

ECONOMICS OF REACHING YEAR 2015 NON- CONVENTIONAL RENEWABLE ELECTRICITY GENERATION TARGET

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degree of Master of Science



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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.

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Abstract

As per 2008 National Energy Policy, it is envisaged to reach 10% of electricity energy generation by end of year 2015 from Non-Conventional Renewable Electricity (NCRE) generation sources. As per generation data, NCRE projects have generated around 525 GWh of electric energy during 2009. To reach this envisaged amount by end of year 2015, total annual NCRE contribution has to be increased to 1700 GWh as per year 2005 and 2008 Long-Term Generation Expansion Plan (LTGEP) demand predictions.

To encourage more private investments on NCRE resources for grid connected power generation, Sustainable Energy Authority (SEA) has introduced cost based and source specific tariff system. However, when implementing this new tariff structure, SEA has to subsidize this new tariff system since its tariff is higher than present CEB avoided cost tariff especially during initial years of operation.

In this study, present CEB avoided cost calculation methodology has been reviewed to reflect more realistic avoided cost as per Small Power Purchase Agreement (SPPA) guidelines. With proposed modifications to the present methodology of avoided cost calculation, avoided cost of CEB has been forecasted for until year 2020 based on data available in LTGEPs. Also based on the identified potential NCRE sources, tariff commitments of SEA has been calculated under constant terms for each year when reaching year 2015 NCRE generation endeavor. Here, analysis has been done under different scenarios to analyze the return on overall investment with varying fossil fuel prices.

Net revenue of SEA will largely depend on fuel prices, plants implementation and retiring schedules as well as combination of NCRE power plants in operation. As per the considered scenarios, to breakeven the NCRE tariff investment, average crude oil prices should at least reach 100 – 120 US \$ per barrel.

List of Abbreviations

CEB	Ceylon Electricity Board
SEA	Sustainable Energy Authority
CCY	Combined Cycle
NCRE	Non-Conventional Renewable Electricity
CPC	Ceylon Petroleum Corporation
SPP	Small Power Producer (or Small Power Plant)
CDM	Clean Development Mechanism
WASP	Wien Automatic System Planning (model)
METRO	Medium Term Reservoir Optimisation (model)
IPP	Independent Power Producer
LTGEP	Long-term Generation Expansion Plan
SPPA	Small Power Purchase Agreement (of CEB)
GWh	Gigawatthour
kWh	kilowatthour
MW	Megawatt
ENS	Energy not Served
NPV	Net Present Value
FOR	Forced Outage Rate
LDC	Load-duration Curve
GHG	Green house gasses
HV	High Voltage
MV	Medium Voltage
CCPI	Colombo Consumer Price Index
SRC	Short Rotational Coppicing
UNFCCC	United Nations Framework Convention on Climate Change
EU ETS	European Union Emission Trading Scheme
CCX	Chicago Climate Exchange