



DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

NSW Electricity Strategy

Our plan for a reliable, affordable and sustainable electricity system



Minister's Foreword

Electricity is the quiet driver of our modern way of life. It powers the computers at our schools and life-saving equipment at our hospitals. It keeps our local businesses competitive in fast-paced, global markets. For many decades, our electricity system has provided cheap and reliable power for the people of NSW and underpinned our economic prosperity.

Despite its success, the electricity system is facing increasing pressure. Our existing power stations are getting older and retiring. The grid is becoming congested. Electricity bills are unacceptably high. Public calls for what our electricity market should be doing, and by when, are loud and divided.

I firmly believe that, by applying liberal principles grounded in science, markets and economics, we can solve these problems and address those concerns.

The NSW Government has relied on those principles to develop this Electricity Strategy and deliver better outcomes for energy consumers. This Strategy will improve competition, drive the roll-out of cost-effective technologies and set one of the highest targets for reliability anywhere in the world.

At the same time, this Strategy is expected to reduce electricity bills by \$40 per year, drive \$8 billion in private investment, create at least 1,200 jobs and make NSW the home of Australia's first coordinated Renewable Energy Zone.

Consumers and businesses across NSW expect the Government to show clear and decisive leadership to manage the changing electricity system. This Strategy sets out the NSW Government's clear expectations for what the electricity system must do and how it must deliver for consumers. I'm confident that, over time, the actions in this Strategy will restore confidence in our grid.

The Hon. Matt Kean MP
Minister for Energy and Environment



A reliable, affordable and sustainable electricity system

The NSW Electricity Strategy is the NSW Government's plan for a reliable, affordable and sustainable electricity future. Meeting these objectives involves a three-layered approach:

First, the NSW Government will support the market to deliver reliable electricity at the lowest price, while protecting the environment. Firmed renewables are now the most cost-competitive form of new generation and cost less than the current wholesale electricity price. The economics of today's technologies create the opportunity for market forces to deliver on the NSW Government's three objectives for the electricity system. This Strategy supports the market by reducing barriers to entry for new generation, through an Energy Security Safeguard that ensures the rollout of cost effective energy savings measures and through a framework that ensures the construction of new generation to replace existing power stations.

These measures are expected to reduce household bills by \$40 per year, leverage \$8 billion of private investment, mostly in regional NSW; maintain the electricity system's reliability over the long-term; and improve environmental outcomes. This Strategy is estimated to result in 1,200 new jobs, most of which are expected to be in regional NSW.

Second, the NSW Government will set an Energy Security Target to ensure that the State has sufficient generation capacity to cope with unexpected generator outages during periods of peak demand, such as during heat waves.

As electricity generators age, they become less reliable. For example, the Liddell power station had 31 planned and unplanned outages in 2018.

For this reason, the NSW Government will aim to have sufficient capacity to cope with the two largest generating units in the State being out during a one in ten year heatwave. This target will ensure that the State has a resilient electricity system.

The target will work as follows: if a capacity shortfall is forecast and there is a real risk that the private sector will not address that shortfall, the NSW Government will take action to address this.

Third, the NSW Government will ensure the State has sufficient powers to deal with an electricity emergency, if one arises.

This document provides a summary of the Strategy. It does so in five parts: Part 1 explains how the electricity system works; Part 2 explains the trends and challenges that are shaping the electricity system; Part 3 sets out the work that is already underway to address the system's challenges; Part 4 sets out the Strategy; and Part 5 explains how the Strategy will meet the challenges posed in the years ahead.

1. How electricity works

The key aspects of the electricity system, the industry structure, governance and key concepts for the Strategy are outlined below.

NSW is part of a national energy system

NSW is part of a National Electricity Market (**NEM**). The NEM covers the five eastern and southern Australian states (and the Australian Capital Territory), and allows electricity to flow and be traded across regions.

Three national market bodies, each with unique functions, oversee the NEM. They are the:

- Australian Energy Market Operator (**Market Operator**) – who operates the market
- Australian Energy Market Commission (**Market Commission**) – who makes the market rules
- Australian Energy Regulator (**Regulator**) – who enforces the rules.

In addition, Ministers from the Commonwealth Government and all states and territories work together through the Energy Council to pursue improvements to the NEM.

Recently, the Energy Council set up an Energy Security Board to make sure there is a strong and whole-of-system focus on energy security and reliability to drive better outcomes for electricity consumers, such as households and businesses.

