Fact Sheet:

December 2018

Energy integration in Western Victoria – 2018 and beyond

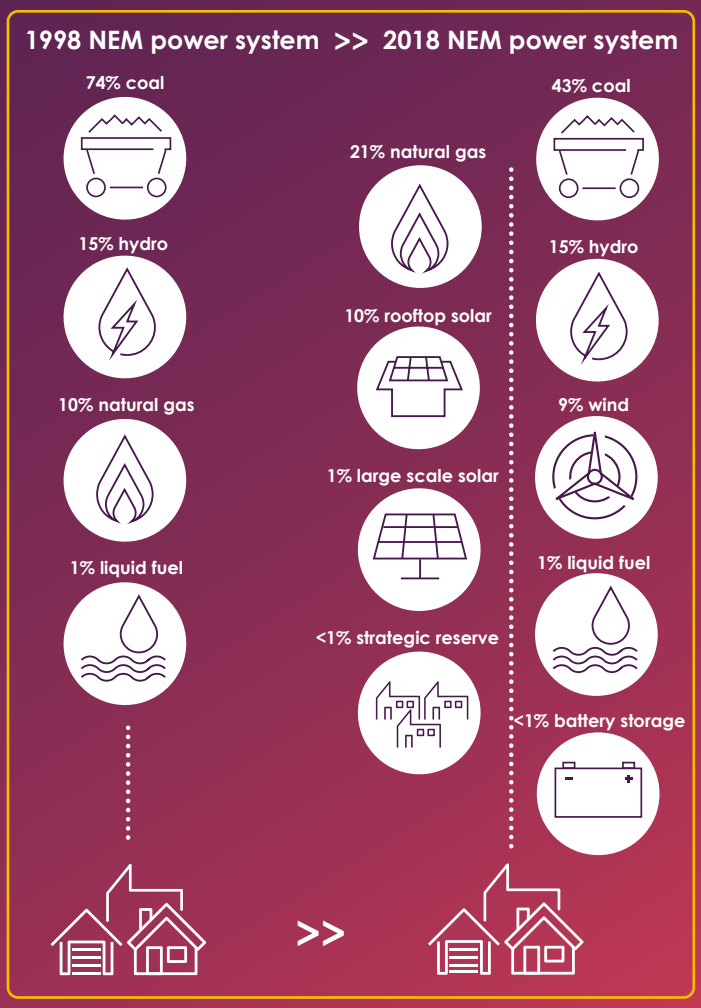
Overview

The Australian Energy Market Operator (AEMO) has prepared this fact sheet to provide information on work underway to integrate new renewable energy generation in Western Victoria into Australia's National Electricity Market (NEM) power system.

Energy generation trends in Western Victoria

When the NEM was established in 1998, Australia's power system was predominantly fuelled by coal, hydro and gas generation. Fast forward two decades, and Australia's power system has changed significantly with the introduction of renewable energy to the generation mix, from sources including rooftop solar photovoltaic (PV), and large-scale solar and wind farms which may combine energy storage technology. With this diversification of energy fuel sources, the infrastructure which delivers energy from coal and gas plants, solar and wind farms, or rooftop solar panels to your home is also changing.

Much of Australia's energy infrastructure was built in the 1950s around resources located along the coast. Australia's NEM is one of the world's largest interconnected power systems, stretching from Port Douglas in Queensland to Port Lincoln in South Australia and across the Bass Strait to Tasmania at a distance of around 5,000 kilometres. The arrival of new energy resources in our energy mix has led to the emergence of new generation hubs in locations outside the traditional generation hubs – new generation hubs which require a different approach to power system management and infrastructure. Western Victoria is one area in particular which has become an attractive location for new renewable generation projects due to the availability of renewable energy resources (such as solar or wind energy). There is significant interest from energy market participants seeking to connect renewable generation projects in Western Victoria to the power system – a trend which has been accentuated by the Victorian Renewable Energy Target (VRET) which came into effect in 2017.



AEMO infographic, "Drivers for Change", 2018

AEMO is responsible for planning and managing the power system to ensure a secure and reliable supply of energy for consumers. This means maintaining power system stability through a complex interaction of many electrical and mechanical elements while balancing energy supply and demand. In our network planning, AEMO has identified that there is currently insufficient capacity within existing transmission infrastructure in Western Victoria to enable the amount of proposed generation in this region to efficiently dispatch electricity to the power system. Without adequate transmission capacity, generators connecting to this part of the network may be heavily constrained, limiting the ability for existing and new generators to export power to the Victorian network, leading to higher prices for consumers.

