Renewable & Sustainable Energy Reviews. Volume:112. Pages: 253-262. September 2019

De-rating of wind and solar resources in capacity mechanisms: A review of international experiences

P. Mastropietro, P. Rodilla, C. Batlle

Abstract— Non-conventional renewable energy technologies are already a key element in the expansion of many power systems. These resources, whose deployment was fostered through different types of support mechanisms in the last decades, must now be integrated as much as possible in all the segments of the electricity market. Where capacity mechanisms are in place, renewable technologies should be involved in these mechanisms in the same way as any other technology. Renewables would thus not only be able to receive a capacity remuneration, but would also be subject to the commitments that a capacity contract entails.

A key and challenging design feature to allow this participation is the definition of a de-rating methodology to evaluate the expected contribution to reliability from renewable technologies. This article presents a comprehensive review of international experiences on this design element, encompassing eleven power systems in the United States, Latin America, and Europe. It illustrates the great variety of regulatory approaches that can be found worldwide and presents a qualitative discussion on renewable de-rating, showing how these methodologies may have to be refined in the near future.

Index Terms— Capacity mechanisms; De-rating; Firm capacity; Firm energy; Capacity credit; Reliability

Citation:
Mastropietro, P.; Rodilla, P.; Batlle, C. "De-rating of wind and solar resources in capacity mechanisms: A review of international experiences", Renewable & Sustainable Energy Reviews, vol.112, pp.253-262. September, 2019.