



IMPACTS OF THREE INTERVAL TARIFF ON INDUSTRIES

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
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Abstract

Ceylon Electricity Board (CEB) has introduced a new tariff structure with effect from 15th March 2008 and it includes flat rate tariff, two part time of day tariff and newly introduced three part time of day tariff for the industrial consumers. Aim of the CEB by introducing optional three part time of day tariff was the reduction of peak demand and the well distributed base load throughout a day when their newly installed coal power plants are connected to the system.

This is the one of outcome of the researches were done by CEB in past few years and the successfulness of this implementation is depend upon the awareness of the consumers. Due to the lack of past investigations to prove the benefits or losses to the consumers as well as to the CEB by introducing this new tariff structure, the results of this project will be more important to the both parties.

This investigation initiated by the selection of sample of industries and the selected sample covers major categories of industries as ceramic, rubber, food processing, hotel, and apparel. When the selection it was also considered the operational pattern of these industries as one shift, two shifts, and three shifts per day. The priority was given to their personal interests as well to carry out these investigations in their factories.

As a first step the data were collected using data loggers to identify the loading patterns and major electricity consumed sections of these industries. Then the well suit options for the change of loading-patterns were identified with the involvement of responsible officers of same industries and then evaluated the expected benefits which could be obtained by tariff part time of day tariff with the proposed changes.

At the end the reduction of peak electricity demand of Sri Lanka was calculated to generalise the results obtained in this investigation and identified some drawbacks of newly introduced three part time of day tariff.



The final results of this research show the average minimum benefit to the industrial consumer is about 10% of their current electricity cost and it can be maximised by further investigations. If 75% of total industries shift their 10% of load out of peak hours, Ceylon Electricity Board will entertain 130 MW reduction of its peak demand.

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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K.M.S.C. Somarathna
28th January 2010

We/I endorse the declaration by the candidate.

UOM Verified Signature

Prof. H.Y. Ranjit Perera

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Acknowledgement

This thesis named as “Impacts of Three Part Time of Day Tariff on Industries” covers the research of Master of Science in Electrical Engineering of University of Moratuwa.

The objective of this research was to study the behaviors of industrial consumers after the implementation of new time of day tariff by Ceylon Electricity Board and analysis of losses or benefits to the consumers at the beginning. Under the guidance of my project supervisors the objective was extended to analyze the impacts to the utility supplier of Ceylon Electricity Board as well.

The idea of this research was brought forward for the first time by Dr. Tilak Siyambalapitiya, one of the supervisors of this project. First I should place my great gratitude to Dr. Tilak Siyambalapitiya for his excellence guiding and support extended to bring this project success. As this was new to me also he guided and encouraged me supplying various information on this from the beginning.

Then I must place my special thanks on Professor H.Y.R. Perera, The Director General, Public Utilities Commission of Sri Lanka, also the other supervisor of this project for his great support extended by providing numerous ideas for the improvements of this research.

Further, I must thank to all the lecturers engaged in MSc course sessions who made our vision broad and try to improve our knowledge in various fields.

Finally, I should thank all my colleagues in MSc course and my work place Spugaskanda power station and also the staff of selected industries for the research for their support extended during the research.

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1. Introduction

1.1 Background

The peak electricity demand in Sri Lanka is continuously increasing at an annual rate of 4.4% [3]. In the dry seasons and also when the major plants are released for the routine maintenance Ceylon Electricity Board (CEB) fails to meet this peak demand and result will be the load shedding in peak hours. CEB has done so many researches in past few years to overcome this situation and one of the solutions introduced is time of day tariff for the industrial consumers.

The pattern of electricity demand within twenty four hours in a day in Sri Lanka is shown in Figure 1.1 [9].

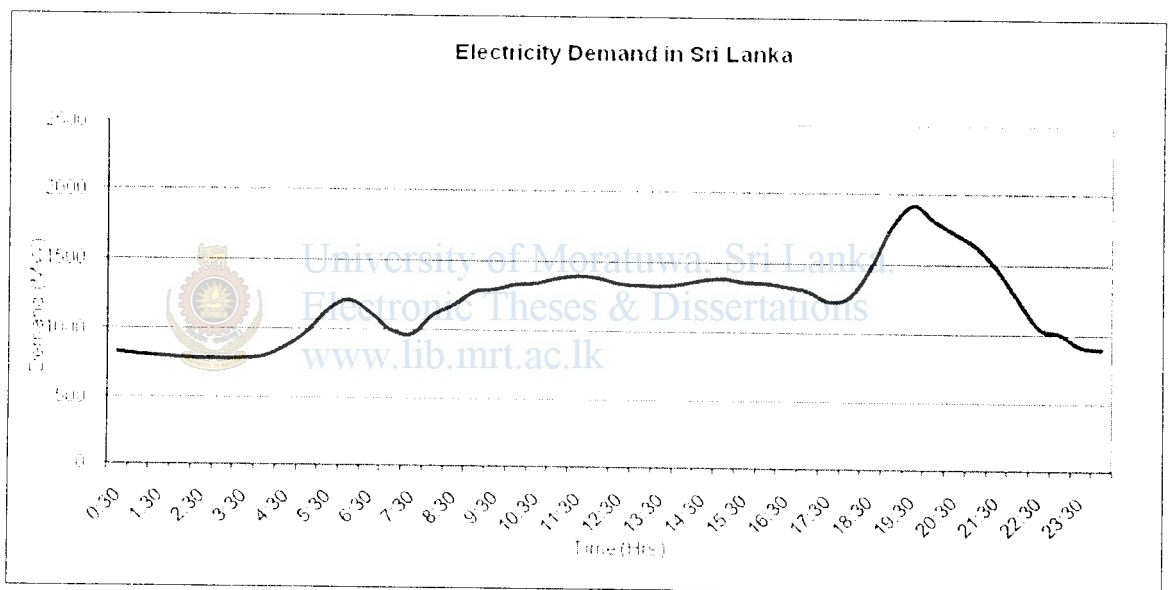


Figure 1.1 - Electricity Demand Pattern in Sri Lanka

The night peak demand is around 1900 MW and it appears at 19:30 Hrs. The demand starts to increase at 18:30 Hrs over the 1400 MW level and starts to decrease below 1200 MW level at 22:30 Hrs.

The day peak demand is around 1400 MW and it appears at 11:30 Hrs. and 14:30 Hrs. The demand starts to increase from 900 MW at 07:00 Hrs and it stays around 1400 MW up to 17:00 Hrs. The minimum demand is around 800MW.



The ideal demand pattern for the CEB would be an uniformly distributed demand through out the day. Time of Day tariff will help to reduce the peak demand and to make use of the excessive generation during off peak hours when the large coal power plants are adding to the system in near future. When both the load curve and the introduced three part, time of day tariff scheme are compared this will be even more identified.

The summary of newly introduced three part time of day tariff with the comparison of flat rate tariff is shown in Table 1.1. [1]

Category	Time Period	Rate (Rs./ kWh)	Fixed Charge (Rs./ Month)	Demand Charge (Rs./ kVA)
Industrial Purpose (I-2)	Not Applicable	8.10	3000.00	675.00
Industrial Purpose (I-3)	Not Applicable	8.00	3000.00	650.00
Hotel Purpose (H-2)	Not Applicable	8.10	3000.00	675.00
Hotel Purpose (H-3)	Not Applicable	8.00	3000.00	650.00
Three Part Time of Day Tariff for Industrial/ Hotel Purpose I-2 (TD3)	Peak (18:30 hrs to 22:30 hrs)	23.00	3000.00	650.00
	Day (04:30 hrs to 1830 hrs)	7.30		
	Off Peak (22:30 hrs to 04:30 hrs)	5.30		
Three Part Time of Day Tariff for Industrial/ Hotel Purpose I-3 (TD3)	Peak (18:30 hrs to 22:30 hrs)	21.00	3000.00	650.00
	Day (04:30 hrs to 1830 hrs)	6.90		
	Off Peak (22:30 hrs to 04:30 hrs)	5.00		

Table 1.1 - Industrial Tariff Introduced by CEB with Effect from 15th March 2008

CEB has revised the tariff structure again on 1st of November 2008 with a slight increment of unit charge of I-2 flat rate tariff (by one rupee and cents twenty) [2], and did not change the unit charge of three part time of day tariff due to the CEB's main plan is to motivate more industrial consumers to apply the three part, time of day tariff.

The tariff revised on 1st November 2008 [2] is shown in Table 1.2 and all other values in Table 1.1 are remaining unchanged.

Category	Time Period	Rate (Rs./ kWh)	Fixed Charge (Rs./ Month)	Demand Charge (Rs./ kVA)
Industrial Purpose (I-2)	Not Applicable	9.30	3000.00	675.00
Industrial Purpose (I-3)	Not Applicable	9.10	3000.00	650.00
Hotel Purpose (II-2)	Not Applicable	9.30	3000.00	675.00
Hotel Purpose (II-3)	Not Applicable	9.10	3000.00	650.00

Table 1.2 - Tariff Revision Introduced by CEB with Effect from 1st November 2008

To obtain benefits from introduced Three part Time of Day Tariff, consumers should maintain their consumption in a minimum level during the peak hours (from 18:30 Hrs to 22:30 Hrs) defined in the tariff system. Also they can maximize their benefits by transferring most of the electricity consumption to the off peak hours (22:30 Hrs to 04:30 Hrs) other than day hours (04:30 Hrs to 18:30 Hrs).

The options available for the consumers to achieve above targets are as follows.

1. Stopping of maximum possible operations in the peak hours if this does not affect meeting of their production targets.
2. Transferring more possible operations to the off peak hours from day hours and peak hours if industry operates in the 24 hours of the day.

3. Running of standby generators in the peak hours.
4. If the factory has two electricity accounts, one account transferred to three part time of day tariff with the rearrangement of transferable or stoppable loads to the above mentioned account.

1.2 Motivation

The transfer of more consumers to the three part, time of day tariff is mainly based on the benefits achievable to them. Though the three part, time of day tariff is newly introduced, no awareness programs are available for the motivation of industrial consumers. Therefore the idea of this research was first brought forward by Dr. Tilak Siyambalapitiya; the one of supervisor of this project.

As an Electrical Engineer in Ceylon Electricity Board this research is more related to my job field and the results obtained at the end of this research will be more beneficial to CEB. Also the knowledge and the experience that I can gathered in various type of industrial sectors in Sri Lanka directed me to select a this type of research for my MSc. project.



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1.3 Objectives

1. Doing the investigation to identify the benefits to the industrial consumers by newly introduced “Three Part Time of Day Tariff” and find out the ways to achieve these benefits.
2. To identify the behavior of industrial consumers of CEB on newly introduced Three Part Time of Day Tariff and check whether targets of the CEB will be achieved.
3. Generalize the results to obtain overall benefit by the industrial consumers in Sri Lanka and forecast the whole reduction of peak demand of CEB.



1.4 Scope of Work

1. Selection of industrial consumers for the investigation in a such a way that one shift, two shift, and three shift, industries are included in the sample.
2. Data collection and studying of loading patterns of the selected industries.
3. Check the viability of each option listed out in the section 1.1.
4. Analysis of impact on load curve by implementing above selected options.
5. Calculation of electricity bill for the each selected industry using both flat rate and three part, time of day tariff and comparison for the evaluation of benefits.
6. Analysis of overall benefit to the industrial consumers as well as utility provider Ceylon Electricity Board.



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2. Statement of the Problem

2.1 Preliminaries

Most of the industrial consumers consume the electricity under the Industrial Purpose I-1, I-2 or I-3 tariff and most of the hotel industries consume electricity under the Hotel Purpose H-1, H-2 or H-3 tariff. The number of factories which plan their operations to suit the two part, time of day tariff or the three part, time of day tariff are few. Three part, time of day tariff was introduced in March 2008 and it's availability is not yet well known among the consumers. In this chapter the comparison was done by the calculation of electricity bill using flat rate tariff and three part, time of day tariff in the selected sample of industries. These industries were selected to cover each type of operation patterns; one shift, two shifts and three shifts per day. Also it covers different type of industries like ceramic, rubber, apparel, food processing, plastic, MDF manufacturing, as well as hotel industry.

This investigation has been done in the following factories and also these factories joined to the investigation with their personal interest to reduce their electricity charges. Last two factories are already in three part time of day tariff category and these two factories were selected to compare the changes of electricity costs with the tariff change.

1. Royal Ceramic PLC
2. Lanka Walltile PLC
3. Associated Motorways PLC
4. Norfolk Foods Pvt Ltd.
5. Unidil Packaging Ltd.
6. Orit Apparel Lanka Pvt Ltd.
7. Hotel Riverina
8. Hydreramany Garments
9. MONA Plastics Pvt. Ltd.
10. Merbok MDF Lanka Pvt. Ltd.

2.2 Problem Identification

2.2.1 Royal Ceramic PLC

Royal Ceramics Lanka PLC is one of the leading manufacturers of glazed ceramic tiles and ceramic porcelain tiles in Sri Lanka. The company was established in 1990 and through rapid growth over the past eighteen years; it has now achieved a market share of over 48%. Royal Ceramics Factory at Eheliyagoda is the first of their three factories. The factory has been established with the latest equipment and has a production capacity of over 112,500 sq. m floor tiles per month.

Electricity is supplied by CEB to the factory through two 1000 kVA transformers and electricity is billing as two separate accounts under the Industrial flat rate (I2) tariff.

