The Private and Social Value of Blackout Risk Reduction

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Abstract

Distributed generation (DG) provides a mechanism to generate electric energy locally rather than drawing from the power grid, which yields energy savings to DG-enabled users. This study focusses on another source of benefits, related to blackout risk reduction. When blackouts do occur, DG-enabled customers enjoy the "private benefit" of continued electric service from local generation. If DG units are deployed at scale and operated in such a way as to decrease stress on power grids during times of peak demand, all users of the grid enjoy a "social" benefit of reduced risk of blackouts occurring. Using building-integrated Combined Heat and Power (CHP) in the PJM power grid as a case study, we estimate blackout risk as a function of demand for grid-provided power and estimate the risk reduction associated with a modest deployment of CHP throughout the PJM region. Even with modest CHP deployment levels, the social benefits exceed the private benefits by an order of magnitude (~$2.5 million of private benefit versus ~$20 - $50 million of social benefit annually). Per MW of CHP, this social benefit is equivalent to prevailing prices in PJM's capacity market, suggesting the value of revisiting capacity auction rules to increase DG participation.

Keywords: Combined heat and power, Power system blackouts, Distributed generation