

Techno-economic assessment of forecasting and communication on centralized voltage control with high PV penetration

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Abstract— The current increase of solar generation in the power system, especially at low-voltage (LV) and medium-voltage (MV) levels, poses a great challenge from the distribution system operation point of view. Centralized voltage control schemes have been presented in the literature as a promising solution to deal with the voltage violations that may be caused by these high solar PV penetration levels. However, this approach relies on the accuracy of forecasted data to optimize the set-points and on the effectiveness of communication infrastructures to send them from the central unit to the inverters at the PV panels. This article presents a novel methodology developed in the European project SUSTAINABLE to assess the impact of forecasting and communication on centralized voltage control. This methodology has been applied through simulation in two Portuguese networks used for the demonstration activities of the project, one in LV and another in MV. The results show that the accuracy of the data used to calculate the set-points as well as the time interval used for their transmission have a significant impact in these applications and highlight the importance of dedicating resources to improve both forecasting tools and communication systems.

Index Terms— Techno-economic analysis; Centralized voltage control; Solar PV; Forecasting; Communication

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