The electricity supply chain

There are four parts to the electricity supply chain:

1. **Generation** - changing raw energy (such as from the sun, wind, gas or coal) into electricity.
2. **Transmission** - moving electricity from where it is generated at power stations to substations near where it is eventually used. This is done using high voltage poles and wires, including interconnectors that move energy between states.
3. **Distribution** - moving electricity from substations to where it is used by households and businesses. This is done using low voltage poles and wires. Electricity generated by rooftop solar panels can also flow back into this network.
4. **Retail** - selling electricity to households and businesses, including metering and billing. This is the direct interface between the electricity industry and consumers.

There are a range of generation technologies with different economic, operating and technical characteristics. Traditionally, NSW has been mostly powered by coal-fired generators, which still provide 80% of the State's electricity today. NSW also consumes electricity from gas-fired, hydro and bioenergy generators, and increasingly from solar and wind farms. Pumped hydro and batteries are storage technologies, which can be used to store electricity produced by generators for use when it is needed later. For example, a battery can be used to store electricity from a solar farm during the day so that it can be later used at night.

The NEM’s design means the generation market is competitive, allowing private companies and investors to build new generators according to market signals. However, this is not the case for transmission, which, in NSW, is operated and maintained by a single private operator, TransGrid. The transmission system is regulated so that TransGrid only earns a regulated return on its transmission assets.

Because TransGrid’s revenue increases with the size of its asset base, there are rules to ensure that only those investments that benefit consumers get added to that asset base. One aspect of this system is the Regulatory Investment Test for Transmission (RIT-T). This test plays an important role, but can take a long time to result in a decision.

What is peak demand?

Times of peak demand refers to those periods during the day when the State uses the highest level of electricity. When households or businesses use more electricity at certain times of the day, more electricity needs to be available at the same time to match that demand. In NSW, peak demand usually happens from mid-afternoon to early evening as people return home from work. Extreme conditions, such as a heatwave, can place extra pressure on the system as more households and businesses use energy-intensive equipment like air conditioners. These tend to be the times when the system’s reliability is most at risk.

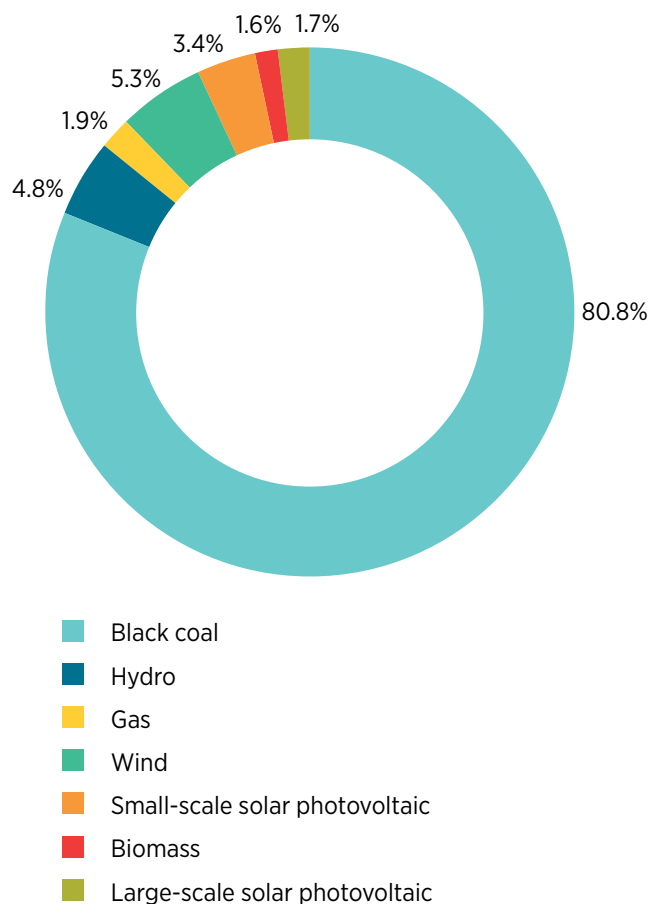
Avoiding blackouts on peak demand days

There are a number of mechanisms to protect the State from blackouts. One of these is the Reliability and Emergency Reserve Trader (RERT) scheme. The RERT allows the Market Operator to enter into contracts with generators or consumers to ensure the reliability standard is met in each region, and to maintain power system security. The costs of these contracts are passed onto consumers. The Market Operator also has the

power to direct large consumers to shut down plant for periods of time and to direct generators to come on line to prevent blackouts.

The NSW Government also has powers to avoid blackouts. While the Market Operator can only direct generators and large energy consumers, if there is an electricity emergency, the NSW Government can direct others to assist in addressing electricity emergencies. For example, by asking businesses to reduce their energy consumption or to take other action to support the system’s reliability.

