CLIMATE COUNCIL

BATTERY BOOM: SUPERCHARGING AUSTRALIA'S RENEWABLE ROLLOUT

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- Greg Bourne

The Climate Council acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders, past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to land, sea and sky. We acknowledge the ongoing leadership of First Nations people here and worldwide in protecting Country, and securing a safe and liveable climate for us all.

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Cover image: Sydney resident Mamoon Reza saves around $2000 a year on electricity bills thanks to his rooftop solar and home battery system.

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Key findings

1 Rooftop solar and batteries are a permanent bill buster, and Australians can collectively save more than $4 billion on their power bills every year if we install two million more batteries in our homes and businesses by 2030.

- There is enormous potential to rollout more home batteries, with 8 per cent of the four million Australian households with solar currently storing their excess solar power with a battery.
- Pairing a battery with rooftop solar almost doubles a household's savings: up to $2300 less per year on power bills for the average family, compared to $1500 in savings with solar only.
- Climate Council's analysis shows that with additional policies, we can add two million batteries to households and businesses by 2030. If we do so, that would collectively save Australians more than $4 billion on their power bills each year.
- Households could boost their savings even more by using the battery in an electric vehicle (EV) to store power and send it back to the grid using vehicle-to-grid technology, cutting out their petrol or diesel costs by around $2000 a year.

2 Australia is on the brink of a battery boom. Solar is already more common in our suburbs than the backyard pool, and the potential for storage in the outskirts of our cities is also enormous.

- Overall, our battery storage capacity has more than doubled within the past three years to more than 3 gigawatts (GW).
- South Australia is smashing it across the board with battery installations at all scales, while Western Australia now has more big batteries than any other state or territory. Meanwhile, the Northern Territory leads the way in the highest proportion of homes with solar that also have a battery, and Victoria takes the medal for the most community-scale batteries.
- Nationally, we will need 49 GW of battery and pumped hydro storage by 2050 – or more than 15 times our existing battery storage capacity – made up of household batteries, community-scale batteries, big batteries and pumped hydro.
- The top-three spots nationally for home battery potential are Tarneit in Victoria, and Bundaberg and Hervey Bay in Queensland – together, these suburbs have enormous battery potential with more than 64,000 rooftop solar systems.
- Vehicle-to-grid technology is a transformative opportunity that can turn our suburbs into mobile storage centres. By connecting EVs to our homes and the grid we could unlock more battery capacity than any other form of storage.

3 Batteries are getting cheaper and better at breakneck speed making them accessible and feasible for more Australians.

- Globally, battery prices have fallen 86 per cent since 2013. This is mostly due to a significant drop in lithium prices, which is a key material in most batteries.
- In 2024-25, the upfront cost of big batteries fell 20 per cent. In contrast, the cost of gas generation jumped up 11 per cent over the same period.
- On average, it is expected to take an Australian 8.3 years to recover the cost of purchasing a battery (as of 2024), down from a 10-year "payback period" in 2022, and 19 years in 2016. This is expected to drop further as demand grows and technology improves. Federal rebates may accelerate this trend.

- In the eight years since we switched on our first big battery (Hornsdale in South Australia in 2017) we have added 33 more, on top of more than 300,000 home batteries. We are also installing more than 500 community-scale batteries across the country.
- In our main grid, batteries can make up 5 per cent of our power supply at high-demand times. In some parts of the country, batteries are already powering up to 30 per cent of demand (in South Australia) and 20 per cent of demand (in Western Australia) with records regularly set and broken for how much energy batteries are both charging and discharging.

4 Batteries not only help cut climate pollution and save families money on power bills, but also make our electricity system more reliable as climate change accelerates.

- Backed up by storage, renewable generation not only keeps electricity more reliable and affordable, it also protects Australians against international price shocks caused by volatility in the coal, oil and gas markets.
- Home batteries and the batteries in EVs are already coming to the rescue of Australian communities by powering essential services and appliances when power supply is disrupted in severe weather events like fires, storms and floods that are accelerating due to climate pollution.
- Batteries in microgrids are helping remote communities switch away from fossil fuels like diesel, and giving them more control over their energy.

5 As the climate crisis unfolds all around us, the race is on to cut climate pollution further and faster this decade. Batteries are a key solution and present a major economic opportunity for Australia.

- Climate pollution is already increasing the frequency and intensity of extreme weather events across the country: 80 per cent of Australians have experienced some form of disaster in recent years.
- We need to cut climate pollution rapidly this decade by getting off coal and gas. Batteries will unlock Australia's renewable potential as our energy system transforms and ensure we have reliable access to clean power whenever we need it.
- With global lithium demand set to increase more than 10-fold between now and 2040 our lithium resources offer significant economic opportunities, including job creation, technological advancements, and enhanced energy security.
- Although Australia produces around half of the world's lithium, we export nearly all of it. We can create more local jobs and economic value by manufacturing batteries here at home.
- Governments can spread the benefits of rooftop solar across our community by ramping up all types of batteries and helping Australians access vehicle-to-grid technology.

INTRODUCTION

At the ballot box this year, Australians voted for a future powered by renewables and storage

Our country is well known for setting, and smashing records when it comes to renewable energy. Today, about 40 per cent of our power now comes from wind, solar and hydro. Batteries are the next frontier when it comes to cutting our bills as quickly as we can cut climate pollution.

Since building our first grid-scale battery in 2017 in record time, and making international headlines, we have added another 33. There's also more than 20 gigawatts of big battery storage in the pipeline; almost double what was planned just a year ago. In neighbourhoods all over the country, hundreds of community-scale batteries are being installed. Plus, an estimated 300,000 Aussies have added a battery to their rooftop solar at home.

As costs rapidly fall and technologies improve, battery storage of all kinds is set to boom across Australia as we benefit from bill savings, further cuts to climate pollution and a more reliable grid. Our analysis shows more than two million batteries can be added at a household level, which would collectively save Australians more than $4 billion a year on their power bills.

Homes with batteries are seeing the benefits first-hand: a home battery can almost double the power bill savings for homes with rooftop solar, up to $2300 a year, or 90 per cent of a typical family power bill. Since coming onto the market in 2015, more than 300,000 households have added a battery. Unlike one-off energy rebates, home batteries permanently bust power bills and slash climate pollution. They also ease demand on the grid in peak times and reduce the need for more transmission, putting downward pressure on power bills for everyone. As communities across Australia experience more frequent and intense climate-fuelled disasters, batteries can keep our homes, businesses and communities going even when power supply is disrupted.

There's also an exciting opportunity to slash climate pollution from our transport system and energy grid at the same time by making best use of the batteries in our growing electric vehicle (EV) fleet. By fast-tracking vehicle-to-grid (V2G) technology and making it one of our largest forms of flexible storage capacity we can accelerate our switch to renewable power, and transform our energy system for the better. Switching to an EV can save households around $2000 more every year on petrol or diesel costs.

As the world's top producer of lithium, both the public and private sectors are already investing significantly to unlock this economic opportunity and create more local jobs by manufacturing and reprocessing batteries here in Australia.

With so much work already underway to power Australia with cheaper and cleaner renewables and storage, now is the time to build on this momentum and ramp up battery storage to match our world-leading rates of rooftop solar. With targeted policies, we can make the most of this enormous opportunity.

Let's charge up!

WHAT'S WATT?

The capacity of a battery is usually measured in both watts and watt-hours. These vary depending on the size and role of a battery in the grid.

Watt (W):
A unit used to measure the amount of electricity produced or consumed in a given moment. In this report, we refer to kilowatts (kW, equal to 1 thousand watts) megawatts (MW, equal to 1 million watts) and gigawatts (GW, equal to 1 billion watts). These units measure how much power a battery could dispatch **at any moment**. This measurement is important when we're talking about the ability of the battery to help stabilise the grid with a rapid injection of power.

Watt-hour (Wh):
A measure of electricity stored, used or generated **over a period of time**. In this report, we usually refer to kilowatt-hours (kWh) megawatt-hours (MWh) and gigawatt-hours (GWh). This refers to the total storage capacity of a battery. For example, if a big battery has a rating of 100 MWh, it can store enough energy to dispatch 100 MW of power for an hour, or 50 MW for two hours, and so on.

Batteries can not only energise the renewable rollout at home, but also abroad. Australia is one of the world's top producers of lithium; a sought-after material for batteries.

Image: Home solar and battery installation.

1.

Batteries will unlock Australia's renewable potential as our energy system transforms

Image: Waratah Super Battery in NSW. Read more about this project on page 31.

The way we power ourselves is changing, for the better

As more and more Australians are affected by climate change, flung between storms and floods to bushfires, the evidence is clear: we need to cut climate pollution now. What we do over the next five years will shape our future for decades to come. Transforming our energy system by getting off coal, oil and gas and switching to renewable alternatives is the biggest opportunity to slash climate pollution, and brings wide-ranging economic and social benefits.

We have already done so much work. Over the past decade Australia has gone big on rooftop solar, becoming a world leader. Today, we're building more wind and solar than ever before, and making incredible progress: Australia now makes around 40 per cent of the power in our main grid from wind, solar and hydro every year (Open Electricity 2025a). At certain times, renewables can supply as much as three-quarters of our power across the country (AEMO 2025b). As the sunniest country in the world, and one of the windiest, we are well placed to power ourselves with renewables.

Still, there's more to be done to ensure Australia benefits from cheaper, clean power into the future. And we've little time to waste: Australia's entire fleet of coal-fired power stations is expected to retire by 2038 (AEMO 2024). Our coal-fired power stations are only operating at around 65 per cent of their full capacity as they reach their end of life, and they're frequently breaking down (Baringa 2024). As coal generators shut down, we're in a race against the clock to bring new generation online to power our homes and businesses. But new generation alone isn't enough – we need to back this new generation capacity with storage, to make sure we have a reliable supply of power whenever we need it.

This is where batteries come in. They can soak up all the excess clean power from the sun and wind, and store it to provide electricity when we need it. CSIRO analysis has confirmed that building a grid powered by 90 per cent wind and solar, backed with storage, gas peaking and upgraded transmission, is the lowest cost and most practical way forward – at least one-third cheaper than alternatives (CSIRO 2024a). This is because solar and wind projects are generally quicker to build and less expensive to run. Most importantly, the sun and wind are abundantly available sources of energy, and do not need to be mined or imported. Batteries are getting cheaper rapidly, with the upfront cost of big batteries falling 20 per cent last year alone (CSIRO 2024a). Backed up by storage, renewable generation not only keeps electricity more reliable and affordable, it protects Australians against international price shocks caused by volatility in the coal, oil and gas markets.

With batteries becoming more affordable, and with abundant cheap and clean power in our grid for them to soak up, Australian households and investors alike are lining up to benefit. As a result, Australia is on the brink of a battery boom, delivering cheaper and more reliable power for us all.

Australia is on the brink of a battery boom, soaking up our cheaper, clean solar and wind power to provide it whenever we need.

POWERING US PAST THE END OF COAL

The Latrobe Valley has powered Victoria with coal for more than 100 years. With all of its ageing coal generators expected to close by 2035 at the latest, work is underway to help the region to navigate these changes and accelerate its switch to a renewable future.

After operating for nearly 50 years, the Hazelwood coal power station was the first in the region to close in 2017. In its place, Engie and Eku Energy commissioned the Hazelwood Battery in 2023 – the first big battery to be built at an Australian ex-coal power station site. The 150 MW/150 MWh battery takes advantage of the existing grid infrastructure that serviced the coal industry. Currently, the Hazelwood Battery has the capacity to store the equivalent of an hour of generation from 30,000 rooftop solar systems, and can also provide services to increase the stability of the grid. The companies are considering expanding the battery's capacity. Hazelwood is leading the way for the transformation of other fossil fuel sites – big batteries are also being installed in such sites across Queensland, New South Wales, Victoria and Western Australia.

Image: Hazlewood battery, Victoria.

The right mix of storage for a stable, reliable, renewable power grid

The Australian Energy Market Operator (AEMO)'s roadmap for Australia's main electricity grid confirms that renewable energy, connected by transmission and distribution, backed up by storage and a small amount of gas, is the fastest, cleanest and most affordable option to keep powering Australia past the end of coal (AEMO 2024).

There is now more than 3 GW of battery storage in the National Electricity Market (NEM, Australia's main grid which covers all states except the Northern Territory and Western Australia). In total, AEMO expects that the NEM will need 22 GW of battery and pumped hydro storage by 2030, growing to 49 GW in 2050 – more than 15 times its current storage capacity. A combination of big batteries, home batteries, the batteries in cars and community-scale batteries, as well as pumped hydro, will all play important roles.

In total, AEMO expects that the National Electricity Market (NEM, Australia's main grid which covers all states except for the Northern Territory and Western Australia) will need 49 gigawatts of battery and pumped hydro storage by 2050 – more than 15 times its current battery storage capacity. A combination of big batteries, household batteries and community batteries, as well as pumped hydro, will all play important roles.

