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The Counterfactual Scenario: are renewables cheaper?

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Non-Technical Summary

In Australia's National Electricity Market (NEM), investing in renewables reached a pivotal moment in ~2018. It was around this time that the cost of new wind and solar projects fell below the production cost of the NEM's 'marginal' coal and gas plants. It was also the point at which the 20% Renewable Energy Target was thought to be met. Consequently, the 105 renewable projects totalling 19,300MW which reached financial close during the period 2019-2025 (at a capital value of $40.1 billion) were dominated by 'on-market' transactions, orchestrated by renewable developers, energy utilities and demand-side corporate buyers.

In early 2022, the Russia-Ukraine war erupted causing global shocks to gas markets (including in Australia). A series of coal plant outages in the NEM during the same year led to severe supply-side dislocation, while higher rainfalls lowered solar output. Thereafter, electricity equipment supply-chains began to seize up, civil construction costs in Australia rose sharply, and the interest rate tightening cycle increased debt servicing costs of new generation plant by a factor of 3. Within three years, the entry cost of onshore wind projects had nearly doubled.

From 2021-2024, household electricity tariffs had risen by ~33% (noting in the same period, wholesale electricity prices in the EU and UK had risen 200-400%). The political economy of ~33% tariff increases is highly problematic. When this occurs during a so-called *cost of living crisis*, we should predict a level of energy policy instability in search of better outcomes.

In response, Australia's two major political parties at both national and sub-national levels entered election cycles over the past five years with well-intentioned policies designed to reduce household electricity bills. The Commonwealth and the State Governments in the NEM's largest three regions (i.e. New South Wales, Victoria and Queensland) – from both sides of politics – introduced renewable policies or targets on the basis that household bills would fall. To summarise an extensive body of energy policy, *"renewables were cheaper"*. But the lived experience of Australian households and businesses has been different. Electricity bills have been rising, not falling.

Are renewables cheaper? In the following article, we unpack this question and examine a *counterfactual scenario*. What would happen if we *cancelled renewables* and had reverted to coal or natural gas? We start our modelling sequence from the mid-2000s when base load power prices were ~$40/MWh. We proceed by pulling these benchmark model results forward to 2025 and compare this to a 50% renewable scenario, and counterfactual scenarios comprising coal and gas.

Our headline results are as follows. On a unit cost basis, coal and gas-fired generation were *unambiguously the lowest cost technologies in the mid-2000s* (setting aside the value of CO_2 emissions). By 2025, the price of both coal and natural gas had increased at multiples above general rates of inflation. Our 2025 counterfactual scenarios, which deploy new coal-fired and gas-fired generation with no renewables, *prove to be surprisingly expensive*.

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When we model the Queensland region given existing trajectories of generation technologies (i.e. aging coal plant, wind, utility-scale and rooftop solar) with the power system operating in a secure state via adequate new entrant dispatchable firming capacity (i.e. batteries, pumped hydro and gas turbines), we find costs and prices are ~30-50% lower than our counterfactual coal and gas scenarios. These results can be generalised to other NEM regions.

It is worth noting that when the various governments (NSW, Victoria, Queensland, Commonwealth) from both sides of the political divide made policy announcements suggesting renewables would be cheaper, *at that time (*2019-2023), they had reasonable quantitative grounds for saying so. The world has changed significantly since then. Nevertheless, the current trajectory is proving cheaper than the counterfactual. This should come as no surprise. If there was a lower cost way, markets and investors would find it.

Many of our incumbent coal plants are low cost (given the absence of a price on CO_2 externalities). However they are aging and as they exit, the unit cost and price of electricity will gradually rise. There are exceptions to the rule. Certain coal power stations in the NEM are, or soon will be, exposed to export coal prices for some, or all, of their fuel supplies. These *are not* low cost plant. They form key targets for wind, solar and storage entry – and in turn, marginal coal plant exit.

From a climate science perspective, coal plant should be closed as soon as possible and be replaced by renewables. From a political economy perspective, reliability of supply must always be assured, and prices must follow a stable trajectory. Furthermore, community, biodiversity and cultural/heritage constraints must be navigated. On the other hand, low cost incumbent coal plants face speed limits. As they age, they will be subject to rising levels of unplanned outage rates due to equipment fatigue. The correlation between coal plant outage rates and age is > 0.90 following 40 years of baseload duties. Furthermore, the average age of the NEM's retired coal plant on exit was 44 years. The NEMs remaining fleet has an average age of 38 years. Evidently, planning for coal plant exit is important.

With power system planning there is no silver bullet, only policy choices and consequential generation portfolio weightings. Existing markets do not always make investment commitments that trend towards system optimal results, and therefore government policy is important. Our results find the recent investment commitments comprising wind, solar, gas turbines, and storage assets present as lowest cost. If there was a lower cost alternative, forward prices would be pointing southwards towards such an outcome, and as noted above, energy companies would be investing in these alternate supply options. But this is not the case. It seems our wholesale markets have, for now, settled at an equilibrium of ~$90/MWh. This aligns reasonably well with our partial equilibrium power system model results.

Governments can always alter economic gravity in energy markets by underwriting specific plant, old coal or new renewables, using taxpayer funds. It is not for us to question the mandates of elected governments. Our advice to policymakers is to work with capital markets and supply chains which are under pressure from equity and debt capital markets to decarbonise. Conversely, capital markets and supply chains need to acknowledge the political economy of stable electricity prices and the reliability of supply – the market is not ready for a procession of incumbent coal plant exits. Price stability and reliability of supply are essential objectives of government, and the political economy of electricity prices means the energy transition cannot come at any cost. For Energy Ministers, the transition thus entails quite a balancing act.