

**DEVELOPMENT OF A TRANSMISSION PRICING  
METHODOLOGY FOR SRI LANKA POWER SYSTEM**

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Degree of Master of Science

Department of Electrical Engineering

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree  
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March 2016

## **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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## **ABSTRACT**

The electricity sector in Sri Lanka is governed by the Sri Lanka Electricity Act, No. 20 of 2009 (as amended), and the Public Utilities Commission of Sri Lanka (PUCSL) is empowered by the Electricity Act to regulate the electricity industry. Ceylon Electricity Board has license of Generation, Transmission and Distribution, while the Transmission Licensee is the Transmission System Operator and the Single Buyer. Five Distribution Licensees (DLs) buy electricity from the Transmission Licensee (TL). Tariffs and charges levied from the Distribution Licensees for purchasing of electricity from the Transmission Licensee are determined in pursuant to the Tariff Methodology approved by PUCSL. In addition to the five DLs there are a few customers directly served by the TL at 220kV and 132kV voltage level, but charged under the tariff imposed by DLs, since the presently approved tariff methodology is not properly address tariff calculation for the bulk customers connected at 132kV/220kV.

In this research, different power market models, transmission pricing principles and methodologies in different power markets were studied first, followed by transmission pricing methodologies in different countries. The study evaluated three main methodologies which can be implemented in Sri Lanka: (i) embedded cost based, (ii) marginal cost based and (iii) composite cost based methodologies. By analyzing data in each proposed model, the best suited methodology for Sri Lanka is recommended to be the embedded cost based method.

The new tariff scheme which is to be implemented should recover the cost of utility, simple, stable and easy to implement in existing framework. With this background it was proposed the embedded cost based tariff calculation model, as the most appropriate option for calculation the transmission tariff in Sri Lanka.

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## TABLE OF CONTENT

Declaration of the candidate & Supervisor.....	i
Abstract.....	ii
Acknowledgements.....	iii
Table of content.....	iv
List of Figures.....	vii
List of Tables.....	viii
List of Abbreviations.....	ix
1. Introduction.....	1
1.1 Objective .....	8
1.2 Methodology .....	8
1.3 Outline of the Thesis .....	9
2. Litreture review.....	10
2.1 Power Market Models .....	10
2.1.1 Monopoly/Vertically Integrated Unit (VIU).....	11
2.1.2 Purchasing Agency/Single Buyer .....	11
2.1.3 Wholesale Competition.....	12
2.1.4 Retail Competition .....	13
2.2 Electricity Trading Arrangement.....	13
2.2.1 Single Buyer Model .....	14
2.2.2 Pool Trading Model .....	14
2.2.3 Bilateral Model.....	15
2.2.4 Hybrid Model .....	15
2.2.5 Characteristics of Trading Models .....	16
2.3 Power market models in different countries.....	16
2.4 Transmission Pricing .....	18

2.4.1	Categories of Transmission Transactions .....	19
2.4.2	Importance of Transmission service and Pricing .....	20
2.5	Transmission pricing principals .....	20
2.5.1	Promote the efficient day-to-day operation of the bulk power market	20
2.5.2	Signal locational advantages for investment in generation and demand	21
2.5.3	Signal the need for investment in the transmission system .....	21
2.5.4	Compensate the owners of existing transmission assets .....	21
2.5.5	Simple and transparent .....	22
2.5.6	Politically and socially implementable .....	22
2.6	Transmission pricing components .....	22
2.6.1	Operating cost .....	22
2.6.2	Opportunity cost.....	23
2.6.3	Reinforcement cost.....	24
2.6.4	Existing system cost.....	24
2.7	Transmission Pricing Methods .....	25
2.7.1	Embedded cost Based (Rolled in Transmission Pricing).....	25
2.7.2	Marginal/ Incremental Pricing Methods .....	29
2.7.3	Composite Embedded & Incremental Cost Based.....	32
2.8	Transmission pricing methods in different countries .....	33
2.8.1	Transmission Pricing in West African Power Pool (WAPP) -Ghana Experience .....	33
2.8.2	Transmission Pricing in Australia.....	38
2.8.2.1	Tasmanian Experience .....	40
2.8.3	Transmission Pricing in Thailand .....	45
2.8.4	Transmission pricing in Northern Ireland .....	49



3.	Transmission Pricing Mechanism for Sri Lanka .....	52
3.1	Power market Model Sri Lanka.....	52
3.2	Power and Energy Trading Process.....	53
3.2.1	Transactions between Transmission Licensee and Generators.....	53
3.2.2	Transactions between the Transmission Licensee and Distribution Licensees.....	54
3.3	Tariff for Transmission Customers .....	55
3.4	Analysis of Transmission Pricing Methods for Sri Lankan Electricity Market .....	56
3.4.1	Embedded Cost Based Method .....	56
3.4.2	Long Run Marginal/Incremental Cost based Method.....	63
3.4.3	Composite cost based Method .....	67
4.	analysis of data.....	69
4.1	Analysis of Data – Proposed Methodology I (Embedded Cost based Method) .....	69
4.2	Analysis of Data - Proposed Methodology II (LRMC based Method) .....	74
4.3	Analysis of Data - Proposed Methodology III (Composite cost based Method) .....	87
4.4	Discussion .....	95
5.	Conclusion .....	99
5.1	Recommendations .....	100
5.2	Study Limitation and Suggestions for Future work .....	100
6.	References.....	102
	Appendix I: Estimation of asset shares in different voltage levels.....	105
	Appendix II: Proposed model of tariff calculation for the embedded cost based method.....	107

