed the demand threshold as a percentage of all periods that exceed the demand threshold, highlighting that reserve is expected to fall below the required margin during summer in 2027-28 but is spread across winter and summer in 2033-34.
- Figure 21 shows the projected frequency of incidents between summer and winter per year, aligning with the seasonal distribution as seen in the monthly analysis presented in Figure 20.
- Figure 22 shows the projected incident durations. There is a wide distribution of incident durations, with incidents of up to seven hours in length. The forecast duration of incidents is also much higher in the 2033-34 financial year compared to 2027-28.

[30] At https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo.

Figure 20 Projected monthly distribution of incidents by forecast month, *Committed and Anticipated Investments* sensitivity, financial years 2027-28 and 2033-34

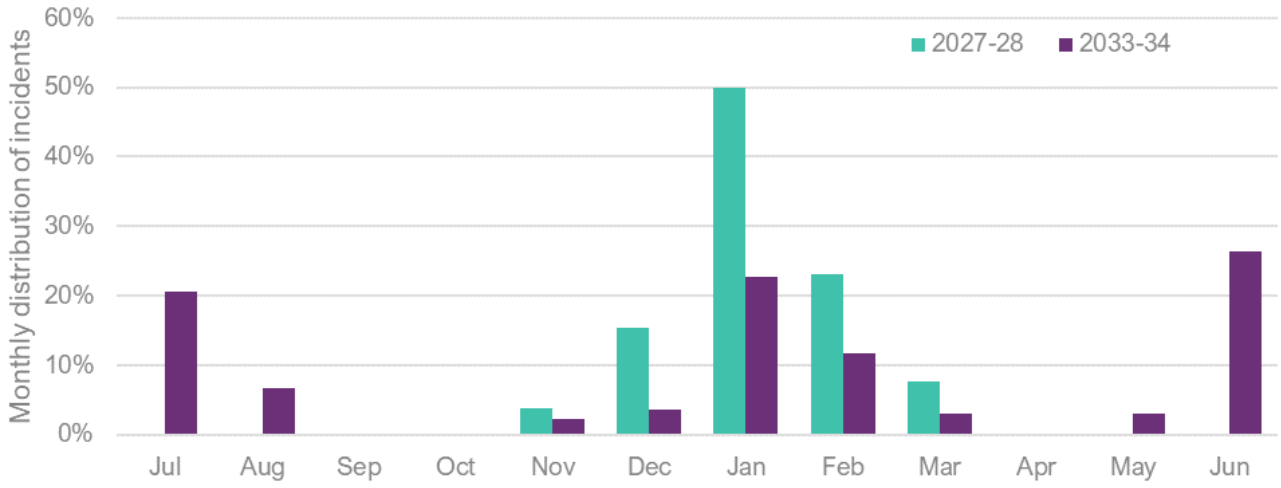


Figure 21 Projected seasonal distribution of incidents, *Committed and Anticipated Investments* sensitivity, financial years 2027-28 and 2033-34

