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Renewable investments in hybridised energy markets: optimising the CfD-merchant revenue mix

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As with many of the world's major energy markets, the Australia's National Energy Market (NEM) is presently transitioning towards full market saturation of renewable technologies, cf. "traditional" fossil fuel generation. In the case of Australia, these technologies have primarily taken the form of variable renewable energy (VRE) viz. wind and solar. Novel challenges in procuring VRE investment result from exogenous (weather dependant) generation profiles, thereby historically necessitating some form of revenue security via Power Purchase Agreements (PPAs) to achieve bankability. In recent years, some of Australia's jurisdictional governments have elicited further VRE investment by auctioning taxpayer-or ratepayer-wrapped Contracts-for-Differences (CfDs), taking on the role of a PPA vis-à-vis facilitating bankability. This results in an increasingly "hybridised" energy market, in which greater proportions of generators operate with limited exposure to real-time spot markets.

An aspect of this market which has received limited attention is the hybridisation of the VRE investments themselves. In the NEM, VRE investors are increasingly taking material exposures to the real-time spot market, referred to by us as 'semi merchant VRE plant'. Of the 19,275MW of total plant commitments in the NEM, at least 3600 MW is exposed to the spot market as of 2023. This pattern can be traced at least as far back as the Victorian Government's 2017 CfD auction for 650MW, which in turn elicited an investment response of 800MW. The implication here is that 150MW or 19% of capacity committed was 'uncontracted' and therefore exposed to the NEM's energy-only spot market prices at the time of financial close.

In this article, we explore the "bankability" of semi-merchant projects within a hybridised market to assess why this trend has emerged. Our research begins by identifying a range of "optimal" CfD (or PPA) contracting set-points whilst applying market-standard capital structuring constraints viz. gearing limitations. Our modelling

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results confirm that investors seeking to acquire meaningful exposures to spot markets (20-30%) are able to service a project financing structure (60-65% debt) assuming “typical” market plant specifications.

We go on to produce additional insights through the use of an ex ante/ex post analysis of the same “typical” semi merchant plant cf. a fully “contracted” plant by applying real observed market data from 2020 to 2023. Our analysis finds that the semi-merchant plant performs well with symmetrical risks around equity returns, whereas fully contracted plant tends to be skewed to downside risks.

We conclude that the ‘lower risk’ description that typically accompanies a fully contracted VRE plant with 100% PPA coverage no longer seems adequate, at least in Australia’s NEM. While perhaps not intended as an initial motivation, access to merchant (upside) risk appears to offset a level of downside risk associated with project operations. We believe the notion of a fully contracted VRE plant exhibiting lower risk appears to conflate the concept of lower volatility with the concept of risk-adjusted returns. To be clear, a semi-merchant plant do experience considerably more revenue volatility than the counterfactual. However, due to other project variables capable of adversely impacting VRE investment returns ex post, 100% PPA contractual cover does not reduce, and may in fact amplify, the volatility of equity returns. In other words, 100% coverage places a cap on returns.

The policy implication for hybridised markets is that priming investment via CfD auctions appears to require less MW on offer to reach a given MW target. Since semi-merchant VRE plants are emerging as the dominant form of entrant in Australia’s NEM, a government seeking to target 5000MW of VRE entry commitments need only auction ~3500-4000MW of CfDs, thus reducing taxpayer exposures considerably.

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