NSW electricity generated 2018/19 (estimate)

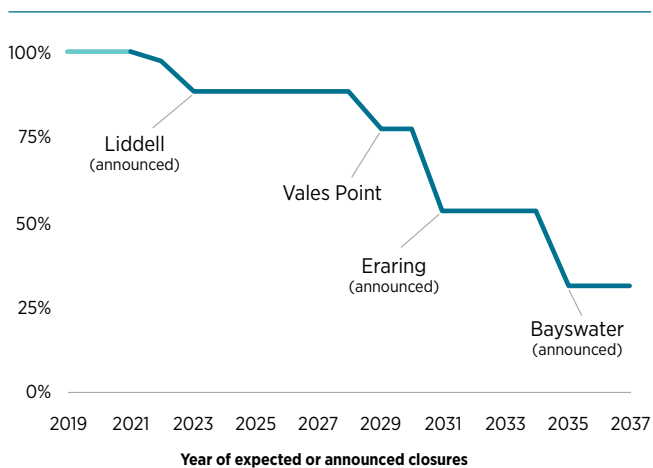


2. How the electricity system is changing

Traditional generators are getting older and closing

Four of the State's five remaining coal-fired generators are set to reach the end of their technical lives and close by 2035, starting with the Liddell Power Station in April 2023.

NSW's coal-fired electricity generation



As these generators get older, they become more fragile and more susceptible to outages, making our electricity system less reliable. Too many outages during a heatwave can lead to electricity blackouts. Together, these conditions have increased the risk of unplanned outages. This happened during a heatwave in January 2019, when unplanned outages at Loy Yang and Yallourn coal-fired power stations in Victoria contributed to the need to switch off parts of the grid in that state.

Households and businesses are joining the electricity transition

Around 490,000 NSW households and small businesses have solar panels installed, which is equivalent to one in five houses in NSW. Larger solar installations by businesses have grown at rates never seen before. It is estimated almost half of Australia's households and businesses will have gone solar by 2050, and many will also have batteries and electric vehicles.

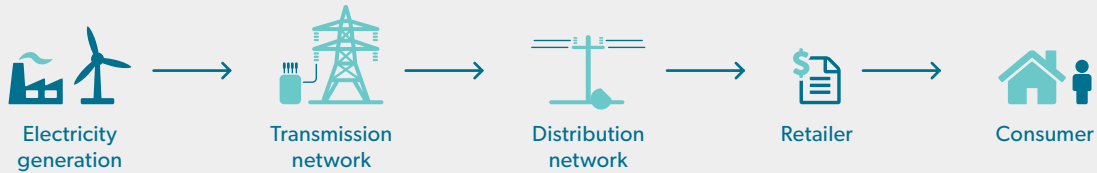
Electricity not used by households and businesses can be sold back to the distribution grid. This can cause problems because the distribution grid was originally built to move electricity from large generators to households and businesses, but not the other way around. As more people get solar and batteries, the electricity system needs to adapt.

Firmed renewables are the cheapest type of new reliable generation

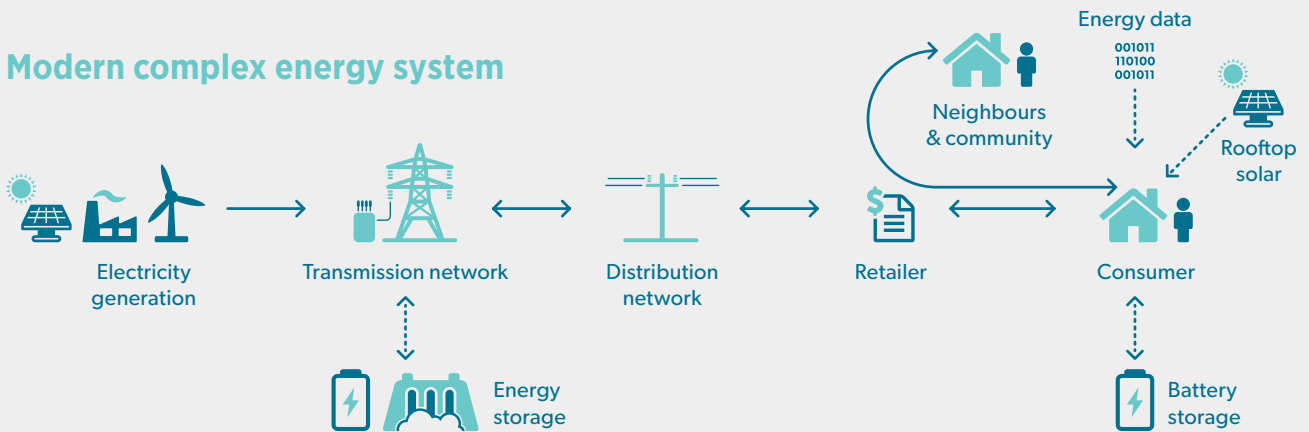
Today, wind and solar are the cheapest forms of new electricity generation. These technologies are the most environmentally friendly. When paired with batteries, pumped hydro or gas-fired generators, they can reliably supply electricity when the sun is not shining and the wind is not blowing, and are the lowest cost option to replace power stations as they close.

