POST TECHNICAL AND ECONOMICAL ANALYSIS OF A 132 KV TRANSMISSION SUB NETWORK OF CEYLON ELECTRICITY BOARD

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Department of Electrical Engineering, University of Moratuwa
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Abstract

Power transmission network components are planned and designed for 30 to 40 years operating period in the network after construction. From planning stage to construction stage it takes about four years. The horizon of the planning process of Ceylon Electricity Board is ten years and each year the planning process is reviewed. Therefore ideally once a transmission line is constructed and energized, it should serve the system requirements for 30 to 40 years.

In a transmission network, grid substations and power stations are connected to each other. More number of grid substations are appeared in areas where industrially and commercially populated. The generated bulk power from major power stations are transferred to the heavily populated areas through grid substations. As the number of grid substations are increased in an area, power stations may also be added to the system with in the same area, to cater the demanded load maintaining the quality of supply.

The cost of the transmission line construction is large and it varies according to the lengths of the line and the capacity. The optimal outcome of the combination of planning and designing of a transmission line is, at the energization, the line should be loaded minimum, the construction cost should be minimum and it should serve the system for full designed period maintaining the system security.

An evaluation was done for the 132 kV transmission network connecting Kolonnawa GS, Kelaniya GS, Kotugoda GS, Sapugaskanda GS, Biyagama GS and Asia Power PS which was reconstructed recently. The evaluation was based on load flow studies and the cost of construction. The load flow studies were done using the software of Power System Simulator for Engineering.

It is observed that mere reconstruction or upgrading the old system will not give the optimal solution in network expansion. With the addition of more and more grid substations to the system, re-arrangement of possible transmission network sections would result better and optimal network behaviour.

DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

J.M.K. Jayasekera
12.01.2006

I endorse the declaration by the candidate.

UOM Verified Signature

Professor J.R. Lucas.

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List of Principal Symbols

ACSR	All Conductor Steel Reinforced
AP	Asia Power
Biya	Biyagama
Capa	Capacity
Cct	Circuit
CEB	Ceylon Electricity Board
Cond.	Conductor
Condi.	Condition
Con.	Constructed
^0C	degree Centigrade
D/C	Double Circuit
GS	Grid Substation
Gen.	Generated
IPP	Independent Power Producer
Kela	Kelaniya
Kolo	Kolonnawa
Kotu	Kotugoda
N	Number of circuits
Ope.	Operating
PS	Power Station
PSS/E	Power System Simulator for Engineering
S/C	Single Circuit
Sapu	Sapugaskanda