The combined capacity of home batteries, EV batteries and community-scale batteries is expected to be enormous, and AEMO is increasing its focus on the opportunity to link these distributed energy resources into one integrated power system. New investment in these networks will efficiently provide homes and businesses with access to secure and reliable power, and be a critical part of the transition to net zero (AEMO 2025a).

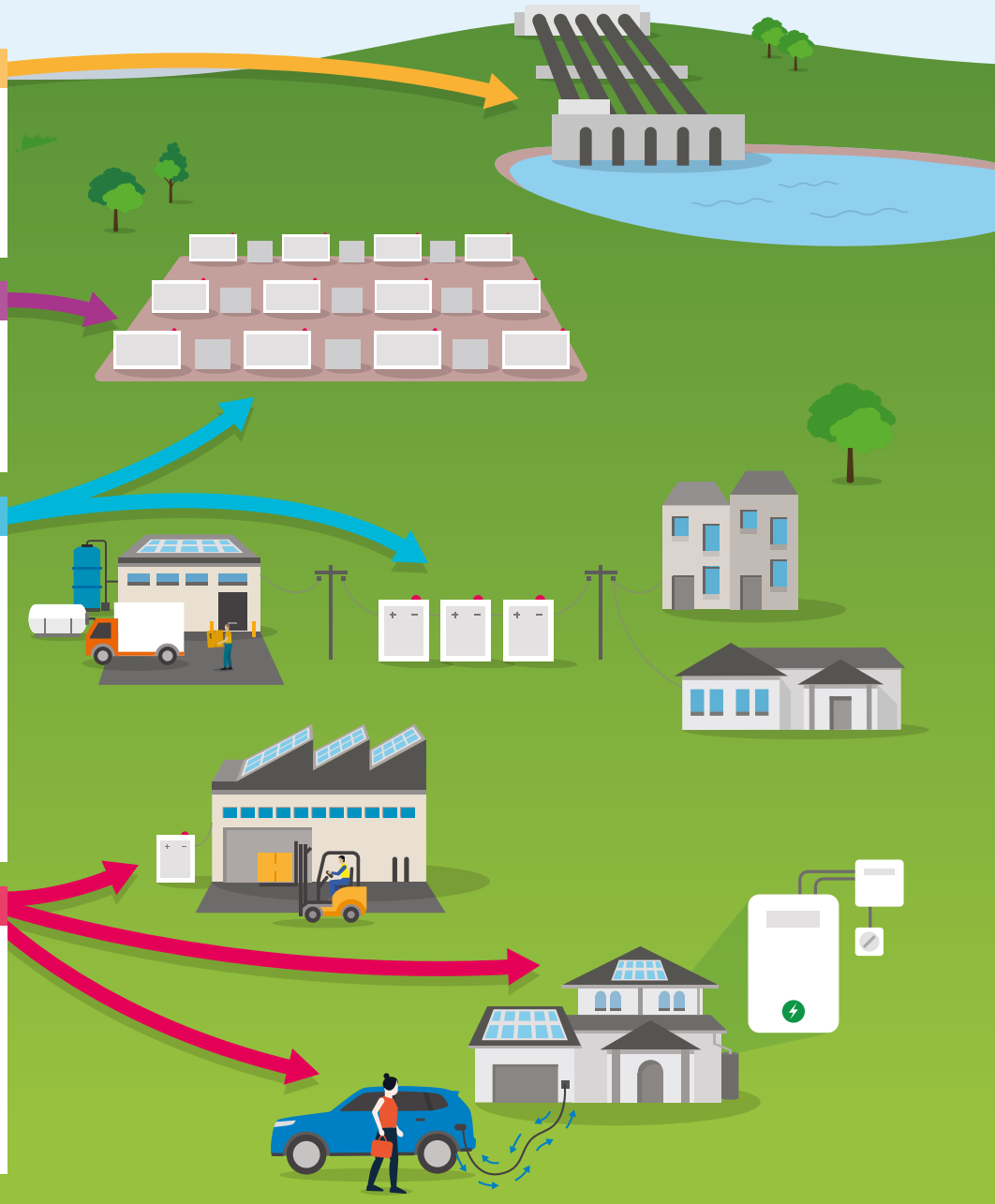
Governments, industry and communities across Australia can work together to bring on more storage at all scales and make sure we have clean, reliable power all day, every day, every season.

Aussie households are leading the battery boom, with the storage capacity in our home batteries and EVs over the coming years expected to be enormous.

Image: Kidston Pumped Hydro in QLD.

THE ROLES DIFFERENT TYPES OF STORAGE PLAY IN OUR GRID

TYPE OF STORAGE	ROLE IN THE GRID
DEEP STORAGE	
Large pumped hydro schemes and emerging technologies.	Pumped hydro is **currently the only deep storage technology available at scale in Australia**, however other technologies are being developed. Pumped hydro can **dispatch power over a long period of time**, to shift it over weeks or months, or cover long periods of low sunlight and wind.
MEDIUM STORAGE	
Pumped hydro or long-duration big batteries.	Pumped hydro and long-duration **big batteries can shift large amounts of power to meet peak demand periods**, which is increasingly important as the proportion of renewables in our grid grows.
SHALLOW STORAGE	
Big batteries and community-scale batteries that can dispatch power for less than four hours.	Big batteries **can store large amounts of energy, but can also provide system security services** historically provided by coal and gas. For example, they can rapidly inject or remove electricity from the grid to balance supply and demand (known as 'frequency control ancillary services' or FCAS). They have already taken over from coal as the primary source of FCAS (Baringa 2024). Community-scale batteries are another form of shallow storage, **storing excess rooftop solar power generated by nearby homes and businesses**, and making it available to all connected households and businesses, including those without their own solar panels.
LOCALLY OWNED STORAGE	
Household, commercial and industrial batteries, and vehicle-to-grid (V2G) enabled EV batteries.	Batteries on homes and businesses, and increasingly in cars, **help cover changes in supply and demand over a 24-hour period** – soaking up excess solar power when it's sunny, and making it available in the evenings. The benefits of rooftop solar and batteries to the grid are boosted significantly when they are **coordinated as part of a virtual power plant (VPP) to act as a single, large generation and storage facility**.



POWERING US THROUGH THE EVENING PEAK

The Cunderdin hybrid solar and battery project in Western Australia, launched in April 2025, is currently the country's biggest solar and battery hybrid facility. The 128 MW solar farm, together with a 55 MW four-hour battery energy storage system, is designed to deliver consistent power supply during peak evening demand periods. It does this by sending some power to the grid for use during the day when solar power is abundant, but saving the rest to dispatch during the evening peak. This means the one facility can provide a consistent output for the whole of WA's evening peak, between 5.30 and 9.30pm. This differs from most other existing big batteries, which soak up excess rooftop solar during the day, and send it back into the grid in the evening. The project is expected to generate the equivalent annual power consumption of 51,000 households and prevent 140,000 tonnes of climate pollution from entering the atmosphere.

Cunderdin is currently the biggest facility of its kind, but similar facilities are being built all over the country, including the Fulham Solar Farm and Battery in Gippsland, Victoria, and the Pottinger Energy Park in New South Wales' South West Renewable Energy Zone (Parkinson 2025a).

Image: Batteries can provide cheaper, clean power during the evening peak.

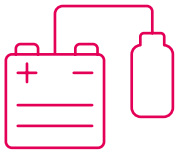
EMERGING TECHNOLOGIES TO PROVIDE DEEP STORAGE

As our grid becomes more renewable, we will need more deep storage to fill longer-term drops in power supply. Pumped hydro is a mature, proven deep storage technology but is expensive and complex to develop. There are a number of emerging zero-emissions technologies that, together with pumped hydro, could help provide longer-term storage for a reliable, completely renewable power system without the need for fossil gas as a back-up supply.

Some of the most promising technologies already being explored in Australia and around the world include:

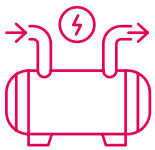
Green hydrogen

Some newer gas turbines are being built with the capacity to turn renewable ("green") hydrogen gas into electricity. While green hydrogen is still a relatively expensive fuel to produce and use at scale, Australia's production capacity is increasing and as it becomes more cost-effective, it may play a greater role in our power system and provide a clean, flexible alternative to fossil gas. New South Wales, South Australia and Queensland are already supporting investment in hydrogen-ready turbines.



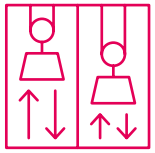
Flow batteries

Flow batteries use liquid electrolytes to store power, and are able to feed energy back to a grid for up to 12 hours. The electrolytes are stored externally to the battery so can be easily added to, to expand storage capacity. South Australia is home to Australia's first large-scale flow battery, which was completed in 2023 to store power from a nearby solar farm as part of the Spencer Energy Project at Port Pirie (ARENA 2023). Researchers at Victoria's Monash University are also developing a household-scale flow battery (Monash University 2025). This exciting home-grown breakthrough could provide a much cheaper alternative to lithium-ion battery systems, which cost around $13,000 for a typical household.



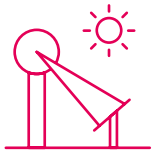
Advanced compressed air energy storage (A-CAES)

A-CAES technology compresses air and then stores it in tanks under the earth under high pressure, using water as a weight. The air can then be released to power turbines at the surface. This is an emerging alternative to pumped hydro, and can be done in ways that are less costly, have fewer environmental impacts and are more climate resilient. For example, a demonstration project in Broken Hill, due to be completed in 2029, is co-located on an existing mine site and uses existing underground mine infrastructure (ARENA 2025a).



Gravitational storage

Gravitational storage uses power, when it is cheap and abundant, to lift a heavy weight. When power is needed, the weight is released, sending the stored power back to the grid. Like A-CAES, gravitational storage can make use of existing underground infrastructure to reduce environmental impacts. Studies are currently underway to repurpose the Mount Isa copper mine site, due to close in July 2025, as a gravitational storage facility (Heynes 2024).



Concentrated solar thermal power (CSP)

CSP uses mirrors to capture the sun's energy and store it for long periods, delivering low cost, low carbon, reliable heat and electricity available on-demand. Vast Energy's 30MW Vast Solar 1 (VS1) project in Port Augusta will deploy Vast's award winning, proprietary CSP technology. With eight hours of storage, VS1 will provide critical long duration energy storage for South Australia's grid. The project is due to commence construction later this year and be operational by 2028.

Image: Vast Energy's 30MW Vast Solar 1 project in Port Augusta.

Making the most of our cheaper renewable power

Thanks to Australia's efforts to increase renewable generation, in some parts of the country, we have more renewable power than we can use at times. For example, South Australia is the first place in the world where rooftop solar alone can at times exceed the entire state's power demand (Government of South Australia). This is a fantastic achievement, but can also create challenges for our grid, especially when combined with existing inflexible baseload coal generation.

To manage this problem, network operators would historically disconnect rooftop solar systems from the system when there was too much power in the grid, which also stops them from generating power for household appliances and batteries. In some parts of Australia, network providers also put limits on new installations, restricting them to smaller systems than properties could otherwise accommodate. While sometimes necessary, these technical fixes disadvantage households and businesses which could be benefiting more from investing in rooftop solar and battery systems.

Batteries at all scales provide a mechanism to store more of the excess, cheap power, instead of wasting it. Installing batteries alongside smarter solar systems that can adjust the amount of energy being exported, means household and business rooftop solar systems can generate to their full capacity, and the energy can be used efficiently. Community-scale batteries are also an efficient way to soak up excess solar power, without all homes and businesses in the area needing their own battery. Many of Australia's big batteries are also designed to soak up excess rooftop solar, including two of Australia's newest, largest batteries being installed in Collie, Western Australia.

SOAKING UP EXCESS SOLAR POWER WITH COMMUNITY-SCALE BATTERIES

The Australian Government's Community Batteries for Household Solar program is installing 420 community-scale batteries across the country, to soak up excess rooftop solar for communities to use at peak times. The batteries will enable more households to install rooftop solar, help households who can't install solar to access the benefits of cheaper, clean solar power, and reduce pressure on the grid – all while cutting climate pollution.

The Bondi Community Battery in NSW, supported through the program, has been soaking up excess solar power from Bondi rooftops since 2024. The battery system also supports a cleaner transport system in the area: it includes a council-operated EV charging station, powered by the stored solar. Since the battery was installed, it has helped to reduce strain on the grid and lower power costs for residents (Pixii 2024).

Images: Australia is the world leader in rooftop solar.

