

Centralized vs distributed generation. A model to assess the relevance of some thermal and electric factors. Application to the Spanish case study.

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Abstract— Deployment of Distributed Energy Resources (DER) is already a reality for electricity supply and the debate whether distributed generation is going to replace almost totally or partially the current centralized generation paradigm is currently in place. Technical and economic advantages of DER have been addressed in the literature although regulation has also played a central role in DER deployment. This paper aims at contributing to that debate. Firstly, the advantages of both paradigms are reviewed and the cost recovery problem of the existing centralized related stranded costs discussed. Secondly, an optimization model, formulated to specifically address the discussion comparing both configuration paradigms. Main factors affecting the debate are identified and represented in the model: investment and operation costs, flexibility system requirements, demand response capabilities, building thermal demands, network investments and losses, and access-fee design, among others. Thirdly, a realistic case study, based on Spain, is presented and some qualitative conclusions extracted. Such kind of model is useful to undertake country specific studies either to perform sensitivity analysis revealing the relevance of the factors involved and the direct and indirect relationships among technologies, or to analyze the more efficient system configuration and align regulatory decisions towards it.

Index Terms— Distributed Energy Resources; Centralized Generation; Distributed Generation; Energy Storage; Demand Response

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