Businesses and investors are seeing this opportunity. As at October 2019, NSW has more than 100 private sector proposals to build large renewable generators. If built, these generators would total 17,700 megawatts (MW) of generation capacity within the State, and inject \$24 billion of investment into regional NSW.

Traditional linear energy system



Modern complex energy system



The grid is getting overcrowded

Our electricity grid was mostly built between the 1950s and 1970s to connect traditional coal and hydro generators, and has only been updated in minor ways since. This has kept network costs down for energy consumers but led to overcrowding as new generators have connected to the grid. Today, only one in 20 of the State's new generation proposals are able to connect. An overcrowded grid results in higher losses of electricity in transmission, reducing generator revenue and investor confidence.

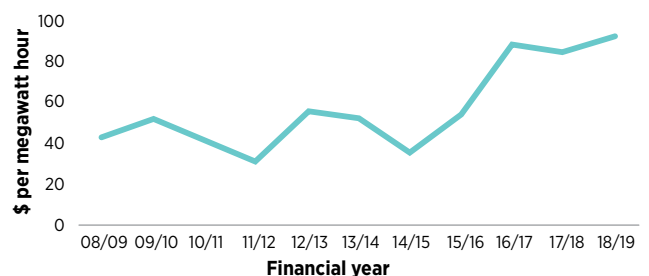
Investor confidence in NSW has decreased, with recent industry research showing that concerns relating to grid connection are the greatest challenge for energy businesses to build new projects. The NEM needs to modernise the grid so businesses and investors can build the next wave of generators before our ageing coal-fired generators close.

One of the issues this poses is that the RIT-T, which was designed to deal with incremental upgrades to transmission, needs to allow decisions on new scale-efficient investments to be made in a timely way. This is necessary to ensure that new generation can connect to the grid prior to plant closures and so that consumers can realise the price reductions of lower cost generation connecting to the grid.

Rising electricity prices are putting pressure on households and businesses

The electricity system has seen wholesale electricity prices go up significantly. In 2014–15, the annual average wholesale price was \$36 per megawatt hour, which rose to \$92 in 2018–19. While household electricity bills have remained stable, they are expected to increase over the next two years due to rising network costs. This puts pressure on households, businesses and the economy.

Annual volume weighted average spot price in NSW





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3. Governments are already taking action

Governments are already taking action to address some of the challenges associated with the issues set out previously.

Updating the transmission system and market design

Integrated System Plan

In 2018, the Market Operator released the Integrated System Plan – a blueprint for the electricity system transition over the next 20 years and beyond.

In developing the plan, the Market Operator found that the cheapest way to replace coal-fired generators would be to build a mix of low-cost renewables, gas-fired generators and other storage like batteries and pumped hydro. The plan calls for new transmission (such as interconnectors) to be built and Renewable Energy Zones to be developed, allowing the cheapest electricity to be moved to where it is needed.

Coordination of generation and transmission investment

The Energy Council has asked the Market Commission to regularly review the drivers that impact future generation and transmission investment. This process, known as the Coordination of Generation and Transmission Investment (COGATI) review, is progressing reforms to the way generators access and use the grid, and to the way transmission businesses charge fees to recover the costs of building and maintaining the grid.

The Market Commission is aiming to have these reforms in place by June 2022.

NSW Transmission Infrastructure Strategy

The NSW Transmission Infrastructure Strategy is the NSW Government's plan to unlock private sector investment in new interconnectors and Renewable Energy Zones. It aims to modernise the transmission grid and reduce overcrowding so that new generators can connect to the grid. In doing this, the Strategy will help deliver new regional infrastructure that could support up to 17,700MW of new energy projects, \$23 billion in regional investment and 2,000 construction jobs.

NSW's Transmission Infrastructure Strategy helps unlock up to 17,700MW of new electricity.

Post-2025 market design

The Energy Council has tasked the Energy Security Board with developing advice on a long-term electricity market framework to support reliability from the mid-2020s. By the end of 2020, the Energy Security Board is due to recommend any changes or alternatives to the electricity market's design that aim to deliver a secure, reliable and lower-emissions electricity system at least cost to energy consumers. The Energy Security Board also published the Converting the Integrated System Plan into Action Consultation Paper in May 2019, which sets out a way to action the priorities identified in the Integrated System Plan.

