

Transmission and storage expansion planning under imperfect market competition: social planner versus merchant investor

I.C. González Romero; S. Wogrin; T. Gómez San Román

Abstract-

The growing penetration of energy storage technologies constitute a new challenge for electricity market design. In this context, decentralized generation companies decide their investments by maximizing their own profit, while centralized intermittency of renewable production and the short- and long-term dynamics of storage technologies, which may enable generation companies to exercise new forms of market power. However, traditional (and widely utilized) congestion rents. Finally, we carry out a comprehensive analysis of a 3-node greenfield case, and we extract more general insights from a brownfield IEEE 24-node case. We found that, compared to a social planner, both the traditional cost-minimization planner and the merchant investor would lead to a relatively small diminishing of social welfare. Nonetheless, the resulting generation mix of the system can drastically change.

Index Terms- Transmission expansion planning; Generation expansion planning; Strategic behavior; Bi-level programming; Storage; Renewables

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