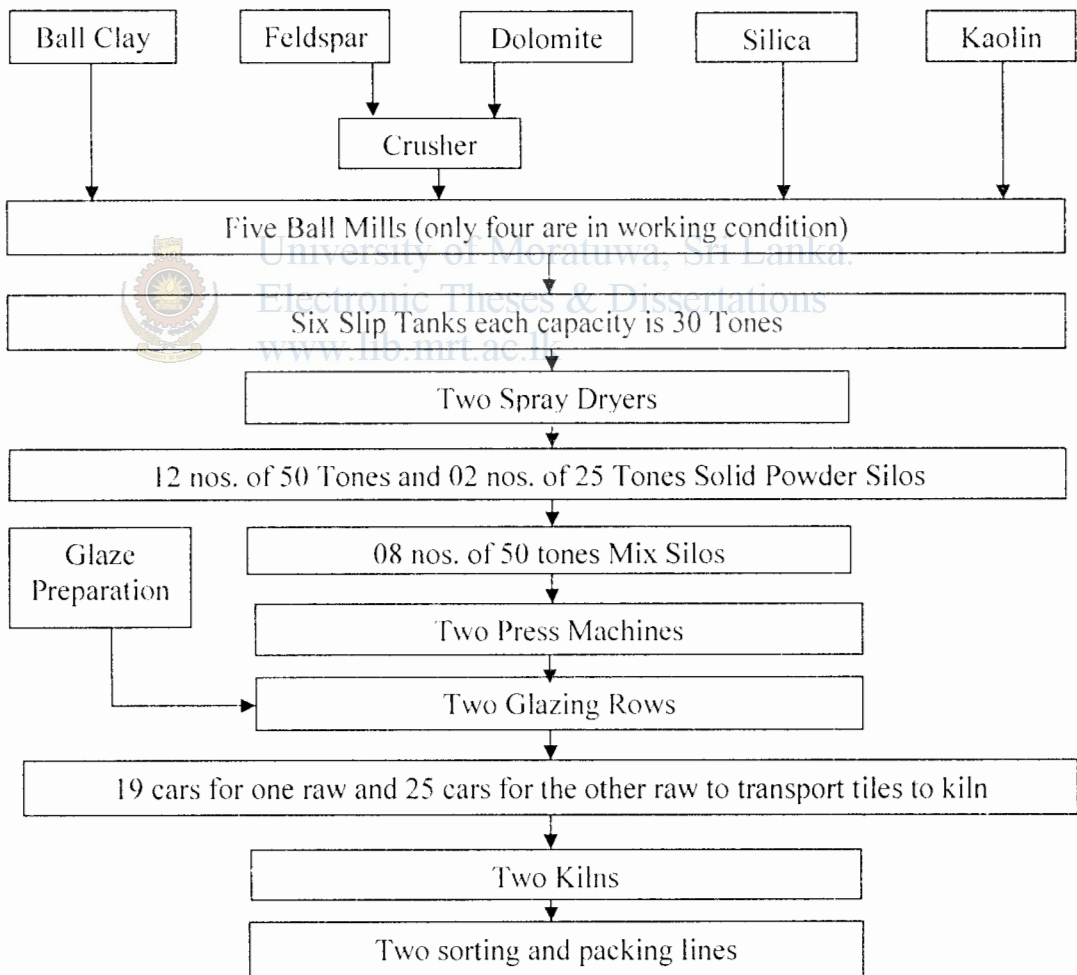


Figure 2.1 - Process Flow Diagram of Royal Ceramics PLC



Department Wise Percentage Energy Consumption

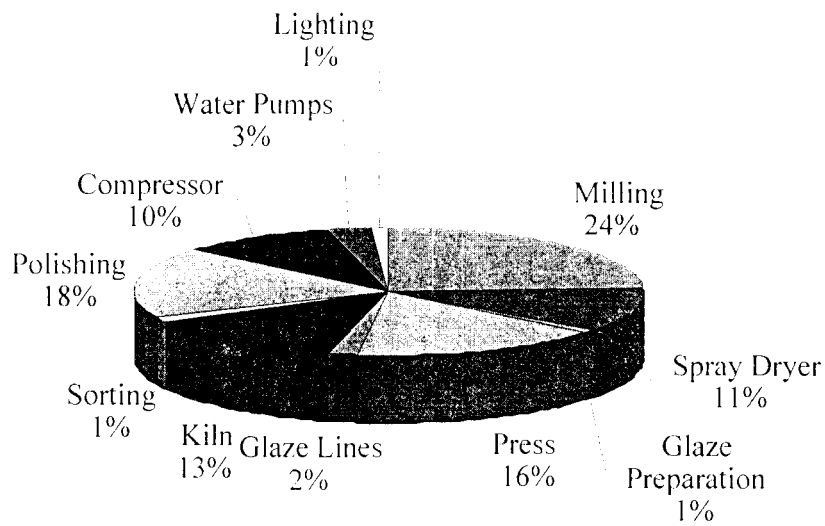


Figure 2.2 – Department wise percentage Energy Consumption of Royal Ceramic PLC

Milling department is the highest electricity consumption section in the factory. The polishing plant is the next highest electricity consumption section as shown in Figure 2.2.



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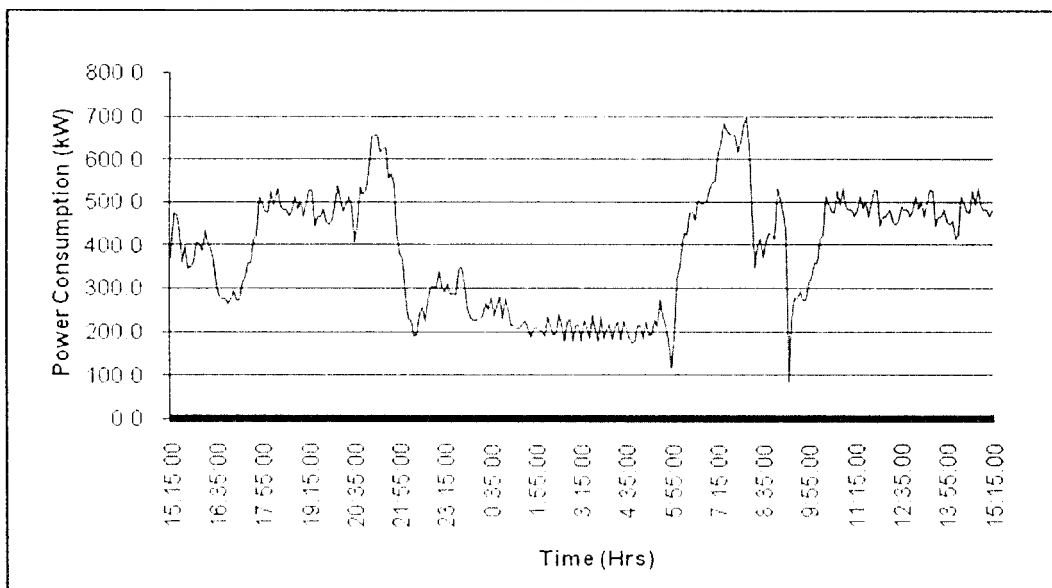


Figure 2.3 - Loading Pattern of Transformer No. 01 of Royal Ceramics PLC

Using the load curve data collected in 23rd and 24th May 2008 following electricity charges per month were calculated for transformer No. 01.

Transformer No. 01						
Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
23 rd May 2008	17:00 to 18:00 Hrs	358.08	9.30	3330.17	7.30	2,614.00
23 rd May 2008	18:00 to 18:30 Hrs	495.69	9.30	2304.95	7.30	1,809.26
23 rd May 2008	18:30 to 19:00 Hrs	484.23	9.30	2251.66	23.00	5,568.62
23 rd May 2008	19:00 to 20:00 Hrs	477.50	9.30	4440.76	23.00	10,982.52
23 rd May 2008	20:00 to 21:00 Hrs	494.30	9.30	4596.96	23.00	11,368.83
23 rd May 2008	21:00 to 22:00 Hrs	571.35	9.30	5313.57	23.00	13,141.08
23 rd May 2008	22:00 to 22:30 Hrs	246.35	9.30	1145.52	23.00	2,833.01
23 rd May 2008	22:30 to 23:00 Hrs	270.81	9.30	1259.28	5.30	717.66
23 rd May 2008	23:00 to 24:00 Hrs	304.35	9.30	2830.48	5.30	1,613.07
24 th May 2008	00:00 to 01:00 Hrs	245.11	9.30	2279.56	5.30	1,299.10
24 th May 2008	01:00 to 02:00 Hrs	217.98	9.30	2027.17	5.30	1,155.27
24 th May 2008	02:00 to 03:00 Hrs	209.57	9.30	1948.99	5.30	1,110.72
24 th May 2008	03:00 to 04:00 Hrs	202.92	9.30	1887.18	5.30	1,075.49
24 th May 2008	04:00 to 04:30 Hrs	205.54	9.30	955.78	5.30	544.69
24 th May 2008	04:30 to 05:00 Hrs	190.66	9.30	886.59	7.30	695.92
24 th May 2008	05:00 to 06:00 Hrs	204.50	9.30	1901.88	7.30	1,492.87
24 th May 2008	06:00 to 07:00 Hrs	425.55	9.30	3957.60	7.30	3,106.50
24 th May 2008	07:00 to 08:00 Hrs	620.34	9.30	5769.15	7.30	4,528.48
24 th May 2008	08:00 to 09:00 Hrs	473.00	9.30	4398.86	7.30	3,452.87
24 th May 2008	09:00 to 10:00 Hrs	329.22	9.30	3061.71	7.30	2,403.28
24 th May 2008	10:00 to 11:00 Hrs	448.38	9.30	4169.90	7.30	3,273.15
24 th May 2008	11:00 to 12:00 Hrs	492.21	9.30	4577.60	7.30	3,593.17
24 th May 2008	12:00 to 13:00 Hrs	467.13	9.30	4344.31	7.30	3,410.05
24 th May 2008	13:00 to 14:00 Hrs	485.42	9.30	4514.41	7.30	3,543.57
24 th May 2008	14:00 to 15:00 Hrs	477.80	9.30	4443.57	7.30	3,487.96
24 th May 2008	15:00 to 16:00 Hrs	394.82	9.30	3671.87	7.30	2,882.22
24 th May 2008	16:00 to 17:00 Hrs	348.58	9.30	3241.84	7.30	2,544.67
Total				85,511.33		94,248.04
Total for 26 days				2,223,294.66		2,450,449.09
Maximum Demand Charge				468,517.50		451,165.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				2,694,812.16		2,904,614.09
Saving due to transfer to the three part time of day tariff						-209,801.93
Percentage of saving						-7.79

Table 2.1 - Comparison of the calculation of Electricity Bill of Royal Ceramics PLC Using Flat Rate Tariff and Three Part Time of Day Tariff

As shown in the Table 2.1 if the electricity account is transferred to the three part time of day tariff the electricity bill of transformer no. 01 will be increased approximately by Rs. 209,801.93 and it is about 7.8 % of its current value.

Therefore to obtain the benefits of three part time of day tariff the loading pattern of transformer no.01 should be adjusted according to the economical time intervals defined by CEB.

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every five minute by data logger.
- To calculate total unit charges per month, number of working days per month is considered as twenty six.

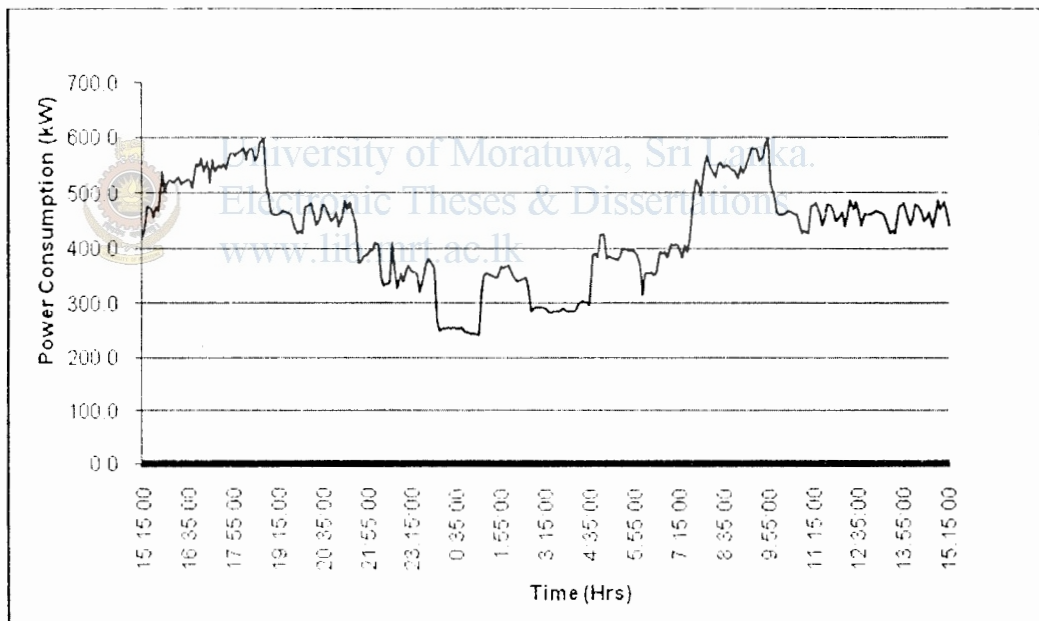


Figure 2.4 - Loading Pattern of Transformer No. 02 of Royal Ceramics PLC

Using the load curve data collected on 23rd and 24th May 2008 following electricity charges per month were calculated for transformer No 02.

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every five minute by data logger.
- To calculate total unit charges per month, number of working days per month is considered as twenty six.

