

Energy Storage and Renewables in New Jersey: Complementary Technologies for Reducing our Carbon Footprint

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Abstract

Solar energy represents an important priority in New Jersey, which lacks access to other sources of renewable energy such as wind, hydro or biomass. However, it is also highly volatile, and at higher penetration levels can place tremendous stresses on the grid. Batteries are very effective for frequency regulation, but given the high cost of bulk storage, they are not practical for smoothing the variations of cyclic and random variations of solar over longer periods. We propose to investigate the dynamics of the New Jersey distribution grid at high levels of solar penetration, with a network that includes conventional generation as well as battery storage using chemistries designed for specific needs. We anticipate that this research will help prioritize battery research by identifying the economic value of different characteristics. In addition, it will guide policy by quantifying the costs of increasing levels of solar penetration using accurate models of grid dynamics so that we can identify system bottlenecks. Finally, the analyses and policies determined by this work will better frame the design conditions for grid scale energy storage.