

Design of Colombo city electricity network for anticipated future demand

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Colombo is the capital city in Sri Lanka and it needs the highest day time electricity demand in the country. Colombo city is geographically divided into nine zones based on the major developments in “Colombo City Development Plan – 2020” published by Urban Development Authority (UDA) of Sri Lanka in 2008. The major development projects proposed to be completed by 2020 are located in concentrated development zone and the port related activity zone. With the upcoming projects, the amount of electricity demand in each zone will increase and existing electricity supply network will not be able to cater to the predicted demand.

This paper focuses on designing an upgraded, adequate and reliable network for Colombo city in 2021. Furthermore, this analysis is carried out to determine the optimum transmission voltage in 2021 to meet the anticipated demand growth.

The demand forecast is prepared up to 2021 based on past generation data and future requirements (bulk demands) obtained from relevant authorities. Then, Sri Lankan power system is modeled using the PSS/E (Power System Simulator for Engineers) software and the existing Colombo city electricity network is simulated to identify the weak areas to be reinforced for future requirements. Simulations have been carried out for two network topologies with two different voltage levels, 132 kV and 220 kV proposed to be used in the year 2021. The results obtained from the simulations include, network load flow, voltage at different busbars, short circuit levels and transmission losses. A Techno-Economic analysis has been carried out to determine the most effective network for Colombo city in 2021.

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