Transformer No. 02						
Date	Time	Avg Power before adjust kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
23rd May 2008	17:00 to 18:00 Hrs	549.81	9.30	5113.24	7.30	4,013.61
23rd May 2008	18:00 to 18:30 Hrs	572.74	9.30	2663.24	7.30	2,090.50
23rd May 2008	18:30 to 19:00 Hrs	564.52	9.30	2625.00	23.00	6,491.94
23rd May 2008	19:00 to 20:00 Hrs	457.56	9.30	4255.27	23.00	10,523.79
23rd May 2008	20:00 to 21:00 Hrs	461.68	9.30	4293.61	23.00	10,618.61
23rd May 2008	21:00 to 22:00 Hrs	435.88	9.30	4053.67	23.00	10,025.21
23rd May 2008	22:00 to 22:30 Hrs	375.07	9.30	1744.08	23.00	4,313.31
23rd May 2008	22:30 to 23:00 Hrs	358.62	9.30	1667.59	5.30	950.35
23rd May 2008	23:00 to 24:00 Hrs	357.39	9.30	3323.69	5.30	1,894.14
24th May 2008	00:00 to 01:00 Hrs	253.40	9.30	2356.62	5.30	1,343.02
24th May 2008	01:00 to 02:00 Hrs	313.14	9.30	2912.22	5.30	1,659.65
24th May 2008	02:00 to 03:00 Hrs	339.24	9.30	3154.95	5.30	1,797.98
24th May 2008	03:00 to 04:00 Hrs	287.27	9.30	2671.60	5.30	1,522.52
24th May 2008	04:00 to 04:30 Hrs	294.29	9.30	1368.44	5.30	779.87
24th May 2008	04:30 to 05:00 Hrs	376.51	9.30	1750.75	7.30	1,374.25
24th May 2008	05:00 to 06:00 Hrs	391.83	9.30	3644.00	7.30	2,860.34
24th May 2008	06:00 to 07:00 Hrs	366.39	9.30	3407.40	7.30	2,674.63
24th May 2008	07:00 to 08:00 Hrs	437.66	9.30	4070.27	7.30	3,194.94
24th May 2008	08:00 to 09:00 Hrs	546.18	9.30	5079.44	7.30	3,987.08
24th May 2008	09:00 to 10:00 Hrs	563.06	9.30	5236.44	7.30	4,110.33
24th May 2008	10:00 to 11:00 Hrs	464.45	9.30	4319.38	7.30	3,390.48
24th May 2008	11:00 to 12:00 Hrs	459.89	9.30	4277.01	7.30	3,357.22
24th May 2008	12:00 to 13:00 Hrs	461.81	9.30	4294.87	7.30	3,371.24
24th May 2008	13:00 to 14:00 Hrs	456.48	9.30	4245.24	7.30	3,332.29
24th May 2008	14:00 to 15:00 Hrs	460.36	9.30	4281.32	7.30	3,360.61
24th May 2008	15:00 to 16:00 Hrs	470.89	9.30	4379.31	7.30	3,437.52
24th May 2008	16:00 to 17:00 Hrs	524.84	9.30	4881.05	7.30	3,831.36
Total				96,069.70		100,306.81
Total for 26 days				2,497,812.31		2,607,976.95
Maximum Demand Charge				468,517.50		451,165.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				2,969,329.81		3,062,141.95
Saving due to transfer to the three part tariff						-92,812.14
Percentage of Savings						-3.13

Table 2.2 - Comparison of the calculation of Electricity Bill of Royal Ceramics PLC Using Flat Rate Tariff and Three Part Time of Day Tariff



As shown in the Table 2.2 if the electricity account is transferred to the three part time of day tariff the electricity bill of transformer no. 02 will be increased approximately by Rs. 92,812.14 and it is about 3.13 % of its current value.

Therefore to obtain the benefits of three part time of day tariff the loading pattern of transformer no.02 should be adjusted according to the economical time intervals defined by CEB.

2.2.2. Lanka Walltile PLC

As the first Walltile Company in Sri Lanka the Lanka Walltile Limited was established in Balangoda in 1975 under the Lanka Ceramic Corporation. The rapid growth of the both domestic and export market led them to setup their second factory in Meepe as Lanka Walltile Meepe Private Limited. Today they produce variety of tiles with special trim tiles, decorated tiles, hand made and hand printed tiles, targeting the expanding and diverse market. The annual production capacity is three million square meters of tiles.

CEB electricity is supplied to the factory through three 1000 kVA transformers and emergency power is supplied by a 1250 kVA standby generator. Two 1000 kVA transformers are used to power supply to the canteen, office, stores and housing scheme, gas yard and for Kilns while other one is connected to the factory.

Process flow diagram is almost same as shown in Figure 2.1, the “process flow diagram of Royal Ceramics PLC” other than the differences of number of equipments and the capacities of the equipments.

Also the department wise energy consumption was plotted using the data obtained from the factory as shown in Figure 2.5 and found the highest energy consumer is milling department as same as in Royal Ceramics PLC.



Department Wise Percentage Energy Consumption

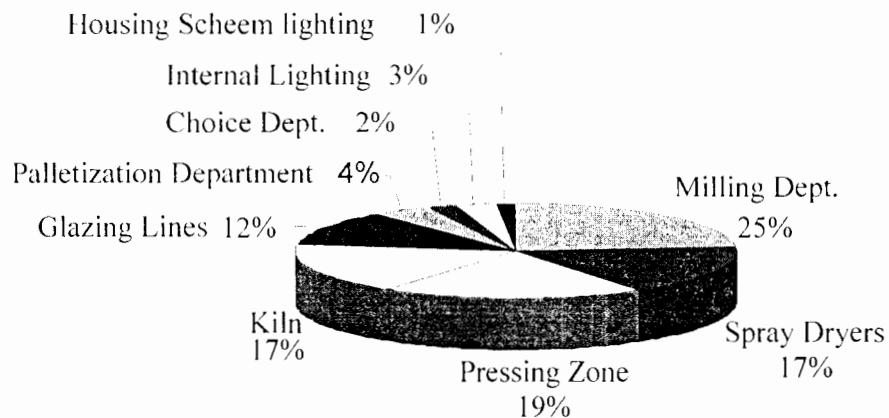


Figure 2.5 – Department wise Percentage Energy Consumption of Lanka Walltile PLC

Data logger was connected from 25th November 2008 to 26th November 2008 and recorded data every minute was plotted as follows.

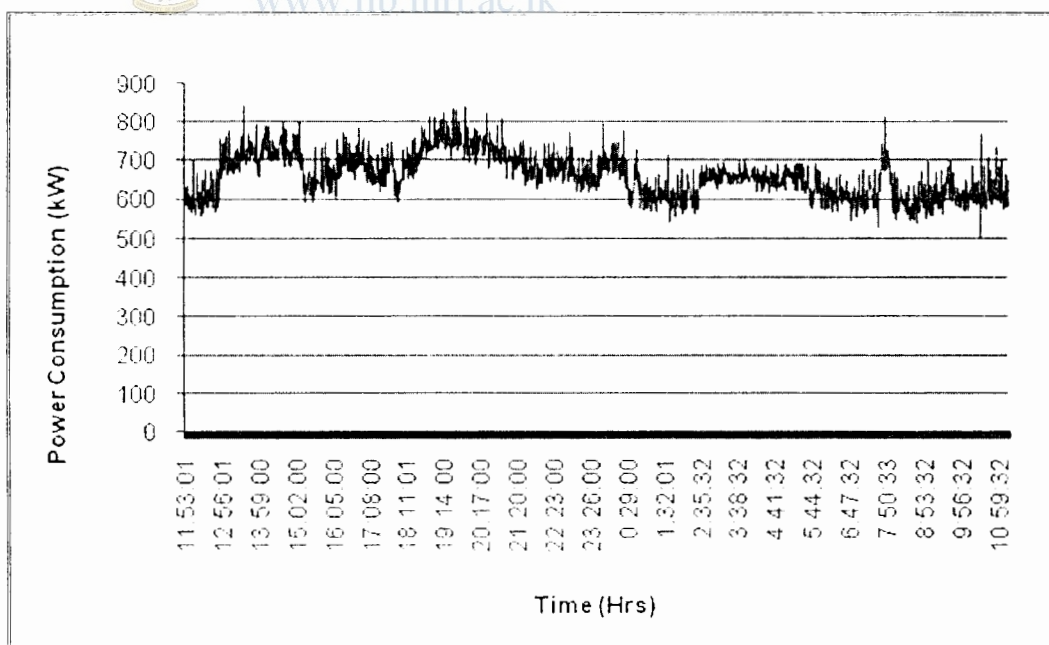


Figure 2.6 - Loading Pattern of Lanka Walltile PLC

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every five minute by data logger.
- To calculate total unit charges per month, number of working days per month is considered as twenty six.

Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
25th Nov 2008	17:00 to 18:00 Hrs	672.19	9.30	6251.35	7.30	4,906.97
25th Nov 2008	18:00 to 18:30 Hrs	686.14	9.30	3190.57	7.30	2,504.43
25th Nov 2008	18:30 to 19:00 Hrs	742.63	9.30	3453.25	23.00	8,540.30
25th Nov 2008	19:00 to 20:00 Hrs	761.01	9.30	7077.36	23.00	17,503.15
25th Nov 2008	20:00 to 21:00 Hrs	737.23	9.30	6856.20	23.00	16,956.18
25th Nov 2008	21:00 to 22:00 Hrs	691.04	9.30	6426.70	23.00	15,893.98
25th Nov 2008	22:00 to 22:30 Hrs	680.47	9.30	3164.17	23.00	7,825.37
25th Nov 2008	22:30 to 23:00 Hrs	685.00	9.30	3185.27	5.30	1,815.26
25th Nov 2008	23:00 to 24:00 Hrs	670.83	9.30	6238.75	5.30	3,555.42
26th Nov 2008	00:00 to 01:00 Hrs	663.91	9.30	6174.39	5.30	3,518.74
26th Nov 2008	01:00 to 02:00 Hrs	611.23	9.30	5684.47	5.30	3,239.54
26th Nov 2008	02:00 to 03:00 Hrs	631.17	9.30	5869.92	5.30	3,345.23
26th Nov 2008	03:00 to 04:00 Hrs	663.18	9.30	6167.59	5.30	3,514.86
26th Nov 2008	04:00 to 04:30 Hrs	658.21	9.30	3060.68	5.30	1,744.26
26th Nov 2008	04:30 to 05:00 Hrs	656.14	9.30	3051.04	7.30	2,394.90
26th Nov 2008	05:00 to 06:00 Hrs	651.28	9.30	6056.93	7.30	4,754.36
26th Nov 2008	06:00 to 07:00 Hrs	609.67	9.30	5669.90	7.30	4,450.57
26th Nov 2008	07:00 to 08:00 Hrs	694.35	9.30	6457.48	7.30	5,068.77
26th Nov 2008	08:00 to 09:00 Hrs	592.83	9.30	5513.36	7.30	4,327.69
26th Nov 2008	09:00 to 10:00 Hrs	616.84	9.30	5736.60	7.30	4,502.92
26th Nov 2008	10:00 to 11:00 Hrs	617.00	9.30	5738.14	7.30	4,504.13
26th Nov 2008	11:00 to 12:00 Hrs	606.25	9.30	5638.14	7.30	4,425.64
26th Nov 2008	12:00 to 13:00 Hrs	615.23	9.30	5721.63	7.30	4,491.17
26th Nov 2008	13:00 to 14:00 Hrs	714.08	9.30	6640.97	7.30	5,212.80
26th Nov 2008	14:00 to 15:00 Hrs	730.31	9.30	6791.91	7.30	5,331.29
26th Nov 2008	15:00 to 16:00 Hrs	669.55	9.30	6226.82	7.30	4,887.72
26th Nov 2008	16:00 to 17:00 Hrs	693.15	9.30	6446.30	7.30	5,060.00
Total				148,489.90		154,275.65
Total for 26 days				3,860,737.29		4,011,166.99
Maximum Demand Charge				565,650.00		544,700.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				4,429,387.29		4,558,866.99
Saving due to transfer to the three part tariff						-129,479.70
						-2.92

Table 2.3 - Comparison of the calculation of Electricity Bill of Lanka Walltile PLC Using Flat Rate Tariff and Three Part Time of Day Tariff

As shown in the Table 2.3 the electricity bill will be increased approximately about 3% from its previous amount if they transfer to three part time of day tariff. Therefore they also need to do some adjustments to their loading pattern to obtain benefits by time of day tariff.

2.2.3. Associated Motorways PLC (AMW)

The Associated Motorways (AMW) draws its electricity from the national grid at 11kV. Seven transformers having capacities of 2X400kVA, 600kVA, 630kVA, 750kVA, 2X800kVA are installed to step down the supply voltage to 400V. Two numbers of 2,000kVA transformers are used to step down the supply voltage from 11kV to 6kV. One 3,000kVA step-up transformer is connected to the generators to provide standby power at 11kV to a section of AMW power system. This enables energizing essential loads in case of a grid power failure. In addition to this 3,000kVA transformer, another 400kVA transformer is also available, though not energized at present. The power supply is backed-up by three emergency generators of 750kVA.

The department wise energy consumption was plotted according to the data given by the factory as shown in Figure 2.7 and found that the Compound Department is the highest energy consumer.

The electricity metering of AMW factory is done at the 11kV side under the category of two part time of day tariff 1-3 (TD2). Data logger was connected to the 11kV side using voltage and current transformers due to the data logger is not capable for high voltages. The department wise energy consumption was plotted in Figure 2.7 according to the data provided by the factory. The collected data on 11th March 2009 was plotted in Figure 2.8.

