

Title: How Market Power Affects the Behavior of a Pumped Storage Hydro Unit in the Day-Ahead Electricity Market

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Abstract: The integration of large amounts of wind energy in power systems raises important operation issues such as the balance between power demand and generation. The pumped storage hydro (PSH) units are seen as one solution for this issue, avoiding the need for wind power curtailments. However, the behavior of a PSH unit might differ considerably when it operates in a liberalized market with some degree of market power. In this regard, a new approach for the optimal daily scheduling of a PSH unit in the day-ahead electricity market was developed and presented in this paper, in which the market power is modeled by a residual inverse demand function with a variable elasticity. The results obtained show that increasing degrees of market power of the PSH unit correspond to decreasing levels of storage and, therefore, the capacity to integrate wind power is considerably reduced under these circumstances.

Author Keywords: Day-ahead electricity market; Market power; Price-maker; Pumped storage hydro unit; Wind integration

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