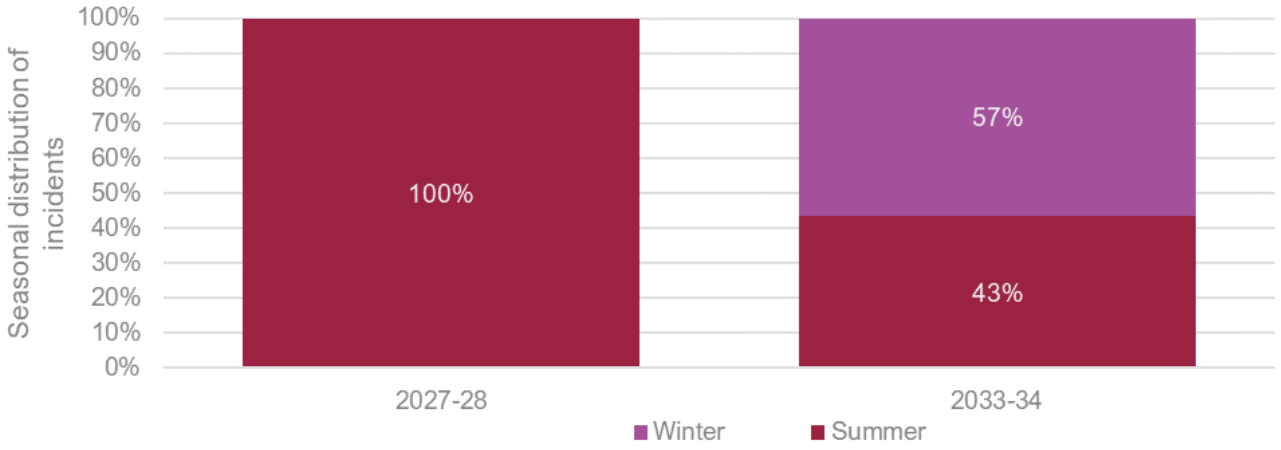
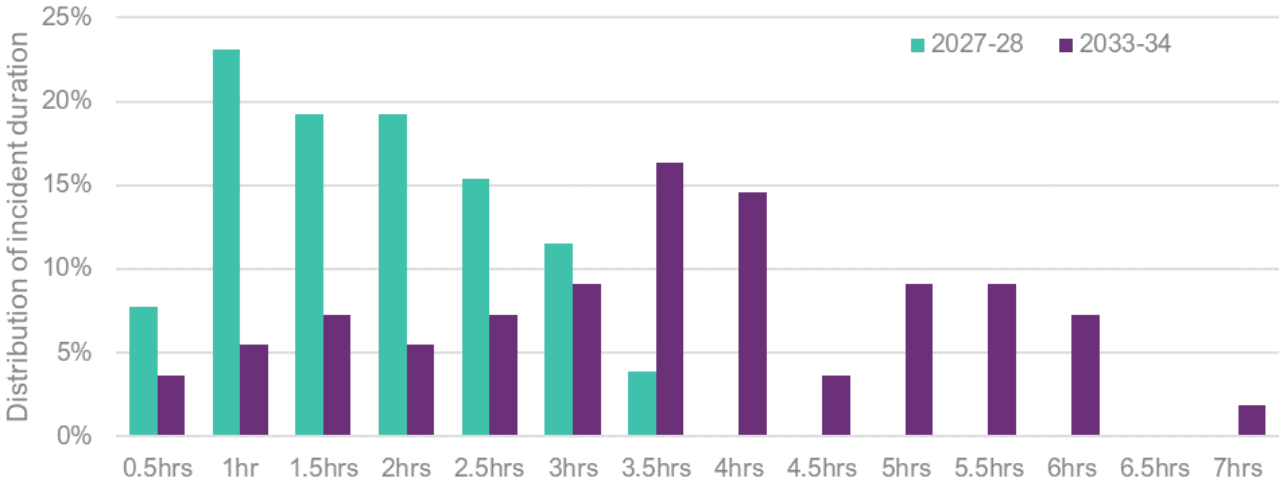


Figure 22 Projected incident duration, *Committed and Anticipated Investments* sensitivity, financial years 2027-28 and 2033-34



6 EST assessment outcomes – tables

The EST assessment outcomes are shown in the following tables.

Table 11 ***Committed and Anticipated Investments* sensitivity (*Step Change*), EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,429	14,587	14,861	14,986	15,008	14,972	15,059	15,195	15,282	15,276
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,814	15,972	16,246	16,396	16,418	16,382	16,469	16,605	16,692	16,686
Scheduled generation and storage firm capacity	12,697	13,585	13,980	11,731	13,414	14,005	14,041	14,056	14,067	10,253
Semi scheduled and non-scheduled generation firm capacity	743	870	951	967	1,073	1,006	992	993	993	976
Demand flexibility firm capacity	379	384	384	369	542	693	814	840	811	713
Regional import firm capacity	2,286	2,314	2,313	2,842	3,005	2,817	2,777	2,779	2,780	2,732
Firm capacity	16,104	17,153	17,628	15,909	18,034	18,521	18,623	18,667	18,652	14,673
EST surplus / deficit	**290**	**1,180**	**1,382**	**-488**	**1,615**	**2,140**	**2,155**	**2,063**	**1,960**	**-2,013**

Table 12 *Green Energy Exports* sensitivity, EST assessment (MW)

