

An evaluation of a local reactive power market: the case of Power Potential

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Abstract

This paper quantifies the benefits of introducing reactive power markets that promote the participation of distributed energy resources (DER) in a coordinated way, between the electricity system operator and the electricity distribution utilities. The contribution that DER could make by displacing conventional network assets in supplying reactive power support is evaluated in the context of a case study, the Power Potential (PP) project in Great Britain. We discuss the rising need for absorptive (leading) reactive power in the PP trial area, driven by the rapid connection of renewable generation in an area of low demand growth. A social cost benefit analysis (SCBA) is performed to quantify the net benefits, with sensitivities regarding bid prices, % of DER participation, time horizons. Price information from the PP live trial conducted between January and March 2021 is also used to evaluate the robustness of the SCBA and to estimate benefits using actual prices. Our results suggest that energy consumers could save from 8-21% of business as usual asset costs by 2050. The introduction of trial bid prices increases these savings by around 3% of business as usual asset costs out to 2050. Potential sources of additional benefits on top of those identified in the SCBA are also discussed.

Keywords reactive power, social cost benefit analysis, distributed energy resources, ancillary services procurement

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