Figure 1 – Western Victoria transmission network as at November 2018

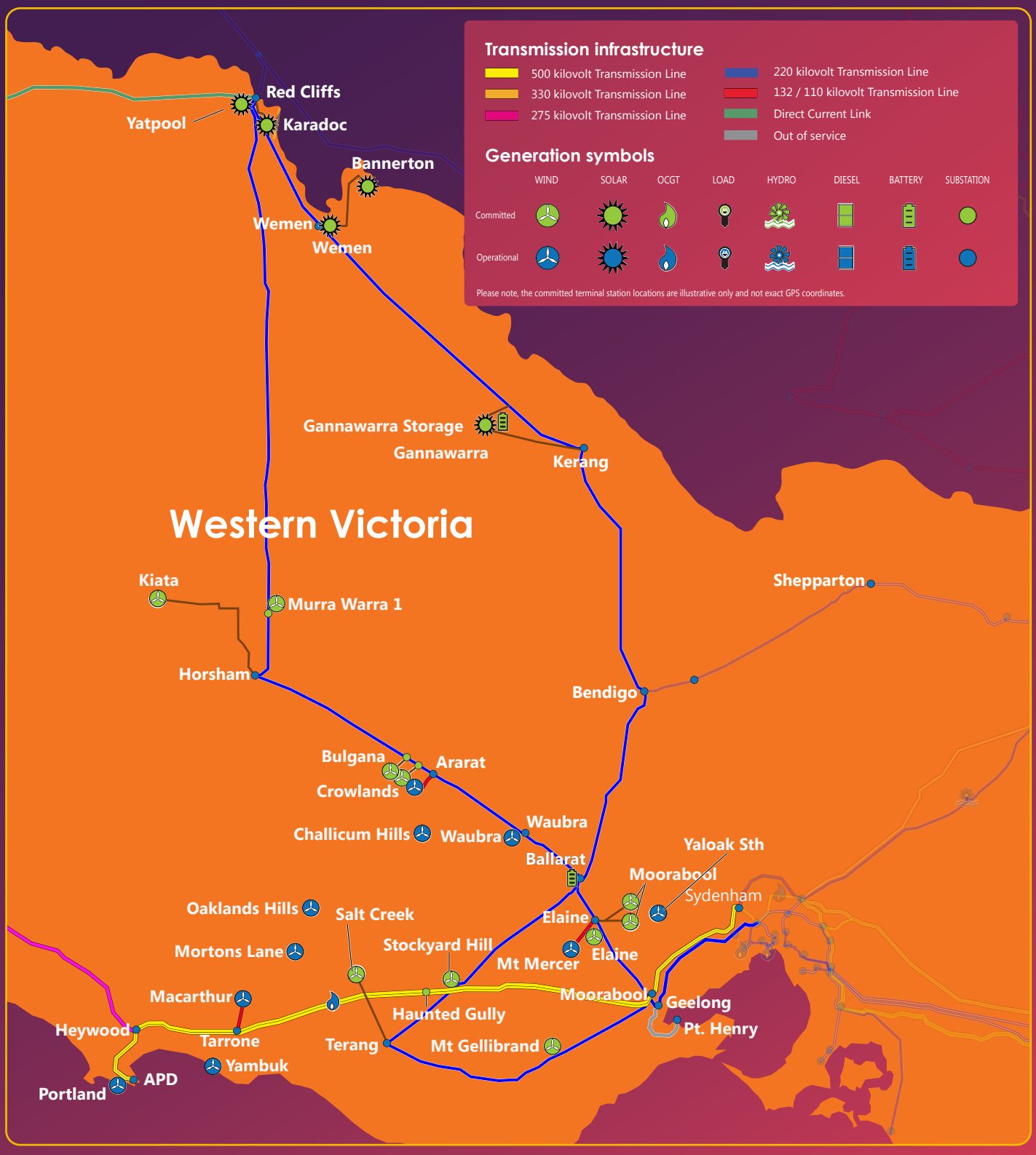


Figure 1 illustrates the "Western Victoria" electrical transmission network and surrounding areas. It covers the Central Highlands, Wimmera Southern Mallee, Mallee, Loddon Campaspe, and parts of the Great South Coast. The network extends from Moorabool Terminal Station, west to Terang Terminal Station, north-east to Ballarat Terminal Station, and to the 220 kilo Volt (kV) loop extending Ballarat – Horsham – Red Cliffs – Kerang – Bendigo.

Visit AEMO's interactive planning and NEM generation maps for the latest information on transmission infrastructure and generation connections.

Electricity transmission network requirements in Western Victoria

The electricity supply chain is made up of several components. Electricity produced from sources including coal, gas, solar, water, and wind is converted to high voltage electricity by generator transformers housed in terminal stations or substations. It then travels long distances via high voltage transmission lines to distribution transformers, where it is converted into low voltage electricity and transported via distribution power lines into homes and businesses across the NEM.

