PROJECT FACTSHEET

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COMBI-CAST

Towards a smart distribution grid operation through a combined photovoltaic forecasting approach.

Inspiration

Within the European Union and in Luxembourg, the electricity production from photovoltaic (PV) systems considerably grew the last years, enabling a more sustainable production, but also less controllable since solar radiation is fluctuating. Forecasting the PV power is therefore of great importance for grid operators as well as energy providers.
Currently, several methods exist to perform forecasting on regional and single site scale. Each one has its benefits and might outperform the other, depending on the forecast horizon, weather conditions or regional scale. Furthermore, the recently more short-term focused markets constrained operators and providers to gain in flexibility regarding their grid operation. Thus, there is a need to improve forecasting models for a better prediction of short-term PV power.

Innovation

In the common research project COMBI-CAST, LIST and its partners will collaborate to develop a new model combining 3 complementary methods, in order to forecast PV power in a certain region and at a short time scale by self-learning algorithms.
The first method, previously developed by LIST (PV Forecast-Project), is using Numerical Weather Prediction (NWP) and a physical model that represents all the PV systems in a certain region. The second one is based on Cloud Motion Vectors (CMV) that normally use satellite data or sky imagers. However, LIST researchers will bring an innovative and challenging approach by using the very high time resolved smart meters (10 seconds) of the PV systems to track cloud motions. The last method is a statistical approach that makes advantage of smart persistence, taking also high resoluted smart meters data into account.
Finally, COMBI-CAST will develop new machine learning algorithms enabling the model to learn under which circumstances it needs to give higher weighting to a specific forecast input in order to reach the most accurate result. It will derive into a probabilistic forecast which will give information on the uncertainty of the final forecast, in accordance with the requirements of the modern energy market.

Impact

COMBI-CAST brings a new method to estimate the CMVs which makes use of methods and equipment that are available to the stakeholders to establish the forecast. The machine learning approach will allow to perform an accurate forecast across a large time horizon from 15 minutes ahead to 72 hours ahead. Such forecasting will enable the stakeholders to do a better net-load forecasting and save costs. On the long term, it will increase the possibilities for a direct marketing of PV electricity.
Further, it will enable the grid operators to have a future smart grid to better estimate the needs for flexibilities in their grids and the optimal operation of flexibility options (e.g. storage, demand-side-management).

Partners
Electris

Financial Support
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