STRATEGIES TO OVERCOME BARRIERS IN ACCELERATING RURAL ELECTRIFICATION IN SRI LANKA

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
in partial fulfillment of the requirements for the
Degree of Master of Science

By

NISHANTHA CHAMINDA EKNELIGODA

Supervised by: Prof. H.Y.R. Perera

Department of Electrical Engineering
University of Moratuwa, Sri Lanka

August 2005

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.

N.C. Ekneligoda
Date: 22/08/2005.

I endorse the declaration by the candidate.

UOM Verified Signature

Prof. H.Y.R. Perera

CONTENTS

Executive summary

This report presents a research carried out on rural electrification in Sri Lanka. This research mainly involves surveys and rural electrification policy studies. The analysis was carried out in a selected district in Sri Lanka.

The first stage of the project was devoted to gathering the data about present electrification level in Sri Lanka. In this stage, the collected data was organized in a manner that enables comparison between the data components. To identify the barriers for electrification, it was decided to conduct three surveys in un-electrified villages, off grid-electrified villages and un-electrified houses in grid electrified villages. Separate questionnaires were prepared for each survey.

The survey in un-electrified villages was carried out in 10 villages in the Ratnapura district. The goal of this survey was to identify the existing barriers in rural electrification. The results of this survey were summarized and **nine** major barriers for rural electrification were identified. The identified barriers were categorized and ranked using a method developed by the researcher. In this ranking procedure, the opinions of the villagers were taken in to consideration, because those people have experienced these barriers for more than 20 years.

The second survey was carried out to observe the existing situation of present off grid projects, specially the micro-hydro power projects, which are functioning properly in Ratnapura district. Five off grid power plants were selected for this survey. Major problems prevailing in the above micro-hydro projects were pin pointed and the contributions that villagers can make to overcome these problems were identified.

Third survey was carried out in 5 grid-electrified villages to identify Problems existing in un-electrified houses. Four major barriers were identified in this survey. In these surveys social data too were collected for a better analysis. More than 90% of the villagers in a particular village were interviewed to obtain better survey result.

The rural electrification policy study was carried out to identify what improvements could be made to the policies, to have solutions to the survey results. This policy study and possible strategies were analyzed by considering the suitable policy evaluation criteria. Not availability of clear policy for rural electrification in Sri Lanka is a major issue. Identification of areas where nation grid can be extended, policy must support to the rest of the areas of electrification through off grid electrification options.

In addition possible strategies were analyzed as solutions to these problems. Integrated rural development, grid extension and isolated power generation, area coverage and intensification can give signification contribution to remove or reduce these barriers. In addition policy improvement also can give significant contribution to solve these barriers.

Acknowledgments

I am most grateful to my research supervisor Prof. H.Y.R. Perera head, department of Electrical engineering, University of Moratuwa for introducing me to the area of rural electrification. He guided the research work presented in this thesis with much dedication and encouragement. I also wish to thank him for his valuable criticisms and handling the tedious task of correcting the report.

This research would not have been possible if not for a generous research grant made by the Senate Research Committee (SRC). My sincere thank should go to Prof. S.R.D. Chandrakeerthi who worked as the Chairman of the SRC .
I also wish to thank Prof. P.D.C. Wijayatunga and Dr. D.P.N. Nanayakkara for their guidance and the encouragement through out this research project.

I am grateful to the members of the progress review committee Prof. H. Sriyananda, Dr. D.P.N. Nanayakkara and Dr. L. Udawatta (Research coordinator) for the monitoring of this research. This was very helpful for the timely completion of the research work and thesis. My sincere thanks go to Dr. Thilak Siyambalapitiya, Prof. P.D.C. Wijayatunga and Prof H.Y.R Perera for being the final exam committee.

Further I am grateful to the electrical engineer Mr. K.L.M.Uwaiz (CEB), Mr. B.Chandrasekara (Energy forum) and Mr. R. Ananda (ITDG).

At last but not least I wish to pay my special thanks to all the lab technicians in the department of electrical engineering, University of Moratuwa.

N.C. Ekneligoda
Department of Electrical Engineering
University of Moratuwa, Sri Lanka.
August 2005.

List if Figures

List of Tables

List if Abbreviations

SRC	Senate research Committee
CEB	Ceylon Electricity Board
ITDG	Intermediate Technology Development Group
DFCC	Development Financed Cooperation of Ceylon
RERED	Rural Economic
ESD	Energy Services Delivery
ECF	Energy conservation Fund
EIRR	Economic Internal Rate of Return
TR	Total Rank
VR	Villagers Rank
NR	Normalized Rank
PV	Photo Voltaic
ESMAP	Energy Sector Management Assistance Programme
IEE	Institute of Electrical Engineers
IEEE	Institute of Electrical & Electronics Engineers
LV	Low Voltage
HV	High Voltage