

IMPACTS OF ENERGY STORAGE IN DISTRIBUTION GRIDS WITH HIGH PENETRATION OF PHOTOVOLTAIC POWER

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ABSTRACT

This paper investigates the influence of energy storage on the network impacts from large-scale PV schemes applying a dynamic computational method. A total of 11 case studies were computed applying a simulation tool that combines power-flow calculations with distributed generation and storage models. Different storage schemes, PV sizing and climatic zones have also been considered.

The study indicates that using a storage of 1kWh per 1kW_p PV may reduce the PV induced over-voltage by 30-100% depending on the case. The benefits were more distinctive in a southern climate than in northern latitudes where the mismatch between solar output and load is more severe at the seasonal scale. With careful siting of the PV units in the grid, significant benefits can be achieved even without storage. These benefits are achieved by placing PV systems in strong grid locations and avoiding the weak ones.