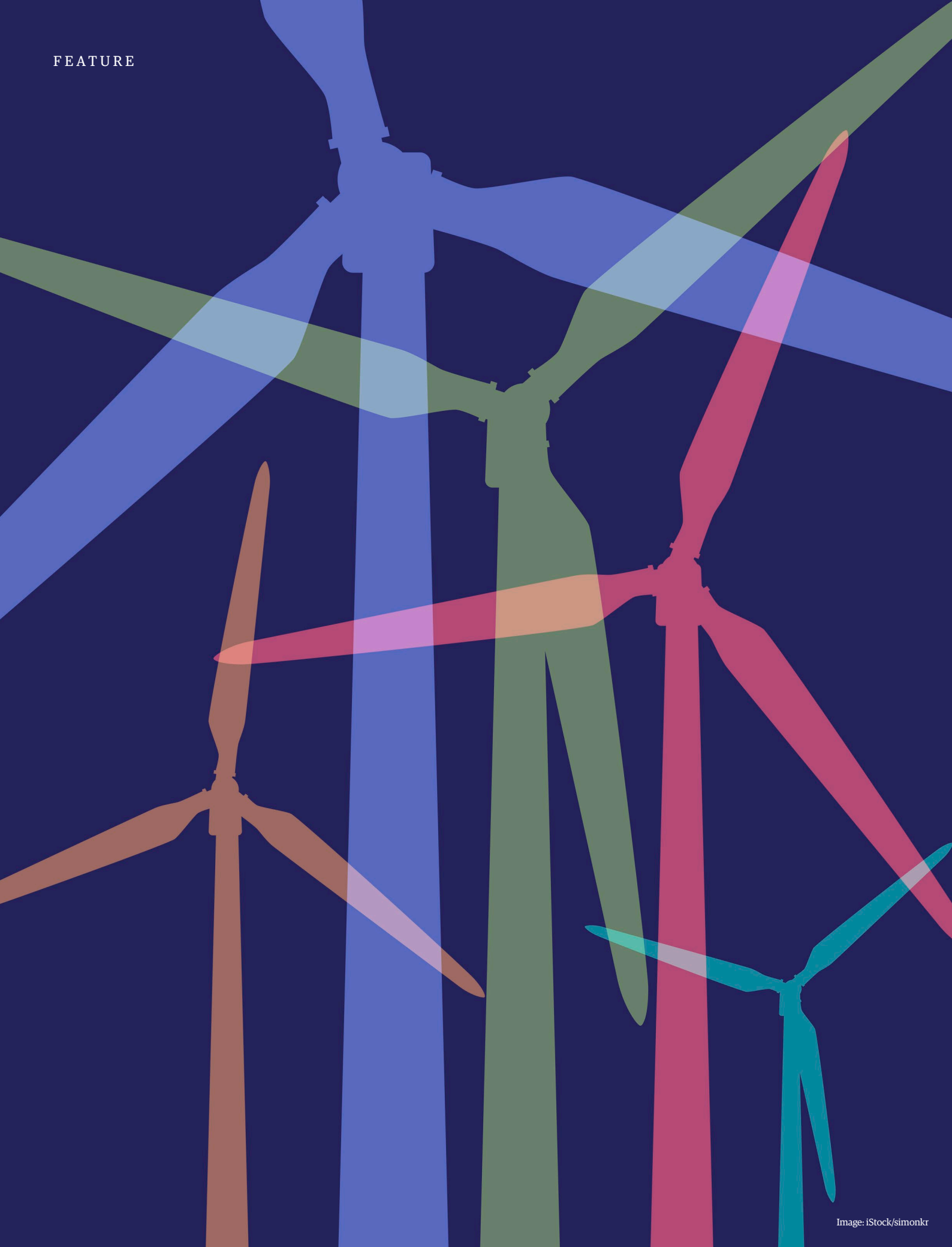


Image: iStock/simonkr

Mythbusting the cost of the energy transition

The best time for Australia to begin transitioning to less carbon-intensive forms of energy production was in the 1970s, when scientists and politicians first began raising the alarm about the impacts of emissions on the climate and human health. The second best time is now, writes Janina Waldmann.

Transitioning to renewable energy and retiring coal and gas production is an ethical imperative for Australia. To meet our Paris Agreement commitments, we must act fast to reduce emissions. Burning fossil fuels, which is what makes up the majority of Australia's energy production currently, creates enormous amounts of greenhouse gases and is not a viable source in the long term.

Plenty of myths continue to do the rounds regarding the energy transition. Those who haven't debated their merits in the pub have heard politicians spout them on the nightly news. "It'll cost jobs!", "solar takes up too much space!", "nuclear is the answer!", "they're dark, satanic mills of the modern era." The reality is, these myths are just that—myths, and it's time to shed some light on them.

Powering Australia

Australia has made significant progress towards a more environmentally friendly energy grid. However, there's still a long way to go, and coal mining is still king in many parts of the country. Expansions to three controversial coal mines were approved as recently as September of last year despite opposition from groups like the Climate Council, Lock the Gate Alliance, Australian Conservation Foundation and The Australia Institute.

