

# **TIME BASED PRICING MODEL FOR DISTRIBUTION UTILITIES IN SRI LANKA**

Master of Science Dissertation

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09/8677



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**Department of Electrical Engineering  
University of Moratuwa, Sri Lanka**

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# **TIME BASED PRICING MODEL FOR DISTRIBUTION UTILITIES IN SRI LANKA**

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University of Moratuwa, Sri Lanka.  
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Dissertation submitted in partial fulfillment of the requirements for the degree Master  
of Science

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Sri Lanka**

**March 2014**

## 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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Date: \_\_\_\_\_

Dr. Narendra de Silva

## Table of Content

Table of Content.....	iv
Abstract.....	vi
Dedication .....	vii
Acknowledgement .....	viii
List of Figures .....	ix
List of Tables.....	x
List of Abbreviations .....	xi
List of Appendices .....	xii
1 Introduction .....	1
1.1 Background .....	1
1.2 Motivation.....	3
1.3 Objective .....	4
1.4 Scope and boundaries.....	4
2 Cost Components Associated with Distribution Systems and Strategies of Recovery.....	6
2.1 Fixed and Variable Costs .....	7
2.2 Traditional Cost Allocation Methods.....	7
2.3 Advanced Methodologies of Costing.....	11
3 Model Investigation .....	14
3.1 Allocation of Fixed Costs .....	14
3.2 Allocation of Losses.....	18
4 Mathematical Modeling of Time Based Cost Components of an Asset under a Known Daily Load.....	19
4.1 Assumptions for the Model.....	19
4.2 Time Based Variation of Cost of Energy Loss Based on a Load Curve - Mathematical Derivation.....	24
4.3 Combination of Cost Components.....	27
4.4 Recovery Cost Components only from Active Energy.....	27

5	Application of Pricing Methodology on Distribution Networks.....	29
5.1	Properties of Selected Distribution Network for Applying TBPM.....	29
5.2	Application of Tariff for Customer Load Curves .....	45
5.3	Observations from Results .....	49
6	Discussion on the Proposed Pricing Strategy.....	51
6.1	Time Based Variation of Cost Components.....	51
6.2	Price Signals Provided by the Proposed Strategy .....	52
6.3	Solutions for the Identified Barriers.....	52
7	Conclusions .....	54
7.1	Conclusions on the Proposed Methodology.....	54
7.2	Recommendations for Future Research .....	55
8	References.....	58
Appendix - A	Purchasing Rates for Application of TBPM .....	60
Appendix - B	Numerical Examples for Observation 4 of Section 5.3 .....	62
Appendix - C	Operation Area of Lanka Electricity Company (Private) Limited ...	63
Appendix - D	11 kV Network of Negombo Branch LECO.....	64
Appendix - E	Load Profile Data.....	66
Appendix - F	Incorporation of Long Run Marginal Costing Concept for TBPM .....	85
Appendix - G	Long Run Marginal Cost for 11 kV Primary Substations of Negombo Branch LECO.....	88

## Abstract

Cost causation based allocation of infrastructure cost is a quite difficult thing in distribution networks. Thus in practice, majority of distribution tariffs in the world price electricity through traditional averaging. This is because of the difficulties in implementation of advanced pricing strategies mainly complexity, caused by high density of nodes compared to transmission networks and lack of advanced metering infrastructure.

This thesis analyzes the question of allocating infrastructure of fixed cost, leading to a more absolute solution. It proposes a time based pricing model (TBPM) which can be easily adopted in distribution networks and transmission networks. Further this study also includes the recovery of cost of losses which is more in line with proposed costing of infrastructure.

The proposed TBPM is cost causation based and suitable for distribution networks. TBPM recovers the costs by allocating to either active energy or both active and /or reactive energies. It works out a price in a particular time interval basis such as hourly basis etc. It comprises of two components

- A time based pricing per energy to allocate fixed cost which is derived from incremental fixed cost per energy unit.
- Allocation of cost of losses pertaining to the network at the time of delivery per energy.

Requirements for TBPM are simple and straightforward such that it can be easily implemented in distribution networks like in Sri Lanka.

A TBPM calculation was done for an 11 kV network spread over 37 km<sup>2</sup> for its actual load patterns. The results verify the cost reflectivity of TBPM by recovering of cost as per the exact burden. The strategy can also be applied to transmission networks.

## **Dedication**

I dedicate this work to my loving parents and to all my teachers.



