

# Australia needs renewables, transmission and lots of storage to quit fossil fuels

**Decarbonisation** | Australia runs a great risk of failing to meet its ambitious but achievable renewable energy goals, writes Stephanie Bashir, CEO of Nexa Advisory, who explains why utility-scale energy storage is among the crucial tools in the country's energy transition toolkit

**T**he clean energy transition is critical to meeting Australia's climate targets, securing our energy future and 'keeping the lights on', as well as controlling cost of living pressures experienced by Australian households and businesses.

Australia has set goals to be net zero by 2050 (requiring a 43% reduction in carbon emissions), and 82% renewable electricity generation by 2030. However, right now, Australia is behind in this task to deliver a low-emission power system.

The scale of renewable power generation (of all types and size) that will need to be built is unprecedented. The Australian Energy Market Operator (AEMO)'s Integrated System Plan (ISP) 2022 "Step Change" scenario implies that we will require an additional 138.5TWh of wind and solar generation by 2035, and 197TWh by 2042, to replace retiring coal power stations.

The transmission that will be required to fully connect the new large-scale decentralised generation, rather than centralised fossil fuel power stations, is the equivalent of 25% of today's entire grid. It will now need to be

built in less than seven years.

Although key transmission projects have been identified, across the country we are a long way behind on their development. No new interconnectors have been built in Australia for over 20 years and the five regulated Primary Transmission Network Service Providers (PTNSPs) have yet to demonstrate they have sufficient capabilities or scale to mobilise the resources necessary for Australia's transmission build out.

Lack of engagement with communities in the early-stage processes of major projects has evoked severe resistance, which has become a bottleneck to new renewable generation capacity.

The issues facing our energy transition are exacerbated by the global race to decarbonisation. New programmes in the United States of America, European Union and Asia are accelerating the clean energy transition by providing clear financial incentives (e.g. the Inflation Reduction Act, USA; the Green Deal Industrial Plan, EU). Australia will need to move quickly to ensure it can attract funding, materials and skilled people.



Credit: Queensland government

**Rendering of Stanwell Clean Energy Hub, a mixed technology development underway at the site of a retired fossil fuel plant**

## Political context

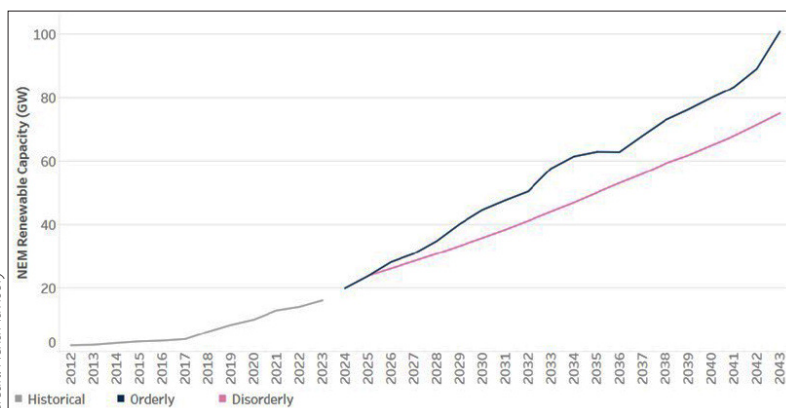
The 2022 "climate election" saw a change in Federal Government and the election of several climate-focused independent candidates. The notable increase in pace and ambition of the political leaders in this sphere over the past 18 months means that Australians are beginning to understand that the shift to a clean energy economy is in our national interest.

Since taking office in May 2022, the Australian government has established new and improved 2030 emissions reduction targets (43%, up from 26-28%), renewable energy targets (82%) and stronger industrial decarbonisation policies.

## 32GW Capacity Investment Scheme

In November 2023, Minister for Climate Change and Energy, Chris Bowen MP, announced a historic new plan to drive investment in renewable energy generation and storage.

A significantly expanded Capacity Investment Scheme (CIS) will now act as the central enabler of Australia's 2030 renewable energy target. Its key feature is that the federal government commits to underwrite up to 32GW of renewables and storage this decade to drive record levels



**Figure 1: Required renewable generation (dark blue) in the NEM as recommended in the 2022 ISP Step Change scenario versus projected future delivery of renewable generation (pink) based on past delivery rates (grey) showing the significant and escalating shortfall in delivering renewable generation required**

of private investment in solar, wind and batteries. For context, Australia's National Electricity Market (NEM) currently has an installed capacity of 64GW, of which approximately 24GW is renewables.

It is expected that the CIS will go a long way towards Australia meeting our 2030 climate targets but, just as importantly, the scheme keeps energy prices down because renewables are Australia's cheapest source of energy and it will help ensure replacement generation is available as the national fleet of unreliable coal-fired power stations shuts down.

At the energy consumer level, Australians remain prolific adopters of rooftop solar, and, reflecting the more ambitious approach taken by political leaders, we are increasingly aware that harnessing the nation's unique access to mineral resources and renewables-friendly weather conditions can benefit our families, towns and the nation as a whole.