Coal, gas and oil make up 65% of our energy mix, while renewable energy sources provide the remainder. Australia has until 2030 to increase the percentage of energy produced by renewable sources to 82%. This is current Federal policy.

Like many other countries, Australia has made significant climate commitments. We're party to the Paris Agreement to meet net zero emissions by 2050. As part of that agreement, we've also committed to reducing greenhouse gas emissions by 43% from 2005 levels by 2030.[1]

Australia has more than a few advantages when it comes to implementing large-scale renewable energy projects. We're a sunny place, with the majority of the country averaging more than seven hours of sunshine per day annually.[2]

> ***Australia has the potential to generate 5000 gigawatts of offshore wind energy, just over 100 times more than the peak National Electricity Market demand in 2024.***

In other parts of the world, the average fluctuates far more. In 2023, Germany received an average of less than five hours of sun per day, and that was an above-average amount.[3] Yet Germany is a leader in solar energy production worldwide. If it's possible there, it's certainly possible here. Rooftop solar alone has the capacity to produce more energy than coal, gas and hydro energy combined in the coming years.[4]

1 https://tinyurl.com/36bkh3s5

2 https://tinyurl.com/2w3ub2t6

3 https://tinyurl.com/mrxffsxp

4 https://tinyurl.com/4sk5hvmy

> *Higher temperatures, more bushfires and flooding, and biodiversity loss all come with their own price tags. Australians' physical and mental health is suffering from increased air pollution and heat, and extreme weather events like the flooding in Lismore in 2022 displace whole communities.*

We've got the wind on our side, too. Australia has the potential to generate 5000 gigawatts of offshore wind energy[5], just over 100 times more than the peak National Electricity Market demand in 2024.[6]

Myth #1 — The transition is too expensive

The 2024 Integrated Systems Plan (ISP) by the Australian Energy Market Operator (AEMO) lays out the most cost-efficient way for Australia to transition to an energy grid powered by renewables, supported by firming technologies, and backed up by gas-powered generation. The ISP is clear that gas is not a stand-in for renewable sources, but exists as an infrequently used backup option to guarantee stability of the grid.

The ISP predicts that the transition to renewable energy will have an annual capitalised cost of $122 billion to 2050. While that number might seem dauntingly big, the plan makes it clear that the transmission elements would repay their investment costs and save consumers $18.5 billion in avoided costs. The projects would also contribute emissions reductions currently valued at $3.3 billion.[7]

It's worth remembering, too, that coal is anything but cheap. Australia's coal-fired power stations are ageing, and operation and maintenance are becoming more expensive. How much a new coal-fired power station costs depends on who you ask, but there's evidence that a single plant could come with a price tag in the $3 billion range.[8]

Solar, wind and firming technologies like batteries are becoming more affordable, and falling costs are leading to higher uptake. One-third of detached homes in the National Electricity Market currently have rooftop solar, and the ISP predicts that this will rise to half of all detached homes by 2034 and again to 79% by 2050. By 2050, it's predicted that rooftop solar capacity will be 72 gigawatts.[9]

Dr Michael Nielsen is the Scientia Senior Lecturer and ARC DECRA Fellow at the School of Photovoltaic and Renewable Energy Engineering (SPREE) at the University of New South Wales. He, too, has heard the common myth that transitioning Australia's energy grid to renewables is too expensive, but he's quick to point out that this isn't the case. "The growth in solar (and other renewable energy technologies) has really been driven first and foremost by the fact that the power they produce is now cheaper than most fossil fuel sources," Dr Nielsen explains.

He refers to the latest International Renewable Energy Agency report to highlight that "the cost of solar modules (in dollars per watt of power produced, and adjusted for inflation) has reduced by more than 60% in the last decade from 2013 to 2023." It's a trend he expects to continue, "especially if module efficiencies continue to improve as commercial tandem solar technologies come online. Growth in solar installation has been exponentially growing over the last decade. While this can't continue forever (no exponential growth can!), the trend doesn't appear to be slowing down anytime soon as the industry is focused on tackling many of the issues of scaling to terawatt-scale production."

The cost of new wind turbines is falling, too. Wind energy is one of the lowest-cost sources of new energy supply, and the Australian Renewable Energy Agency (ARENA) expects that the cost will continue to come down.[10]

Australia will need firming technologies like battery storage to provide stability to the grid. Firming technologies close the gap between electricity supply and demand during peak periods, preventing blackouts and ensuring power is available to everyone who needs it.

The International Energy Agency says that the cost of lithium-ion batteries has declined by 90% since 2010. Not only are batteries getting cheaper, but their lifespans are increasing, and they're getting lighter, making them easier to transport and store.[11]

It's worth considering not only what Australia will spend but also what we'll gain as a nation. An energy grid built on renewables will insulate the market from international price shocks, meaning fewer energy price fluctuations for Aussies.[12]

Myth #2 — renewable energy is unreliable

If there's one thing Aussies want from their energy grid, it's stability. Stable energy is like pizza; it's only a problem if you don't have it. Yes, it's true that the sun doesn't always shine and the wind doesn't always blow, but it's a myth that renewable energy sources can't provide reliable power to Australians. That's where pumped hydro and batteries come in.

