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## How the excitation system parameters and the generator protection settings affect the reliability of electricity delivery from distributed generation facilities

The paper analyzes the causes of disruptions in electricity delivery to critical users in power areas that operate distributed generation facilities (DG), hereinafter referred to as DG areas. Statistics is shown to be affected by the types of the excitation systems (ES) chosen for the DG generators, as well as by the relay protection (RP) settings as configured when designing the facilities. The paper dwells upon the specifications of the ES's used in low-power generators, their effective applications, as well as the consequences of disturbances in the power area or in an external grid. It is proven herein that RP settings as configured by generator manufacturers are often suboptimal, which jeopardizes their further operation, prevents the operator from aligning these settings to those of the grid RPs, and results in unnecessary disconnections. The paper also details upon calculating the parameters of DG-enabled grids in the common software suits, as well as on how to make a list of effective contingencies. It further gives recommendations on grouping the calculation problems by initial disturbance to optimize the number of projected scenarios. The authors prove that ES selection and generator RP configurations must be appropriate if DG facilities are to deliver electricity reliably.

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