

# Solar Forecast Uncertainty: Estimation and Integration into the Energy Management System of a Microgrid

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## Abstract

In this study we aim at evaluating possible ways to introduce information about the uncertainty in solar irradiance forecasts into the energy management system (EMS) of a microgrid powered by photovoltaic(PV) energy. A novel technique is used to assign an uncertainty to the solar irradiance forecast for each time-step of the prediction, using day-ahead forecasts. This data is translated into forecasted output power of the PV modules, which in turn is one of the inputs of the EMS in order to perform the day-ahead scheduling tasks. Even when we do not deal with the load forecast in this work, an equivalent approach could be applied to that matter as well.

The system shown in figure 1 is implemented, which includes irradiance forecasts, uncertainty assignment and translation into output power in the EMS control loop. This system aims to improve the power scheduling thanks to the incorporation of the irradiance uncertainty. The results of the simulations performed will be presented, as well as the comparisons with benchmark EMS systems using some key performance indicators. The final goal is to show the validity of this approach to allow the EMS to take better decisions in the day-ahead scheduling tasks, that at the end could be translated into a more cost-efficient daily operation of the microgrid. This work is to be presented in the Poster sessions.

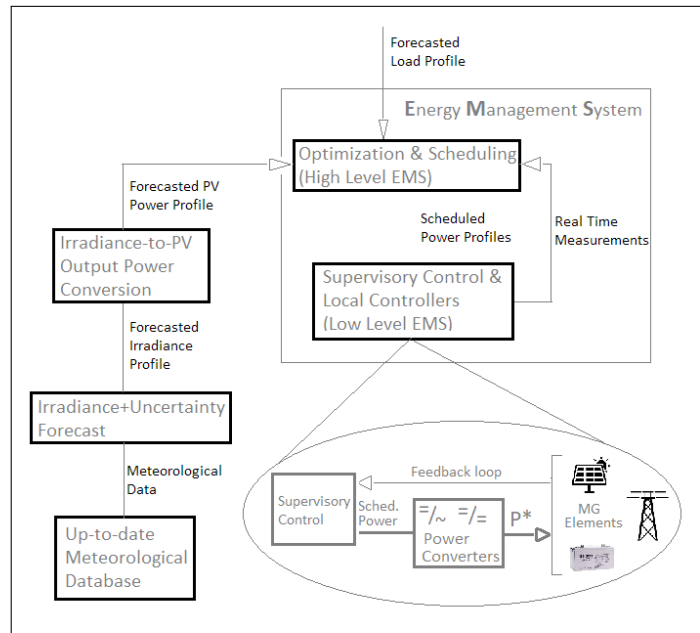


Figure 1: Schematic diagram of the proposed system including preprocessing of solar irradiance forecasts.