Department Wise Percentage Energy Consumption

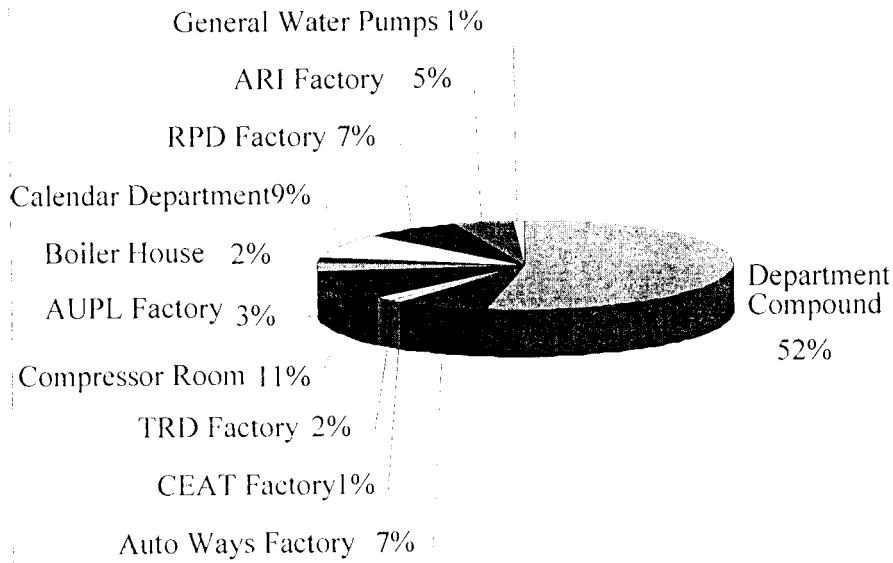


Figure 2.7 - Department wise Percentage Energy Consumption of Associated Motorways PLC

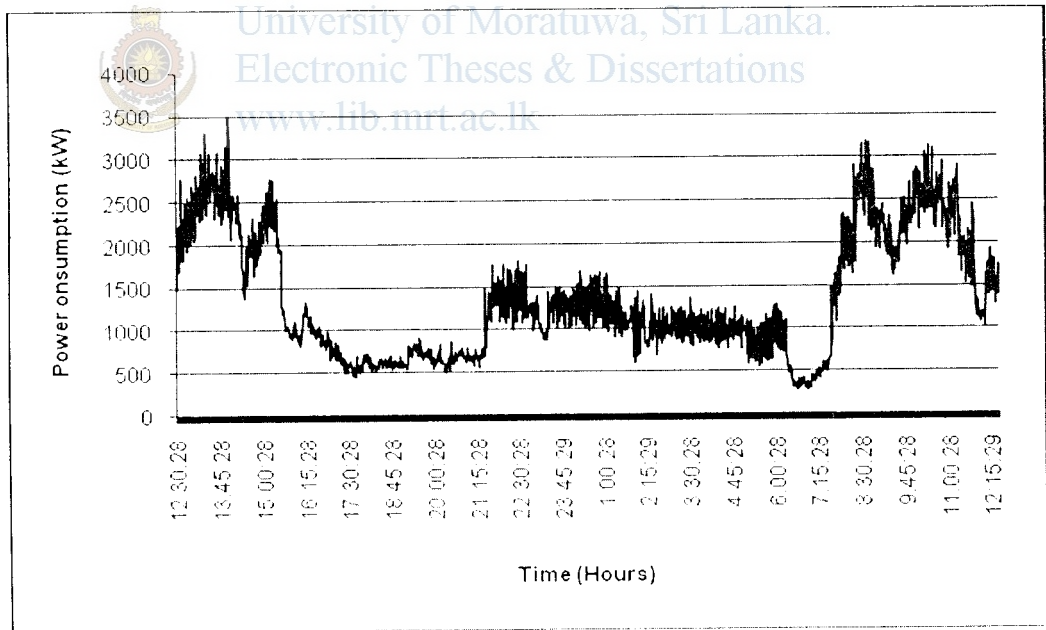


Figure 2.8 - Loading Pattern of Associated Motorways PLC

Date	Time	Avg Power kWh	Two Interval Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
11th March 2009	12:00 to 13:00 Hrs	2188.47	8.00	17507.79	6.90	15,100.47
11th March 2009	13:00 to 14:00 Hrs	2638.31	8.00	21106.48	6.90	18,204.34
11th March 2009	14:00 to 15:00 Hrs	1968.34	8.00	15746.71	6.90	13,581.54
11th March 2009	15:00 to 16:00 Hrs	1121.38	8.00	8971.02	6.90	7,737.51
11th March 2009	16:00 to 17:00 Hrs	898.59	8.00	7188.72	6.90	6,200.27
11th March 2009	17:00 to 18:00 Hrs	580.48	8.00	4643.84	6.90	4,005.32
11th March 2009	18:00 to 18:30 Hrs	606.27	8.00	2425.09	6.90	2,091.64
11th March 2009	18:30 to 19:00 Hrs	613.13	23.00	7051.03	21.00	6,437.89
11th March 2009	19:00 to 20:00 Hrs	725.85	23.00	16694.55	21.00	15,242.85
11th March 2009	20:00 to 21:00 Hrs	696.16	23.00	16011.69	21.00	14,619.37
11th March 2009	21:00 to 21:30 Hrs	717.65	23.00	16506.05	21.00	15,070.74
11th March 2009	21:30 to 22:00 Hrs	1326.82	8.00	10614.56	21.00	27,863.23
11th March 2009	22:00 to 22:30 Hrs	1449.20	8.00	5796.80	21.00	15,216.59
11th March 2009	22:30 to 23:00 Hrs	1331.79	8.00	5327.16	5.00	3,329.48
11th March 2009	23:00 to 24:00 Hrs	1294.30	8.00	10354.42	5.00	6,471.51
12th March 2009	00:00 to 01:00 Hrs	1358.72	8.00	10869.80	5.00	6,793.62
12th March 2009	01:00 to 02:00 Hrs	1041.99	8.00	8335.94	5.00	5,209.96
12th March 2009	02:00 to 03:00 Hrs	1038.27	8.00	8306.20	5.00	5,191.37
12th March 2009	03:00 to 04:00 Hrs	1032.15	8.00	8257.23	5.00	5,160.77
12th March 2009	04:00 to 04:30 Hrs	1011.41	8.00	4045.64	5.00	2,528.52
12th March 2009	04:30 to 05:00 Hrs	998.17	8.00	3992.69	6.90	3,443.70
12th March 2009	05:00 to 06:00 Hrs	869.29	8.00	6954.28	6.90	5,998.07
12th March 2009	06:00 to 07:00 Hrs	348.03	8.00	2784.23	6.90	2,401.40
12th March 2009	07:00 to 08:00 Hrs	1402.58	8.00	11220.65	6.90	9,677.81
12th March 2009	08:00 to 09:00 Hrs	2538.39	8.00	20307.09	6.90	17,514.87
12th March 2009	09:00 to 10:00 Hrs	2228.00	8.00	17823.98	6.90	15,373.18
12th March 2009	10:00 to 11:00 Hrs	2496.22	8.00	19969.80	6.90	17,223.95
12th March 2009	11:00 to 12:00 Hrs	1543.50	8.00	12348.03	6.90	10,650.18
Total				230,640.76		217,516.03
Total for 26 days				5,996,659.78		5,655,416.73
Maximum Demand Charge				2,280,330.00		2,280,330.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				8,279,989.78		7,938,746.73
Saving due to transfer to the three part tariff						341,243.05
Percentage of saving						4.12

Table 2.4 - Comparison of the calculation of Electricity Bill of Associated Motorways PLC Using Two Part Time of Day Tariff and Three Part Time of Day Tariff

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every minute by data logger.
- To calculate total unit charges per month, number of working days per month is considered as twenty six.

Associated Motorways PLC has well arranged their loading pattern to suit for the two part time of day tariff that are currently applied.

According to the data in the Table 2.4 the electricity charges of Associated Motorways PLC will have the minimum benefit of 4.12% of their current amount if they transfer to the three part time of day tariff from two part time of day tariff.

2.2.4. NoFalk Foods Pvt. Ltd.

NoFalk foods pvt. Ltd. is a meat further processing industry situated in the industrial zone at Katuwana near Homagama. Most of their machineries are self developed grinding and mixing machines and the cool rooms are the main electricity consumers after the stop of their food production at 18:00 hrs. CEB Power is supplied to the factory through 600 kVA transformer and for the emergencies 500 kVA diesel generator is available as a standby set.

Data logger was connected on 28th October 2008 at Nofalk foods Pvt. Ltd. and plotted the obtained data in Figure 2.10.

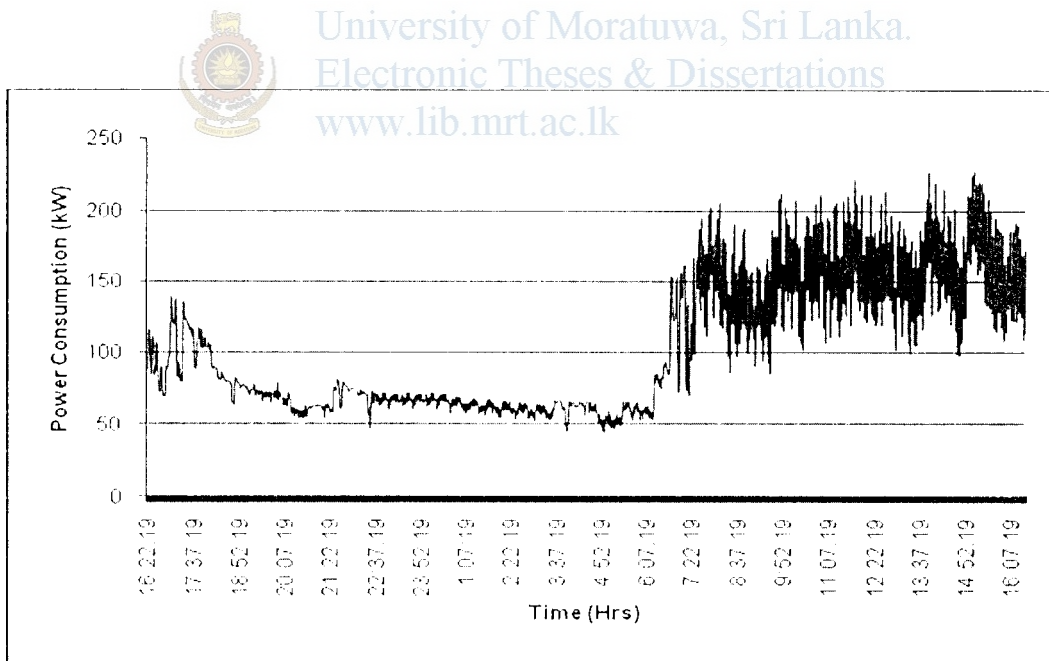


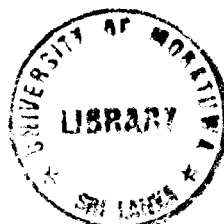
Figure 2.9 - Loading pattern of NoFalk Foods Pvt Ltd.

Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
28th Oct 2008	17:00 to 18:00 Hrs	109.80	9.30	1021.14	7.30	801.54
28th Oct 2008	18:00 to 18:30 Hrs	98.85	9.30	459.67	7.30	360.81
28th Oct 2008	18:30 to 19:00 Hrs	81.93	9.30	380.95	23.00	942.14
28th Oct 2008	19:00 to 20:00 Hrs	72.53	9.30	674.54	23.00	1,668.22
28th Oct 2008	20:00 to 21:00 Hrs	62.45	9.30	580.81	23.00	1,436.40
28th Oct 2008	21:00 to 22:00 Hrs	67.98	9.30	632.23	23.00	1,563.59
28th Oct 2008	22:00 to 22:30 Hrs	71.48	9.30	332.36	23.00	821.98
28th Oct 2008	22:30 to 23:00 Hrs	69.23	9.30	321.91	5.30	183.45
28th Oct 2008	23:00 to 24:00 Hrs	67.66	9.30	629.25	5.30	358.60
28th Oct 2008	00:00 to 01:00 Hrs	62.86	9.30	584.62	5.30	333.17
28th Oct 2008	01:00 to 02:00 Hrs	62.86	9.30	584.62	5.30	333.17
28th Oct 2008	02:00 to 03:00 Hrs	60.43	9.30	562.03	5.30	320.30
28th Oct 2008	03:00 to 04:00 Hrs	59.91	9.30	557.17	5.30	317.53
28th Oct 2008	04:00 to 04:30 Hrs	61.78	9.30	287.29	5.30	163.72
28th Oct 2008	04:30 to 05:00 Hrs	60.66	9.30	282.07	7.30	221.41
28th Oct 2008	05:00 to 06:00 Hrs	56.95	9.30	529.68	7.30	415.77
28th Oct 2008	06:00 to 07:00 Hrs	86.30	9.30	802.63	7.30	630.03
28th Oct 2008	07:00 to 08:00 Hrs	134.87	9.30	1254.33	7.30	984.58
28th Oct 2008	08:00 to 09:00 Hrs	138.78	9.30	1290.68	7.30	1,013.11
28th Oct 2008	09:00 to 10:00 Hrs	138.93	9.30	1292.08	7.30	1,014.22
28th Oct 2008	10:00 to 11:00 Hrs	156.07	9.30	1451.43	7.30	1,139.29
28th Oct 2008	11:00 to 12:00 Hrs	158.68	9.30	1475.71	7.30	1,158.36
28th Oct 2008	12:00 to 13:00 Hrs	154.97	9.30	1441.24	7.30	1,131.30
28th Oct 2008	13:00 to 14:00 Hrs	154.97	9.30	1441.23	7.30	1,131.28
28th Oct 2008	14:00 to 15:00 Hrs	158.55	9.30	1474.52	7.30	1,157.42
28th Oct 2008	15:00 to 16:00 Hrs	163.63	9.30	1521.74	7.30	1,194.48
28th Oct 2008	16:00 to 17:00 Hrs	142.92	9.30	1329.18	7.30	1,043.33
Total				23,195.10		21,839.19
Total for 26 days				603,072.48		567,818.99
Maximum Demand Charge				159,772.50		153,855.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				765,844.98		724,673.99
Saving due to transfer to the three part tariff						41,170.99
Percentage of Saving						5.38

Table 2.5 - Comparison of the calculation of Electricity Bill of NoFalk Foods Pvt Ltd. Using Flat Rate Tariff and Three Part Time of Day Tariff

As shown in the Table 2.5 the electricity bill will be decreased approximately about 5.38% from its previous amount if they transfer to three part time of day tariff.

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2.2.5. Unidil Packaging Pvt Ltd.

Unidil packaging is a company which produces and supplies corrugated cartons to the industries of Sri Lanka. The company is situated at Delgoda and has a workforce of 250 with a production capacity of 10,000 tons of paper per year. It's a company under the group of Ceylon Theaters, and is among the top three corrugated carton manufactures in Sri Lanka.

The main raw material is paper imported from countries such as USA, Japan, Indonesia, Singapore, Pakistan, Germany and South Africa. The first stage of production involves corrugating the paper using a corrugating machine which mainly consists of C/flute, B/flute and double phaser machines. Three-ply and five-ply papers are produced from these machines and then sent to three printing machines installed in the printing section. Other than to the above, a gluer, a slitting machine, and bundling machines are used in the process of making carton.

Electricity is supplied to the factory through 630 kVA transformer installed at factory premises and 250 kVA diesel generator is available for emergencies as a standby power supply. The Corrugator is the highest energy consumer in the factory as shown in Figure 2.12.

Process flow diagram of Unidil Packaging Pvt. Ltd. is shown below in Figure 2.10.

