Abbas Rabiee, Saman Nikkhah and Alireza Soroudi, 2018, Information Gap Decision Theory to Deal with Long-term Wind Energy Planning Considering Voltage Stability *Energy,* Volume 147, Pages 451–463.

**Highlights.**

- A long-term horizon considered for wind energy planning.
- Wind energy planning investigated from perspective of wind farm investors.
- The uncertainty of wind energy is handled via information gap decision theory method.
- Voltage stability constraints considered in a risk averse strategy.
- Loading margin is employed as an index of voltage stability.

**Abstract** This paper proposes a novel approach for long-term planning of wind energy considering its inherent uncertainty. The uncertainty of wind energy is handled via information gap decision theory (IGDT) method. Additionally, due to the importance of security considerations, loading margin is employed as an index of voltage stability to guarantee the security of power system. The operational constraints (such as power flow equations) in initial operation point considered along with those at the voltage collapse point, simultaneously. Accordingly, the IGDT-based voltage stability constrained wind energy-planning model is proposed that can be used for ensuring the safe operation of power networks. The main feature of this model is to handle the uncertainty of wind energy in the long-term wind energy planning via IGDT technique, by considering voltage stability constraints. In order to evaluate the capability of the IGDT technique for uncertainty handling of wind energy, the obtained results are compared with Monte Carlo simulations. To demonstrate the effectiveness of proposed model, it is applied to the New-England 39-bus test system. The obtained results validated the applicability of the proposed model for optimal wind energy planning. The proposed methodology could help wind farm investors to make optimal large-scale wind energy investment decisions.

**Keywords** Information gap decision theory (IGDT); Loading margin uncertainty; Voltage stability; Wind energy; Wind energy planning (WEP).

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