

Optimal Power Distribution and Power Trading Control among Loads in a Smart Grid Operated Industry

Authors : Vivek Upadhyay, Siddharth Deshmukh

Abstract : In recent years utilization of renewable energy sources has increased majorly because of the increase in global warming concerns. Organization these days are generally operated by Micro grid or smart grid on a small level. Power optimization and optimal load tripping is possible in a smart grid based industry. In any plant or industry loads can be divided into different categories based on their importance to the plant and power requirement pattern in the working days. Coming up with an idea to divide loads in different such categories and providing different power management algorithm to each category of load can reduce the power cost and can come handy in balancing stability and reliability of power. An objective function is defined which is subjected to a variable that we are supposed to minimize. Constraint equations are formed taking difference between the power usages pattern of present day and same day of previous week. By considering the objectives of minimal load tripping and optimal power distribution the proposed problem formulation is a multi-object optimization problem. Through normalization of each objective function, the multi-objective optimization is transformed to single-objective optimization. As a result we are getting the optimized values of power required to each load for present day by use of the past values of the required power for the same day of last week. It is quite a demand response scheduling of power. These minimized values then will be distributed to each load through an algorithm used to optimize the power distribution at a greater depth. In case of power storage exceeding the power requirement, profit can be made by selling exceeding power to the main grid.

Keywords : power flow optimization, power trading enhancement, smart grid, multi-object optimization

Conference Title : ICNSC 2015 : International Conference on Networking, Sensing and Control

Conference Location : Tokyo, Japan

Conference Dates : May 28-29, 2015