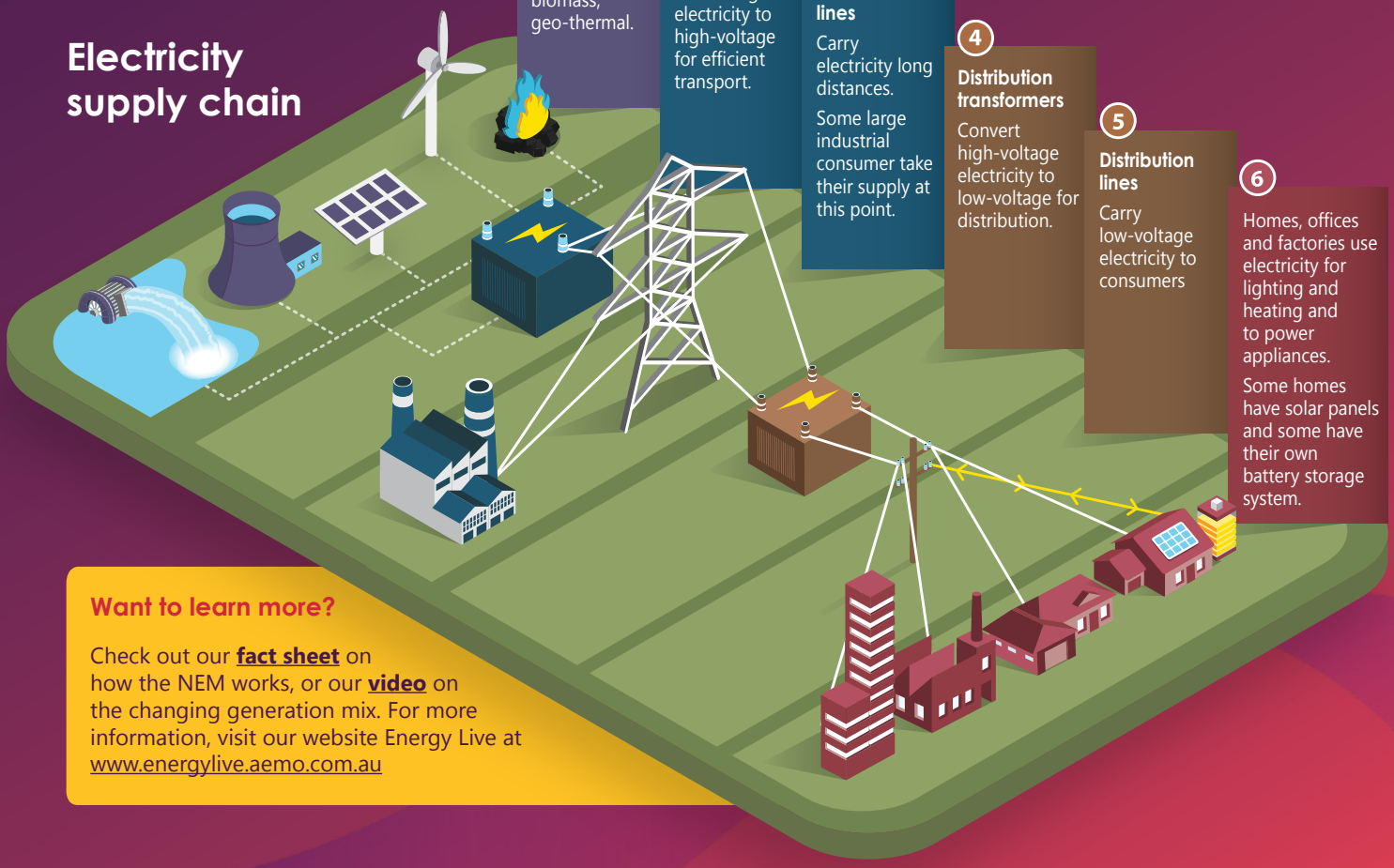
A power line can only retain a certain amount of heat from electricity transmission before it fails, putting the power system at risk of damage and affecting electricity supply. This is measured by the line's 'thermal capacity'.

Without adequate thermal capacity in Western Victoria, generators connecting to this part of the network may be heavily constrained. This could result in generators being forced to dispatch less energy than their available output to maintain power flows within thermal capacity.

Victoria is part of the NEM, which has been designed to meet electricity demand in the most cost-efficient way.

Electricity generation is matched to electricity demand on a least-cost basis, meaning that generators with the lowest cost energy are usually dispatched before more expensive options. If insufficient capacity in the transmission network constrains a lower-cost generator from participating in the energy market, more expensive generation may be dispatched instead, leading to higher electricity prices for consumers.