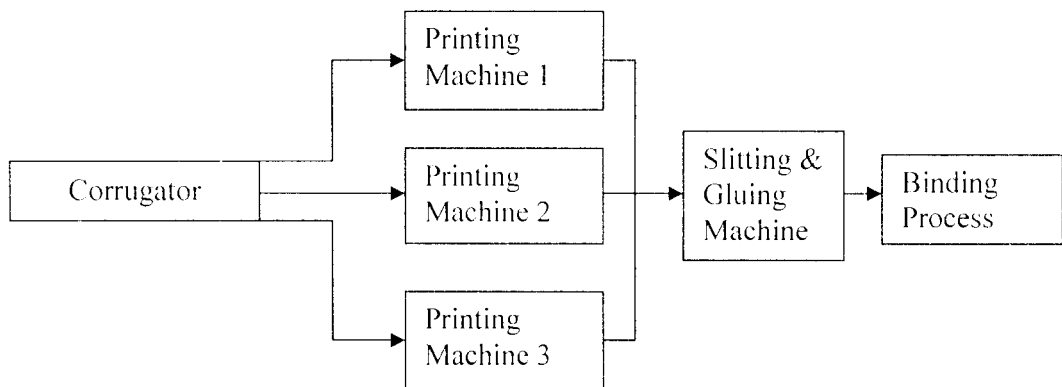


Figure 2.10 – Process Flow Diagram of Unidil Packaging

The section wise energy consumption was plotted in Figure 2.11 using the data given by the factory and data logger was connected on 27th June 2008 and obtained data plotted in Figure 2.12.

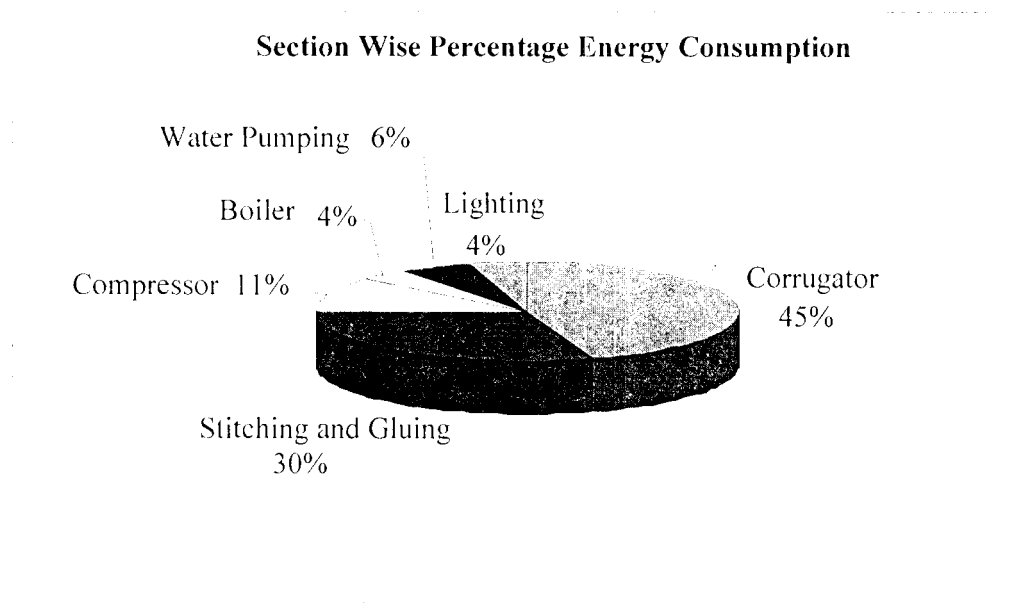


Figure 2.11 – Section wise Percentage Energy Consumption of Unidil Packaging Pvt. Ltd.



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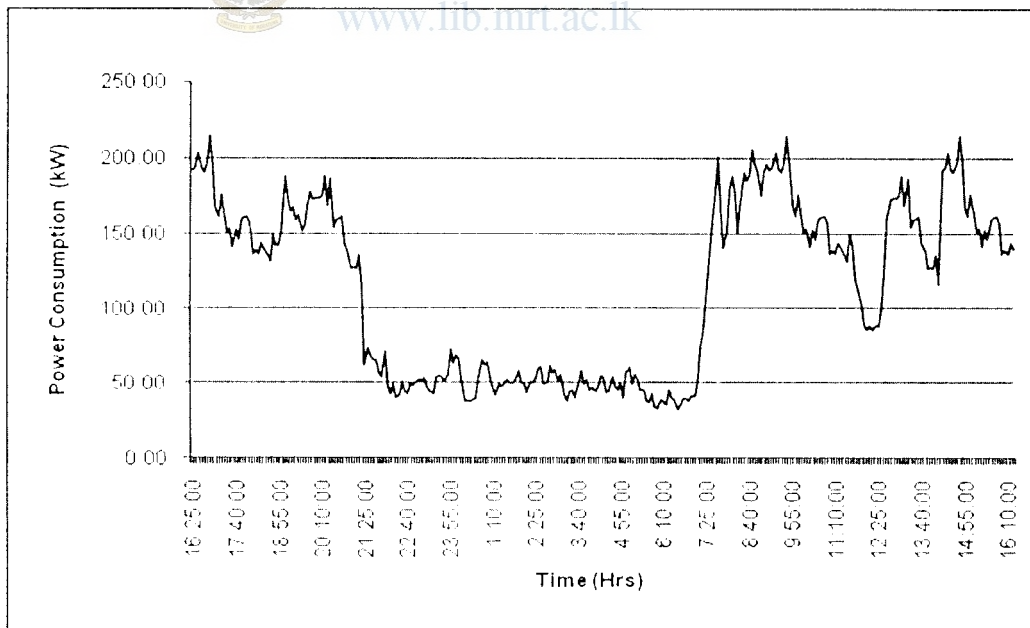


Figure 2.12 - Loading Pattern of Unidil Packaging Pvt Ltd.

Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total charge for the duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
27th June 2008	17:00 to 18:00 Hrs	160.72	9.30	1494.72	7.30	1,173.27
27th June 2008	18:00 to 18:30 Hrs	144.83	9.30	673.47	7.30	528.64
27th June 2008	18:30 to 19:00 Hrs	140.07	9.30	651.34	23.00	1,610.85
27th June 2008	19:00 to 20:00 Hrs	166.04	9.30	1544.15	23.00	3,818.86
27th June 2008	20:00 to 21:00 Hrs	165.11	9.30	1535.51	23.00	3,797.49
27th June 2008	21:00 to 22:00 Hrs	63.45	9.30	590.09	23.00	1,459.35
27th June 2008	22:00 to 22:30 Hrs	48.87	9.30	227.23	23.00	561.96
27th June 2008	22:30 to 23:00 Hrs	46.99	9.30	218.51	5.30	124.53
27th June 2008	23:00 to 24:00 Hrs	52.58	9.30	489.00	5.30	278.68
27th June 2008	00:00 to 01:00 Hrs	51.59	9.30	479.80	5.30	273.44
27th June 2008	01:00 to 02:00 Hrs	51.11	9.30	475.35	5.30	270.90
27th June 2008	02:00 to 03:00 Hrs	52.68	9.30	489.91	5.30	279.20
27th June 2008	03:00 to 04:00 Hrs	48.42	9.30	450.33	5.30	256.64
27th June 2008	04:00 to 04:30 Hrs	47.73	9.30	221.95	5.30	126.49
27th June 2008	04:30 to 05:00 Hrs	47.83	9.30	222.41	7.30	174.58
27th June 2008	05:00 to 06:00 Hrs	46.11	9.30	428.79	7.30	336.58
27th June 2008	06:00 to 07:00 Hrs	37.52	9.30	348.95	7.30	273.91
27th June 2008	07:00 to 08:00 Hrs	115.17	9.30	1071.10	7.30	840.76
27th June 2008	08:00 to 09:00 Hrs	181.21	9.30	1685.29	7.30	1,322.86
27th June 2008	09:00 to 10:00 Hrs	192.57	9.30	1790.93	7.30	1,405.79
27th June 2008	10:00 to 11:00 Hrs	156.84	9.30	1458.64	7.30	1,144.95
27th June 2008	11:00 to 12:00 Hrs	127.18	9.30	1182.79	7.30	928.42
27th June 2008	12:00 to 13:00 Hrs	119.18	9.30	1108.37	7.30	870.01
27th June 2008	13:00 to 14:00 Hrs	157.35	9.30	1463.39	7.30	1,148.69
27th June 2008	14:00 to 15:00 Hrs	177.22	9.30	1648.16	7.30	1,293.72
27th June 2008	15:00 to 16:00 Hrs	156.84	9.30	1458.64	7.30	1,144.95
27th June 2008	16:00 to 17:00 Hrs	138.95	9.30	1292.20	7.30	1,014.31
Total				24,701.02		26,459.81
Total for 26 days				642,226.55		687,955.01
Maximum Demand Charge				159,772.50		153,855.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				804,999.05		844,810.01
Saving due to transfer to the three part tariff						-39,810.96
Percentage of Saving						-4.95

Table 2.6 - Comparison of the calculation of Electricity Bill of Unidil Packaging Pvt Ltd. Using Flat Rate Tariff and Three Part Time of Day Tariff

Assumptions:

- Average energy consumption per hour was calculated using the data recorded every five minute by data logger.
- To calculate total unit charges per month, number of working days per month is considered as twenty six.

As shown in the Table 2.6 the electricity bill will be increased approximately by about 4.95% from its previous amount if they transfer to three part time of day tariff.

2.2.6 Orit Apparel Lanka Pvt Ltd

Orit Apparels Lanka (Pvt.) Limited is a BOI approved limited liability company, owned by Orit Holdings Ltd of the British Virgin Islands, and currently employs a workforce of 2500 in manufacturing plants situated in Naula, Embilipitiya, Marawila and Seethawaka. The Company has a collective production capacity of 5.8 million pieces per year. The first stage of production involves cutting of fabric at Seethawaka factory, sending them to the three factories at Naula, Embilipitiya and Marawila, and sending them back to the Seethawaka washing plant where the washing and finishing process is executed prior to export.

The electricity is supplied to the Company from the Seethawaka primary substation of CEB through two separate transformers, each of capacity 1000kVA. Also two standby generators are available for the emergency situations and the energy consumption is metered at low voltage end as two separate energy accounts under the 1-2 tariff structure. The data logger was connected to transformer No. 01 on 30th March 2009 and plotted obtained data as shown in Figure 2.13.

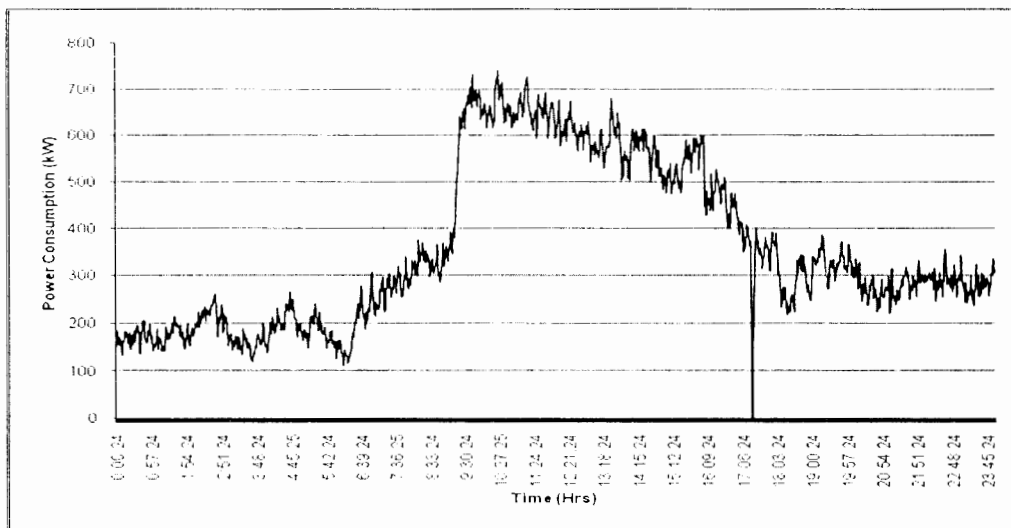


Figure 2.13 - Loading Pattern of Transformer No. 01 of Orit Apparel Lanka Pvt Ltd.

Transformer No. 01						
Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
28th Oct 2008	17:00 to 18:00 Hrs	355.88	9.30	3309.72	7.30	2,597.95
28th Oct 2008	18:00 to 18:30 Hrs	269.65	9.30	1253.86	7.30	984.21
28th Oct 2008	18:30 to 19:00 Hrs	294.55	9.30	1369.68	23.00	3,387.37
28th Oct 2008	19:00 to 20:00 Hrs	327.02	9.30	3041.25	23.00	7,521.37
28th Oct 2008	20:00 to 21:00 Hrs	263.02	9.30	2446.05	23.00	6,049.37
28th Oct 2008	21:00 to 22:00 Hrs	289.13	9.30	2688.93	23.00	6,650.04
28th Oct 2008	22:00 to 22:30 Hrs	288.97	9.30	1343.70	23.00	3,323.13
28th Oct 2008	22:30 to 23:00 Hrs	293.19	9.30	1363.31	5.30	776.94
28th Oct 2008	23:00 to 24:00 Hrs	289.43	9.30	2691.67	5.30	1,533.96
28th Oct 2008	00:00 to 01:00 Hrs	175.37	9.30	1630.89	5.30	929.43
28th Oct 2008	01:00 to 02:00 Hrs	180.04	9.30	1674.39	5.30	954.22
28th Oct 2008	02:00 to 03:00 Hrs	218.62	9.30	2033.15	5.30	1,158.68
28th Oct 2008	03:00 to 04:00 Hrs	155.91	9.30	1449.96	5.30	826.32
28th Oct 2008	04:00 to 04:30 Hrs	186.79	9.30	868.55	5.30	494.98
28th Oct 2008	04:30 to 05:00 Hrs	216.03	9.30	1004.54	7.30	788.51
28th Oct 2008	05:00 to 06:00 Hrs	169.30	9.30	1574.48	7.30	1,235.88
28th Oct 2008	06:00 to 07:00 Hrs	237.68	9.30	2210.45	7.30	1,735.09
28th Oct 2008	07:00 to 08:00 Hrs	287.63	9.30	2674.99	7.30	2,099.72
28th Oct 2008	08:00 to 09:00 Hrs	325.77	9.30	3029.70	7.30	2,378.15
28th Oct 2008	09:00 to 10:00 Hrs	675.27	9.30	6280.04	7.30	4,929.49
28th Oct 2008	10:00 to 11:00 Hrs	650.23	9.30	6047.10	7.30	4,746.65
28th Oct 2008	11:00 to 12:00 Hrs	649.19	9.30	6037.50	7.30	4,739.12
28th Oct 2008	12:00 to 13:00 Hrs	594.71	9.30	5530.78	7.30	4,341.37
28th Oct 2008	13:00 to 14:00 Hrs	583.48	9.30	5426.35	7.30	4,259.40
28th Oct 2008	14:00 to 15:00 Hrs	539.87	9.30	5020.78	7.30	3,941.04
28th Oct 2008	15:00 to 16:00 Hrs	565.74	9.30	5261.39	7.30	4,129.91
28th Oct 2008	16:00 to 17:00 Hrs	452.50	9.30	4208.26	7.30	3,303.26
Total				81,471.49		79,815.57
Total for 26 days				2,118,258.80		2,075,204.76
Maximum Demand Charge				498,777.75		480,304.50
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				2,620,036.55		2,558,509.26
Saving due to transfer to the three part tariff						61,527.29
						2.35

Table 2.7 - Comparison of the calculation of Electricity Bill for Transformer No. 01 of Orit Apparel Lanka Pvt Ltd. Using Flat Rate Tariff and Three Part Time of Day Tariff

As shown in the Table 2.7 if the electricity account is transferred to the three part time of day tariff the electricity bill amount of transformer no. 01 will be decreased by Rs. 61,527.29 and it is about 2.35 % of its current value.

