The challenges to optimally utilize weather dependent renewable energy sources call for powerful tools for forecasting. This paper presents a non-parametric machine learning approach used for multi-site prediction of solar power generation on a forecast horizon of one to six hours. Historical power generation and relevant meteorological variables related to 42 individual PV rooftop installations are used to train a gradient boosted regression tree (GBRT) model. When compared to single-site linear autoregressive and variations of GBRT models the multi-site model shows competitive results in terms of root mean squared error on all forecast horizons. The predictive performance and the simplicity of the model setup make the boosted tree model a simple and attractive compliment to conventional forecasting techniques. (C) 2017 Elsevier Ltd. All rights reserved.