Batteries can help power our economy's growing energy needs

The growth of the internet, cloud computing and more recently artificial intelligence (AI) has driven unprecedented demand for data centres in Australia and around the world. Data centres are the physical locations that house computing machines and other hardware that deliver these services. Data centres help us save energy as they make many processes in daily life more efficient, and in the coming years, their potential applications will expand even further. However, these facilities also consume a lot of energy. According to the International Energy Agency, a typical ChatGPT search uses 10 times more power than a Google search. If the nine billion Google searches we make every day around the world were powered with AI, this would require almost 10 Tera-Watt hours (TWh) of additional electricity every year (International Energy Agency 2024a) – equivalent to one quarter of New Zealand's total power use in a year.

In Australia, demand for new data centres is expected to double in the next decade, with an extra 175 new facilities needed by 2030 (Lenaghan 2025). Some single facilities could require as much electricity as a small city (Australian Energy Market Commission 2025). Additional data centres will create new pressures on our grid at a time when electricity demand is already increasing, as we electrify our homes, businesses and transport networks. Australian energy bodies are looking at ways to manage these opportunities and challenges. In May 2025 the Australian Energy Market Commission (AEMC) opened consultation on new standards to ensure large energy users like data centres can respond appropriately during power system disturbances, to support grid stability (AEMC 2025).

Data centre developers in Australia are already looking at co-locating their centers with big batteries to reduce their energy costs, increase energy security for their systems, and diversify their revenue. For example, the Supernode Project in Brendale, Queensland will co-locate four "hyperscale" data centers with a big battery, to be developed in three stages. In total, the battery will have a huge capacity of 760 MW/3096 MWh. The site is strategically located near Queensland's South Pine power substation and will enable the storage of excess solar and wind energy.

Image: Data centres consume enormous amounts of energy.

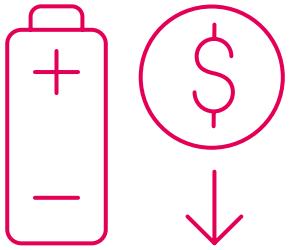
2.

Batteries are becoming cheaper and better, fast

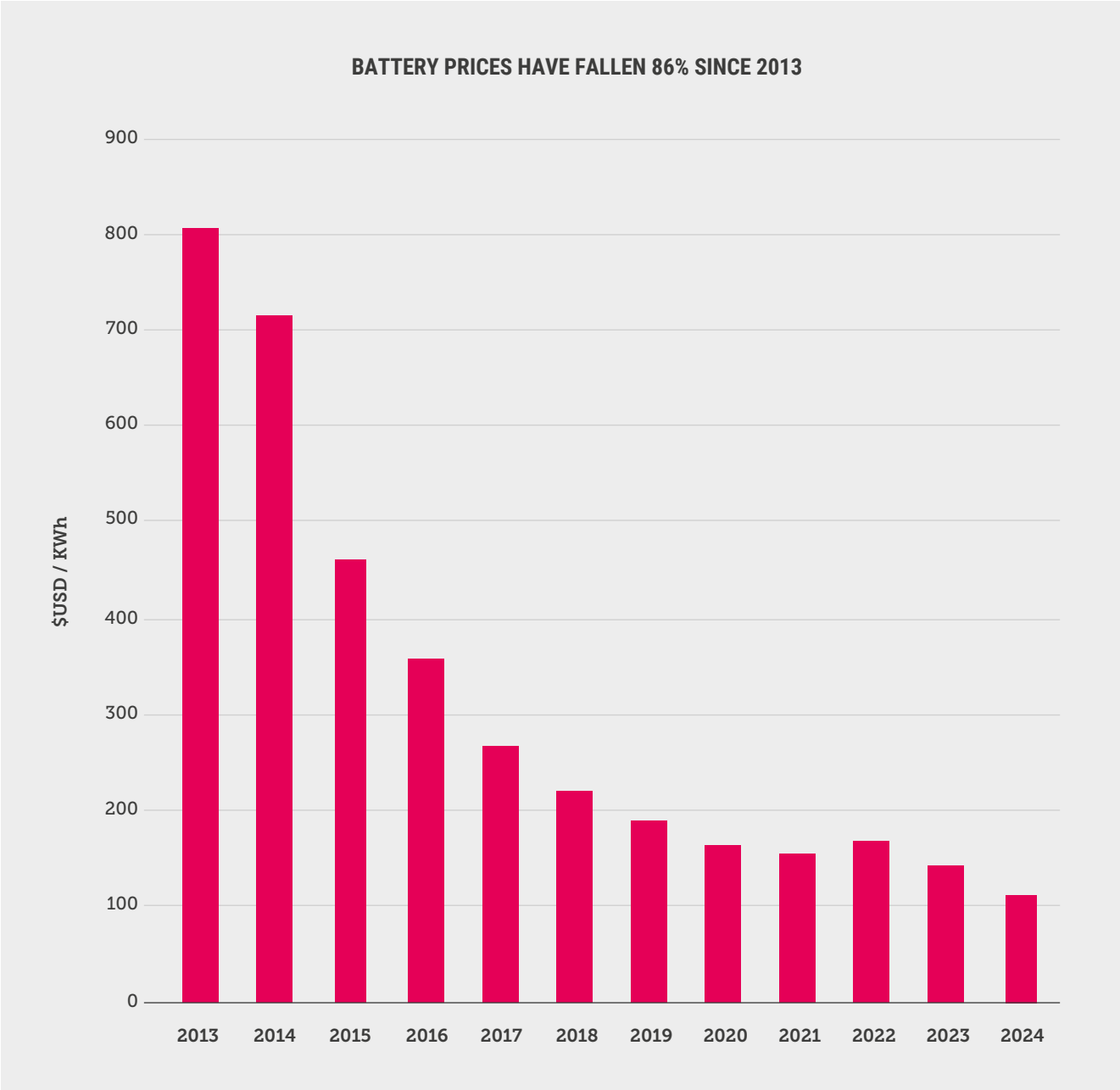
Image: The Hornsdale Power Reserve.

Battery technology is advancing rapidly, while costs are dropping.

Globally, battery prices have fallen 86 per cent since 2013 (BloombergNEF 2024). A big driver is the drop in lithium prices – the key material in most energy storage batteries – which have also dropped by more than 85 per cent in the past three years (International Energy Agency 2025). On top of this, the world's battery manufacturing capacity now exceeds demand, also pushing down prices. Lower-cost lithium-iron phosphate batteries are being used where possible, for example in electric vehicles, instead of lithium-ion batteries.



Battery prices have fallen 86 per cent since 2013



Source: BloombergNEF 2024. Figures represent an average across multiple battery uses and types.

Big battery prices are falling, while the costs of fossil fuel projects increase

In Australia, the upfront cost of big batteries has fallen 20 per cent in the past year alone, as lithium prices drop and economies of scale improve. This is despite price increases in other technologies in recent years due to ongoing global supply chain constraints. For example, the cost of gas generation increased by 11 per cent in 2024-25 (CSIRO 2024a).

As the big battery technology advances, their potential to play a larger role in Australia's grid also grows. For example, the newest big batteries can have a much higher storage and dispatch capacity, and are more efficient and longer lasting than batteries installed just a few years ago (S&P Global 2025). We're seeing this play out first-hand here in Australia. For example, the 500 MW, four-hour duration Collie battery was set to be the biggest in the country when it was announced in 2023. It's due to be completed later this year, and will be able to power around 785,000 homes (Cook and Sanderson 2025). Just two years later, it will now no longer even be the biggest battery in Collie! Another four-hour battery is being expanded just down the road, which when complete in late 2025 will have a total capacity of 560 MW (Neoen 2025a).

In New South Wales, Australia's first eight-hour battery was announced in May 2024. The 50 MW/400 MWh Limondale Battery Energy Storage System, next to the Limondale Solar Farm south of Balranald, is due to start the commissioning process in late 2025. Now, there are four more eight-hour batteries being installed across the state to support the transition away from coal (Parkinson 2025b).

BIG BATTERIES ARE RAPIDLY BECOMING MORE POWERFUL, EFFICIENT AND LONGER LASTING

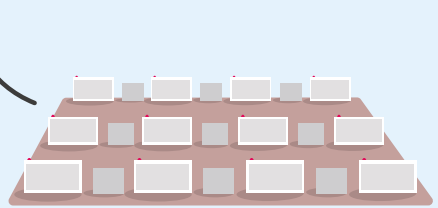
The world's first big battery: Hornsdale Power Reserve, South Australia

TOTAL CAPACITY:
150 MW / 194 MWh

INSTALLED:
2017

EXPANDED:
2020

SAVINGS TO CONSUMERS:
$150 million in its first two years

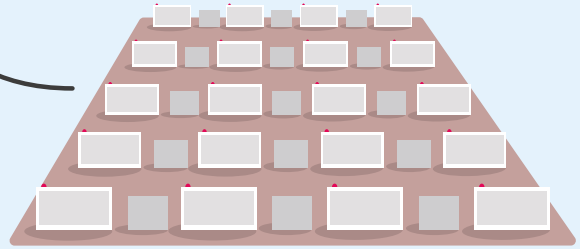


Collie's biggest battery

TOTAL CAPACITY:
560 MW / 2.2 GWh

INSTALLED:
2024

EXPANSION:
To be completed in late 2025



ABLE TO POWER:

20 per cent of the average demand in WA's South-West Interconnected System (SWIS)

Home batteries are becoming more affordable for even more Aussies

One in two Aussie families are keen to get batteries, but the upfront cost is a barrier (Climate Council 2024a). However, the falling costs of batteries, together with financial incentives from governments, are making battery storage accessible to more Australians.

There are nearly 80 different home batteries on the Australian market, starting at around $4000 for a 5 kWh battery (Smart Energy Council 2025). However, for a typical home, a battery costs around $13,000 (SunWiz 2025). The payback period for a battery depends on a range of factors, but overall, is falling as technology and economies of scale improve. In 2024, the payback period was around 8.3 years (Sunwiz 2025), compared to 10 years in 2022 and 19 years in 2016 (Kaka and Pendlebury). Manufacturers predict prices will continue to fall, by between 4-10 per cent in 2025 alone, which will further reduce the payback period, especially when combined with government subsidies (SunWiz 2025).

With the average Australian staying in their home for around nine years (Domain 2023), this means batteries are now in reach for more Australians than ever – and financial incentives can make a big difference in tipping the scales. Increased demand for batteries as a result of subsidies, including the Australian Government's Cheaper Home Batteries Program, which will add household batteries to the offerings in the Small-scale Renewable Energy Scheme from 1 July this year, could also help prices fall further: The cost of solar has more than halved since the introduction of the Small-scale Renewable Energy Scheme in 2012 (Clean Energy Council 2025).

Image: Home batteries are becoming more affordable for even more Australian families.

There's a huge opportunity if we can turn our electric cars into "batteries on wheels"

Electric vehicles (EVs) contain powerful lithium-ion batteries that have the potential to transform both our transport networks and our grid. The battery technology in EVs is advancing rapidly – nearly every week there is a new announcement from a manufacturer who has developed a more powerful, faster charging battery. While EVs on the market a decade ago typically had the capacity to travel between 100 to 150 kilometers on a single charge, cars on the market today have a range of up to 530km (EVSE 2025). Earlier this year, BYD announced that it has developed a charging system that can completely charge an EV with a range of around 600km in just five minutes – around the same time it takes to fill a car with petrol (Smy 2025a). The prices of EVs are also dropping, with support from the New Vehicle Efficiency Standard (NVES) encouraging more competition and cheaper electric cars in the Australian market. Currently, the cheapest electric vehicle available in Australia costs around $30,000. Cheaper EVs are expected to enter the market this year, with some cars that could cost as little as $25,000 (Smy 2025b).

There are already more than 300,000 EVs on Australian roads (EV Council 2025). By 2050, up to 97 per cent of the cars on our roads could be electric – slashing climate pollution from our transport sector (CSIRO 2024). By the early 2030s, Australia's total EV fleet battery capacity is likely to be greater than all other forms of storage in the NEM, including pumped hydro (ARENA, RACE and enX 2025).

Work is underway across Australia to unlock the potential of the batteries in our cars with vehicle-to-grid (V2G) technology. V2G enables an EV to not only charge using power from the grid, but supply stored power back to the grid. A household with rooftop solar can store excess solar power in their car battery and then use this power when they need, or sell it back to the grid, providing a source of income. Early adopters of V2G are making around $1000 every year from selling energy back into the grid from their cars. One driver even made nearly $600 in just two hours by selling power from both their EV and home battery when power prices were high! (NRMA 2025). On top of this, switching to an EV can save households around $2000 every year on petrol or diesel costs (AEMC 2024).

With the electrification of our transport sector set to increase the pressure on our grid, V2G is a win-win-win: when combined with rooftop solar, it will reduce the demand on our grid, slash energy bills for its adopters, reduce the need for additional investment in home batteries, all while cutting climate pollution from both our transport and power systems. The benefits of V2G will be even greater when these systems are coordinated through mechanisms like Virtual Power Plants (VPPs). Like coordinated home batteries, this could further reduce the need for investment in grid-scale generation and storage, while also reducing distribution network costs by reducing peak

Electric cars can transform the way we use power by reducing grid demand, cutting our costs, and reducing the need for other types of storage

demand on the grid. Modelling shows that with the right policy settings, hundreds of thousands of Australian households could reduce their power bills and cut climate pollution with V2G by 2030, and millions by 2040 (ARENA, RACE and enX 2025).