Therefore to maximize the benefits from three part time of day tariff the loading pattern of transformer no.01 has to be adjusted according to the economical time intervals defined by CEB.

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every minute by data logger.
- To calculate total unit charges per month, number of working days per month is considered as twenty six.

Data logger was connected to transformer No. 02 on 1st April 2009 and plotted obtained data as shown in Figure 2.14.

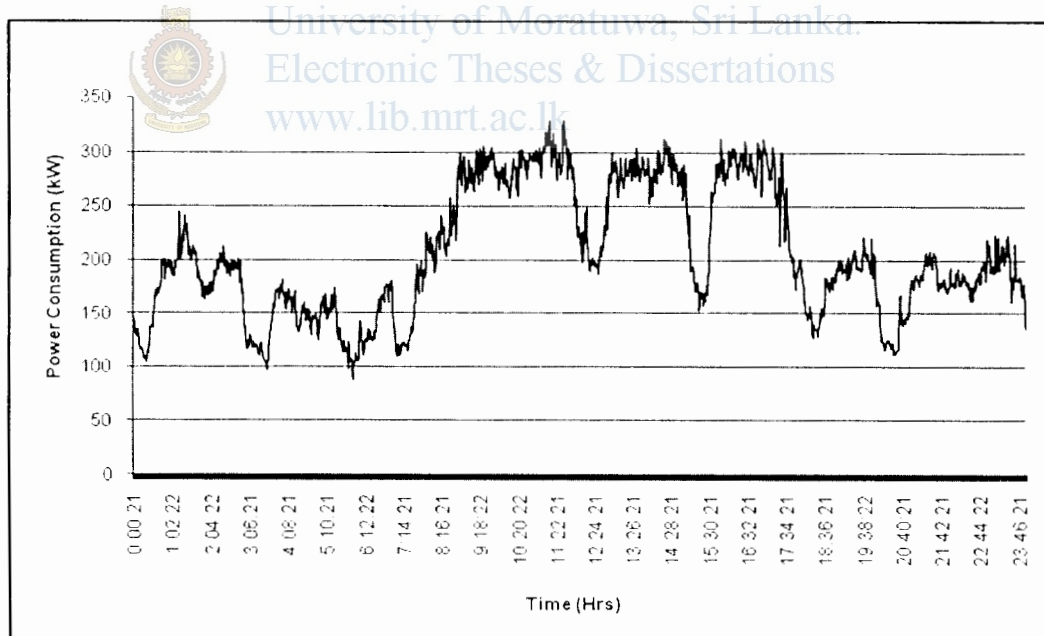


Figure 2.14 - Loading Pattern of Transformer No. 02 of Orit Apparel Lanka Pvt Ltd.

Transformer No. 02						
Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
1st April 2009	17:00 to 18:00 Hrs	204.79	9.30	1904.53	7.30	1,494.95
1st April 2009	18:00 to 18:30 Hrs	144.87	9.30	673.64	7.30	528.77
1st April 2009	18:30 to 19:00 Hrs	177.02	9.30	823.15	23.00	2,035.74
1st April 2009	19:00 to 20:00 Hrs	196.01	9.30	1822.86	23.00	4,508.14
1st April 2009	20:00 to 21:00 Hrs	153.61	9.30	1428.57	23.00	3,533.03
1st April 2009	21:00 to 22:00 Hrs	181.19	9.30	1685.04	23.00	4,167.30
1st April 2009	22:00 to 22:30 Hrs	178.92	9.30	831.99	23.00	2,057.60
1st April 2009	22:30 to 23:00 Hrs	187.45	9.30	871.66	5.30	496.75
1st April 2009	23:00 to 24:00 Hrs	178.71	9.30	1662.02	5.30	947.17
1st April 2009	00:00 to 01:00 Hrs	181.79	9.30	1690.67	5.30	963.50
1st April 2009	01:00 to 02:00 Hrs	186.38	9.30	1733.30	5.30	987.79
1st April 2009	02:00 to 03:00 Hrs	182.24	9.30	1694.80	5.30	965.86
1st April 2009	03:00 to 04:00 Hrs	147.42	9.30	1371.03	5.30	781.34
1st April 2009	04:00 to 04:30 Hrs	155.34	9.30	722.32	5.30	411.64
1st April 2009	04:30 to 05:00 Hrs	144.16	9.30	670.33	7.30	526.17
1st April 2009	05:00 to 06:00 Hrs	111.93	9.30	1040.93	7.30	817.07
1st April 2009	06:00 to 07:00 Hrs	163.11	9.30	1516.95	7.30	1,190.72
1st April 2009	07:00 to 08:00 Hrs	192.05	9.30	1786.06	7.30	1,401.96
1st April 2009	08:00 to 09:00 Hrs	265.39	9.30	2468.09	7.30	1,937.32
1st April 2009	09:00 to 10:00 Hrs	285.35	9.30	2653.76	7.30	2,083.06
1st April 2009	10:00 to 11:00 Hrs	292.79	9.30	2722.96	7.30	2,137.37
1st April 2009	11:00 to 12:00 Hrs	277.54	9.30	2581.10	7.30	2,026.03
1st April 2009	12:00 to 13:00 Hrs	250.02	9.30	2325.20	7.30	1,825.15
1st April 2009	13:00 to 14:00 Hrs	282.04	9.30	2622.95	7.30	2,058.88
1st April 2009	14:00 to 15:00 Hrs	266.97	9.30	2482.84	7.30	1,948.90
1st April 2009	15:00 to 16:00 Hrs	275.32	9.30	2560.43	7.30	2,009.80
1st April 2009	16:00 to 17:00 Hrs	289.64	9.30	2693.69	7.30	2,114.40
Total				47,040.86		45,956.43
Total for 26 days				1,223,062.24		1,194,867.23
Maximum Demand Charge				221,400.00		213,200.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				1,447,462.24		1,411,067.23
Saving due to transfer to the three part tariff						36,395.01
Percentage of Saving						2.51

Table 2.8 - Comparison of the calculation of Electricity Bill for Transformer No. 02 of Orit Apparel Lanka Pvt Ltd. Using Flat Rate Tariff and Three Part Time of Day Tariff

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every minute by data logger.

- To calculate total unit charges per month, number of working days per month is considered as twenty six.

As shown in the Table 2.8 for the account of transformer No. 02 Orit Apparel Lanka Pvt. Ltd. has the minimum benefit of 2.51% of its current value if it is transferred to the three part time of day tariff. If they do some adjustment to their loading pattern the benefits can be maximized.

2.2.7 Hotel Riverina

Riverina is one of four star hotel of Confifi group located at Moragalla, Beruwala. Hotel comprises of 3157 sq. ft Conference hall, 1200 sq. ft Restaurant, 192 Guest rooms, Banquet hall and Palm beach garden. Major electricity usage systems of the hotel are Central Air conditioning system, Laundry, Kitchen and Cold rooms etc. Air Conditioning system & the Kitchen are the highest electricity consumers in the hotel.

Electricity is taken from the national grid via a 1000kVA transformer rated at 11kV/400V and consumption is metering at the 400V side. Diesel generator of 500kVA is employed to cater the electricity demand in case of emergency.

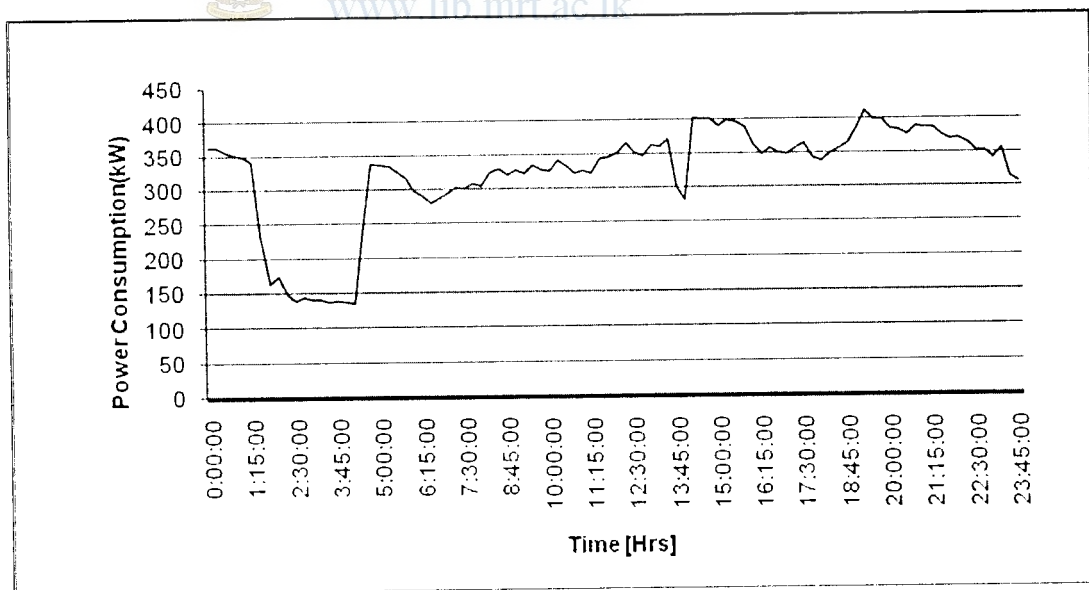


Figure 2.15 - Loading Pattern of Hotel Riverina.

Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
27th Feb 2009	17:00 to 18:00 Hrs	353.75	9.30	3289.88	7.30	2,582.38
27th Feb 2009	18:00 to 18:30 Hrs	343.50	9.30	1597.28	7.30	1,253.78
27th Feb 2009	18:30 to 19:00 Hrs	343.50	9.30	1597.28	23.00	3,950.25
27th Feb 2009	19:00 to 20:00 Hrs	398.75	9.30	3708.38	23.00	9,171.25
27th Feb 2009	20:00 to 21:00 Hrs	383.75	9.30	3568.88	23.00	8,826.25
27th Feb 2009	21:00 to 22:00 Hrs	380.75	9.30	3540.98	23.00	8,757.25
27th Feb 2009	22:00 to 22:30 Hrs	368.00	9.30	1711.20	23.00	4,232.00
27th Feb 2009	22:30 to 23:00 Hrs	352.50	9.30	1639.13	5.30	934.13
27th Feb 2009	23:00 to 24:00 Hrs	329.00	9.30	3059.70	5.30	1,743.70
28th Feb 2009	00:00 to 01:00 Hrs	357.75	9.30	3327.08	5.30	1,896.08
28th Feb 2009	01:00 to 02:00 Hrs	272.50	9.30	2534.25	5.30	1,444.25
28th Feb 2009	02:00 to 03:00 Hrs	152.25	9.30	1415.93	5.30	806.93
28th Feb 2009	03:00 to 04:00 Hrs	140.00	9.30	1302.00	5.30	742.00
28th Feb 2009	04:00 to 04:30 Hrs	136.50	9.30	634.73	5.30	361.73
28th Feb 2009	04:30 to 05:00 Hrs	290.50	9.30	1350.83	7.30	1,060.33
28th Feb 2009	05:00 to 06:00 Hrs	328.50	9.30	3055.05	7.30	2,398.05
28th Feb 2009	06:00 to 07:00 Hrs	288.50	9.30	2683.05	7.30	2,106.05
28th Feb 2009	07:00 to 08:00 Hrs	301.75	9.30	2806.28	7.30	2,202.78
28th Feb 2009	08:00 to 09:00 Hrs	319.50	9.30	2971.35	7.30	2,332.35
28th Feb 2009	09:00 to 10:00 Hrs	328.25	9.30	3052.73	7.30	2,396.23
28th Feb 2009	10:00 to 11:00 Hrs	330.25	9.30	3071.33	7.30	2,410.83
28th Feb 2009	11:00 to 12:00 Hrs	334.50	9.30	3110.85	7.30	2,441.85
28th Feb 2009	12:00 to 13:00 Hrs	354.50	9.30	3296.85	7.30	2,587.85
28th Feb 2009	13:00 to 14:00 Hrs	349.00	9.30	3245.70	7.30	2,547.70
28th Feb 2009	14:00 to 15:00 Hrs	372.25	9.30	3461.93	7.30	2,717.43
28th Feb 2009	15:00 to 16:00 Hrs	394.00	9.30	3664.20	7.30	2,876.20
28th Feb 2009	16:00 to 17:00 Hrs	355.00	9.30	3301.50	7.30	2,591.50
Total				71,998.28		77,371.08
Total for 26 days				1,871,955.15		2,011,647.95
Maximum Demand Charge				565,650.00		544,700.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				2,440,605.15		2,559,347.95
Saving due to transfer to the three part tariff						-118,742.80
Percentage of Saving						-4.87

Table 2.9 - Comparison of the calculation of Electricity Bill of Hotel Riverina Using Flat Rate Tariff and Three Part Time of Day Tariff

Assumptions:

- Average energy consumption per hour was calculated using the data recorded in every minute by data logger.



