

Tutorial on In-Plant Power Generation

The purpose of this tutorial is to provide guidelines to the successful integration of local generation into industrial power systems. This will cover both islanded operation as well as connection with the utility. The selection of the governor and excitation modes (primary regulation) for the different operation scenarios will be discussed. Secondary regulation is a key factor in ensuring that the in-plant power generation provides a robust source of electrical energy to supply the loads under normal and disturbed conditions. The application of secondary regulation in both the islanded and connected modes will be one of the main themes of the tutorial.

The characteristics of the utility power supply (frequency and voltage fluctuations, harmonic voltage levels etc.) are very important when designing the interface with the utility. The influence of these parameters on the design of the electrical system itself and on the in-plant generation control will be discussed. The design of the substation automation must also take into account the in-plant generation since fast load shedding will be necessary to ensure robust operation during disturbances. Traditional substation automation is being challenged by the arrival of IEC 61850. Integration of this new substation automation philosophy will be included in the tutorial.