- Pumped hydro

Pumped hydro is an energy production and storage technology in which water is pumped

5 https://tinyurl.com/56f72unc
6 https://tinyurl.com/ye77ff2n

Is nuclear the answer?

Is nuclear the answer?
In short, no. Putting aside the ethical considerations of nuclear power and the fact that nuclear power generation is currently illegal in Australia, there's no long-term cost benefit to switching to nuclear power. The CSIRO's 2024 GenCost report estimates that not only would a nuclear power plant cost $8.5 billion and 15 years to build, but the power supplied would cost roughly twice as much as that produced by renewable sources. Even if nuclear were the way to go, Australia has no existing infrastructure, and plants won't be built in time to meaningfully contribute to the energy mix in time to hit net zero targets.[1]

1 https://tinyurl.com/y949sere

7 https://tinyurl.com/3hku83k6
8 https://tinyurl.com/mwws2mjx
9 https://tinyurl.com/4hpfv3ze

10 https://tinyurl.com/yc3w94cu
11 https://tinyurl.com/6zvk4rff
12 https://tinyurl.com/mrxxw4rc

Spotlight on South Australia

South Australia is a leader in renewable energy production, storage, and job creation. The Festival State is on track to generate 100% of its energy from renewable sources by 2030 and has switched off its last coal-fired power plant. It's home to the world's first big battery, the Hornsdale Power Reserve, which reduced South Australians' energy costs by $150 million in its first two years of operation.

Next year, construction will begin on the Whyalla hydrogen power plant facility, providing additional grid stability for South Australian residents and creating about 1000 jobs during the construction process.

to a higher reservoir during periods of excess energy availability and flows from the higher reservoir into a lower one during peak periods, producing energy in the process. This setup means pumped hydro can generate electricity on demand and fill in gaps when wind and solar power aren't available.

Australia is home to several pumped hydro projects. The Snowy Hydro 2.0 project in New South Wales' Mount Kosciuszko National Park is Australia's largest committed renewable energy project. Snowy Hydro 2.0 will provide 350,000 megawatt-hours of large-scale storage to the National Electricity Market and can provide 2200 megawatts of on-demand power generation.[13]

Queensland is home to the Kidston pumped hydro project, which was built using the existing infrastructure of the Kidston Gold Mine. It's due to start producing energy in the second half of 2025.

- Batteries

Batteries are an invaluable firming technology. Solar energy production peaks during the sunniest part of the day, but that's not typically when people use energy. Peak demand times tend to be in the evening when people are in their homes running their dishwashers, televisions, washing machines and operating lights. Batteries can store the excess energy produced during the day and make it available during peak demand periods.

The Department of Climate Change, Energy, the Environment and Water runs the Community Batteries for Household Solar Program and will install 420 batteries across Australia. These batteries will enable 100,000 homes to share energy storage from rooftop solar installations.[14] Projects like these provide energy independence and an affordable and reliable source of energy for residents.

With the right firming technologies in place, there's no reason renewable energy sources need inherently be less reliable than oil, gas and coal.

Myth #3 — the transition will cost jobs

According to the Minerals Council of Australia, the coal industry employed approximately 48,000 people in 2023. It's understandable, then, that individuals and communities want to know what will happen to the workers who find themselves out of a job when many of Australia's coal-fired power stations shut by the mid-2030s.

So where will new employment opportunities come from?

The AEMO predicts the transition to renewable energy will create 30,000 jobs over the next 20 years, with many in regional areas.[15]

Jobs and Skills Australia's Clean Energy Generation report from 2023 outlines the need for a workforce transformation to meet Australia's net-zero targets. Job creation will peak during the construction phase of the energy transition, as technicians, labourers, engineers, scientists and tradespeople are needed to build new transmission projects.[16]

Regional Australia has a high proportion of individuals employed in highly-polluting industries, and the report makes clear that these regions will benefit from the jobs created by Australia's transition to renewable energy. Funding must also flow to these regions to retrain and cross-skill existing workforces for work in the renewables sector.

Inaction is not an option

Transitioning to green energy will not be easy. The reality, however, is that as a country, we're not facing a choice of business as usual or transitioning to renewable energy sources. We're comparing the transition cost to the cost of not transitioning, and that tally is stacking up quickly.

Higher temperatures, more bushfires and flooding, and biodiversity loss all come with their own price tags. Australians' physical and mental health is suffering from increased air pollution and heat, and extreme weather events like the flooding in Lismore in 2022 displace whole communities. These costs are economic, but they're also human. Climate inaction has led and will continue to lead to the deaths of Australians from preventable causes attributable to climate change.

Australia is well-placed to be a global leader in renewable energy. Our country's size, ample sunlight and substantial offshore wind capacity are on our side.

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13 https://tinyurl.com/e55tsd34

14 https://tinyurl.com/ypzuzj5n

15 https://tinyurl.com/y4atjwxn

16 https://tinyurl.com/mrx5zvbf



Pumped-hydro storage power plant in Tasmania (Australia).
Image: i-Stock/ René Lorenz.