V2G is still an emerging technology and currently only works in a limited number of cars and chargers. However, it is set to become available to more and more Australians in the near future. In South Australia, SA Power Networks has already announced that it will treat V2G charging in the same way it does a typical home battery, and has launched a new website explaining what keen EV buyers need to do to hook their car into the grid.

In New South Wales, a joint project by CSIRO and Essential Energy, one of Australia's largest electricity distributors, has successfully demonstrated that EVs equipped with Australia's most common charging plug type can store and share energy from rooftop solar systems. The study replicated real-world household energy use and grid connection to assess how V2G charging could be used to manage household energy demands and grid exports (CSIRO 2025). This research paves the way for wider adoption of the technology, allowing more Australians to use the batteries in their car to store solar power and export it to the grid.

Image: When ex-Tropical Cyclone Alfred caused blackouts in the Brisbane area, Jo Fraser's household used their EV to power their fridge.

3.

Australians are already embracing battery storage, but we're just getting started

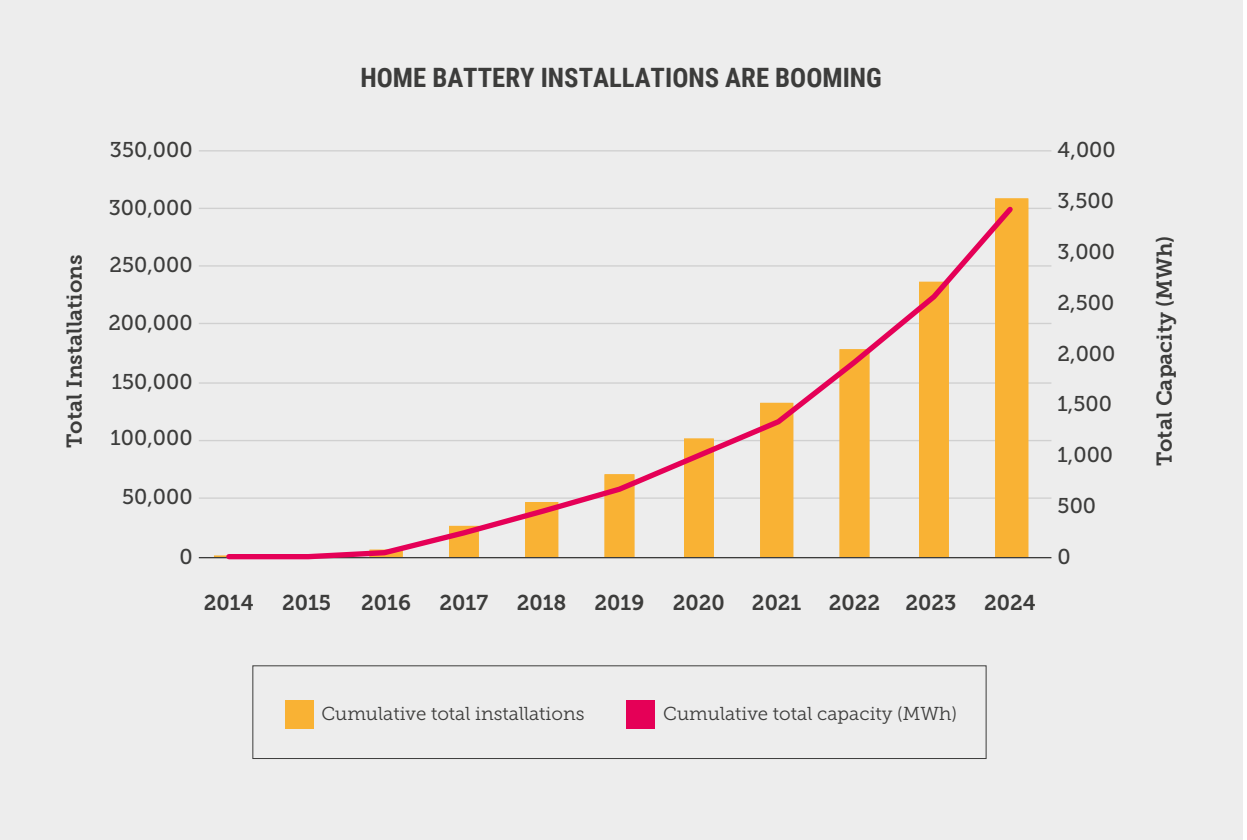
Image: Community members at the Yarra City Council Community Battery launch.

Just as battery technologies and costs are rapidly improving, so is Australia's battery storage capacity: it has more than doubled in the past three years to more than 3 GW (AEMO 2024). Overall in the main grid, at peak times batteries can make up up to 5 per cent of our power. In some parts of Australia, this can be much higher – South Australia can get more than 30 per cent of its power from batteries at certain times, and Western Australia can get nearly 20 per cent (Parkinson 2025c).

As home to the world's first ever big battery – the Hornsdale Power Reserve in South Australia, which started soaking up the state's renewable power back in 2017 (Neoen 2025b) – Australia is a world leader in big battery storage. In the eight years since then, we have switched on more than 30 big batteries across the country. In the first few months of 2025, big batteries have been making and breaking records regularly for the amount of power they are soaking up and discharging (OpenElectricity 2025b).

Community-scale batteries are also popping up all over the country, with 420 set to be installed through the Australian Government's Community Batteries for Household Solar program, and even more through state-based initiatives in Victoria and South Australia.

Home batteries only really entered the Australian market in 2015 – two decades after rooftop solar. Now, more than 300,000, or 8 per cent of the homes and businesses with rooftop solar, have a battery. In 2024, Australians installed more than 72,000 new home batteries, a 27 per cent increase from 2023. Around one quarter of homes that install solar now include a battery to go along with it (SunWiz 2025).



Source: Sunwiz Australian Battery Market Report 2025.

SUPER SAVER: HORNSDALE POWER RESERVE, SOUTH AUSTRALIA

South Australia is home to the Hornsdale Power Reserve, the world's first big battery which opened in November 2017. The 150 MW battery enables more of South Australia's low-cost renewable energy to flow into the grid, and also includes technologies to support grid stability and can respond rapidly when South Australia is separated, or 'islanded', from the rest of the grid. For example, in November 2019 a network outage in Victoria resulted in South Australia being disconnected from the rest of Australia's main electricity grid. This caused technical difficulties for South Australia's network, and volatility in market prices. The Hornsdale battery helped South Australia's energy system to return to its normal frequency range within minutes – saving consumers an estimated $14 million. In total, it is estimated that the battery saved electricity consumers more than $150 million in its first two years (Aurecon 2019).

Image: The Hornsdale Power Reserve in South Australia.

Household batteries are helping average Australian families save on their power bills

Average Aussie households are taking advantage of government subsidies to install batteries and slash their power bills. In New South Wales, many of the top suburbs installing batteries through the NSW Government's Home Battery Incentive program – including Campbelltown, Penrith, Wollongong and the Blue Mountains (Minns 2025) – have median incomes around the same as, or lower than, the state's average. In Queensland, more than half of the 1400 Queensland households installing batteries through the state's now closed Battery Booster program are low income households (noting the program was means tested, but households earning up to $180,000 were eligible – well above the national median annual household income) (de Brenni 2024).

As battery installations increase, they are expected to follow the same pattern as solar installations. Middle-income households are the most likely to install solar, while high-income households are actually less likely to install solar, as they tend to have more disposable income and therefore less interest in reducing their power bills. Uptake is also lower in low-income households, who may not be able to afford the upfront costs (Climate Council 2024b). Many of Australia's top solar suburbs – places like Bundaberg and Caloundra in Queensland, Wyong in New South Wales, Cranbourne in Victoria, and Mandurah in Western Australia – all have median incomes around the same as, or lower than than, the national average.

With only 8 per cent of the four million Australian households with solar currently having a battery, there is enormous potential to roll out more batteries and increase savings for these households even more. A home battery can almost double the power bill savings for homes with rooftop solar, up to $2300 a year, or 90 per cent of a typical family power bill (Albanese and Bowen 2025).

Although batteries are becoming more affordable for more Australians, renters, apartment dwellers and people on low or fixed incomes still face many barriers in installing their own solar and batteries. Community-scale batteries are one key way of sharing the benefits of cheaper, clean solar power with households that face barriers to installing their own solar and batteries. Governments can also build on existing work to increase energy efficiency in social housing stock and rental properties, to roll out solar and batteries where feasible.

With 92 per cent of the four million Australian households with solar yet to install a battery there's huge potential. Those most likely to add a battery are middle-income households

Batteries are helping keep communities safe as our climate changes

Climate pollution is already increasing the frequency and intensity of extreme weather events across the country: 80 per cent of Australians have experienced some form of disaster in recent years (Climate Council 2023). Batteries are not only key to reducing the pollution from our power system, but can also help provide power to homes, businesses and community refuges when power supply is disrupted in extreme weather events like storms, fires, floods and cyclones.

For example, when Tropical Cyclone Alfred hit communities in Queensland and northern NSW in March 2025, it severely disrupted power supply – plunging half a million properties into darkness (Climate Council 2025). Those with EVs were able to use the vehicle-to-load (V2L) feature – available in most EV models other than Tesla – to power the appliances they needed like fridges, kettles, and phone and laptop chargers (Kurmelovs 2025a). Homes with solar and batteries were able to have uninterrupted power supply, and some even had excess power to help out their neighbours (Kurmelovs 2025b).

These capabilities can save lives. When the power went out in parts of Queensland on Christmas day in 2023 due to storms and flash flooding, one family was able to use their EV to power their young son's dialysis machine (Kurmelovs 2024). The battery was used for one night, but could have powered the machine for up to four nights before needing to be charged. Without this option, the family would have needed to travel from the Gold Coast to Brisbane in the middle of severe weather to access treatment.

It's not just household and EV batteries that can save the day in emergencies. Solar and batteries can also be installed on community facilities to provide a secure source of power when they are used as refuges when severe weather conditions strike. Microgrids are also being installed around Australia to increase energy resilience in communities. A microgrid is a small grid that powers a group of buildings, often connected to the main grid but with the ability to operate independently of it as well. They enable remote communities to transition away from fossil fuels like diesel, and give these communities autonomy over their energy.

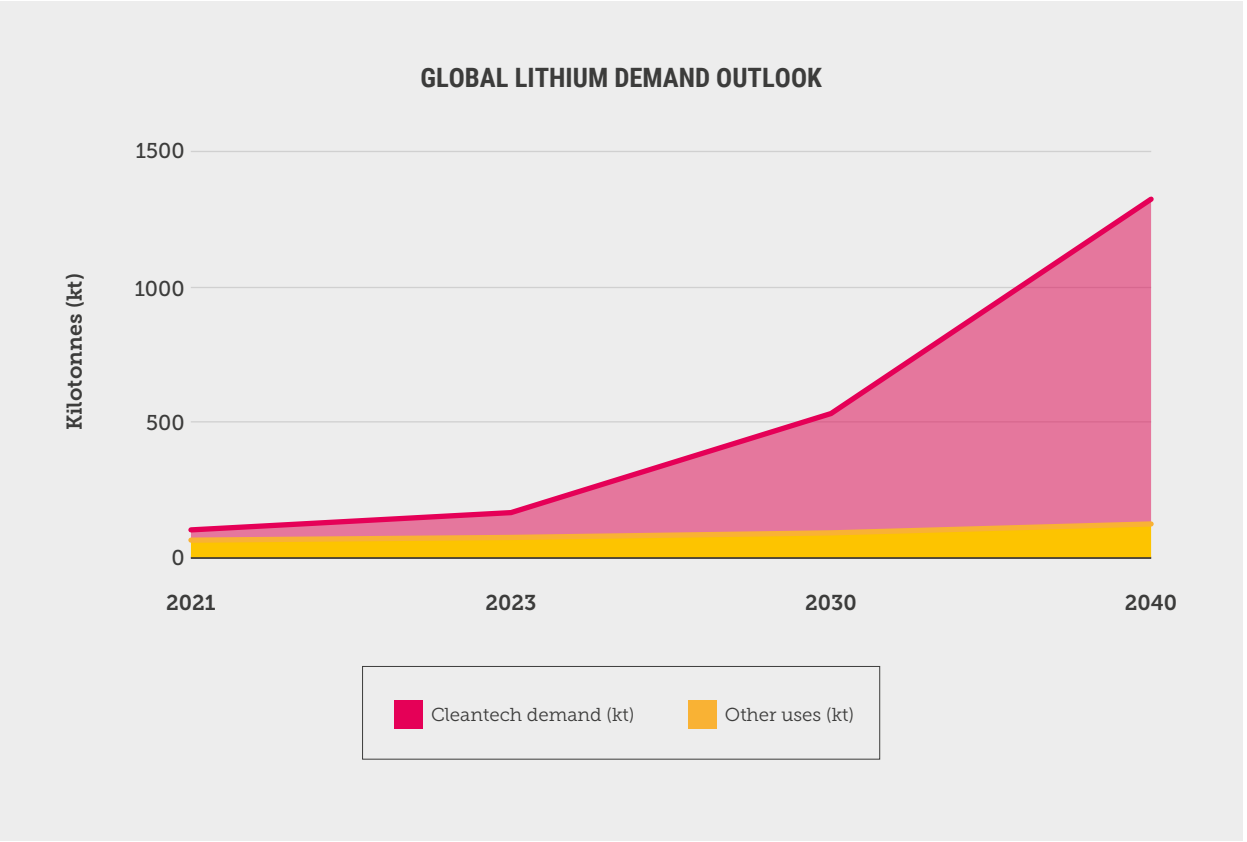
For example, the Corryong solar and battery microgrid is being installed in the town in north-east Victoria to provide it with a reliable, resilient, renewable power source. Corryong was one of the Victorian towns hit hardest by the Black Summer bushfires in 2019-20, and in the past it has been disconnected from the grid for over a month due to bushfires. The microgrid will be able to power more than 900 local households and businesses for up to five days, helping to keep the community safe (Allan 2024).

