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Development and Metrological Validation of a Control Strategy in Embedded Island Grids Using Battery-Hybrid-Systems

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Abstract : This article presents an approach for stand-alone and grid-connected mode of a German low-voltage grid with high share of photovoltaic. For this purpose, suitable dynamic system models have been developed. This allows the simulation of dynamic events in very small time ranges and the operation management over longer periods of time. Using these simulations, suitable control parameters could be identified, and their effects on the grid can be analyzed. In order to validate the simulation results, a LV-grid test bench has been implemented at the University of Technology Hamburg. The developed control strategies are to be validated using real inverters, generators and different realistic loads. It is shown that a battery hybrid system installed next to a voltage transformer makes it possible to operate the LV-grid in stand-alone mode without using additional information and communication technology and without intervention in the existing grid units. By simulating critical days of the year, suitable control parameters for stable stand-alone operations are determined and set point specifications for different control strategies are defined.

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