- To calculate total unit charges per month, number of working days per month is considered as twenty six.

As shown in the Table 2.9 the electricity bill of hotel Riverina will be increased by 4.87% of its current value if they transferred to the three part time of day tariff.

2.2.8 Hyderamani Garments Pvt. Ltd.

Hyderamani Garments Pvt. Ltd., Seethawaka is one of the garment factories of the Hyderamani group that is situated in Seethawaka industrial zone. They produce ladies jackets for the international market.

CEB power is supplying to the factory from Seethawaka grid sub station through the 1000 kVA and 630 kVA transformers installed in the Garment Division. Another 1000 kVA transformer is installed in the Cutting Section but it is situated in separate premises in the industrial zone. The latter was not considered for this research because of the tight working plan of this section it is not possible to do some adjustments to the operation pattern.

Data logger was connected on 13th and 14th May 2009 in the Hyderamani Garments Pvt. Ltd. and plotted the data obtained as shown in Figure 2.16.

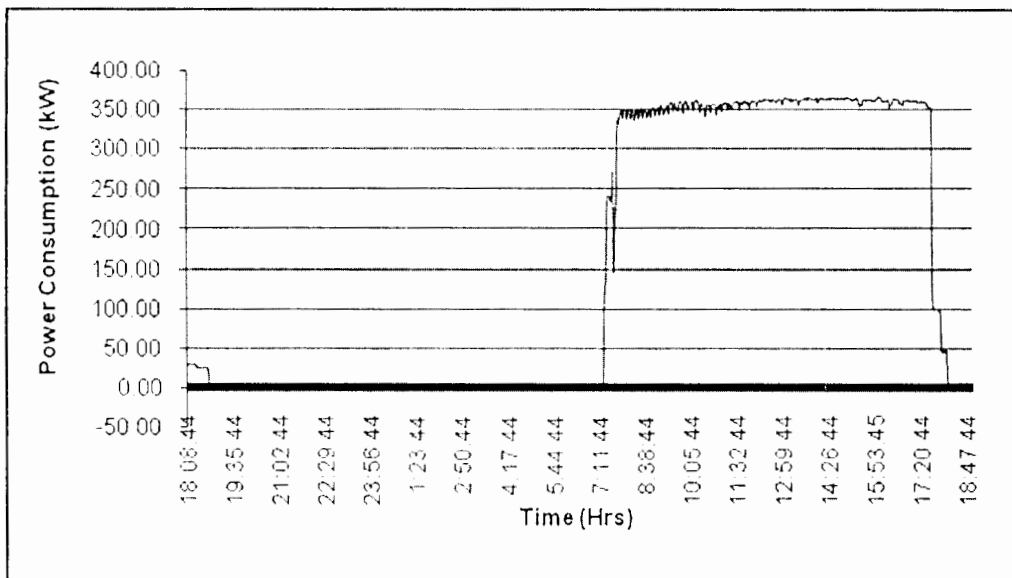


Figure 2.16 - Loading Pattern of Transformer No. 01 of Hyderamani Garments Pvt. Ltd

Transformer No. 01						
Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
13th May 2009	17:00 to 18:00 Hrs	263.38	9.30	2449.41	7.30	1,922.65
13th May 2009	18:00 to 18:30 Hrs	28.63	9.30	133.13	7.30	104.50
13th May 2009	18:30 to 19:00 Hrs	15.77	9.30	73.33	23.00	181.36
13th May 2009	19:00 to 20:00 Hrs	0.00	9.30	0.00	23.00	0.00
13th May 2009	20:00 to 21:00 Hrs	0.00	9.30	0.00	23.00	0.00
13th May 2009	21:00 to 22:00 Hrs	0.00	9.30	0.00	23.00	0.00
13th May 2009	22:00 to 22:30 Hrs	0.00	9.30	0.00	23.00	0.00
13th May 2009	22:30 to 23:00 Hrs	0.00	9.30	0.00	5.30	0.00
13th May 2009	23:00 to 24:00 Hrs	0.00	9.30	0.00	5.30	0.00
14th May 2009	00:00 to 01:00 Hrs	0.00	9.30	0.00	5.30	0.00
14th May 2009	01:00 to 02:00 Hrs	0.00	9.30	0.00	5.30	0.00
14th May 2009	02:00 to 03:00 Hrs	0.00	9.30	0.00	5.30	0.00
14th May 2009	03:00 to 04:00 Hrs	0.00	9.30	0.00	5.30	0.00
14th May 2009	04:00 to 04:30 Hrs	0.00	9.30	0.00	5.30	0.00
14th May 2009	04:30 to 05:00 Hrs	0.00	9.30	0.00	7.30	0.00
14th May 2009	05:00 to 06:00 Hrs	0.00	9.30	0.00	7.30	0.00
14th May 2009	06:00 to 07:00 Hrs	0.00	9.30	0.00	7.30	0.00
14th May 2009	07:00 to 08:00 Hrs	175.67	9.30	1633.77	7.30	1,282.43
14th May 2009	08:00 to 09:00 Hrs	344.98	9.30	3208.27	7.30	2,518.32
14th May 2009	09:00 to 10:00 Hrs	352.03	9.30	3273.90	7.30	2,569.84
14th May 2009	10:00 to 11:00 Hrs	353.29	9.30	3285.61	7.30	2,579.03
14th May 2009	11:00 to 12:00 Hrs	355.87	9.30	3309.62	7.30	2,597.88
14th May 2009	12:00 to 13:00 Hrs	359.99	9.30	3347.88	7.30	2,627.90
14th May 2009	13:00 to 14:00 Hrs	361.77	9.30	3364.48	7.30	2,640.94
14th May 2009	14:00 to 15:00 Hrs	362.68	9.30	3372.89	7.30	2,647.53
14th May 2009	15:00 to 16:00 Hrs	360.85	9.30	3355.86	7.30	2,634.17
14th May 2009	16:00 to 17:00 Hrs	359.54	9.30	3343.76	7.30	2,624.67
Total				34,151.91		26,931.21
Total for 26 days				887,949.70		700,211.57
Maximum Demand Charge				246,375.00		237,250.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				1,137,324.70		940,461.57
Saving due to transfer to the three part tariff						196,863.13
Percentage of Saving						17.31

Table 2.10 - Comparison of the calculation of Electricity Bill of Transformer No. 01 of Hyderamani Garments Pvt Ltd. Using Flat Rate Tariff and Three Part Time of Day Tariff

As shown in the Table 2.10 if the electricity account is transferred to the three part time of day tariff the electricity billing amount of transformer no. 01 will be decreased approximately about 17.31 % of its current value.

The chilled water plants and all air conditioning plants of the above factory are connected to transformer No. 01 and as a common practice they are switching off all air conditioners after 18:00 hours. Therefore the load of transformer No. 01 becomes zero after 18:00 hours.

All other loads in the factory including sewing machines in the production lines are powered by transformer No. 02. Most of the production lines are stopped at 18:00 hours other than few production lines that couldn't complete their daily targets.

Data logger was connected to transformer No. 02 on 15th May 2009 in the Hyderamany Garments Pvt. Ltd. and plotted the data obtained as shown in Figure 2.17.

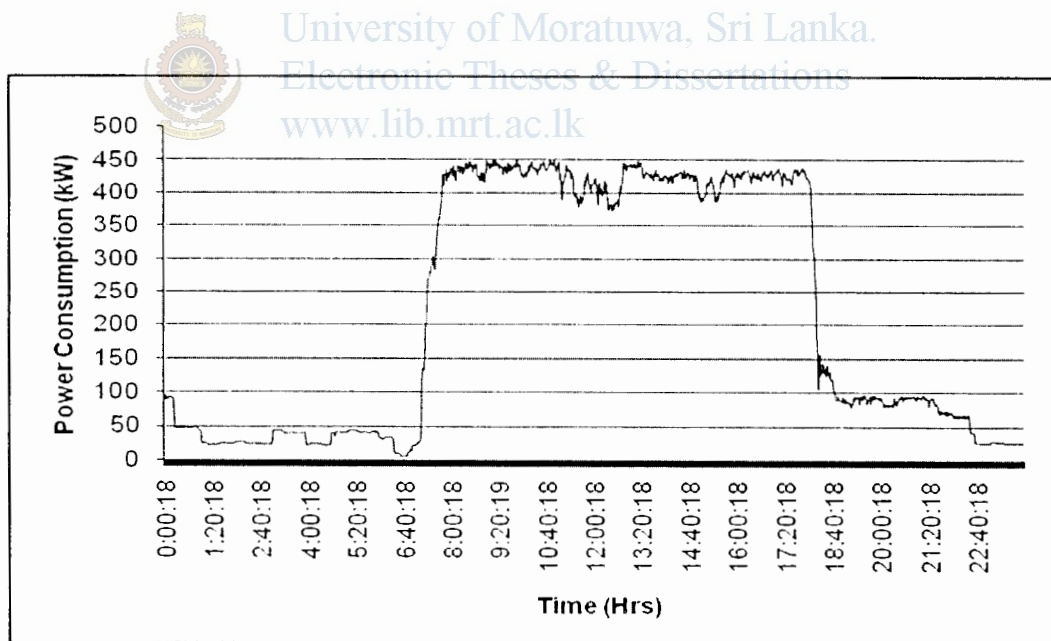


Figure 2.17 - Loading Pattern of Transformer No. 02 of Hyderamani Garments Pvt. Ltd

Transformer No. 02						
Date	Time	Avg Power kWh	Flat Rate Tariff		Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs	Unit Price Rs per kWh	Total charge for the duration Rs
13th May 2009	00:00 to 01:00 Hrs	58.17	9.30	540.99	7.30	424.65
13th May 2009	01:00 to 02:00 Hrs	23.75	9.30	110.45	7.30	86.69
13th May 2009	02:00 to 03:00 Hrs	24.34	9.30	113.18	23.00	279.90
13th May 2009	03:00 to 04:00 Hrs	38.64	9.30	359.36	23.00	888.74
13th May 2009	04:00 to 04:30 Hrs	22.92	9.30	213.18	23.00	527.22
13th May 2009	04:30 to 05:00 Hrs	29.33	9.30	272.77	23.00	674.59
13th May 2009	05:00 to 06:00 Hrs	40.78	9.30	189.64	23.00	469.00
13th May 2009	06:00 to 07:00 Hrs	18.77	9.30	87.29	5.30	49.75
13th May 2009	07:00 to 08:00 Hrs	279.46	9.30	2598.95	5.30	1,481.12
14th May 2009	08:00 to 09:00 Hrs	434.60	9.30	4041.80	5.30	2,303.39
14th May 2009	09:00 to 10:00 Hrs	439.91	9.30	4091.13	5.30	2,331.50
14th May 2009	10:00 to 11:00 Hrs	438.42	9.30	4077.34	5.30	2,323.65
14th May 2009	11:00 to 12:00 Hrs	412.79	9.30	3838.93	5.30	2,187.78
14th May 2009	12:00 to 13:00 Hrs	405.12	9.30	1883.79	5.30	1,073.56
14th May 2009	13:00 to 14:00 Hrs	431.85	9.30	2008.09	7.30	1,576.24
14th May 2009	14:00 to 15:00 Hrs	422.39	9.30	3928.27	7.30	3,083.48
14th May 2009	15:00 to 16:00 Hrs	413.37	9.30	3844.38	7.30	3,017.64
14th May 2009	16:00 to 17:00 Hrs	428.15	9.30	3981.83	7.30	3,125.52
14th May 2009	17:00 to 18:00 Hrs	428.16	9.30	3981.89	7.30	3,125.57
14th May 2009	18:00 to 18:30 Hrs	215.18	9.30	2001.14	7.30	1,570.79
14th May 2009	18:30 to 19:00 Hrs	160.42	9.30	1491.87	7.30	1,171.04
14th May 2009	19:00 to 20:00 Hrs	89.89	9.30	835.96	7.30	656.18
14th May 2009	20:00 to 21:00 Hrs	88.34	9.30	821.61	7.30	644.92
14th May 2009	21:00 to 22:00 Hrs	81.35	9.30	756.56	7.30	593.86
14th May 2009	22:00 to 22:30 Hrs	62.36	9.30	579.92	7.30	455.21
14th May 2009	22:30 to 23:00 Hrs	45.79	9.30	425.89	7.30	334.30
14th May 2009	23:00 to 24:00 Hrs	25.89	9.30	240.80	7.30	189.02
Total				47,317.01		34,645.29
Total for 26 days				1,230,242.16		900,777.65
Maximum Demand Charge				305,721.00		294,398.00
Fix Charge				3,000.00		3,000.00
Total Electricity Billing Amount				1,538,963.16		1,198,175.65
Saving due to transfer to the three part tariff						340,787.51
Percentage of Saving						22.14

Table 2.11 - Comparison of the calculation of Electricity Bill of Transformer No. 02 of Hyderamani Garments Pvt Ltd. Using Flat Rate Tariff and Three Part Time of Day Tariff

As shown in Table 2.11 the electricity billing amount of transformer No. 02 will be decreased by 22.14% if this account transferred to three part time of day tariff.