NOT ALL HEROES WEAR CAPES

To help more Aussies benefit from the capabilities of EV batteries during natural disasters, mycar Tyre and Auto has launched *The Chargers* initiative: building a team of EVs that will travel to areas experiencing power loss after a natural disaster to share their battery power with the local community. The initiative is the first of its kind in Australia, and encourages owners of EVs with V2L capabilities across Queensland, Victoria, New South Wales and the Australian Capital Territory to sign up to the trial. When a disaster occurs that cuts a community off from power supply, once it is safe to enter the area, these volunteer Chargers will be sent out to help households in need by helping them power essential appliances and devices.

Australia is developing its own home-grown battery industry

Not only is Australia the sunniest and one of the windiest places in the world, we are also the top producer of lithium – the key material in most energy storage batteries. We produce around half of all lithium worldwide (Australian Bureau of Statistics 2022). With global lithium demand set to increase more than 10-fold between now and 2040 (International Energy Agency 2024b), our lithium resources offer significant economic opportunities, including job creation, technological advancements, and enhanced energy security.



Source: International Energy Agency 2024.

Although Australia produces around half of the world's lithium, we export nearly all of it – mostly as lithium ores. We can create more local jobs and economic value by manufacturing batteries here at home. The National Battery Strategy, part of the Australian Government's Future Made in Australia agenda, aims to develop a thriving battery industry in Australia. Through the strategy, the Australian Government is delivering:

- The $523 million Battery Breakthrough Initiative to promote the development of battery manufacturing capabilities. Consultation on the design and guidelines for the program was undertaken in 2024, and the program is expected to open for applications in 2025.
- Support for the Future Battery Industries Cooperative Research Centre (CRC) to map Australian battery capability and value chains and drive battery innovation. The Australian Government has allocated more than $20 million over five years to the Future Battery Industries CRC (Future Battery Industries CRC 2024).
- $14 million to establish the Powering Australia Industry Growth Centre to develop workforce skills and training. The program is running over four years from 2023-24 to 2026-27.
- $5.6 million to support Queensland to conduct options analysis and research to establish the Australian Made Battery Precinct, to drive battery manufacturing in Australia. The Australian Government has committed up to $100 million of investment into the development of the precinct in partnership with the Queensland Government.

SUPERCHARGING AUSTRALIA'S BATTERY INDUSTRY

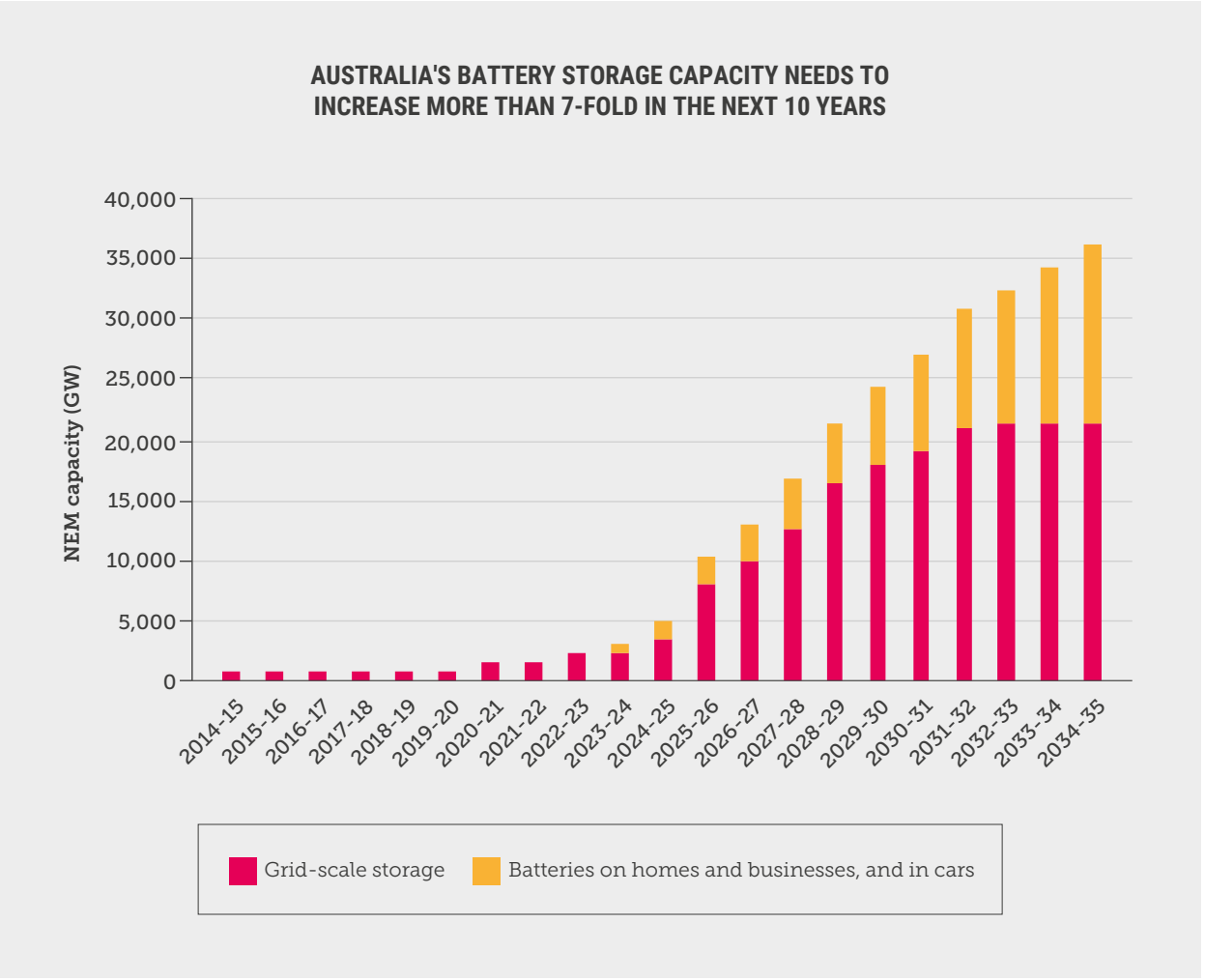
The private sector is also taking action to supercharge Australia's battery industry. Supercharge Australia is an international partnership between global clean energy startup accelerator New Energy Nexus, and Australia and New Zealand's largest climate tech startup accelerator EnergyLab. The initiative is supporting Australia to become a global hub for battery technology innovation by connecting start-ups along Australia's lithium value chain with global expertise, industry and investors.

The inaugural Supercharge Australia Incubator was launched earlier this year, and will provide hands-on support to 10 early-stage companies to develop their businesses. The 2025 cohort includes businesses from New South Wales, Victoria, Queensland, Western Australia, South Australia and New Zealand. The businesses are developing all kinds of technologies, from new battery chemistry breakthroughs and AI-powered energy technologies to innovative ways of recycling and reusing batteries.

Battery storage is set to boom over the coming years

In total, AEMO expects that the NEM, Australia's main grid, will need 33 GW of battery and pumped hydro storage by 2035, and 49 GW by 2050 – more than 15 times the NEM's current battery storage capacity. The combined capacity of coordinated (VPP-connected) home batteries and EV batteries is expected to be enormous – nearly 30 per cent of installed storage capacity in the NEM by 2035, and 66 per cent by 2050.

Battery storage is set to boom across Australia in coming years, with support from governments at all levels. There are more than 20 gigawatts of big battery storage in the pipeline – almost double the amount that there was the same time last year (AEMO 2025b)! The Australian Government predicts that thanks to its new home battery subsidy, more than one million batteries will be installed on homes and businesses by 2030. However, we still have a long way to go. With additional targeted initiatives to support low-income households, renters, people in apartments, and owners of EVs to access the benefits of batteries, we can increase our storage capacity even more and make sure everyone benefits.



Source: AEMO 2024 Integrated System Plan for the National Electricity Market.

4.

Who's leading the charge?

Different states and territories across Australia are approaching battery storage in different ways depending on their energy needs. South Australia is smashing it across the board: home to the world's first big battery, the highest proportion of households with a battery and Australia's largest VPP. While South Australia was an early adopter, Western Australia now has more big batteries than any other state or territory, helping to enable its move away from coal. Thanks to its Home and Business Battery Scheme, the Northern Territory leads the way in the proportion of homes with solar that also have a battery. Victoria's Neighbourhood Battery Initiative has helped it take the lead for the most community batteries. The successes in each state and territory provide valuable lessons for the rest of the country to follow.

Image: Bungala Solar Farm in South Australia.

WHO'S LEADING THE CHARGE?

BIG BATTERIES

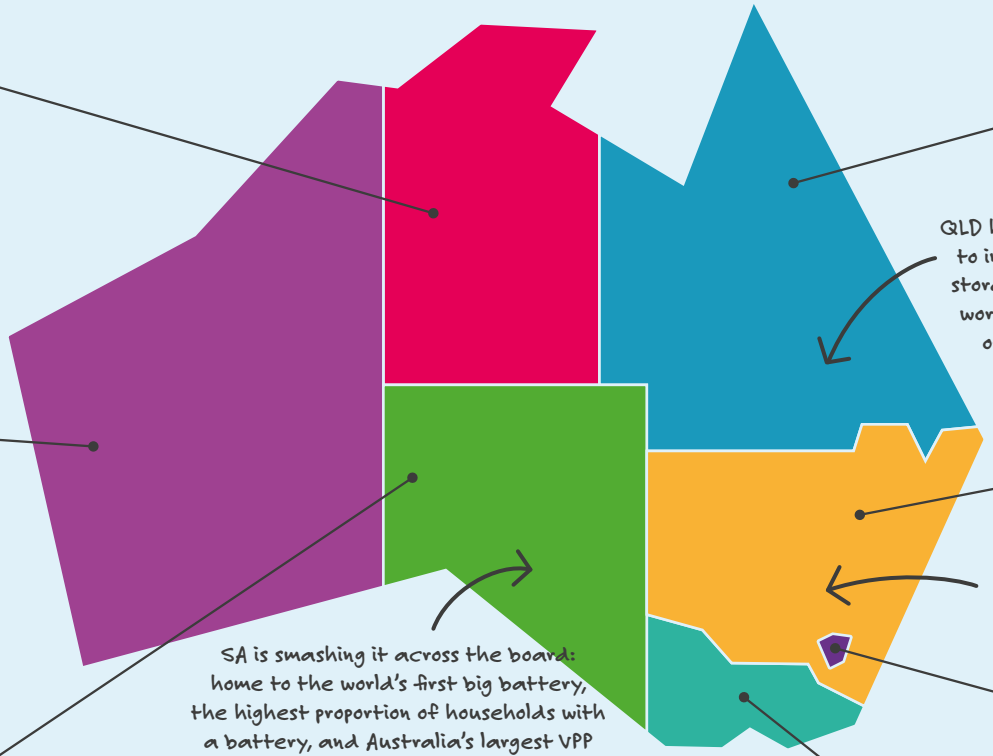
In service and commissioning big batteries as reported in the AEMO NEM Generation Information April 2025.

COMMUNITY-SCALE BATTERIES

Batteries to be delivered through the Australian Government's Community Batteries for Household Solar program, Victoria's 100 Neighbourhood Batteries Program, and South Australia's emPowering SA program.

HOUSEHOLD BATTERIES

As estimated in the SunWiz Australian Battery Market Report – 2025. Refers to the proportion of homes with solar that also have a battery.