However, despite these encouraging indicators of progress, we have a long way to go to meet climate targets and make the most of our natural advantages. AEMO forecasts the energy system will need a total of 44GW of variable renewable energy (+28GW), 15GW of storage (+13GW) and 10,000km of new transmission lines before 2030 just to keep the lights on. This is largely to replace coal-fired power stations as they are retired over the next seven to ten years.

Meeting this challenge will be critical to maintaining the confidence in and the buy-in for the transition, both at a political level and, more importantly, for businesses and families.

## Challenges

Where Australia's energy market is concerned, understanding what needs to be done and getting on with the job of doing it are two very different propositions. While the 2022 Integrated System Plan provides Australia's energy system with a decarbonisation roadmap, it is becoming extremely unlikely that we will meet our 2030 and 2050 targets. There are two main reasons for this devastating conclusion.

First, we simply don't generate enough power from renewables to meet our energy needs. Second, even if we could generate enough renewable energy, we do not have the transmission infrastructure required to convey it to consumers. Major transmission projects take around seven years to go from start ("Phase One") to finish (connection).

Coal remains our primary source of

energy and keeping these power stations open not only produces harmful emissions, it also increases energy costs to Australian consumers.

We can't afford to keep debating the same issues. We need to get really good at building renewable energy and transmission infrastructure, fast.

We need to rethink how our transmission market operates and how we gain the social acceptance that is required get wind and solar projects approved and connected. We will also need better investment, competition and collaboration.

Key transmission projects have been identified but they are a long way behind on development. The hold up is caused by a complex mix of regulation, social license and consumer trust challenges.

Transmission line infrastructure in Australia typically operates as a regulated monopoly market, with the five PTNSPs lacking the capability, capital or scale to mobilise the resources required for the transmission build-out.

Making matters worse, a lack of engagement with communities by the PTNSPs and governments in the early-stage process of development has prompted well-organised resistance to new transmission that is a practical and political dead weight to progress. While support for renewable energy projects has improved in Australia, support for overground transmission lines lags well behind, and is eroding further.

Transmission is now the missing link in Australia's energy transition. Winning the support of farmers and regional communities looms as one of the most consequential challenges for the energy sector and political leaders committed to transforming Australia into a "renewable energy superpower".

## What needs to happen

The transmission infrastructure we need to build in regional areas, where the wind and solar farms are, are major constructions, and they can be an eyesore and impact land use. Getting community buy-in is absolutely essential.

One of the things we can do differently is to engage with local communities in a more genuine and meaningful way, listening to and taking account of the unique issues and challenges of each region. Communicating the unique role the regions have in hosting the clean energy transition, and ensuring communities obtain tangible and relevant benefits, can go a long way towards unlocking support.

## Prioritising environmental impact and planning processes

Environmental impact assessments and planning reports are vital to the preservation of our native flora and fauna. But each of these reports takes at least three years to complete and this is time we do not have.

We are not advocating for cutting corners on protecting our nation's biodiversity. We do need to, and can, streamline environmental impact reports without shirking our duty of care, whether by cutting red tape and bureaucracy, or automating these very time- and resource-intensive processes where possible.

It certainly needs to be made clear as soon as possible where new generation and transmission infrastructure can and can't go. Land use mapping and engagement with key communities to set those boundaries is key.

## Transmission supply chains are constricting the bottleneck

Expanding and strengthening our transmission infrastructure is Australia's biggest bottleneck in the energy transition.

Thanks to global 2030 and 2050 emissions targets and high fossil-fuel prices, the worldwide renewable energy sector is set to boom over the next three decades. Such rapid and massive growth will significantly increase demand for labour, expertise, materials and specialised electrical equipment.

We are in a global race for supply chains and procurement—and as a result, delivering transmission cost-effectively, efficiently and on time will be difficult.

This means attracting investors, and stimulating competition through open tenders which will provide access to global procurement and supply chains to help us speed things up.

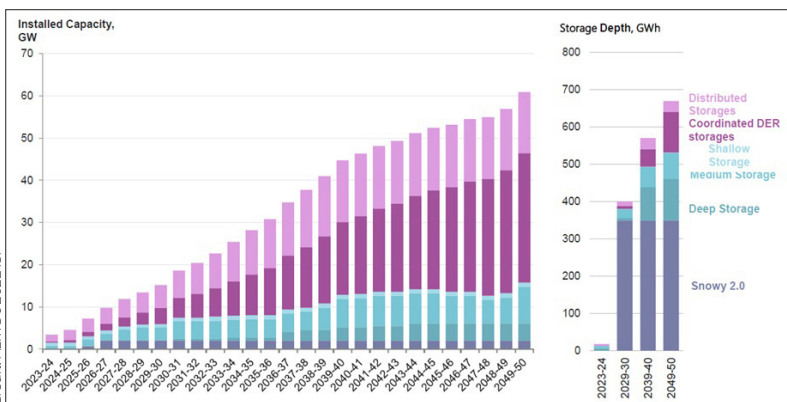
## Distributed energy resources (DER) can be a key contributor

To meet our 2030 renewable generation target, the 2022 ISP suggested that we need a total capacity of 79GW, 35GW of rooftop solar PV and 44GW of large-scale wind and solar generation.