Appendix III: TOU Energy cost calculation for Composite based Method.....	114
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## List of Figures

Figure 1-1 Structure of Electricity Industry .....	4
Figure 1-2 Comparison of Energy Tariff .....	6
Figure 1-3 Comparison of Revenue from Transmission Customers 2015.....	6
Figure 1-4 Load profiles of DLs .....	7
Figure 1-5 Load profile of Steel Corporation .....	7
Figure 1-6 Load Profile of West Coast .....	8
Figure 2-1 Power Market Models .....	10
Figure 2-2 Vertically Integrated Model .....	11
Figure 2-3 Single Buyer Model.....	11
Figure 2-4 Wholesale Competitive market Model.....	12
Figure 2-5 Retail Competitive Market Model.....	13
Figure 2-6 Single Buyer Trading Model.....	14
Figure 2-7 Pool Trading Model.....	14
Figure 2-8 Bilateral Trading Model .....	15
Figure 2-9 Power Market Structure in Ghana .....	35
Figure 2-10 Structure of national Energy market Australia.....	39
Figure 2-11 Structure of Electricity Industry in Thailand.....	46
Figure 2-12 Electricity Pricing Structure in Thailand.....	48
Figure 3-1 Power market model in SL.....	52
Figure 3-2 Bulk Supply Transaction Process-SL.....	53
Figure 3-3 Structure for the pricing model .....	57
Figure 3-4 Power flow .....	59
Figure 4-1 Demand forecast for Base case and Increased demand scenario .....	75
Figure 4-2 Most expensive power plants operate in the margin in 2016.....	84
Figure 4-3 Summary of Capacity Tariff component.....	96
Figure 4-4 Summary of Energy Tariff component .....	96
Figure 4-5 Comparison of Capacity tariff component .....	97
Figure 4-6 Comparison of Energy Tariff Component.....	98

## **List of Tables**

Table 1-1 Generation Statistics Sri Lanka .....	2
Table 1-2 Transmission Bulk Supply Customers .....	5
Table 1-3 Applicable tariff rates .....	5
Table 2-1 Different parties in Market Models .....	16
Table 2-2 Power markets in Different Countries .....	17
Table 2-3 Countries studied the tariff methodologies.....	33
Table 4-1 Calculated capacity costs .....	73
Table 4-2 Demand forecast for 10 years .....	74
Table 4-3 Capex and Fixed O&M for Base case and Demand Increment case.....	75
Table 4-4 Total Annuitized costs of capital .....	76
Table 4-5 Net present value of the demand forecast.....	76
Table 4-6 Investment plan for long term transmission development.....	78
Table 4-7 Demand Increment.....	79
Table 4-8 Calculated cost of generation in generation stations .....	80
Table 4-9 Calculated Plant Factors .....	82
Table 4-10 Calculated figures of fraction of availability time in the margin .....	83
Table 4-11 Calculated average cost of energy .....	85
Table 4-12 Summary of the calculated TOU Energy price.....	85
Table 4-13 TOU Energy cost at 132kV voltage level.....	86
Table 4-14 Investment Plan forTransmission development.....	87
Table 4-15 Operational expenses for fixed assets in Transmission System .....	88
Table 4-16 Energy Cost of Generation .....	93
Table 4-17 Average Energy Cost of generation.....	94
Table 4-18 Time of Use Energy Cost of generation .....	94
Table 4-19 Summary of Calculated Tariff.....	95
Table 5-1 Proposed tariff components .....	100

## **List of Abbreviations**

AARR	Aggregate Annual Revenue Requirement
AFCR	Annual Fixed Charged Rate
ASRR	Annual Service Revenue Requirement
BST	Bulk Supply Tariff
CEB	Ceylon Electricity Board
Disco	Distribution Company
DNSP	Distribution Network Service Provider
ECOWAS	Economic Community of West African States
ERERA	ECOWAS Regional Electricity Regulatory Authority
ESI	Electricity Supply Industry
Genco	Generation Company
IMO	Independent Market operator
IPP	Independent Power Producer
ISO	Independent System operator
LRIP	Long Run Incremental Pricing
LRMCP	Long Run Marginal Cost Pricing
MC	Marginal Cost
NCRE	Non-Conventional Renewable Energy
NEM	National Energy Market
NEMMCO	National Electricity Market Management Company
O&M	Operation and Maintenance
OPF	Optimal Power Flow
ORC	Optimized Replacement Cost
PPA	Power Purchase Agreement
PSA	Power Sales Agreement
PUCSL	Public Utilities Commission Sri Lanka
SMO	System and Market Operator
SPP	Small Power Producer
SRIC	Short run Incremental Cost
SRMCP	Short run Marginal Cost Pricing
TNSP	Transmission Network Service Provider
TransCo	Transmission Company
TSO	Transmission System Operator
VIU	Vertically Integrated Unit
VSPP	Very Small Power Producer
WAPP	West African Power Pool
WACC	Weighted Average Cost of Capital