ASSESMENT OF COST OF EXTERNALITIES FOR CEB THERMAL GENERATION OPTIONS

Piumie Upeksha Karunaratne

118677D

Degree of Master of Science

Department of Electrical Engineering

University of Moratuwa

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Singankutti Achchige Piumie Upeksha Karunaratne

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Dissertation submitted in partial fulfilment of the requirement for the

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DECLERATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters Dissertation under my supervision.

Signature of the supervisor: Date:

Dr.W.D.A.S. Rodrigo

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ABSTRACT

Costs of externality are effects that are typically not taken into account in finalizing the market price of goods or materials. Environmental impacts and social damage costs are the main externalities needed to be considered.There is a growing requirement for policy analysts to take account of the environment in their decision making and to undertartake the specified cost benefit analysis. Therefore it is a vital fact to monetary value the social and environmental damage that can be occurred due to an infrastructure and to use it as a variable cost.

In the case of power generation, electricity production causes environmental damages of which the associated costs are not borne by the producers or consumers of that electricity. Hence, true generation costs should include both the private costs incurred to provide power such as capital cost, O&M cost and labour and the external costs of damage to the environment.

In Sri Lanka, due to the absence of reliable health and environmental impact studies, an estimated value of 0.13 US Cents/kWh was added as the social damage cost for the scenario studies of coal in Long Term Generation Expansion Plan, (2012 -2032) by the Generation Planning unit of Ceylon Electricity Board.

Thus, in this research, a realistic monetary value for the social damage cost is assessed for coal power generation studies in Sri Lanka based on the environmental and social impacts associates with it. The Impact path way method is discussed and used for the monetary valuation. The respective pollution levels are obtained by means of Gaussian plume air dispersion model. Then with certain assumptions and limitations, value of 0.08 US Cents/kWh is derived as the external cost or the social damage cost for coal power generation studies .Finally, conclusions are drawn based on results and sensitivity analyses.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABRVIATIONS

AAQ	Ambient Air Quality
ADB	Asian Development Bank
CEB	Ceylon Electricity Board
CO2	Carbon Dioxide
COI	Cost of Illness
DRF	Dose Response Function
DS	Divisional Secretariat
E	East
EIPS	Environment Issues in Power Sector
ESP	Electrostatic Precipitator
FGD	Flue Gas Desulfurization
GDP	Gross Domestic Product
HCA	Human Capital Approach
HEI	Health Effect Institute
ITI	Industrial Technology Institute
JVC	Joint Venture Company
LTGEP	Long Term Generation Expansion Plan
N	North
NE	North East
NOx	Oxides of nitrogen
NW	North West
PM	Particulate Matter
PPM	Past Per Million
RAD	Restricted Activity Day
RHA	Respiratory Hospital Admissions
S	South
SE	South East
SOx	Sulfuric Dioxides
SW	South West

TPCL	Trincomalee Power Company Limited
VSL	Value of Statistical Life
W	West
WLD	Work Loss Days
WTA	Willingness to Accept
WTP	Willingness to Pay

LIST OF APPENDICES