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## List of Figures

Figure 3-1 Load curve of a hypothetical customer A .....	15
Figure 3-4 Hypothetical load curves of customer A and B.....	16
Figure 3-2 Hypothetical feeder - Case 1 .....	16
Figure 3-3 Hypothetical feeder - Case 2 .....	16
Figure 4-1 Load curve example .....	21
Figure 4-2 Load duration curve example .....	21
Figure 4-3 Inverse load duration curve .....	21
Figure 5-1 Input load curves on 2013-06-03.....	31
Figure 5-2 Output load curves on 2013-06-03 .....	34
Figure 5-3 Variation of cost components related to asset base - Case 1.....	34
Figure 5-4 Purchasing and selling rates Case 1 .....	35
Figure 5-5 Variation of cost components related to asset base - Case 2.....	41
Figure 5-6 Purchasing and selling rates -Case 2 .....	41
Figure 5-7 Percentage variation of cost components with respect to active power output .....	43
Figure 5-8 Assumed load curves for tariff application .....	46
Figure 5-9 Shifted load curve for maximization of benefit .....	46
Figure F-1 Variation of fixed component with LRMC.....	86

## List of Tables

Table 5-1 –Data related to asset base for TBPM application example .....	30
Table 5-2 Loss factors for TBPM application.....	30
Table 5-3 Purchasing rates for TBPM application.....	31
Table 5-4 Load input and output on 3 <sup>rd</sup> of June 2013 .....	32
Table 5-5 Variation of cost components related to the asset base- Case 1 .....	33
Table 5-6 Variation of purchasing and selling rates -Case 1 .....	36
Table 5-7 Recovery of fixed cost – Case 1 .....	38
Table 5-8 Recovery of cost of losses – Case 1.....	39
Table 5-9 Variation components and recovery of fixed cost – Case 2 .....	40
Table 5-10 Base values for comparison .....	42
Table 5-11 Percentage variation of cost components with respect average values ...	44
Table 5-12 Details of assumed load curves for tariff application .....	45
Table 5-13 Application of results for assumed load curves.....	47
Table 5-14 Recoveries of shifted load curve D for maximization of benefits .....	48
Table 5-15 Comparison between recoveries of assumed load curves A, B and C.....	49
Table 5-16 Comparison between recoveries of assumed load curves A and D.....	49
Table A-1 BST for 2013 .....	60
Table A-2 Purchasing rates for TBPM application.....	61
Table E-1 Load profile data of 11 kV network of Negombo Branch- LECO for the month of June 2013 .....	66
Table F-1 Variation of cost components related to fixed cost with LRMC value .....	87
Table G-1 Values for LRMC calculation.....	90

## List of Abbreviations

AIC	Average incremental cost
AMI	Advanced metering infrastructure
BST	Bulk Supply Tariff
CEB	Ceylon Electricity Board
DL	Distribution Licensee
h	hour
HV	High voltage
kV	Kilo volt
kVA	kilo volt ampere
kVAh	kilo volt ampere hour
kVAr	kilo var
kVArh	kilo var hour
kW	kilo watt
kWh	Kilo watt hour
LDC	Load duration curve
LECO	Lanka Electricity Company (Private) Limited
LHS	Left hand side
LKR	Sri Lankan Rupees
LRIC	Long run incremental cost
LRMC	Long Run Marginal Cost
LV	Low voltage
LV	Low voltage
MIC	Marginal Incremental Cost
MV	Medium voltage
MW	Mega watt
PSS	Primary substation
PUCSL	Public Utilities Commission of Sri Lanka
RHS	Right hand side
SLTM	Sri Lanka Tariff Methodology
SRMC	Short Run Marginal Cost
TBPM	Time based pricing model
TL	Transmission Licensee
TOU	Time of Use

## List of Appendices

Appendix	Description	Page
Appendix - A	Purchasing Rates for Application of TBPM	60
Appendix - B	Numerical Examples for Observation 4 of Section 5.3	62
Appendix - C	Operation Area of Lanka Electricity Company (Private) Limited	63
Appendix - D	11 kV Network of Negombo Branch LECO	64
Appendix - E	Load Profile Data	66
Appendix - F	Incorporation of Long Run Marginal Costing Concept for TBPM	85
Appendix - G	Long Run Marginal Cost for 11 kV Primary Substations of Negombo Branch LECO	88



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