NORTHERN TERRITORY

- 0 big batteries
- 16 community-scale batteries
- 15.9%of homes with solar have a battery

QUEENSLAND

- 6 big batteries
- 82 community-scale batteries
- 4.0% of homes with solar have a battery

WESTERN AUSTRALIA

- 8 big batteries
- 33 community-scale batteries
- 4.4% of homes with solar have a battery

NEW SOUTH WALES

- 6 big batteries
- 111 community-scale batteries
- 9.5% of homes with solar have a battery

SOUTH AUSTRALIA

- 6 big batteries
- 28 community-scale batteries
- 13.9% of homes with solar have a battery

TASMANIA

- 0 big batteries
- 8 community-scale batteries
- 8.3% of homes with solar have a battery

VICTORIA

- 7 big batteries
- 140 community-scale batteries
- 8.4% of homes with solar have a battery

ACT

- 0 big batteries
- 3 community-scale batteries
- 14.0% of homes with solar have a battery

HIGHLIGHTS AND TOP SUBURBS FOR BATTERY POTENTIAL ACROSS AUSTRALIA

Governments all over the country are investing in programs to boost battery storage in homes and businesses. The Australian Government's $2.3 billion Cheaper Home Batteries Program will reduce the cost of a typical battery by 30 per cent from 1 July 2025. It will provide the discounts through the existing Small-scale Renewable Energy Scheme, which has played a key role in accelerating the adoption of rooftop solar for more than a decade. Importantly, the program will also support small businesses and community facilities to install batteries sized up to 100 kWh.

Australia's top solar suburbs have huge potential to take advantage of programs like the Cheaper Home Batteries program to install discounted storage and make the most of their solar power.

Cheaper Home Batteries Program

South Australia

- The SA VPP, unveiled in 2018, is Australia's largest VPP, sharing the benefits of cheaper, clean solar power with more than 6500 Housing SA homes and even more private households.
- The emPowering SA program is delivering community-scale batteries for South Australia, with two batteries already installed to deliver renewable energy and lower residential electricity rates to at least 600 Housing SA tenants in Magill, Edwardstown and surrounds.
- The Retailer Energy Productivity Scheme (REPS) provides free or discounted energy updates, including for households that join a VPP.

As the first place in the world where rooftop solar alone can at times exceed the entire state's power demand, SA has been a leader in battery storage to soak up all its excess renewable power. It is home to the world's first big battery, the Hornsdale Power Reserve which charged up way back in 2017. Since then, it's brought on another five big batteries with several more expected to connect to the grid very soon.

South Australia leads for the highest proportion of households with a battery, at more than 7 per cent, but falls just behind the Northern Territory for the proportion of rooftop solar systems with a battery. The South Australian Government is supporting equity across the community in the switch to renewables by sharing the benefits of cheap rooftop solar to social housing tenants through the SA VPP and the emPowering SA community battery program.

SA's top suburbs ready to take their solar to the next level with home batteries:

- Salisbury (8400 rooftop solar systems)
- Morphett Vale (8200 rooftop solar systems)
- Smithfield (8100 rooftop solar systems)

Victoria

- The Solar Homes Program provides a zero-interest loan of up to $8800 for the installation of a battery system, to be repaid monthly over four years.
- In May 2025 the Victorian Government announced the scheme has been closed for applications, after exceeding its target of 4500 loans. In total, the Victorian Government has supported the installation of more than 20,000 home batteries over the last seven years through loans and rebates (Solar Victoria 2025).
- The Neighbourhood Battery Initiative is providing grants to support a range of community-scale battery models in Victoria.

Victoria has targets to reach at least 2.6 GW of energy storage capacity by 2030, and 6.3 GW by 2035. This includes a combination of short-, medium- and long-duration energy storage systems to ensure Victorians have access to reliable renewable power whenever it's needed. To help reach these targets, Victoria's Neighbourhood Battery Initiative has made it a clear front runner in community-scale batteries. Through the initiative, Victoria installed Australia's (and possibly the world's) first inner-city community-scale battery. The Yarra Community Battery in Fitzroy was launched in 2022. Importantly, key decisions about its placement and noise level were decided by a Community Reference Group. Off the back of the success of the battery, work is also underway to install batteries in Clifton Hill and Richmond (Yarra Energy Foundation 2024).

Victoria's top suburbs ready to take their solar to the next level with home batteries:

- Tarneit (23,200 rooftop solar systems)
- Cranbourne (18,100 rooftop solar systems)
- Craigieburn (17,500 rooftop solar systems)

Western Australia

- The WA Government has committed to deliver a Residential Battery Scheme by 1 July 2025. The scheme will complement the Australian Government's Cheaper Home Batteries Program for a combined rebate of up to $7500. Households will be required to participate in a VPP to be eligible for the Scheme.

The WA government has committed to close its last two state-owned coal-fired generators by 2029. Government and industry alike are investing in big batteries to help keep the state's grid – which can already get up to 80 per cent of its power from renewables at certain times (Parkinson 2025d) – stable past the end of coal. Two of Australia's largest batteries are being installed in Collie, right next to two of the state's coal-fired generators. The government-owned 500 MW, 4-hour duration Collie battery was set to be the biggest in the country when it was announced in 2023. Just two years later, it will now no longer even be the biggest battery in Collie, demonstrating the pace of the progress we are making!

WA's top suburbs ready to take their solar to the next level with home batteries:

- Mandurah (19,200 rooftop solar systems)
- Armadale (16,700 rooftop solar systems)
- Ashby (16,700 rooftop solar systems)

Northern Territory

- The NT's Home and Business Battery Scheme provided grants of $400 per kWh of capacity, up to a maximum grant of $12,000. In June 2025, the NT Government announced that the program had reached its $6 million funding allocation and is closed to new grants.

Thanks to the NT's recently closed battery incentive scheme, the NT has the highest proportion of rooftop solar systems that are connected to a battery. An increase in the maximum grant from $5000 to $12,000 in late 2024 helped uptake surge even higher, with more and more territorians saving on their power bills.

NT's top suburbs ready to take their solar to the next level with home batteries:

- Nightcliff (4000 rooftop solar systems)
- Mitchell (3200 rooftop solar systems)
- Alice Springs (2800 rooftop solar systems)

New South Wales

- The Household Battery Incentive program provides an upfront discount on the cost of battery installation for homes and small businesses. Since the program launched in November 2024, more than 7800 batteries have been installed in homes and businesses across NSW.
- The NSW Government has recently announced that the program will close from 30 June 2025. However, from 1 July 2025, the NSW Government incentive for connecting a battery to a VPP will nearly double. For example, the payment for a 27 kWh battery will increase from around $800 to around $1,500. The VPP incentive can be combined with the Australian Government's battery discount.

New South Wales has the most home batteries in the country, but due to its large population and high rates of solar, its proportion of rooftop solar systems connected to a battery is still smaller than other states. With targets to reach 16 GWh of long duration storage by 2030 and an additional 12 GWh by 2034, NSW also has more grid-scale storage in the pipeline than any other state (AEMO 2025b)! The Waratah Super Battery, at the former Munmorah coal-fired power station on the Central Coast, is already connected to the grid and will be fully operational in late 2025. At 850 MW/1,680 MWh, it's one of the most powerful batteries in the world.

NSW's top suburbs ready to take their solar to the next level with home batteries:

- Box Hill (12,800 rooftop solar systems)
- Kellyville (12,300 rooftop solar systems)
- Wyong (11,500 rooftop solar systems)

Queensland

- Queensland's Battery Booster Rebate program closed in May 2024, after initially being expanded from $10 million to $16 million due to its success. More than 1400 households were approved for a rebate, with more than 52 per cent of recipients being from low income households.

It should come as no surprise that the Sunshine State has the highest rate of rooftop solar in the world – with solar installed on more than half of all houses (Climate Council 2024b). This represents a big opportunity to support more Queenslanders to install batteries and increase the benefits of their cheap, clean solar power.

Queenslands top suburbs ready to take their solar to the next level with home batteries:

- Bundaberg (21,400 rooftop solar systems)
- Hervey Bay (19,800 rooftop solar systems)
- Caloundra (17,900 rooftop solar systems)

Tasmania

- The Tasmanian Government's Energy Saver Loan Scheme provides no-interest loans to help fund the purchase and installation of energy efficient products and upgrades, including household batteries.

As Tasmania already has the capacity to make 100 per cent of its power from renewables – largely on-demand hydro, with some wind – Tasmania has not yet faced the same need for storage as other states. However, with a target to double its renewable generation, storage will become increasingly important. Several big batteries have been committed or proposed in the state, and Tasmania is also investigating how to make the most of its existing hydro power infrastructure and water resources to develop pumped hydro (Hydro Tasmania 2025).

Tassie's top three solar suburbs are:

- East Launceston (4800 rooftop solar systems)
- Devonport (2600 rooftop solar systems)
- Rosny (2300 rooftop solar systems)

Australian Capital Territory

- The ACT's Sustainable Household Scheme provides a no-interest loan of up to $15,000 for energy efficient product upgrades, including batteries. So far, the scheme has supported more than 1,600 households to install a battery (ACT Government 2025).
- Through the Big Canberra Battery program, one big battery is being installed in the ACT and 11 smaller-scale batteries have been installed at government sites to help power essential services.

The ACT has been powered by 100 per cent renewables since 2020, thanks to local solar farms and wind farms it funds in other parts of Australia. The ACT has a target to install at least 250 MW of new large-scale battery storage, and the government is also working to make sure schools, health-care facilities and other important services are powered by cheap, clean and reliable renewables and storage to slash climate pollution, increase community resilience and set an example for the rest of Australia (ACT Government 2024).

The ACT's top three solar suburbs are:

- Macnamara (7800 rooftop solar systems)
- Coree (6300 rooftop solar systems)
- Franklin (5900 rooftop solar systems)

5.

How Australia can supercharge the battery boom

Across Australia, a huge amount of work is already under way to increase renewables and storage in the grid. The Australian Government's target is to reach 82 per cent renewable by 2030. By adopting additional practical policies to fast-track the rollout of renewables and battery storage, we can end coal power generation sooner than anticipated – by 2030 – and start phasing out polluting gas, all while providing a secure, reliable, affordable power supply. This 94 per cent renewable power system would cut climate pollution by 126 million tonnes in 2030, helping to secure a safer future for our kids (Climate Council 2024d).

The Climate Council has identified five key opportunities, underpinned by six practical policy recommendations, for both federal and state governments to ramp up battery storage. The policy recommendations are designed to build on existing work, address gaps and make the most of emerging opportunities while ensuring the benefits of the switch to clean energy are shared across the community:

1 Use batteries on homes and businesses to store extra solar power for use later

- Roll out rooftop solar and storage for social housing
- Ensure all new and substantially renovated homes, apartments and commercial buildings have solar, and the capacity to add storage

2 Install more community-scale batteries to expand the benefits of rooftop solar

- Accelerate 'solar soaker' community-scale batteries
- Increase community resilience while cutting climate pollution with solar and batteries

3 Continue the rollout of big batteries to store power and increase grid stability

4 Make the most of our growing fleet of EVs by unlocking vehicle-to-grid (V2G) charging

- Support Aussies to install V2G charging technology

5 Ensure batteries are safe and sustainable throughout their lifespan

- Strengthen and harmonise battery safety and recycling standards

Our *Seize the Sun* report found that with policies like these, Australia could add two million household and business batteries, and 5000 community batteries by 2030, adding 25 GW of storage to our grid. With 2 million solar and battery-powered homes by 2030, each saving up to $2300 on their power bills, collective savings could be more than $4 billion in a single year. On top of this, the opportunity for V2G in Australia is progressing rapidly, and we need to make sure we are ready to harness its huge storage potential as more Australians purchase EVs.

RECOMMENDATIONS

1. Use batteries on homes and businesses to store extra solar power for use later

THIS WILL

- Allow households and businesses with solar to store the free electricity they generate during the day time and then use it in the evenings, slashing up to 90 per cent from household power bills.
- Reduce evening peak demand, putting downward pressure on bills for everyone – not just those with batteries.
- Support the establishment of virtual power plants (VPPs) to deliver more value for households and reduce the need for investment in grid-scale storage.

Australia has more rooftop solar systems per person than anywhere else in the world, with solar on more than four million rooftops. The momentum is showing no signs of slowing down – we are installing more than 25,000 new systems every month. Each of these households is saving around $1,500 on their power bills on average. As many families struggle with costs of living, rooftop solar is a clear opportunity to help Australians cut their power bills and our climate pollution at the same time.

A home battery can almost double the power bill savings for homes with rooftop solar, up to $2,300 a year – that's 90 per cent of a typical family power bill (Albanese and Bowen 2025).

