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Coordinating Generation and Transmission Investment for High Renewable Penetrations in the NEM

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The Australian National Electricity Market (NEM) is experiencing a transitional period in their electricity generation mix as they shift from dispatchable fossil-fuel generation (DFFG) to intermittent renewable energy generation (REG). In order to uphold the goals of the NEM; power system security, reliability and affordability, coordination of new REG with appropriate and significant transmission infrastructure is required as the NEM transitions towards a low carbon future. Historically, network investment in the NEM has been based around DFFG and not on weather-resource dependant generation such as REG. The result is a transmission network that is concentrated on the eastern coast, leaving valuable renewable resources to the west untapped and not easily accessible. It is important to coordinate investment in the power system to ensure investment decisions are made appropriate as all costs are socialised to the end users. The aim of this paper is to provide PLEXOS modelling for strategic high-voltage direct current (HVDC) transmission and large-scale renewable energy investment in the form of Renewable Energy Zones (REZs) for Australia to transition to a low carbon future. The PLEXOS modelling will look at different scenarios of strategic HVDC transmission investment across the NEM with the aim of minimising overall costs and maximising benefits and renewable penetrations.