PRIVATE INVESTMENT IN POWER SECTOR AND DEVIATIONS FROM LEAST COST PLAN

K V S Madhavi Kudaligama

Master of Engineering

September, 2000

Executive Summary

This report describes and suggests trade-off methods for Generation Expansion Planning Studies carried out for the period of 2000-2017. The project examines the effect of bringing forward a project which would otherwise be included at a latter year in the optimal plan and bringing in a project which is not within the least cost plan. In addition to that techniques for assessing the impact of such deviations were developed and the affects on prices were examined.

The studies presented in this report were conducted under three-block load duration curve; the base the peak and the mid peak. The existing hydroelectric plants were used as a single composite plant.

The thermal plants considered were Coal, Combined Cycle, Gas Turbines, oil-fired steam and diesel plants running on residual oil. Existing thermal plant were represented by six composite thermal plants. It was assumed that plant additions were done in the beginning of the year and no n of the plants were retired during the planning period.

The sensitivity of the recommended generating plant additions to the changes in commissioning year is presented in the report.

The major recommendation is: The overall effect of bringing forward are, therefore different from case to case and involve many subtle issues that have to be carefully evaluated. Certain modifications to the least cost plan have a relatively healthy effect overall, but others may not.

An expansion plan to bring forward or bring in an excluded project on the base of an optimal least cost expansion plan is a trade-off plan. Mathematically the new plans derived here are sub optimal plans. Since there is no such thing as a unique sub optimal plan it is wise that as decision makers generation planners have to evaluate the many possible outcomes derived like above.

Generally a plan to bring forward or bring in a private project is good if conflicts among private investors are eliminated, utility investment is reduced and the total cost increases are not excessive.

Acknowledgments

I am most grateful and privileged to have Dr. Priyantha DC Wijetunga, Senior Lecturer, University of Moratuwa as the supervisor. His kind and encouraging assistance with regard to the problem formulation, constructing and comments on the results is greatly appreciated.

I am deeply indebted to all the lecturers, colleagues and friends, too numerous to mention here, who have contributed so generously in various stages of this project over few months. Special mention should make to the engineers in the Generation Planning Branch, CEB namely WJLS Fernando, TAK Jayasekara, PVIP Jayatissa and TN Sandasiri.

Many thanks are owed especially to the Head and the Staff of the Department of Electrical Engineering University of Moratuwa, colleagues of the 1st batch of the M.Eng/PG Diploma Course in Electrical Engineering and non executive staff of the Generation Planning Branch, CEB for assistance in reviewing, complying and editing this report.

Finally this work is dedicated to my beloved parents who have always been with me in every hurdle I cleared.

KVSM Kudaligama
September 2000

CONTENTS

Annexes

List of Tables

List of Figures

Acrronyms

CEB	-	Ceylon Electricity Board
GDP	-	Gross Domestic Product
T&D	-	Transmission and Distribution
MW	-	Mega Watt
ADB	-	Asian Development Bank
WB	-	World Bank
BOO	-	Build, Own and Operate
BOT	-	Build, Operate and Transfer
LF	-	Load Factor
SYSIM	-	System Simulation Model
CIF	-	Cost, Insuranee and Freight
HHV	-	Higher Heating Value
LINDO	-	Liner, Interactive and Discrete Optimiser
LDC	-	Load Duration Curve
US$	-	American Dollars