

2026 Victorian Annual Planning Report

Appendix 2

Approach to network limitation review

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Acronyms

Term	Definition
AEMO	Australian Energy Market Operator
DSN	declared shared network
NER	National Electricity Rules
POE	probability of exceedance
VAPR	Victorian Annual Planning Report

Appendix 2:

Approach to network limitation review

To identify network augmentation needs, VicGrid investigates transmission network limitations by:

- Reviewing historical network performance over the previous year, noting that past performance is becoming a weaker indicator of future performance as the demands on the declared shared network (DSN) change¹
- Reviewing future network performance under a range of demand and generation scenarios, considering government policy and economic growth projections described in section 2 and section 3, through exploratory studies in this section

For the purposes of the Victorian Annual Planning Report (VAPR), a limitation is defined as a network element or location that, in the next 10 years:

- Is forecast to be loaded to 100% of its continuous rating of a DSN network element, or experience voltages outside its normal voltage range, during system normal operating conditions
- Is forecast to be loaded to 100% of its short-term rating of a DSN network element, or experience voltages outside its contingency voltage range, following a credible contingency event
- Does not maintain the minimum three phase fault level or stable voltage waveform system strength standard for that location as determined by the Australian Energy Market Operator (AEMO) under the National Electricity Rules (NER) 5.20C.1
- Has voltage unbalance levels that do not meet the requirements outlined in NER 5.1a.7
- Has typical inertia dispatched being less than the secure operating level of inertia, where the typical inertia is the value at one standard deviation below the mean and the secure operating level of inertia is the minimum level of inertia required to operate an islanded inertia sub-network in a secure operating state²
- Does not maintain sufficient reactive margins following a credible contingency event as outlined in NER 5.1.8
- Does not meet the requirements for steady-state magnitude of power frequency voltage outlined in NER 5.1.4
- Has a fault level shortfall as outlined in NER 11.143.14
- Has a heavily restricted outage window due to other constraints and limitations

Exploratory studies, which mainly include screening and trigger studies, are carried out to identify DSN thermal and voltage control limitations that may emerge over the next 10 years. Screening studies are used to identify expected limitations, while trigger studies are used to test the system under more extreme scenarios to identify conditions that trigger further limitations.

The VAPR analysis always incorporates a full set of statewide screening studies, and specific trigger studies are undertaken if necessary to examine the triggers likely to cause transmission network limitations beyond the current 10-year forecasts of generation, demand, or other planning inputs.

Screening studies identify limitations by assessing network performance in terms of security and performance obligations under a range of different power system configurations. Security and performance obligations define the transmission system's technical limitations (for example, voltage ranges, thermal limits, stability limits, maximum fault currents, and fault clearance requirements). These obligations ensure that connected assets (and the power system itself) are designed to operate within known technical limits.

In assessing the impact of limitations, VicGrid considers information from power system performance analysis each year for the next 10 years regarding:

- The percentage n and $n-1$ loadings of the transmission plant associated with the network thermal capacity limitation, based on the continuous and short-term ratings, respectively

¹ See Section 3 in the VNPIR at <https://www.vicgrid.com.au/transmission-planning/victorian-annual-planning-report>

² See *Inertia Requirements Methodology Inertia Requirements and Shortfalls*, at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/System-Security-Market-Frameworks-Review/2018/Inertia_Requirements_Methodology_PUBLISHED.pdf

- The load and energy at risk (load at risk is the load shedding required to avoid the network limitation)
- Expected unserved energy, which is the energy at risk after accounting for forced outages
- Dispatch cost, which is the additional cost from constraining generation
- Limitation cost, which is the total additional cost due to both constraining generators and expected unserved energy

Power system performance analysis uses conservative assumptions for demand, temperature, and wind speed to capture as many network limitations as possible for market simulation. For this reason, DSN performance analysis results (that is, the percentage loadings) can show more severe impacts than market simulations. VicGrid derives forecast transmission plant loadings using load flow simulations and develops load flow base cases for these simulations using inputs and assumptions aligned with AEMO's latest Inputs, Assumptions and Scenarios Report³ wherever possible. Key assumptions and inputs include:

- The 10% probability of exceedance (POE) terminal station demand for maximum demand base cases
- Historical maximum power transfers for a high Victoria to New South Wales power transfer base case
- Typical generation dispatch and interconnector flow patterns under the given operating conditions
- The system's normal operational configuration for the existing Victorian transmission network
- Committed transmission network augmentation and generation projects, and other likely future projects which VicGrid considers relevant to network limitation review including projects identified as part of the optimal development pathway in the 2025 Victorian Transmission Plan
- Standard continuous ratings and short-term ratings at 45°C and 0.6 metres per second wind speed
- Unless indicated, 15-minute ratings for transmission lines - some transmission lines in Victoria are equipped with automatic load shedding schemes, which avoid overloading by disconnecting load blocks following a contingency, and these schemes allow lines to operate to five-minute ratings
- The market impact of each network limitation, based on probabilistic market simulations that apply:
 - Weighted 50% POE and 10% POE maximum demand forecasts (weighted 70% and 30% respectively)
 - Historical wind generation availability and historical load profiles
 - Dynamic ratings based on historical temperature traces
- Committed new and retired generation

For more information, see the Victorian Electricity Planning Approach⁴.

³ See <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2026-integrated-system-plan-isp/2025-26-inputs-assumptions-and-scenarios>

⁴ See the *Victorian Electricity Planning Approach* at <https://www.vicgrid.com.au/transmission-planning/victorian-annual-planning-report>