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Kate Burgess

Shifting sands of Australia's electricity transition

While the world digested the news that Donald Trump had won the US presidential race, Australian political leaders were quietly having their own watershed moment.

A day after the US election, fossil fuel-loving Australia ratified the Paris Climate Change Agreement, signing up to slash emissions by 26% to 28% by 2030 compared to a 2005 baseline.

It is widely recognised that Australia will fail to meet these targets if it does not fundamentally alter its emissions-intensive electricity sector, which produces 63% of the country's power from coal and is the main baseload provider of energy.

The International Energy Agency reckons that to avoid warming moving northwards of 2 degrees, all OECD countries will need to have removed carbon pollution from their electricity grids by 2035.

Australia therefore has less than 20 years to decarbonise its power system. And it may have to ratchet up the rate of change even more because its Paris targets are not tough enough for Australia to do its part in preventing a 2 degree warming scenario, according to the Climate Institute.

Evolution

Market forces are failing to precipitate this change, energy policy experts warn. Flatlining demand for electricity and the sheer efficiency of the ageing coal-fired power fleet have until now motivated investors to do nothing, argues University of New South Wales professor Iain MacGill.

"The electricity industry has an exit problem. Some of the lowest cost operating plants are still up to 50 years old. It really speaks to the nature of the energy infrastructure in what's been a fairly slow rate of technological progress.

"If all the coal leaves at once we have a very serious problem. If none of the coal leaves, then that's not the sort of transition that we need to be seeing," he adds.

French utility Engie's revelation last month that it would close its 1.6GW Hazelwood lignite-fired generator early next year, wiping 14% of capacity from the Victorian power grid, was a stark reminder that governments have little control over how the transition plays out.

"Part of the challenge is that generation entry and exit is meant to be a market-driven process so we're relying on private participants to somehow synchronise their entry and exit," MacGill says.

The transition also threatens to unhinge the security of the power grid and those who invest in it. Large generators are being removed from the grid and being replaced with smaller, more intermittent sources of power such as wind and solar. To date consumers have paid for it through the Renewable Energy Target (RET).

The rise of distributed power sources – such as rooftop solar and battery storage – is also going to load up electricity grids and will see them being planned, managed and regulated in new ways.

Already under stress, the energy system has also faced price spikes in South Australia when a key regional interconnector was offline, and blackouts due to freak storms.

Australia's task is to make its electricity system cleaner while keeping it reliable and affordable, a conundrum which MacGill dubs the "energy trilemma".



Review fever

Energy Minister Josh Frydenberg instigated a review into the security of the National Electricity Market (NEM) at a Council of Australian Governments meeting in October. Chaired by the country's chief scientist Alan Finkel, it will report back on 9 December.

The Australian Energy Market Operator, the Australian Energy Market Commission and the Australian Energy Regulator are all separately reviewing energy security in the NEM, although none are viewing it through the lens of climate policy.

Since the price on carbon was abolished in 2014 when Tony Abbott was Prime Minister, there has not been any policy to spur coal plant shutdowns. Meanwhile the RET policy – settled in mid-2015 after both major political parties backed it – encourages renewables into the system but does not guide them to where the grid can best support them.

Expiring in 2020, investors are looking beyond the RET for new policies that will make renewable projects stack up. State governments have jumped in to fill the void at a federal level, offering their own targets and promising to buy the power generated on long-term contracts.

“But [states] have done this in isolation from consideration for how the network needs to develop. [Victoria] has offered contracts for renewables but hasn't been watching from a reliability front,” says the chairman of Infrastructure Capital Group and avid renewables investor Andrew Pickering.

Plant closures and a pullback in manufacturing paint an uncertain picture of where electricity prices are headed, and are making it difficult for investors to forecast prices, Pickering adds.

“We are getting worried about the renewables sector for long-term investors who aren't sure about what will happen to contracts when they end. There is a sawtooth effect of generation closing and manufacturing closing – it is hard to forecast long-term because you don't know what the market will look like.”