Encouraging investment in new generators and a modern grid

NSW Emerging Energy program

The NSW Government's \$75 million Emerging Energy program supports the development of innovative large-scale electricity generation and storage projects. It does this by providing grants for a mix of technologies that will help diversify the NSW electricity mix and drive more competition in the wholesale market. The NSW Government has already awarded grants totalling \$7 million to the first group of projects.

The \$75 million Emerging Energy program supports innovative technology for a modern grid.

Commonwealth Underwriting New Generation Investments program

The Commonwealth Government is running the Underwriting New Generation Investments program to support targeted new electricity generation investment that will lower prices, increase competition and increase reliability in the system. The financial support program is technology-neutral. It aims to bring down wholesale electricity prices, help industry to access affordable electricity, and improve reliability in the electricity system. Twelve projects have been shortlisted, three of which are in NSW. The multi-phased program will be open over four years to June 2023.

Snowy 2.0

The Commonwealth Government has also committed to building Snowy 2.0, the next phase of the Snowy Hydro Scheme. This pumped hydro project would provide 2,000MW of on-demand generation, 175 hours of storage, and create more competition in the electricity market to help keep downward pressure on electricity prices. Snowy 2.0 is set to start producing electricity from 2024–25.

Retailer Reliability Obligation

The Retailer Reliability Obligation (RRO) is a national regulatory requirement for electricity retailers to secure on-demand electricity supplies, including by investing in electricity generation, to meet their share of demand when the grid is under pressure. Designed by the Energy Security Board, the RRO started in July 2019 as a long-term solution to support the NEM's reliability and security.

Helping households and businesses reduce electricity bills

NSW Solar for Low Income Households trial

The NSW Government is trialling a new way to help people on low incomes with their power bills, installing free solar systems for up to 3,000 eligible households. A 3 kilowatt solar system will be provided to eligible households that agree to not receive the Low Income Household Rebate. Households could save up to \$300 a year on electricity bills.

NSW Empowering Homes program

The NSW Empowering Homes program will support the rollout of up to 300,000 solar-battery systems across the State over the next 10 years, unlocking up to \$3.2 billion in clean electricity investment and adding up to 3,000 megawatt hours of storage into the NSW electricity system when complete. The program will help create jobs, reduce emissions, bolster the system's reliability and place downward pressure on electricity bills.

NSW energy rebates

The NSW Government offers a range of rebates to help the community reduce their electricity bills. The Low Income Household Rebate helps people with eligible Commonwealth-issued concession cards pay for their electricity bills. The Family Energy Rebate helps households pay their bills if they have dependent children and receive the Commonwealth Family Tax Benefit. The Life Support Rebate helps pay their electricity bills if they are, or have someone living with them who is required to use approved energy-intensive equipment at home. Other rebates include the Medical Energy Rebate, the Seniors Energy Rebate and the Energy Accounts Payment Assistance scheme.

National Default Market Offer

In October 2018, the Commonwealth Government asked the Regulator to develop Default Market Offer prices for households and small businesses following recommendations made by the Australian Competition and Consumer Commission in its Retail Energy Pricing Inquiry Final Report. The Default Market Offer, which commenced 1 July 2019, serves as a price cap for electricity for customers on what's known as 'standing offers' in NSW and other states.





4. A strategy to secure our electricity future

The purpose of the NSW Electricity Strategy is to improve the efficiency and competitiveness of the NSW electricity market and encourage investment in new price-reducing generation and energy saving technology.

The NSW Electricity Strategy sets out actions that will support a competitive and low-cost energy market, and deliver more resilient electricity supplies. It is underpinned by four important principles:

- New **market-driven electricity generation** should drive down prices and help protect the environment. This is because firmed renewables are the cheapest form of new reliable generation and cheaper than the current wholesale price
- As electricity is an essential service, state and Commonwealth **governments are ultimately responsible** for reliable electricity
- Government action should **limit costs to households, businesses and taxpayers**
- Government action should **be consistent with the nature of the national electricity system and NSW policy objectives.**

Supporting a competitive and low-cost electricity market

Making it easier to invest

1. **Case management service for critical electricity infrastructure** - The NSW Government will provide a new case management service for electricity infrastructure that is critical to the system's reliability. This service will be a central point of contact for businesses and investors, ensuring any issues are addressed as early as possible and making it easier for projects to get up and running.

