

Storage and demand response contribution to firm capacity: analysis of the Spanish electricity system

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Abstract-

Provision of firm capacity will become a challenge in power systems dominated by open cycle gas turbine (OCGT), and demand response (DR) technologies in providing the firm capacity required to guarantee the security of supply in a real-size power system such as the Spanish one in horizon 2030. The paper contributes with detailed and realistic modeling of the DR capabilities. Demand is disaggregated by sector and activities and projected towards 2030, applying a growth rate by activity. The load flexibility constraints are considered to ensure the validity of the results. A generation operation planning and expansion model, SPODER, is conveniently upgraded to properly represent the different storage alternatives addressed in the paper. The results highlight the importance of considering demand response for evaluating long-term firm capacity requirements, showing a non-negligible impact on the investment decisions on the amount of firm capacity required in the system and the optimal shares of wind and solar;

Index Terms- Firm capacity; Demand response; Demand growth; Batteries; Pumped-hydro storage

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