A LEAST COST LONG -TERM ENERGY SUPPLY STRATEGY FOR SRI LANKA, FOR THE USAGE OF PETROLEUM, COAL AND NATURAL GAS

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Department of Electrical Engineering

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DECLARATION

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 our supervision.

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Signature of the supervisor Date:

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ABSTRACT

Long term energy sector planning is essential for a country to acquire sustainable development in all its social, economic and environmental dimensions. Further it will ensure the energy supply security of the country. Energy supply side needs to deal with technical, economic and environmental assessments of all energy supply options such as natural resources, energy imports, energy exports, etc. Also the energy supply side should follow policy directives of the government and should take all other related constraints in to account. Similarly the demand side too has to deal with the assessment of future energy needs of various consumption sectors, policy directives, etc.

Sri Lanka being a country scant of fossil fuels mainly depends on imports of petroleum and coal. Even though coal is used for electricity generation only, petroleum products are being used for variety of applications. Further, at the moment Sri Lanka does not deal with Natural Gas (NG) to fulfill its energy needs. However, potential NG fields have been found in Sri Lanka during the recent past. Therefore analyzing the viability of using NG is a timely requirement.

The software MESSAGE was used to model the energy chains associated with Petroleum, Coal and NG. The model was validated by comparing it with results of LTGEP of CEB and results of the initial natural gas utilization road map.

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Under results, modernization of the existing refinery, introducing NG to the energy sector, and introducing electric vehicles have become economically viable options in the long run. Further, coal has become the most economical option for electricity generation. In addition, construction of a urea plant has become more economical than importing urea.

This model can be used in the planning stages of introducing a new technology, new energy source, or any other major change in the energy sector.

Key words: Long Term Energy Planning, Energy chain modeling, Least Cost, Technical, Economical.

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LIST OF ABBREVIATIONS

Abbreviation	Description
Bcm	Billion cubic meters
BTU	British Thermal Unit
CEB	Ceylon Electricity Board
CPC	Ceylon Petroleum Corporation
GWh	Giga watt hour
IAEA	International Atomic Energy Agency
kcal	kilo calorie
kWh	kilo watt hour
LECO	Lanka Electricity Company (Pvt) Ltd.
LKR	Sri Lankan Rupee
LNG	Liquefied Natural Gas
LOLP	Loss of Load Probability
LPG	Liquefied Petroleum Gas
LTGEP	Long Term Generation Expansion Plan
Mcf	Million cubic feet
MoPRE	Ministry of Power and Renewable Energy
MJ	Mega joule
MW	Mega watt
NCRE	Non-Conventional Renewable Energy
NCV	Net Calorific Value
NG	Natural Gas
O&M	Operation and Maintenance
PJ	Peta Joule
PUCSL	Public Utilities Commission of Sri Lanka
scf	Standard cubic feet
SEA	Sustainable Energy Authority
SLSEA	Sri Lanka Sustainable Energy Authority
t	Tonne (1,000 kg)
USD	United States Dollar

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