Not only do batteries help reduce households' reliance on grid power during peak evening hours when electricity is most expensive, they also allow households to export solar power during peak times at a much higher value than during the day. More batteries will reduce demand on the grid in peak times, putting downward pressure on wholesale power prices (the prices energy retailers pay, which make up up to 40 per cent of our power bills). The Smart Energy Council estimates that if we reach one million home batteries in 2030, all Australians connected to the grid could be at least $1.3 billion better off every year through reduced wholesale electricity costs (Smart Energy Council 2025). Storing energy in batteries also means there will be less pressure on our transmission lines, and we will not need to spend as much on upgrading them, which can help reduce network costs. Network costs currently account for up to half of our power bills.

The benefits of home batteries are greatly increased if rooftop solar and battery owners connect their systems into a VPP, enabling network operators to more accurately manage energy generation, storage and use. Effective coordination of batteries on homes and businesses, could offset the need for an additional $4.1 billion in grid-scale storage investment – putting downward pressure on everyone's bills, not just households with batteries (AEMO 2024).

Governments and energy bodies all over the country are delivering analysis, policies and programs to boost battery storage in homes and businesses and support the establishment of VPPs. This includes the Australian Government's $2.3 billion Cheaper Home Batteries Program, which will reduce the cost of a typical home battery by 30 per cent from 1 July 2025. Importantly, the program will also support small businesses and community facilities to install batteries sized up to 100 kWh. Batteries in an on-grid system will be required to be capable of being coordinated through a VPP to be eligible for the scheme.

AEMO is increasing its focus on the opportunity to link distributed energy resources into one integrated power system (AEMO 2025a), and the AEMC is undertaking a pricing review to address the important role that electricity pricing, products, and services will play in supporting the uptake of consumer energy resources. The National Consumer Energy Resources Roadmap sets a pathway to make household solar, batteries and EVs an integral part of Australia's secure, affordable and sustainable future power system, with VPPs playing an important role in this.

At a state level, the South Australian government provides incentives for joining VPPs, and the Western Australian Government has announced that households will be required to participate in a VPP to be eligible for its battery incentive scheme. New South Wales and Victoria have also delivered programs to incentivise participation in VPPs.

We can build on the successes and learnings from programs already underway, and address any gaps, to accelerate the rollout of home batteries over the next five years. Importantly, we can support those most in need, who face barriers to installing their own solar and storage, to access the benefits of cheaper, clean power.

MAKING IT HAPPEN: ROLL OUT ROOFTOP SOLAR AND STORAGE FOR SOCIAL HOUSING

Delivery

Australian Government State governments

In Australia, there are more than 800,000 people living in 450,000 social housing homes. As the members of our communities that are facing some of the toughest cost-of-living challenges, social housing tenants stand to benefit significantly from the bill savings provided by rooftop solar and storage (Australian Institute of Health and Welfare 2024).

The Australian Government is already partnering with state and territory governments to deliver the Social Housing Energy Performance Initiative to fund energy efficiency upgrades in more than 100,000 homes. However, solar is only included in the initiative in New South Wales, Queensland and Victoria, and storage is not included in any state or territory. While these important upgrades will help to make properties cheaper, safer and more comfortable to live in, providing tenants with access to rooftop solar and storage would slash bills and climate pollution even further.

Governments can install solar and storage on suitable social housing properties by rethinking the way they provide energy bill relief to tenants. The Australian Government and Victoria, New South Wales, South Australia, Queensland and Western Australia all already use forms of green bonds to support investment in projects that deliver positive environmental outcomes. These green bonds could be used to finance the upfront cost of installing rooftop solar and storage on social housing. With rooftop solar and storage slashing their energy bills, social housing tenants will then have less need for ongoing energy bill rebates which currently cost governments hundreds of millions of dollars each year. The savings on these rebates can be used to meet the returns on the green bonds, reducing the total cost of delivering this new rooftop solar and storage.

Because a large number of these homes will be owned by a single state government agency or community housing provider, there is also significant potential for these batteries to be connected to a VPP to boost their contribution to a more sustainable and reliable grid.

MAKING IT HAPPEN: ENSURE ALL NEW AND SUBSTANTIALLY RENOVATED HOMES, APARTMENTS AND COMMERCIAL BUILDINGS HAVE SOLAR, AND THE CAPACITY TO ADD STORAGE

Delivery

Australian Government State governments

Around 170,000 new homes are built in Australia each year – including both freestanding properties and apartments (ABS 2024). Through the National Housing Accord, Governments are working together to accelerate new housing development and build 1.2 million new well-located homes across Australia by the end of the decade, as part of tackling the nation's housing affordability and availability challenges. There is a significant opportunity to bring the benefits of solar plus storage to more people by ensuring panels are added as a standard feature to all new and substantially rebuilt properties, and that they have the capacity for storage.

The National Construction Code sets out the minimum requirements for how new homes and apartments must be built. Recent updates to the Code to improve energy efficiency requirements have helped improve rates of solar on new homes and apartments, but do not go far enough. Australia already has a big retrofit job ahead of us to extend the benefits of rooftop solar, storage and energy efficiency to existing buildings. Every new and rebuilt home delivered now without solar panels and capacity for storage is simply adding to this challenge.

Federal and state governments should work together to set a new bar in the National Construction Code, making rooftop solar and the capacity for storage a standard feature of all new housing delivered in Australia, wherever this is practically possible.

For commercial buildings, the Australian Building Codes Board has proposed that the National Construction Code is strengthened to make installing a rooftop solar system a standard requirement for all new commercial buildings (Australian Building Codes Board 2024). These changes were proposed to come into effect in 2025, however their progress has been delayed (Australian Building Codes Board 2025). It is important that these changes are progressed as soon as possible, and that options are considered to ensure the mandated solar is backed up by storage.

Over the period 2025 to 2035, adding rooftop solar to commercial buildings – from healthcare centres to shops and warehouses – has been estimated to deliver $4 billion worth of benefits in reduced energy costs, network costs and emissions (Centre for International Economics 2024). Adding storage would increase these savings even more.

Australian governments have been making incremental improvements to building standards for years, slowly edging towards homes and businesses which are cheaper to run and produce less climate pollution. It's time to go all the way by making rooftop solar and capacity for storage a standard feature of all new and substantially renovated properties. This would complement the Australian Government's Cheaper Home Batteries Program, and other state-based programs that are supporting Aussies to install storage on their homes, by supporting battery installations in new housing stock.

RECOMMENDATIONS

2. Install more community-scale storage to expand the benefits of rooftop solar and storage and increase community resilience

THIS WILL

- Provide households and businesses that don't have rooftop solar with access to locally generated solar power, resulting in cheaper bills, and reducing the need to invest in local grid infrastructure, like poles and wires.
- Soak up excess solar to smooth out peaks in supply and demand, stabilising the grid and enabling more households to install solar.
- Use different types of community-scale batteries in targeted locations to provide a reliable power supply in emergencies, and enable remote communities to transition away from fossil fuels and increase their energy autonomy.

Although batteries are becoming more accessible to many across the country, a significant proportion of our population – including people who are renting, living in apartments or on low or fixed incomes – still face many barriers in installing their own solar and batteries. Community-scale batteries are one key way of sharing the benefits of cheaper, clean solar power with these members of our community.

Community-scale batteries act as a bridge between households, businesses and our grid, and help to share the bill saving benefits and cost-of-living relief provided by local solar power with more of the community. They store excess rooftop solar energy generated by nearby homes and businesses which don't have their own storage. This stored energy can then be accessed by all households and businesses connected to the local network, including those without their own solar panels.

Community-scale batteries can help to match energy supply and demand directly within local communities by shifting day time solar power for evening use. Storing more power close to where it is produced also reduces the need for more transmission infrastructure.

Community-scale battery pilots around the country are testing different business models to see which can deliver the best value and benefits for the community.

Government programs are already supporting more than 500 community-scale batteries across the country, but it remains challenging for community-scale batteries to be viable without government support.

As we learn more about using community-scale batteries through these pilots, governments and energy bodies need to ensure community benefits are at the centre of their policy and market design criteria. For example, batteries that are owned by community groups and local councils, rather than network operators, can help ensure communities receive the benefits. Community batteries can also be installed in targeted locations to share the benefits of rooftop solar with social housing tenants who don't have their own solar and batteries.

Other community-level generation and storage systems like microgrids and solar and batteries on community facilities, can also increase energy resilience in communities. For example, they can ensure at-risk communities have a reliable power supply in emergencies, and enable remote communities to shift away from fossil fuels like diesel and have more control over their energy. There are opportunities to build on existing Australian Government programs to increase energy security and autonomy for communities across the country.

MAKING IT HAPPEN: ACCELERATE 'SOLAR SOAKER' COMMUNITY-SCALE BATTERIES

Delivery

Australian Government State governments

Investment in community-scale batteries is an affordable alternative to more significant grid upgrades, which may otherwise be needed to ensure Australians who already have rooftop solar – and those who install it in future – can get the most out of their panels. Community batteries can help maximise the benefits of rooftop solar, soaking up excess power and sharing it with the wider community, without everyone with solar needing to invest in their own battery.

The Climate Council's *Seize the Decade* plan identified a need for approximately 5000 community-scale batteries around the country by 2030, to firm up increasing rooftop solar generation alongside household batteries. The Australian Government made an initial $200 million investment in 420 community-scale batteries around the country from 2022 to 2024. The Community Batteries for Household Solar program was significantly oversubscribed, demonstrating the opportunity to incorporate many more community-scale batteries into our grid.

The Australian Government can expand the Community Batteries for Household Solar program to build on this momentum and the learnings. Because the necessary grant and delivery systems are already in place, further rounds could be rolled out quickly and efficiently. While the first round of grant recipients are largely energy network operators, a second stage of the program could focus on partnering with local governments and community groups to deliver community batteries in areas with significant potential to expand solar uptake. This will help ensure communities receive the benefits of their locally made and stored solar power.

In Queensland, the Noosa Council's community battery (supported by the Community Batteries for Household Solar program) provides a practical example of how local governments can get involved in the delivery of this important infrastructure. The council owns the battery, which is operated by a specialist energy firm to buy and sell power into the NEM. As well as supporting local homes and businesses to make the most of their solar in one of Australia's sunniest regions, the council uses any profits to invest in other projects that cut climate pollution in their community (Noosa Council 2023).

State governments can also deliver programs to support the rollout of community-scale batteries, like the Victorian Government's Neighbourhood Batteries Program and South Australia's emPowering SA program. The emPowering SA program is delivering the benefits of cheap rooftop solar to social housing tenants. The community batteries installed in Magill and Edwardstown will bring renewable energy and lower power rates to at least 600 Housing SA tenants in these Adelaide suburbs. Over their expected 15 year life, these two community batteries alone are expected to together deliver around $5 million of benefits to Housing SA tenants.

MAKING IT HAPPEN: INCREASE COMMUNITY RESILIENCE WHILE CUTTING CLIMATE POLLUTION WITH SOLAR AND BATTERIES

Delivery

Australian Government

Climate pollution is already increasing the frequency and intensity of extreme weather events across the country, often causing disruptions to power supply. Household batteries and V2G charging capabilities will enable more homes to power their appliances when there are disruptions in power supply. With additional targeted initiatives for community facilities and remote communities, we can ensure at-risk communities have a reliable power supply when they are most in need.

The Australian Government's Community Energy Upgrades Fund already supports energy upgrades at existing local government facilities. **The Australian Government could expand the Fund to include a stream focused on disaster resilience, supporting the installation of off-grid enabled solar and storage on community facilities to help keep communities safe in severe weather events.** For example, the Nillumbik Shire Council in Victoria installed rooftop solar panels and a battery system on its community sport and recreation facility. The facility doubles as a relief centre in emergencies, and the solar battery system can keep powering the facility off-grid if power supply is cut off. This is an important contribution to a community hard hit by the devastating 2009 Victorian Black Saturday bushfires. The solar and battery system is also used to power a public EV charging station.

In addition, the Regional and Remote Communities Reliability Fund is supporting feasibility studies looking at microgrid technologies to replace, upgrade or supplement existing electricity supply arrangements in off-grid and fringe-of-grid regional and remote communities. The Australian Renewable Energy Agency (ARENA) is delivering the $125 million Regional Microgrids Program to develop and deploy microgrids across regional Australia, with $75 million allocated to First Nations communities. Programs are also being delivered at a state level, for example the Victorian Government has delivered the Energy Resilience Solutions program to provide 26 community hubs with energy back-up systems to provide support during prolonged power outages caused by severe weather.

The **Australian Government should apply the learnings from these programs and provide national leadership** to ensure all regional and remote communities across Australia have secure access to renewable power.

State governments can also explore opportunities to coordinate deployment of V2L and V2G capabilities in their state's EV fleet to support their communities to have access to essential electric appliances, like medical equipment, when power supply is disrupted.

