POWER MARKET UNCERTAINTIES MATTER MORE THAN PHYSICAL ONES: A STOCHASTIC ASSESSEMENT OF WIND POWER VALUE IN FRANCE

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Abstract

Since 2019, Europe power markets have experienced significant volatility driven by the pandemic in 2020, leading to historically low prices, followed by a sharp recovery in 2021 as economies reopened, and high prices in 2022, due to the energy crisis, particularly in natural gas dependent countries. Other factors, such as fluctuating renewable energies and extreme weather events have added to price instability. By 2023, market interventions and diversification of energy sources helped moderating prices (European Council, 2023), but volatility remains together with investor perceptions that market volatitlity is highly unpredictable. In front of these uncertainites, predictive tools are necessary for energy operators and policy-markers to accurately design contracts based on the short-term power market operation. This paper evaluates the expected value of off-shore wind energy on the power market facing the double uncertainty, of the wind power inflow and of the power price on the wholesale spot market. A stochastic model applies to each wind power and power price profiles. By using real data on the French spot power prices from the year 2014 to 2019 and hourly wind power profiles on the French Atlantic coast from 2010 to 2019, the model estimates the turnover of the wind power operator on the power market. Forecasting spot price variation shows more uncertainty from the market than physical unpredictability of the wind power profile. This tends to recommend wind power operators, if averse to risk, long-term contracts to hedge against risks and guarantee cost-recovery through fixed revenues.