So far, we have 21GW of rooftop solar PV already installed, and 25GW of large-scale renewable generation built. So, to meet our 2030 target we need a further 33GW of renewable generation: 14GW of rooftop solar PV and 19GW of large-scale renewables.

Breaking this down further, we need to add approximately 6GW of new renewable generation each year. Excitingly, the combination of rooftop and large-scale renewable and storage development is

Credit: AEMO's 2022 ISP



almost meeting that annual requirement.

In 2022, Australia added 2.8GW of new large-scale renewable generation and storage, and 2.7GW of residential-scale rooftop solar PV (3.3GW in 2021). However, the balance between large- and small-scale solar PV is different to that envisaged in AEMO's 2022 ISP.

As noted above, accelerating the build and connection rate of large-scale wind and solar generation is proving difficult.

The current rate of annual rooftop solar PV installations (2.5GW per year) means that, in the next seven years, DER could "take up the slack" and contribute a minimum of 18GW of additional renewable generation capacity, which is over 55% of the 33GW required to hit the Federal Government's 82% renewable energy target.

### Energy storage: Opportunities at every scale

Storage capacity at all scales will be required to ensure a reliable energy system. This includes the storage available on the distribution network as well as in homes, such as community batteries and virtual power plants (VPPs), and demand-side management.

The 2022 Integrated System Plan sets out the scale of the storage challenge: today, Australia has a little less than 2GW of storage connected to the energy system. By 2030, we need a total of 15GW of storage, and by 2050 we need 61GW. Even with a supercharged Capacity Investment Scheme (which aims to secure 9GW of dispatchable capacity this decade) and the rapid rate that batteries can be deployed, that's a big ask.

Small-scale storage in households can play a critical role in stabilising the enormous amount of energy being created on Australian rooftops.

Increasingly, rooftop solar and batteries are being paired together in new installations (nearly 50% of new rooftop solar

PV installs are accompanied by a battery, according to the Australian Energy Council). This is encouraging. However, while this uplift has made storage more affordable, residential batteries remain out of reach for most households due to cost — likely to remain the case for the foreseeable future without government intervention.

### Utility-scale storage is critical to a successful transition

Utility-scale storage will be needed to "firm" Australia's clean energy grid to stabilise a bigger and more complex energy network and ensure the lights stay on.

South Australia is the home of the world's first "big battery," the Hornsdale Big Battery. Since that was connected, large-scale batteries in Australia have been deployed faster than was expected.

Batteries provide a number of benefits to the system and overall transition, which are sometimes underestimated or not understood.

Utility-scale storage:

- Provides "frequency" support which helps to stabilise the grid in real time
- Supports the power system's integrity and the network in case of exceptional events.
- Allows "arbitrage" when intraday prices are volatile — with the increase in variable renewable generation in the system and the exit of coal, this will be a significant commercial incentive in Australia.
- Provides inertia services as coal power plants phase out, to solve a network issue in the system.
- Smooths the intermittency of renewables—firming is critical to a 100% renewable energy system.

### What is needed

Australia's economy remains dominated by fossil fuels, and our national emissions

### AEMO Integrated System Plan - Expected Energy Transition to 2050 (Storage)

continue to rise. Clearly, there is plenty of work to be done to add more speed and ambition to Australia's energy transition.

Nexa Advisory and our partners across industry and the community are focused on driving this ambition. We have identified the solutions to roadblocks holding Australia back from accelerating its energy transition and meeting our generation and emissions reduction targets:

To roll out transmission infrastructure at speed, we need to open up regulated monopoly markets to competition and investment (as the Victorian government has done) and we need to design the planning approvals process in line with energy generation capacity requirements identified by energy market operators.

The pilot phase of the Capacity Investment Scheme, announced by state and federal governments in December 2022, has seen Australia build more utility-scale storage ("big batteries") than ever before. But to meet the "gap" in dispatchable energy caused by forecast coal-fired power station closures, governments will need to ensure the next stage of the CIS delivers on its promise of 32GW of new variable renewable energy and storage by 2030. That could drive the need to legislate the scheme to ensure political endurance and investor certainty.

To drive decarbonisation at the household level, governments should look to expand the Small-scale Renewable Energy Scheme to include household batteries and legislate a national mechanism to provide investment. It also means prioritising tariff reform to ensure people are incentivised to build trust and allow for innovation in service delivery.

Australia already has smart solutions to meet new and improved energy targets. The science and economic cases have been made and political will is beginning to align with 2030 climate targets. What's left is finding the money, the ambition and the leadership to realise our potential and become a world-leading renewables-powered clean economy.

### Author

Stephanie Bashir has over two decades of experience in the Australian energy sector with extensive experience in commercial, regulation, energy policy, government and stakeholder engagement. She is the founder and CEO of Nexa Advisory advising a broad range public and private clients including renewable energy developers, investors and climate impact philanthropists to help accelerate efforts towards a clean energy transition.

