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On the Added Value of Probabilistic Forecasts Applied to the Optimal Scheduling of a PV Power Plant with Batteries in French Guiana

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Abstract : The uncertainty concerning the power production of intermittent renewable energy is one of the main barriers to the integration of such assets into the power grid. Efforts have thus been made to develop methods to quantify this uncertainty, allowing producers to ensure more reliable and profitable engagements related to their future power delivery. Even though a diversity of probabilistic approaches was proposed in the literature giving promising results, the added value of adopting such methods for scheduling intermittent power plants is still unclear. In this study, the profits obtained by a decision-making model used to optimally schedule an existing PV power plant connected to batteries are compared when the model is fed with deterministic and probabilistic forecasts generated with two of the most recent methods proposed in the literature. Moreover, deterministic forecasts with different accuracy levels were used in the experiments, testing the utility and the capability of probabilistic methods of modeling the progressively increasing uncertainty. Even though probabilistic approaches are unquestionably developed in the recent literature, the results obtained through a study case show that deterministic forecasts still provide the best performance if accurate, ensuring a gain of 14% on final profits compared to the average performance of probabilistic models conditioned to the same forecasts. When the accuracy of deterministic forecasts progressively decreases, probabilistic approaches start to become competitive options until they completely outperform deterministic forecasts when these are very inaccurate, generating 73% more profits in the case considered compared to the deterministic approach.

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