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Non-Firm vs. Priority Access: on the Long Run Average and Marginal Cost of Renewables in Australia

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Renewable Energy Zone (REZ) initiatives in Australia's National Electricity Market (NEM) are intended to create requisite new network hosting capacity for Variable Renewable Energy (VRE). VRE connections in Australia's market operate under a non-firm, open access regime. Various proposals by policy advisors to alter the NEM's access design from non-firm to 'priority' have been persistent and appear to be motivated by entry frictions including emerging system strength shortfalls, changes in Marginal Loss Factors and network congestion. Focusing on network congestion is warranted, but switching to 'priority access' brings with it unintended consequences.

As Newbery explains, renewable peak to average production ratios are determined by maximum to annual capacity factors – wind farm maximum output is ~3x average production, and maximum solar output (in Australia) is ~4x average production. Holding all else constant, adding renewables will result in increasing levels of network congestion, more episodes of renewable output exceeding aggregate final demand, or both – culminating in rising renewable curtailment. The key point is, and our modelling work illustrates, that marginal curtailment rates are multiples (3-4 times) average curtailment rates, so curtailment rates are set to accelerate.

With this relative pattern of curtailment, what REZ market outcome might prevail in the NEM given the existing non-firm, open access regime? And how might this change if it were altered to a 'priority access' regime? The existing non-firm access regime implies equal dispatch rights for all connected generators in a REZ with production-weighted pro-rata sharing of curtailment.

Priority access on the other hand implies some form of ranking, and synthetic priority dispatch right to connecting VRE generators (i.e. presumably in the order of entry: last-in, first-out of the dispatch process) in the REZ. These two regimes produce strikingly different outcomes given Australia's National Electricity Market Design.

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- A decision to pursue priority access has the intended effect of guiding the REZ market along a marginal curtailment curve and therefore a long run marginal cost trajectory, which is a steeply rising curve restricting capacity.

- A decision to maintain a non-firm open access regime (perhaps with an aggregate MW limit) guides the market along the average curtailment curve, and therefore a long run average cost trajectory, which is a gentler rising curve that reaches equilibrium at higher capacity levels.

In economics, marginal costs and prices can be more efficient than average cost pricing, but this assumes efficiency elsewhere. If it were possible to build timely transmission hosting capacity and communities were not ambivalent to renewable developments, marginal pricing may well be more efficient. But this is not the environment that policymakers are facing. Even in a vast geographic state like Queensland, such conditions do not hold. There are limits to development in every community. And, marginal costs and prices are not exclusively more efficient than average costs and revenues in equilibrium, particularly when short run marginal costs are close to zero. There are many applied examples where the underlying assumptions which drive the efficiency of the classic microeconomics result break down, and policymakers and regulators step in to guide markets and firms to average cost and price outcomes to maximise welfare over the otherwise strict profit maximising result (the regulation of monopoly transmission network utilities being a case in point).

Our modelling finds that in a priority access regime, prices would be 25% higher for the equivalent MW installed. While it provides greater certainty to investors, consumers bear a higher price. We find the welfare maximising result is a non-firm, open access regime (perhaps with some cumulative MW limit) and has the advantage of extracting some rent from early entrants and so reducing costs to consumers.

For producers, the risk of curtailment is as it has always been – a forecastable risk. And the extent of this risk in any given location will be regulated by equity investors and risk averse project banks after accounting for expected (zonal) spot and forward prices, forecasts of Marginal Loss Factors, and likely network congestion of the current location and in the context of the broader market.

For new entrants, curtailment rates should rise in line with average curves. PPAs are time-limited and on maturity, resets will no doubt incorporate prevailing expectations of curtailment-adjusted new entrant costs. And as Gohdes et al., recently observed, equity Internal Rates of Return associated with renewable projects in the NEM present as efficient, stable and with investors increasingly taking on some element of merchant exposure – a risk-adjusting mechanism to accommodate the array of uncertainties facing all generation projects.