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,522	14,750	15,064	15,274	15,456	15,564	15,781	16,050	16,285	16,459
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,907	16,135	16,449	16,684	16,866	16,974	17,191	17,460	17,695	17,869
Scheduled generation and storage firm capacity	12,703	13,597	13,993	11,757	13,414	14,041	14,117	14,145	14,172	10,360
Semi scheduled and non-scheduled generation firm capacity	743	871	952	969	1,073	1,009	997	999	1,000	986
Demand flexibility firm capacity	380	385	385	371	557	717	843	867	837	743
Regional import firm capacity	2,287	2,316	2,315	2,848	3,005	2,824	2,792	2,797	2,801	2,760
Firm capacity	16,113	17,168	17,645	15,944	18,049	18,591	18,749	18,807	18,811	14,849
EST surplus / deficit	**206**	**1,032**	**1,196**	**-740**	**1,183**	**1,617**	**1,558**	**1,347**	**1,116**	**-3,020**

Table 13 *Progressive Change* sensitivity, EST assessment (MW)

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,480	14,611	14,804	14,805	14,324	13,240	13,377	13,714	13,768	13,671
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,865	15,996	16,189	16,215	15,734	14,650	14,787	15,124	15,178	15,081
Scheduled generation and storage firm capacity	12,700	13,587	13,976	11,701	13,414	13,896	13,868	13,904	13,913	10,099
Semi scheduled and non-scheduled generation firm capacity	743	870	951	964	1,073	998	980	982	982	961
Demand flexibility firm capacity	355	359	359	345	519	658	755	756	706	593
Regional import firm capacity	2,286	2,314	2,312	2,834	3,005	2,795	2,743	2,749	2,750	2,690
Firm capacity	16,083	17,130	17,598	15,844	18,012	18,347	18,345	18,391	18,351	14,343
EST surplus / deficit	**219**	**1,135**	**1,409**	**-370**	**2,278**	**3,697**	**3,558**	**3,267**	**3,172**	**-738**

Table 14 ***Data Centre*** **sensitivity, EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,441	14,616	14,926	15,117	15,222	15,298	15,493	15,747	15,929	16,030
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,826	16,001	16,311	16,527	16,632	16,708	16,903	17,157	17,339	17,440
Scheduled generation and storage firm capacity	12,698	13,587	13,985	11,753	13,414	14,025	14,086	14,113	14,135	10,325
Semi scheduled and non-scheduled generation firm capacity	743	870	952	968	1,073	1,008	995	997	998	983
Demand flexibility firm capacity	379	384	384	370	542	694	816	844	815	718
Regional import firm capacity	2,286	2,314	2,313	2,847	3,005	2,821	2,786	2,790	2,794	2,751
Firm capacity	16,105	17,155	17,633	15,938	18,034	18,548	18,683	18,744	18,741	14,777
EST surplus / deficit	**279**	**1,154**	**1,323**	**-589**	**1,401**	**1,840**	**1,780**	**1,587**	**1,402**	**-2,663**

Table 15 ***On Time Delivery*** **sensitivity, EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,429	14,587	14,861	14,986	15,008	14,972	15,059	15,195	15,282	15,276
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,814	15,972	16,246	16,396	16,418	16,382	16,469	16,605	16,692	16,686
Scheduled generation and storage firm capacity	13,362	13,990	14,840	11,966	14,009	14,005	14,041	14,056	14,067	10,253
Semi scheduled and non-scheduled generation firm capacity	820	882	960	913	1,007	1,006	992	993	993	976
Demand flexibility firm capacity	379	384	384	349	508	693	814	840	811	713
Regional import firm capacity	2,284	2,314	2,317	2,683	2,820	2,817	2,777	2,779	2,780	2,732
Firm capacity	16,845	17,570	18,501	15,910	18,344	18,521	18,623	18,667	18,652	14,673
EST surplus / deficit	**1,030**	**1,597**	**2,255**	**-487**	**1,926**	**2,140**	**2,155**	**2,063**	**1,960**	**-2,013**