2. **Project funding through the Emerging Energy program** - The NSW Government will award the next round of grants under the Emerging Energy program for new technologies that provide sustainable and on-demand electricity. By ensuring that insights from these projects are shared, the NSW Government is helping to bring down the costs of new technologies and supporting an innovative and competitive market.
3. **Making it easier to do business** - The NSW Government will keep working with industry to make it easier to do business in electricity in NSW. The NSW Government will also work with the Energy Council and the Energy Security Board to review the national rules to find any red tape or duplication that could be streamlined or removed.

Reducing risk for investors

4. **Rolling out Renewable Energy Zones** - The NSW Government will ask the market for Expressions of Interest to invest in NSW Renewable Energy Zones, starting with a 3,000 MW pilot Renewable Energy Zone in the State's Central-West.

This pilot Renewable Energy Zone would produce enough energy to power up to 1.3 million homes each year.

The NSW Government will set up a dedicated Renewable Energy Zone body that will bring together investors and undertake early planning so benefits for local communities are maximised. Where appropriate, the NSW Government will change the regulatory settings to incentivise generators to cover part of the cost of building new transmission for Renewable Energy Zones.



Encourage clean and affordable technologies to take pressure off the grid

5. **A new Energy Security Safeguard** – The NSW Government will extend and expand the Energy Savings Scheme under a new name, the Energy Security Safeguard. To reflect our transitioning electricity system and encourage emerging technologies, the Safeguard will include:
 - a. an energy efficiency scheme – that will run until 2050, include a more ambitious energy savings target and support technologies that reduce the consumption of electricity or gas from the wholesale market
 - b. a demand reduction scheme – a new scheme to support technologies like batteries that can shift demand away from peak periods.

By driving investment in these technologies, the Safeguard will deliver bill savings for NSW consumers, while supporting the reliability and sustainability of our electricity system.

6. **Supporting new generation in NSW** – The NSW Government will work to develop a regulatory framework to promote new electricity generation in NSW. This energy regulatory framework will be focused on bringing new, lower cost generation into the NSW market before existing power stations close. This will help reduce electricity prices and protect the environment.

Delivering more resilient electricity supplies

7. **Setting an Energy Security Target** – The NSW Government will set a target to give the market certainty about how much new electricity is needed to deliver a reliable energy system over the medium to long-term. The Target will be set at an amount that is enough capacity for NSW to handle heatwave conditions, plus an extra buffer of the two largest generating units in the State in case of unplanned outages. The Target will serve as an additional framework that complements the existing national reliability measures, while bolstering the State's electricity resilience.

8. **Avoiding electricity emergencies** – If it looks like the Target won't be met, the NSW Government will take action to maintain the reliability of the electricity system, because it is too important to fail. The NSW Government will accelerate key projects that will deliver more resilience to the system while meeting strict criteria to minimise costs to the community, restrain electricity companies from delaying key projects, and ensure projects are consistent with other government objectives, including protecting the environment.

Potential actions include:

