Electrical Energy Analysis: Inputs to Design Additional Power and Automatic Transfer Switch to Circumvent Power Outage in ESSU Main Campus

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Abstract:

Eastern Samar State University (ESSU) is dealing with substantial electrical system issues, involving overloaded transformers and an underperforming generator, which result in an unreliable power supply. This study seek to design an upgraded transformer, generator, and additional renewable energy power source along with an automatic transfer switch (ATS) to guarantee a stable power supply during outages and enhance overall system reliability. To address these challenges, the research implies a comprehensive assessment of the current electrical wiring and load analysis across the campus. This consist of mapping the as – built electrical plan layout, reviewing wiring configurations, and collecting load data for various electrical loads. The data gathered will contain details of the campus's current wiring, load information for each building, performance metrics for transformers and generators, and the specifications of additional solar photovoltaic (PV) systems. Simulation analysis proves that the existing electrical system needs an upgrade specially the transformers and backup generator. As the results shown, upgrading transformer capacities to 10 MVA, 200 kVA, and 10 MVA, along with increasing the generator capacity to 10 MW, will substantially improve overload conditions. Furthermore, incorporating solar power will reduce grid dependency and stabilize voltage levels. The practical outcomes of this study include enhanced reliability of the university's power supply, a lower risk of electrical outages, and improved integration of renewable energy sources. These upgrades ensures a more stable and efficient power system for ESSU, addressing operational needs while promoting a more sustainable energy approach.

Keywords:

Solar Energy, Electricity, As-Built Design, Generator, Simulations.