

# **A Decision Support System for the Electrical Power Districting Problem**

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## **(ABSTRACT)**

Due to a variety of political, economic, and technological factors, many national electricity industries around the globe are transforming from non-competitive monopolies with centralized systems to decentralized operations with competitive business units. This process, commonly referred to as deregulation (or liberalization) is driven by the belief that a monopolistic industry fails to achieve economic efficiency for consumers over the long run. Deregulation has occurred in a number of industries such as: aviation, natural gas, transportation, and telecommunications. The most recent movement involving the deregulation of the electricity marketplace is expected to yield consumer benefit as well.

To facilitate deregulation of the electricity marketplace, competitive business units must be established to manage various functions and services independently. In addition, these business units must be given physical property rights for certain parts of the transmission and distribution network in order to provide reliable service and make effective business decisions. However, partitioning a physical power grid into economically viable districts involves many considerations. We refer to this complex problem as the electrical power districting problem.

This research is intended to identify the necessary and fundamental characteristics to appropriately model and solve an electrical power districting problem. Specifically, the objectives of this research are five-fold. First, to identify the issues relevant to electrical power districting problems. Second, to investigate the similarities and differences of electrical power districting problems with other districting problems published in the research literature. Third, to develop and recommend an appropriate solution methodology for electrical power districting problems. Fourth, to demonstrate the effectiveness of the proposed solution method for a specific case of electric power districting in the Republic of Ghana with data provided by the World Bank. Finally, to develop a decision support system for the decision makers at the World Bank for solving Ghana's electrical power districting problem.