RECOMMENDATIONS

3. Continue the rollout of big batteries to store power and increase grid stability

THIS WILL

- Back up the solar and wind generation in our grid, so that power is always available when it's needed.
- Provide a highly flexible source of storage that can dispatch energy when needed in a fraction of a second.
- Keep the grid running smoothly by balancing fluctuations in energy supply and need, replacing services historically provided by coal and gas.
- Provide a grid-scale storage solution that is simple and quick to install, cheap to operate and can be easily expanded if needed.
- Unlock more capacity on existing transmission infrastructure when placed in strategic locations investment in grid-scale storage.

Big batteries provide so many benefits for our grid: as well as storing large amounts of energy and helping to shift it to meet peak demand periods, they are more flexible than gas as a back-up source of power, and can be called on to keep our grid stable. For example, big batteries can be called on by the grid operator to rapidly inject or remove electricity from the grid and balance supply and demand (known as 'frequency control ancillary services'). Batteries have already taken over from coal as the primary source of frequency services (Baringa 2024).

Across Australia, more than 30 big batteries are boosting stability and resilience in our grid, and many more are on the way: there is more than 20 GW of big battery storage in the pipeline to connect to our grid (AEMO 2025b)**!**

The Australian Government's Capacity Investment Scheme (CIS) will support $15 billion of investment in 9 GW of battery storage and pumped hydro, as part of its target to support 32 GW of new renewable generation and storage capacity nationally by 2030. The Clean Energy Finance Corporation, Australia's public green bank, also invests in large-scale storage and has supported some of Australia's biggest batteries, including the Waratah Super Battery in New South Wales and the Victorian Big Battery in Geelong. There are also a large number of big battery projects going ahead without government support.

Utility-scale storage needs to 2030, including big batteries and pumped hydro, are expected to be fully met by existing government commitments. This includes the storage to be underwritten by the CIS (Climate Council 2024d).

4. Make the most of our growing fleet of EVs by unlocking vehicle-to-grid charging

THIS WILL

- Help more Aussies unlock the potential of the solar on their roofs.
- Allow EV owners to use their cars as "batteries on wheels", avoiding the need to purchase home batteries as well.
- Enable EV owners to make money by sending power back to the grid, boosting the savings from cutting out petrol or diesel use in their cars.
- Create a huge source of flexible storage, reducing the need for investment in grid-scale batteries.

Vehicle-to-grid (V2G) has huge storage potential for our energy system: EVs contain powerful batteries, able to store between five and ten times more power than a typical home battery. With more and more Australians purchasing EVs and installing rooftop solar, V2G will reduce the need for additional investment in home batteries. Modelling shows that with the right policy settings, hundreds of thousands of Australian households could reduce their power bills and cut climate pollution with V2G by 2030, and millions by 2040 (ARENA, RACE and enX 2025).

Almost half of Australian drivers (47 per cent) like the idea of using their car as a home battery, and would sell stored energy back to the grid to generate income. Importantly, 85 per cent of drivers park their cars at home at least three days a week during the day, when solar is being generated, and the evening, when the need for power in the grid is highest. This means the benefits of V2G are available to the majority of drivers (NRMA 2025).

However, V2G is still an emerging opportunity and there remain significant barriers to its adoption, including a lack of information for consumers, limited number of vehicles that allow V2G, lack of bidirectional chargers in the Australian market, high installation costs and complex, burdensome regulatory processes (NRMA 2025). Work to unlock the opportunities of V2G is underway across Australia, including:

- A national standard for V2G was adopted in late 2024, marking the completion of a key commitment under the National Consumer Energy Resources (CER) Roadmap.
- The National CER Roadmap also includes a commitment for all jurisdictions to review their own technical or regulatory frameworks and remove barriers for adoption.
- ARENA has developed a National Roadmap for Bidirectional Charging, including further policy recommendations for governments and regulators.

In New South Wales, Essential Energy – which covers 95 per cent of the state – has completed a study with CSIRO which found that V2G technology is tried, tested and ready for market. In South Australia, SA Power Networks has announced that it will treat V2G charging in the same way it does a typical home battery, and has launched a new website explaining what keen electric vehicle buyers need to do to hook their car into the grid.

These are important steps in enabling the adoption of the technology – but more coordinated, national action is needed.

MAKING IT HAPPEN: SUPPORT AUSSIES TO INSTALL V2G CHARGING TECHNOLOGY

Delivery

Australian Government

V2G presents an enormous opportunity for Aussie households and our grid. We already have solar on more than 4 million rooftops, creating abundant cheap, clean power. With the New Vehicle Efficiency Standard now in effect, the uptake of EVs is set to increase, and V2G will allow EV owners to maximise the benefits of their cars and rooftop solar, by using them as batteries on wheels – slashing their power bills and climate pollution from our transport and power systems, all at the same time.

ARENA has recently published a National Roadmap for Bidirectional EV Charging, informed by consultation with key stakeholders. The Roadmap identifies the critical path to achieving commercial adoption of bidirectional EV charging in Australia.

As recommended in the Roadmap, the **Australian Government should send a clear signal to the international market that Australia is committed to V2G by developing a national strategy**. This could be done alongside the review of the National Electric Vehicle Strategy due to be completed in 2026, to ensure the two strategies are aligned.

Together with the adoption of national V2G standards in 2024, a national V2G strategy will help overcome one of the key barriers to adoption – the limited number of V2G chargers available in the Australian market. To further accelerate the roll-out in the short-term, the strategy should include key actions such as:

- Offering rebates for households to install and use chargers with V2G capabilities, to fast-track adoption, demonstrate to others that it is possible, and act as a strong signal to the market. This could be delivered through the existing Small-scale Renewable Energy Scheme, which will soon be expanded to include home batteries. In the United Kingdom (UK), the world's largest-ever V2G trial and found financial incentives led as the biggest driver of participation (Mooney 2025).
- Developing information and resources to increase awareness and understanding of V2G among industry and consumers. This could include information for car dealerships, as well as online and social media content for consumers.
- Investing in research and development to address barriers to uptake in commercial fleets, public charging, car sharing and heavy vehicles.

There remain barriers for people renting and in apartments to access standard, unidirectional EV charging. Governments should also consider opportunities for V2G capabilities as part of work underway to address these barriers.

5. Ensure batteries are safe and sustainable throughout their lifespan

Batteries help build a safer future by enabling us to slash climate pollution from our power system. While they are far less environmentally damaging than fossil fuel alternatives, and are safe when used appropriately, it is important that they are appropriately regulated to reduce these risks as much as possible. On top of protecting our communities and environment, this will give Aussies the confidence to invest in batteries to help accelerate the rollout.

Managing fire risk

In recent years as Australians have been embracing EVs, e-bikes, e-scooters and even battery-powered appliances like vacuum cleaners, there have been increasing reports in the media around battery fires. While these fires can be dangerous when they do occur, they are not as common as media reports can make it seem. For example, data from around the world shows that EV fires are actually around 20 times less likely than fires in petrol and diesel cars (Electric Vehicle Council 2024). In Australia, there have only been eight reported EV battery fires since 2021 – one caused by arson, three caused by collisions, another three caused by an external fire spreading to the vehicle, and one with an unknown cause (EV FireSafe 2024).

However, some battery products, in particular items like e-bikes and e-scooters, are currently less tightly regulated than car and home batteries. This means there are cheap, poorer quality products in the market that come with higher risks. To help minimise the risks, there is a role for governments to ensure products containing lithium-ion batteries are appropriately managed and that consumers have the information they need to have the confidence to invest in batteries and use them safely.

Increasing environmental sustainability

Critical minerals, including lithium, are essential to our transition to net zero. However, just like all mining – the extraction of these resources comes with environmental impacts. There is a large body of evidence showing that the benefits of clean energy technologies far outweigh any environmental impacts and climate pollution along supply chains. For example, total lifecycle greenhouse gas emissions of EVs are around half those of internal combustion engine cars on average, with the potential for a further 25 per cent reduction when powered by renewable energy (International Energy Agency 2021). Research also shows that a renewable power system will require significantly less mining than the current fossil system (Nijnens et al 2023). Currently, about 1500 million tonnes of fossil fuels are mined and extracted each year. The International Energy Agency (2021) projects that by 2040, we could be extracting around 28 million tonnes of critical minerals for renewable energy – more than 500 times less mining than under the current fossil fuel system!

Unlike fossil fuels, which cannot be re-used after they are combusted to make electricity, and must be extracted on an ongoing basis, minerals and metals in batteries can be reused and recycled continuously. By 2035, Australia could be generating 137,000 tonnes of lithium battery waste every year (McKell Institute 2022). A domestic recycling industry for these materials could be worth up to $3.1 billion, and will play an important part in growing Australia's local battery industry (Future Battery Industries CRC 2021b).

Currently, around 95 per cent of the materials in lithium-ion batteries can be recycled. However, we only recycle 10 per cent (CSIRO 2024c). This means the majority of battery waste is either stockpiled or goes to landfill – creating significant environmental and health risks, including fire risk. We can reduce the environmental impacts of the shift to renewable power by recycling batteries as much as we can. We currently recycle 98 per cent of our lead acid batteries, demonstrating what is possible with the right systems in place (CSIRO 2024c). There is already work underway: last year, CSIRO opened an Australian-first pilot facility for a domestic solution to the safe treatment, recycling and disposal of used lithium-ion batteries. In New South Wales, the EPA has partnered with local councils to establish a trial to accept products with embedded batteries at select Community Recycling Centre locations.

MAKING IT HAPPEN: STRENGTHEN AND HARMONISE BATTERY SAFETY AND RECYCLING STANDARDS

Delivery

 Australian Government  State governments

The most effective way to reduce both the environmental impacts and the safety risks of batteries is by ensuring manufacturers of batteries take responsibility for their products throughout their lifecycle, known as product stewardship. Similar work is already underway for other renewable technologies, for example the Australian Government has committed to develop a mandatory product stewardship scheme to reduce waste from solar photovoltaic systems and other small electrical products.

State and territory electrical safety regulators are responsible for regulating electrical consumer products. As part of the National Battery Strategy, the Australian Government has committed to work with states and territories to standardise regulation across the country. Environment Ministers are working on a proposal, led by NSW and Victoria, to ensure batteries are safely managed throughout their lifecycle. The NSW Government intends to introduce legislation into parliament this year requiring battery suppliers to participate in mandatory safe disposal and product stewardship of their products, to address the risk of battery fires (NSW EPA 2024).

The Australian, state and territory governments should complete this work as soon as possible to support the rapid rollout of household batteries, EVs and other low pollution technologies like e-bikes. To complement the regulatory reforms, clear and consistent resources should be developed to give Australians the confidence to invest in products containing lithium-ion batteries and ensure they are used safely and responsibly.

State and territory governments should support this work by banning the disposal of lithium-ion batteries (and other renewable energy equipment) in landfill. Governments must also ensure that there are appropriate infrastructure and services in place for the collection and recycling of building on the learnings from trials already underway in some parts of Australia.

Conclusion

We have already done so much work to build a 40 per cent renewable grid, and over the next five years, the Australian Government plans to double this. But renewable generation alone is not enough – we need to support our wind and solar with storage so that we can access cheap, clean power around the clock. With all our coal-fired power stations already set to close by 2038, we can ramp up batteries, together with pumped hydro to help us phase out fossil fuels even sooner.

One-third of Aussie homes already have rooftop solar – more than anywhere else in the world. However, only 8 per cent of these homes currently have a battery. We have so much potential to add batteries to back up existing solar systems, and make sure more newly installed systems have batteries as well. Households with solar and batteries can nearly wipe out their power bills completely, and help put downward pressure on everyone's bills by reducing peak demand and the need for investment in new transmission infrastructure and grid-scale storage.

Community-scale batteries can help share the benefits of cheap, clean solar power with everyone in the community and increase energy resilience. Creating a home grown battery industry, as part of the Future Made in Australia agenda, will also help create new skills, jobs and economic opportunities for Australians.

Image: We have so much potential to add batteries to back up our world leading rates of rooftop solar.

Unlocking the potential of the batteries in our EVs to store power and send it back to the grid presents a win-win-win: when combined with rooftop solar, it will reduce the demand on our grid, slash energy bills for its adopters, reduce the need for additional investment in home batteries, all while cutting climate pollution from both our transport and power systems.

The Climate Council's six practical policy recommendations can build on the momentum underway to supercharge storage across Australia. By 2030, we can provide clean and reliable electricity both day and night by installing two million household batteries and 5000 community-scale batteries. We can help Aussies access V2G charging, and we can increase the resilience of communities with solar and storage. We can do all this while making sure we are using batteries responsibly throughout their lifecycles and reducing their environmental impacts and safety risks giving more people the confidence to invest in these technologies.

Delivering more coordinated storage at all scales to fill different needs in our grid will enable us to meet our growing energy needs. With more wind, solar, battery storage and pumped hydro, we can deliver a 94 per cent renewable grid this decade and build a safer future for our kids.

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