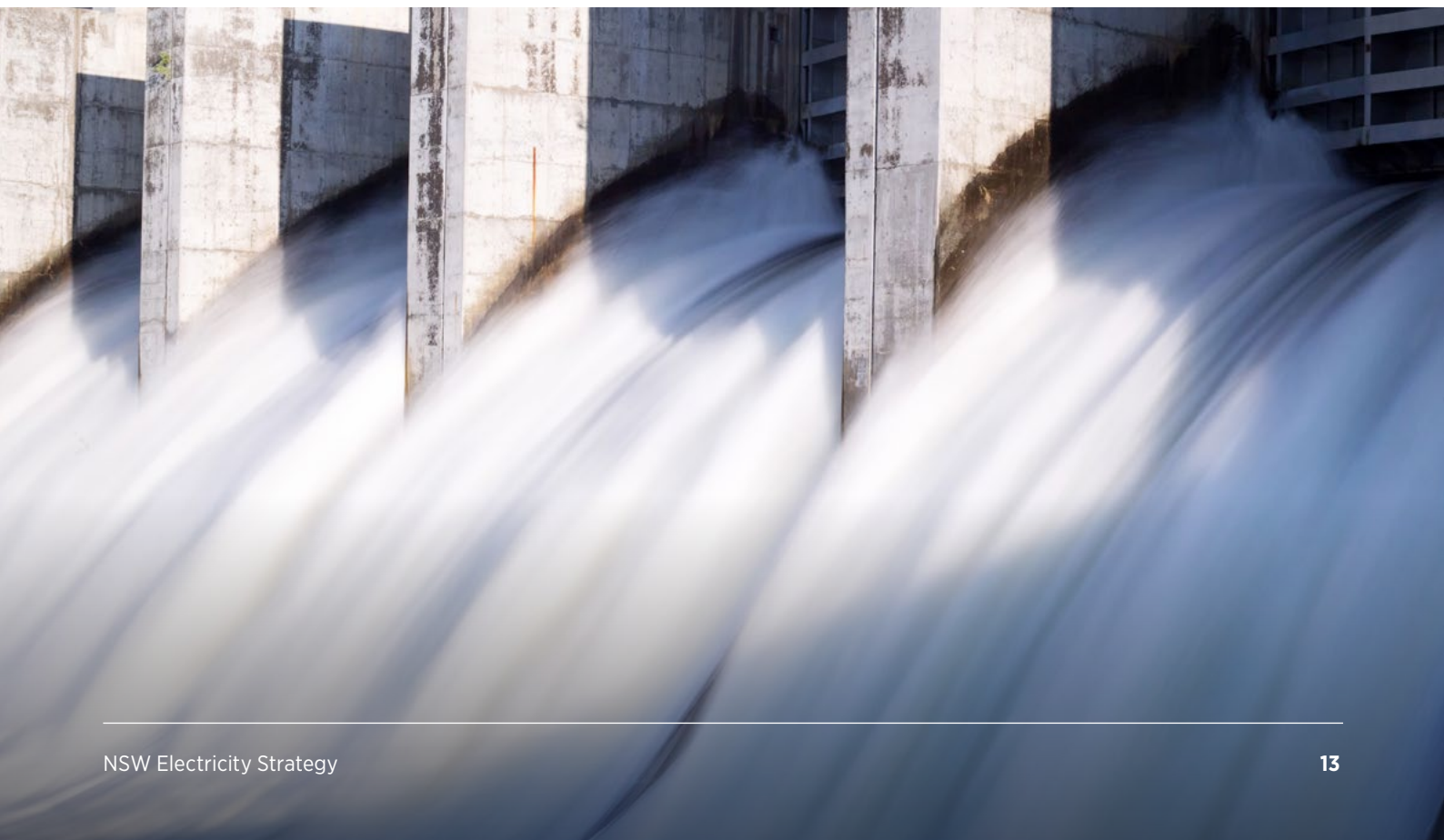
- a. increasing scheme targets under the Energy Security Safeguard
- b. using whole-of-government procurement to incentivise new reliable generators
- c. offering more industry grants through the Emerging Energy program
- d. fast-tracking additional priority transmission projects.

The Government will take action which minimises costs to taxpayers and consumers, and limits the risk to businesses delaying investment in anticipation of Government action.

9. **Powers to gather more information** – The NSW Government will make sure it has powers to gather information from industry participants to help keep track of critical electricity infrastructure and its impacts on the system's reliability. This will better equip the State, in partnership with the Market Operator, to ensure any breaches of the Target are dealt with proactively to strengthen the resilience of the electricity system.

Being prepared for an electricity emergency

10. **Robust emergency response powers and processes** – NSW has a robust set of emergency response powers. To ensure they remain fit for purpose, the NSW Government will regularly review them in light of market conditions and run emergency response simulations to make sure they are supported by the right systems and processes.



5. Meeting the State's Energy Security Target

The Energy Security Target today

NSW currently has a tight reserve condition with firm supply just under forecast Energy Security Target throughout through to 2020–21.

For any shortfall over this period, NSW can use its robust set of emergency response powers, and the Market Operator would be able to use its direction powers and the RERT, to make available sufficient capacity to bridge this shortfall, if required.

However, this approach would be expensive for consumers and disruptive to some businesses. For this reason, it is appropriate to address the shortfall in a timely manner. The State's shortfall in its security target is expected to be addressed by the summer of 2021, with the following projects providing additional capacity increases through to 2022–23:

