Optimal Offering Strategies for Wind Power in Energy and Primary Reserve Markets

Wind power generation is to play an important role in supplying electric power demand, and will certainly impact the design of future energy and reserve markets. Operators of wind power plants will consequently develop adequate offering strategies, accounting for the market rules and the operational capabilities of the turbines, e.g., to participate in primary reserve markets. We consider two different offering strategies for joint participation of wind power in energy and primary reserve markets, based on the idea of proportional and constant splitting of potentially available power generation from the turbines. These offering strategies aim at maximizing expected revenues from both market floors using probabilistic forecasts for wind power generation, complemented with estimated regulation costs and penalties for failing to provide primary reserve. A set of numerical examples, as well as a case-study based on real-world data, allows illustrating and discussing the properties of these offering strategies. An important conclusion is that, even though technically possible, it may not always make sense for wind power to aim at providing system services in a market environment.

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