Table 16 ***Actionable Transmission and Coordinated CER* sensitivity, EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,430	14,589	14,864	14,994	15,014	14,994	15,087	15,232	15,326	15,329
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,815	15,974	16,249	16,404	16,424	16,404	16,497	16,642	16,736	16,739
Scheduled generation and storage firm capacity	13,362	13,989	14,835	11,966	14,012	14,008	14,042	14,057	14,069	10,262
Semi scheduled and non-scheduled generation firm capacity	820	882	960	913	1,007	1,006	992	993	993	977
Demand flexibility firm capacity	385	412	444	444	625	869	1,047	1,148	1,205	1,192
Regional import firm capacity	2,284	2,314	2,316	2,683	2,820	2,818	2,777	2,779	2,781	2,734
Firm capacity	16,852	17,597	18,554	16,005	18,464	18,701	18,858	18,977	19,048	15,165
EST surplus / deficit	**1,036**	**1,624**	**2,305**	**-399**	**2,040**	**2,297**	**2,361**	**2,335**	**2,312**	**-1,574**

Table 17 ***Federal and State Schemes* sensitivity, EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,430	14,589	14,864	14,994	15,014	14,994	15,087	15,232	15,326	15,329
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,815	15,974	16,249	16,404	16,424	16,404	16,497	16,642	16,736	16,739
Scheduled generation and storage firm capacity	13,362	13,989	14,835	11,966	14,012	15,151	14,900	14,917	14,931	11,151
Semi scheduled and non-scheduled generation firm capacity	820	882	960	913	1,007	994	962	963	964	942
Demand flexibility firm capacity	385	412	444	444	625	858	1,016	1,114	1,169	1,150
Regional import firm capacity	2,284	2,314	2,316	2,683	2,820	2,782	2,694	2,696	2,698	2,637
Firm capacity	16,852	17,597	18,554	16,005	18,464	19,784	19,572	19,691	19,762	15,880
EST surplus / deficit	**1,036**	**1,624**	**2,305**	**-399**	**2,040**	**3,380**	**3,075**	**3,049**	**3,026**	**-859**

Table 18 ***HumeLink Delay* sensitivity, EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,429	14,587	14,861	14,986	15,008	14,972	15,059	15,195	15,282	15,276
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,814	15,972	16,246	16,396	16,418	16,382	16,469	16,605	16,692	16,686
Scheduled generation and storage firm capacity	12,697	13,585	13,980	11,674	13,414	14,005	14,041	14,056	14,067	10,253
Semi scheduled and non-scheduled generation firm capacity	743	870	951	962	1,073	1,006	992	993	993	976
Demand flexibility firm capacity	379	384	384	368	542	693	814	840	811	713
Regional import firm capacity	2,286	2,314	2,313	2,828	3,005	2,817	2,777	2,779	2,780	2,732
Firm capacity	16,104	17,153	17,628	15,831	18,034	18,521	18,623	18,667	18,652	14,673
EST surplus / deficit	**290**	**1,180**	**1,382**	**-565**	**1,615**	**2,140**	**2,155**	**2,063**	**1,960**	**-2,013**

Table 19 ***No Hunter Transmission Project* sensitivity, EST assessment (MW)**

	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
Maximum demand (as generated)	14,429	14,587	14,861	14,986	15,008	14,972	15,059	15,195	15,282	15,276
Reserve margin	1,385	1,385	1,385	1,410	1,410	1,410	1,410	1,410	1,410	1,410
Energy security target	15,814	15,972	16,246	16,396	16,418	16,382	16,469	16,605	16,692	16,686
Scheduled generation and storage firm capacity	12,697	13,585	13,980	11,731	11,908	12,188	11,933	11,945	11,962	10,253
Semi scheduled and non-scheduled generation firm capacity	743	870	951	967	953	876	843	844	844	976
Demand flexibility firm capacity	379	384	384	369	481	603	692	714	690	713
Regional import firm capacity	2,286	2,314	2,313	2,842	2,668	2,451	2,360	2,362	2,364	2,732
Firm capacity	16,104	17,153	17,628	15,909	16,009	16,118	15,828	15,865	15,861	14,673
EST surplus / deficit	**290**	**1,180**	**1,382**	**-488**	**-409**	**-263**	**-641**	**-740**	**-831**	**-2,013**