Dynamic control strategy in partially-shaded photovoltaic power plants for improving the frequency of the electricity system

Rahmann, Claudia
Mayol, Carolina
Haas, Jannik

© 2018 Elsevier Ltd When large-scale photovoltaic power plants (PV-PPs) operate under partially-shaded conditions, their power output can be extremely fluctuating. This situation may compromise the energy balance of the electricity grid, which in turn threatens its secure operation from a frequency control viewpoint. In this context, the development of control strategies to reduce the variability of the power generated by PV-PPs is a key issue towards reaching sustainable electric systems. With this purpose, this paper proposes a novel control strategy to reduce the negative effects that PV-PPs operating under partially-shaded conditions may cause on the frequency control of electricity grids. The control operates the PV-PP in deload mode, i.e. keeping power reserves. The deload level of the PV-PP is set dynamically during the day considering a 10-min forecast of solar generation. The forecast is performed with artificial neural networks, first predicting the day-type (sunny, cloudy, o