

عنوان مقاله:

Two-stage Operational Planning of a Virtual Power Plant in the Presence of a Demand Response Program

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خلاصه مقاله:

The spread of the smart grid has led to the widespread penetration of small-scale distributed energy resources. Distributed generations (DGs) include conventional small-scale power plants and renewable energies with no pollutant emission. This paper presents two-stage stochastic planning for the participation of a virtual power plant (VPP) in energy and reserve markets in the presence of demand response (DR) programs. The proposed VPP consists of various power generation sources, including wind turbines, photovoltaics (PV), combined heat and power (CHP) units, microturbines, and boilers; power storage sources, including battery storage systems (BSS) and thermal buffer tank (BT); and also energy consumers, including electric vehicles (EV) and end consumers. The designed VPP enables participation in these markets by aggregating DERs. Probability distribution functions are applied to generate scenarios based on the existing uncertainties in renewable energy generation, energy price, and consumer demand. The number of possible scenarios is reduced using a scenario reduction technique. Two-stage stochastic planning is proposed to manage the designed VPP. The results suggest that participation in DR programs leads to a considerable increase in optimal operational profit of the VPP.

کلمات کلیدی:

Demand Response, Virtual power plant, distributed generations, Renewable energies

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