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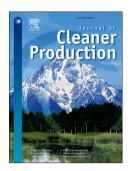
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#### ACCEPTED MANUSCRIPT

## A capacity-investment model of wind power with uncertain supply-price under high penetration rate

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Abstract: With the rapid development of renewable energy, the proportion of wind power in power supply has

grown significantly. Also, it influences the power price fluctuation. Since the marginal cost of wind power is almost

zero, the growth of wind power's penetration rate has led to a crowding-out effect and challenged traditional power

generation technology, substantially reducing the power price in the market. In perfect competition market, the

real-time balance between supply and demand of power is regulated by the real-time power price fluctuation. So

this paper models the intermittence of wind power as uncertain supply, and develops a capacity-investment model

under the uncertainties of both supply and demand. We introduce priority dispatch elasticity to describe the

crowding-out effect and take the power price to be endogenous in order to model the situation of high penetration

rate. We compare the optimal wind power capacity decision under the strategy of priority grid connection and

abandoned power management. Our results show that optimal capacity investment is inversely related to priority

dispatch elasticity under both strategies. However, the profit from power generation is always higher when

adopting the abandoned power management strategy.

**Keyword**: wind power; intermittent energy; capacity planning; high penetration rate

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