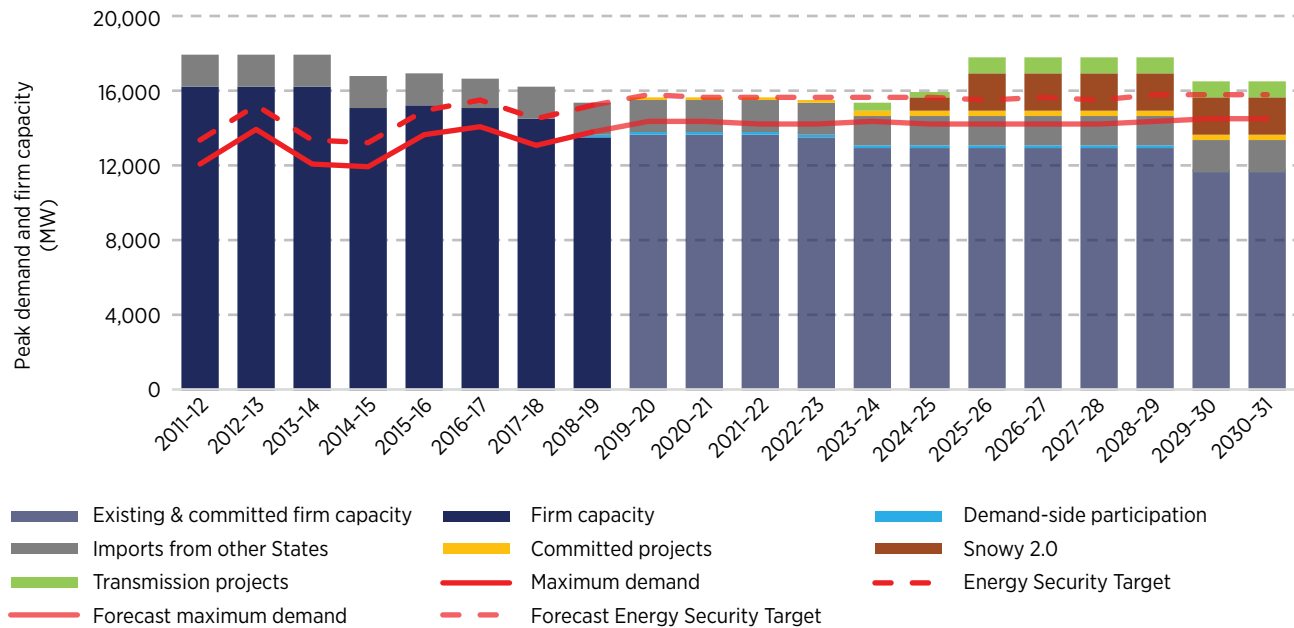
1. **The Queensland/NSW Interconnector Transmission Project (QNI)** – this project will upgrade the existing interconnector between NSW and Queensland, allowing the State to import an additional 190MW from Queensland, helping in peak demand periods and putting downward pressure on prices. To accelerate this project the NSW Government is underwriting TransGrid's early planning works and, together with the Commonwealth, underwriting up to \$102 million of procurement and construction costs, while the project goes through the RIT-T. Because of the work of the Commonwealth and NSW Governments, QNI is expected to be ready by September 2021.

2. **The Victoria/NSW Interconnector Transmission Project (VNI)** – this project will upgrade the existing interconnector between NSW and Victoria, allowing the State to import an additional 170MW from Victoria. The NSW Government is underwriting TransGrid's early planning works for VNI, helping to get the project delivered in 2021.
3. **The Emerging Energy program** – The NSW Government's Emerging Energy program, which is primarily designed to support innovation, is expected to deliver around 200MW of additional firm capacity.
4. **Private sector investments** – the private sector has announced investments in existing power stations which will see an additional 60MW of capacity at the Mount Piper Power Station by December 2021 and 100MW at the Bayswater Power Station by December 2022. The private sector has also committed wind and solar farms with firmed capacity of 115MW by 2023.

The Energy Security Target 2020–2030

Over the course of the 2020s, NSW is projected to experience its tightest reserve conditions in 2023–24 after the Liddell power station closes in April 2023. This tight reserve condition is partially mitigated by the QNI and VNI upgrades and the private sector projects committed over the next few years. The figure on page 15 provides the projected outlook for the Energy Security Target out to 2030–31.

Outlook for the NSW Energy Security Target



While there remains a risk of breaching the Energy Security Target in the summer of 2023-24 without further investment, there are more than enough proposed firm generation projects to meet and exceed the Target. However, without final investment decisions on these projects, there is a risk that they will not proceed. These projects include:

- a 250MW gas peaking plant at Newcastle (AGL)
- a 320MW gas peaking plant at Tallawarra (Energy Australia)
- four large-scale 50MW batteries (AGL with Maoneng Group)
- the 50MW Darlington Point Battery
- projects funded under the Emerging Energy program.

The NSW Government has five options to enhance firm supply or reduce peak demand, if required, to meet the Energy Security Target:

1. Fast track the development of the HumeLink interconnector to unlock up to 1200MW of existing capacity, of which 500MW would be available during periods of peak demand, and 2000MW of new reliable capacity following the completion of Snowy 2.0
2. Accelerate a further upgrade of the Queensland-NSW Transmission Interconnector Upgrade (378MW)
3. Use the NSW Government's electricity contracts to stimulate private sector investment in firm generation
4. Expand the Emerging Energy program
5. Increasing scheme targets under the Energy Security Safeguard.

These options will be assessed against the State's objectives, including to limit financial exposure to taxpayers and consumers.

Further information

To read the detailed Electricity Strategy and find out about NSW Government programs and policies please visit energy.nsw.gov.au.

energy.nsw.gov.au

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