GREEN HOUSE GAS MITIGATING OPTIONS FOR THE SRI LANKAN POWER SECTOR

Master of Engineering

A. R. Ranasinghe

September, 2000

EXECUTIVE SUMMARY

Global Warming due to increased amount of anthropogenic (created by man) GHG emissions has been a hotly debated subject discussed in various forums. Repercussions due to this increasing global temperature range from outbreaks of diseases to mass inundation of land due to sea level rise. To respond to these threats arising out of Global Warming phenomenon the international community has already undertaken some measures to curtail the emission of GHGs within stable limits.

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in May 1992, during, Rio Earth summit held in June 1992. So far five conferences of Parties (COP) to the convention have been held.

At the third Conference of parties to the UNFCCC held in Kyoto, Japan in 1997, a consensus decision was taken to adopt a protocol, under which industrialized countries will reduce their combined GHG emissions by at least 5.2% compared to the 1990 levels, during the period of 2008-2012. The Kyoto Protocol introduced three flexibility mechanisms to achieve this objective Clean Development mechanism (Article 12), Joint Implementation (Article 6) and Emission Trading (Article 17).

Sri Lanka is a developing country with a relatively low amount of GHG emissions at present. It has the capacity to participate in CDM projects. It is first necessary to assess the potential for prospective CDM projects in the country, before actual participation, once working solutions are devised for the implementation of the Kyoto protocol. Once the implementation stage has been reached many developing countries would be competing to attract the attention of the developed countries by offering an array of GHG mitigating projects in their respective countries. A market would therefore evolve where investments by the developed countries would be primarily targeting the low cost projects with high GHG mitigating potential in the developing countries.

It is necessary for Sri Lanka to identify the prospective GHG mitigating projects in the country in various sectors. The GHG mitigating potential of such projects should be studied in the light of underlying financial and technological parameters and constraints and a countrywise database should be devised. The Power Sector would constitute a significant portion of the total GHG mitigating potential in the country. This study aims to identify the best project options in the Sri Lankan Power Sector that could benefit from the CDM mechanism once workable solutions are found for the implementation of the Kyoto protocol.

ACKNOWLEDGEMENTS

I wish to express my utmost gratitude to the supervisors, Dr. P.D.C. Wijethunga and Mr. W.J.L.S. Fernando for their excellent guidance, advice and encouragement given to me for successfully completing this study.

Special gratitude and thanks goes to the Committee on Environmental Policy and Management (CEPOM) of the Ministry of Irrigation and Power for initiating this study.

Many thanks goes to Ceylon Electricity Board (CEB), for providing computing and other logistic resources.

I wish to thank Ms. T.A.K Jayasekera, Chief Engineer - Generation Planning Branch, CEB and the entire Generation Planning team for the continued support and encouragement. Special thanks goes to Mr. P.V.I.P Jayatissa for his useful support in formulating the DSM cases used for the study.

Special thanks also goes to Mr. P.J. Joseph, Ministry of Science and Technology for providing useful information regarding the dendro power option.

Many thanks are due to Mr. Sunith Fernando, Resource Management Associates (Pvt) Ltd and Mr. L. Ariyadasa, Project Manager, CEB pilot Wind Project at Hambabthota for their contributions in developing the Wind power scenario for this study.

I wish to express my appreciation to Dr. Tilak Siyambalapitiya, who acted as the external examiner, for evaluation of this project and his useful suggestions and remarks for further enhancements.

Finally, I wish to express my gratitude to Thanuja, my wife, and my parents for the encouragement and moral support given to me during this study. I also appreciate Sithara, my daughter, for bearing up with me forfeiting the precious '*daddy time*' to help me complete this work.

CONTENTS

Annexes

List of Tables

List of Figures

ACRONYMS

CCY	-	Combined Cycle Power Plant
CDM	-	Clean Development Mechanism
CEB	-	Ceylon Electricity Board
CECB	-	Central Engineering Consultancy Bureau
CIF	-	Cost, Insurance and Freight
COP	-	Conference of the Parties
CPC	-	Ceylon Petroleum Corporation
DSM	-	Demand Side Management
ERU	-	Emission Reduction Unit
GEF	-	Global Environment Facility
GT	-	Gas Turbine
IAEA	-	International Atomic Energy Agency
IDC	-	Interest During Construction
IEA	-	International Energy Agency
IPCC	-	Inter-Governmental Panel for Climate Change
IPP	-	Independent Power Producer
K-M	-	Kehelgamu Oya and Maskeliya Oya
KPS	-	Kelanatissa Power Station
LDC	-	Load Duration Curve
LNG	-	Liquefied Natural Gas
LOLP	-	Loss Of Load Probability
LTGEP	-	Long Term Generation Expansion Plan
OECF	-	Overseas Economic Co-operation Fund
O&M	-	Operation and Maintenance
PF	-	Plant Factor
PV	-	Present Value
SL Rs.	-	Sri Lankan Rupees
US$	-	American Dollars
WASP	-	Wien Automatic System Planning Programme
WB	-	World Bank