Bankable policy

Climate Change Institute head of policy Olivia Kember says a bipartisan approach consistent with Australia's long-term objectives is urgently needed.

“If you want your energy transition to deliver affordability and security the best way is to develop a pathway to where we need to go and give investors a stable policy framework to deliver on that pathway.”

The UK, US and Canada have all introduced policies to remove polluting coal plants from their electricity systems. Canada has a ban on any plants older than 50 years, while the US and UK have slapped strict limits on the emissions plants are able to produce.

Grattan Institute energy policy program director Tony Wood says Australia must adopt its own unique solution to deal with the unique challenges it faces.

“I don't think there's a perfect answer we can import into Australia. We have a different combination of emissions sources, a very high dependence on coal, we don't have any nuclear, we've got relatively little hydro and a country of modest population spread over enormous distance.”

Australia's biggest coal generator AGL Energy – which has both lignite and hard coal-fired plants – supports the age rule being used in Canada. The company's head of sustainability, Tim Nelson, argues generators would not need to be paid for switching off.

By contrast, a market-based scheme – as proposed by Frank Jotzo at the Australian National University – would see plant owners bid competitively to close and a regulator chooses the lowest one. The government could stage manage the plant exits but consumers would likely foot the bill.

AGL – which is also building the Powering Australian Renewable Fund – also advocates a baseline and credit scheme, which critics claim are relatively costly to administer and don't penalise firms for polluting.

AGL's Nelson argues that carbon polluters' ability to earn points for making their emissions lower than a set target, "gives you an incentive to run a little harder on the low emissions plants and less on the more emission intensive". The policy is useful for generators already in operation, he pointed out.

He added that the RET should be extended beyond 2020 to encourage new build and be coupled with a so-called firm capacity right. Renewable projects would be paired with a gas-fired generator that would switch on when the wind and solar resource was not available.

"If you do those three things, you've got the hallmarks of a bankable policy that provides decarbonisation but also modernisation. So you're hitting the goals of reliability, affordability and environmental considerations," Nelson says.

Grattan's Wood agreed the chaos could be averted by re-establishing a carbon price. "The government should hold the line and leave the renewable energy target alone and they should hold the line in terms of any form of government invention to close plants. There is no justification for governments to regulate the shutdown of capacity," he says.

Experts also posture that the electricity system will become more volatile with renewables and exacerbated by consumers feeding electricity back into the grid, and the rise of storage and electric vehicles.

"It is unlikely that the market in the way it is set up now is going to be able to deliver [increased renewable energy]. Because you need a number of things that aren't well priced including frequency control, inertia, dispatchability, demand management," the Climate Institute's Kember says. "How far is the future going to be decentralised versus centralised or a weird hybrid of the two?"

Network effect

State-based network operators are battling to adapt their grids for the influx of renewables, which will fundamentally alter how they upgrade and augment their networks. Sensing they have the ability to game the system, the regulator is keeping a close eye.

On 30 November the AER put out new rules banning networks from shifting solar PV and battery services into their regulated businesses.

"Batteries creates another challenge for [network operators] as how they might manage a local decentralised generation network that consists of solar PV and batteries. I think they're still struggling to work out how they operate it," AMP Capital head of ESG research Ian Woods says.

He believes heightened volatility from plant closures may lead to higher network prices as companies "have to invest to make the network work more effectively".

Network operators including TransGrid and ElectraNet are weighing a new interconnector between their networks in South Australia and New South Wales. At a cost of AUD 500m, it is hoped the new link would allow more renewable generation to be connected in the region.

But building this new interconnector may only solve today's reliability issue, and may be redundant when battery storage becomes cost effective and consumers sell power back into the grid en masse, AGL's Nelson believes.

"Given the shift towards distributed energy and storage I think interconnection is a risky prospect – its large capital investment that's pretty much fixed on the ground and once in place it locks in costs to consumers for a reasonable period of time," he added.

The Finkel review should provide answers on how to strengthen the National Electricity Market and what policy and rule changes are required to prepare the system for its distributed future.