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Poster Title: Design of a coordination mechanism to facilitate efficient distribution network investment

Abstract: Significant developments are occurring in the electricity sector. Households and end-consumers are increasingly able to respond to price signals, either by investing in distributed energy resources (DER) or by reducing demand during high price periods. System operators and regulators, are starting to realize the efficiency gains that can be achieved by engaging end users, and providing incentives to contribute to the optimization of power system operation and planning across the short, medium and long-term. The sector is facing significant challenges, resulting from a combination of rapid developments in the sector, and a technical and regulatory framework that is designed for a system that in reality no longer exists. Despite exacerbating some challenges, many of these developments present new solutions, but require a policy framework that supports and leverages these opportunities appropriately. The potential for operators to leverage their consumers to respond to system needs is considerable, and has been driven in part by the wide-scale implementation of advanced meters and appliances ('domotics'), the move towards more cost-reflective pricing (such as time-of-use or critical peak pricing tariffs), roll-out of demand response and efficiency programs, and the development and implementation of DERs. However, further changes are needed. There is particular interest in increasing the efficacy of investment decisions, by better coordinating the large range of technologies and participants that are both impacting, and also providing new solutions to, system operation. Planning and regulatory processes in many jurisdictions are not keeping up with the rapid rate of change in the sector. The traditional centralized approach to system planning is no longer fit for purpose. It is necessary to update the regulatory settings that govern investment decisions, as these have a significant impact on efficient decision making. While traditionally the only way to meet increasing demand was to expand or reinforce network capacity through grid investments, it is now possible to utilize DERs, such as demand response or storage solutions, to achieve the same outcome at lower costs (referred to as Non-Wires Alternatives, NWAs). However there are several key challenges, including information asymmetry, choosing the appropriate level of granularity (both spatial and temporal), and signal stability, that need to be overcome for this response to be unlocked in the most efficient way. This paper discusses the key considerations needed to efficiently coordinate investments in the distribution system, and proposes a methodology to guide efficient investments in both traditional investments and NWAs.