Electricity supply chain



Want to learn more?

Check out our **fact sheet** on how the NEM works, or our **video** on the changing generation mix. For more information, visit our website Energy Live at www.energylive.aemo.com.au

Read on to find out how AEMO is addressing this.

The Regulatory Investment Test for Transmission process

Strategic planning of our power system is crucial to making smart, informed decisions in the long-term interests of Australian energy consumers. In our role as the transmission network planner for Victoria, AEMO is undertaking the Western Victoria Renewable Integration Regulatory Investment Test for Transmission (RIT-T) to assess the technical and economic viability of increasing transmission network capacity in Western Victoria, to facilitate the efficient connection of new generation in the region.

Reducing network congestion will allow generators in the region to participate more fully in the energy market, expanding energy supply mix and increasing competition to the benefit of consumers.

The RIT-T process is a regulatory mechanism that applies an economic cost-benefit test on new transmission electricity infrastructure proposed for the NEM. It is designed to identify the most economically efficient infrastructure investment option, so the investment meets the long-term needs of consumers.

Through this RIT-T process, AEMO, in consultation with industry, government and other key stakeholders, is considering a range of options, including:

Minor network augmentations (i.e. small upgrades designed to maximise the capacity of existing infrastructure).

Major network augmentations (such as new or upgraded transmission lines, and/or the installation of equipment).

Non-network options (such as battery storage and/or demand side management) to increase transmission capacity in the Western Victoria region.

The RIT-T process is defined in the National Electricity Rules. It requires NEM network planners considering significant investment in new transmission infrastructure to publish three reports:

1. The first report, the Project Specification Consultation Report (PSCR), seeks feedback and advice on the identified need for new transmission infrastructure.
2. The second report, the Project Assessment Draft Report (PADR), identifies and seeks feedback on the preferred infrastructure investment option.
3. The third report, the Project Assessment Conclusions Report (PACR), presents the transmission planner's recommended solution to deliver the highest net economic benefit and intended course of action.

Read on to learn about AEMO's role in the RIT-T process

Infrastructure to support our energy future

AEMO is fuel and technology neutral in our approach to planning and managing the power system. Our focus is on the adequacy of available energy resources to meet the needs of the power system, and our ability to operate the system in a manner that supplies consumers with reliable, secure and cost-effective electricity. In this RIT-T, AEMO aims to identify the most efficient means of increasing transmission capacity in Western Victoria to facilitate the connection and dispatch of new generation to the grid. This includes conducting detailed market modelling, as well as industry and public consultation via requests for submissions on our reports, and stakeholder engagement activities with government, and industry.

While AEMO is responsible for planning the transmission network in Victoria, we do not own any energy transmission infrastructure in the NEM. Should major network augmentations be justified through the RIT-T process, we are generally required to conduct a tender process for a preferred party to be responsible for the ownership, construction, and operation of new transmission infrastructure.

Infrastructure investment options identified through this RIT-T process considers the changing generation mix in the NEM, and the long-term plan for transmission network development outlined in AEMO's **2018 Integrated System Plan**.

Western Victoria Renewable Integration RIT-T reporting documents

AEMO published our first report for the Western Victoria Renewable Integration RIT-T, the **PSCR**, in April 2017. This report is available on our website. AEMO published a **Western Victoria Renewable Integration RIT-T Project Update** in July 2018 to provide information on how our annual **Victorian Planning Report** and inaugural **Integrated System Plan** also published in July 2018 is informing our work on this RIT-T.

The second report in the RIT-T process, the **Project Assessment Draft Report (PADR)**, was published in December 2018.

The final report, the Project Assessment Conclusion Report (PACR) will be published mid-2019

We welcome your feedback

AEMO is committed to keeping stakeholders informed of the progress of the Western Victorian Renewable Integration RIT-T and will provide further updates in the coming months.

You can also contact us at any time at WestVicRITT@aemo.com.au . For more information on the RIT-T for Western Victoria, head to our **website**.

About AEMO:

AEMO is responsible for operating Australia's largest gas and electricity markets and power systems, including the National Electricity Market and interconnected power system in Australia's eastern and south-eastern seaboard, and the Wholesale Electricity Market and power system in Western Australia.

AEMO also operates the Victorian Declared Wholesale Gas Market and the Victorian gas transmission system; the wholesale gas Short Term Trading Market hubs in Adelaide, Sydney and Brisbane; the Wallumbilla Gas Supply Hub in Queensland; and the Moomba Gas Supply Hub in South Australia.

As Australia's independent energy markets and power systems operator, AEMO provides critical planning, forecasting and power systems security advice and services to deliver energy security for all Australians.

For more information, head to http://aemo.com.au/ or www.energlive.aemo.com.au or follow us here -