CONTROL OF DİSTRİBUTED RENEWABLE ENERGY SOURCES WİTH GRİD OBJECTİVES

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Abstract - One of the main bottleneck in increasing the share of Renewable Energy Sources (RES) is dynamic stability. Control of such entities is thus fundamental for their grid integration.

Compared to classic thermal plants, RES are of small capacities and geographically distributed. To positively maximizetheir impact on overall grid stability, the control actions of each RES should be coordinated. Their large number and space distribution are challenges for this coordination. Also, a classic fully coordinated and centralizedcontrol would not allow resilience in operation (ie, good behavior in case of stop/restart of part of the RES units, no need for specific actions – redesign or reconfiguration – of controls).

The recent European research project H2020 POSYTYF (https://posytyf-h2020.eu/),coordinated by the author, issued a new concept called DVPP-Dynamic Virtual Power Plant to run a set of geographic distributed RES as a unit and with direct participation to grid ancillary services. Advantages and disadvantages of centralization and decentralization of the controls have been investigated and some original decentralized control approaches have been introduced. Some of them will be presented in this intervention. Several control architectures will be comparatively presented and discussed.

At the grid level, RES integration will be discussed for both ancillary services at primary and secondary levels.
Implementation issues in a 20kW hardware-in-the loop platform will be also given. Specific control actions to make implementable and efficient in real life the controls will be discussed.

Keywords - Renewables, Grid Ancillary Services, Dynamics, Virtual Power Plants, Control, Plug And Play

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