No.	Name of the Industry	Saving if transferred to three part tariff Rs	Loss if transferred to three part tariff Rs	Percentage of saving / Loss
01	Royal Ceramic Lanka Pvt Ltd. Transformer No. 01 Transformer No. 02		209,801.93 92,812.14	7.79 3.13
02	Lanka Walltile PLC		129,479.70	2.92
03	Associated Motorways PLC	341,243.05		4.12
04	NoFalk Foods Pvt Ltd.	41,170.99		5.38
05	Unidil Packaging Pvt Ltd.		39,810.96	4.95
06	Orit Apparel Pvt Ltd. Transformer No. 01 Transformer No. 02	61,527.29 36,395.01		2.35 2.51
07	Hotel Riverina		118,742.80	4.87
08	Hyderamany Garments Pvt Ltd. Transformer No. 01 Transformer No. 02	196,863.13 340,787.51		17.31 22.14

Table 2.12 - Summary of the Comparison of Electricity Charges

The data in the table shows most of the industries are operating in 24 hours have no considerable benefits if they transferred to three part time of day tariff without doing some adjustments of their loading pattern. But the industries that are working only day shifts will have the benefit if they requested three part time of day tariff and if they do some further studies and well adjust their loading pattern they can maximize the benefit.

The next chapter includes the possible adjustments for each industry selected for the research to obtain benefits by three part time of day tariff.

3. Theoretical Development

3.1. Analysis of Savings to Industrial Consumers

- Prepare of time table for the operation pattern after the identification of possible changes in selected industries.
- Identification of total capacity of stoppable or shift possible loads.
- Deduct the total amount of kW found above at the relevant time periods by the data obtained using data logger.
- Plot the new load curve using analyzed data.
- Calculation of average power per hour or half an hour according to the requirement specified in three part time of day tariff.

Average power per hour = Total amount of all data samples per hour / No. of data samples per hour

- Calculation of electricity bill using the rates given in the *Gazette of the Democratic Socialist Republic of Sri Lanka No 1540/17 Saturday March 15, 2008 [1]* and *Tariff Revision announced by CEB with effect from 1st November 2008 [2]*.



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Electricity charges (Rs) = [A * 7.30 + B * 23.00 + C * 5.30] * number of working days per month +
Maximum Demand * 650 + 3000.00

A : Total number of kWh consumed from 04:30 Hrs to 18:30 Hrs in selected day

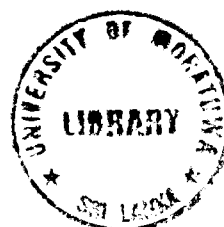
B : Total number of kWh consumed from 18:30 Hrs to 22:30 Hrs in selected day

C : Total number of kWh consumed from 22:30 Hrs to 04:30 Hrs of next day

A = B = C = Average 1 + Average 2 + Average 3+.....

Average = Total kWh in one hour/ No of samples per hour

(Total kWh in one hour can be obtained by data logged by data logger in every minute or some cases in every five minute)



- Comparison of electricity cost with current electricity bill and calculation of average percentage of saving per industry.

$$\text{Average percentage of saving} = \left[\frac{\text{Electricity cost calculated using I-2 (T.D.3)} - \text{Electricity cost calculated using existing tariff}}{\text{Electricity cost calculated using existing tariff}} \right] * 100$$

- Calculation of total saving of industrial consumers in flat rate tariff per hour.

3.2 Analysis of Savings or Losses to Ceylon Electricity Board

- Total cost for the electricity in rupees for apparel industries in Sri Lanka per year is available in the report *Annual Survey of Industries – 2008 published by Department Census and Statistics of Sri Lanka* [4]
- The number of medium scale industrial electricity accounts in flat rate tariff category is available in *Statistical Digest 2008 of Ceylon Electricity Board* [3]
- Total cost in rupees for electricity of the apparel industries under the medium scale flat rate tariff category was calculated using above mentioned data.

The electricity consumption of medium scale apparel industries in flat rate category	=	Annual electricity consumption in rupees of apparel industries	*	Percentage of medium scale consumer accounts of industrial total
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- Average percentage of saving of electricity cost can be obtained by the analysis mentioned in sub section 3.1
- Rupee component of average saving of medium scale apparel industries per year can be calculated and it is the component that effect to the utility provider “Ceylon Electricity Board”.

4. Proposed Solutions

The methods to maximize the benefits of each industry if transferred to the three part time of day tariff are shown in this chapter and the steps based on are discussed in sub section 1.1 Background of section I Introduction.

4.1 Proposals for Royal Ceramic PLC

The transferable or stoppable loads identified in the Royal Ceramic PLC are as follows

1. Ball Mills
2. Metal Crusher
3. Polishing Plant

They are operating polishing plant if demand is available for polished tiles. On that day the measurements were done, the polishing plant was not working. Also they are operating metal crusher for 16 hours a day. It can not operate in the night due to the public complains about noise pollution. But they are planning to construct a building with sound proofing facility to operate crusher 24 hours a day. Therefore rearranging loading of ball mills as well as crusher are considered.

Three Ball Mills out of five are connected to transformer no. 01 and other two are connected to transformer no. 02. Ball mill no. 02 is out of order and there are only four ball mills in operation. The crusher is powered up by transformer no. 02. Therefore, the adjustments to Ball Mill and crusher operating time were considered for both transformers and a minimum benefits to the consumer was observed.

The unit cost of the standby diesel generator was measured and it is about Rs. 24.00 per kWh and therefore the running of diesel generator at the peak interval was not considered.

Prepared time table was submitted to the factory personnel to operate ball mills and crusher according to the plan and time table is attached in Appendix 3. The time table shows the loading pattern of the ball mills and the crusher before the adjustments. The maximum demand of transformer no. 01 is also considered in the new time plan. This has not been taken in to account in preparing the existing plan.

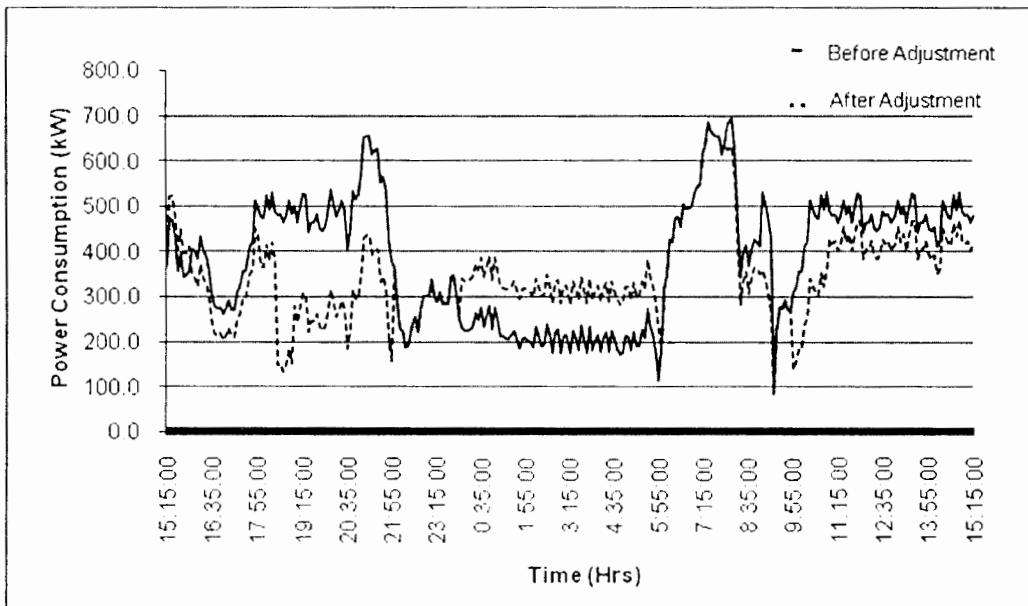


Figure 4.1 - Loading pattern of transformer No. 01 after the adjustment

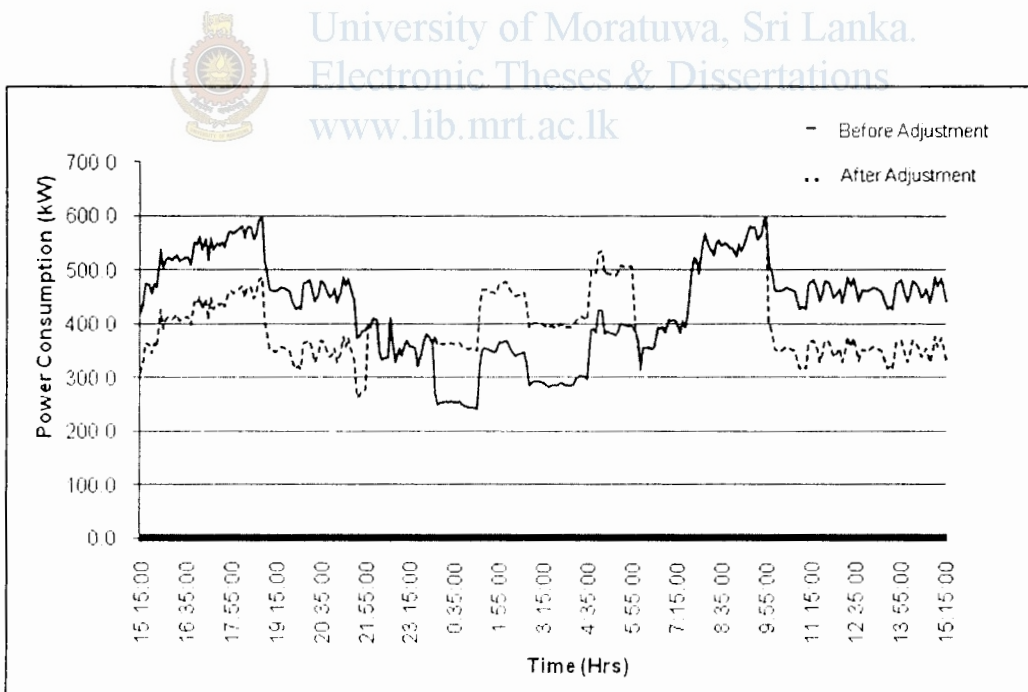


Figure 4.2 - Loading pattern of transformer No. 02 after the adjustments

Transformer No. 01							
Date	Time	Flat Rate Tariff			Three Part Tariff		
		Avg Power before adjust kWh	Unit Price Rs per kWh	Total Charge for the Duration Rs	Avg Power after adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
23rd May 2008	17:00 to 18:00 Hrs	358.08	9.30	3330.17	298.08	7.30	2,176.00
23rd May 2008	18:00 to 18:30 Hrs	495.69	9.30	2304.95	354.26	7.30	1,293.05
23rd May 2008	18:30 to 19:00 Hrs	484.23	9.30	2251.66	153.39	23.00	1,763.95
23rd May 2008	19:00 to 20:00 Hrs	477.50	9.30	4440.76	257.50	23.00	5,922.52
23rd May 2008	20:00 to 21:00 Hrs	494.30	9.30	4596.96	274.30	23.00	6,308.83
23rd May 2008	21:00 to 22:00 Hrs	571.35	9.30	5313.57	351.35	23.00	8,081.08
23rd May 2008	22:00 to 22:30 Hrs	246.35	9.30	1145.52	246.35	23.00	2,833.01
23rd May 2008	22:30 to 23:00 Hrs	270.81	9.30	1259.28	270.81	5.30	717.66
23rd May 2008	23:00 to 24:00 Hrs	304.35	9.30	2830.48	304.35	5.30	1,613.07
24th May 2008	00:00 to 01:00 Hrs	245.11	9.30	2279.56	355.11	5.30	1,882.10
24th May 2008	01:00 to 02:00 Hrs	217.98	9.30	2027.17	327.98	5.30	1,738.27
24th May 2008	02:00 to 03:00 Hrs	209.57	9.30	1948.99	319.57	5.30	1,693.72
24th May 2008	03:00 to 04:00 Hrs	202.92	9.30	1887.18	312.92	5.30	1,658.49
24th May 2008	04:00 to 04:30 Hrs	205.54	9.30	955.78	315.54	5.30	836.19
24th May 2008	04:30 to 05:00 Hrs	190.66	9.30	886.59	300.66	7.30	1,097.42
24th May 2008	05:00 to 06:00 Hrs	204.50	9.30	1901.88	314.50	7.30	2,295.87
24th May 2008	06:00 to 07:00 Hrs	425.55	9.30	3957.60	425.55	7.30	3,106.50
24th May 2008	07:00 to 08:00 Hrs	620.34	9.30	5769.15	620.34	7.30	4,528.48
24th May 2008	08:00 to 09:00 Hrs	473.00	9.30	4398.86	413.00	7.30	3,014.87
24th May 2008	09:00 to 10:00 Hrs	329.22	9.30	3061.71	258.38	7.30	1,886.20
24th May 2008	10:00 to 11:00 Hrs	448.38	9.30	4169.90	278.38	7.30	2,032.15
24th May 2008	11:00 to 12:00 Hrs	492.21	9.30	4577.60	432.21	7.30	3,155.17
24th May 2008	12:00 to 13:00 Hrs	467.13	9.30	4344.31	407.13	7.30	2,972.05
24th May 2008	13:00 to 14:00 Hrs	485.42	9.30	4514.41	425.42	7.30	3,105.57
24th May 2008	14:00 to 15:00 Hrs	477.80	9.30	4443.57	417.80	7.30	3,049.96
24th May 2008	15:00 to 16:00 Hrs	394.82	9.30	3671.87	444.82	7.30	3,247.22
24th May 2008	16:00 to 17:00 Hrs	348.58	9.30	3241.84	288.58	7.30	2,106.67
Total				85,511.33			74,116.07
Total for 26 days				2,223,294.66			1,927,017.83
Maximum Demand Charge				468,517.50			451,165.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				2,694,812.16			2,381,182.83
Saving due to transfer to the three part tariff							313,629.33
Percentage of saving							11.64

Table 4.1 - Calculation of Electricity Bill for Transformer No. 01 of Royal Ceramic PLC after the adjustments

At the end of this adjustment of loading pattern for transformer no. 01 the Royal Ceramics PLC will save the electricity cost of Rs. 313,629.33 and it will be 11.64% of the total electricity cost of transformer no.01.

Transformer No. 02							
Date	Time	Flat Rate Tariff			Three Part Tariff		
		Avg Power before adjust kWh	Unit Price Rs per kWh	Total Charge for the Duration Rs	Avg Power after adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
23rd May 2008	17:00 to 18:00 Hrs	549.81	9.30	5113.24	439.23	7.30	3,206.38
23rd May 2008	18:00 to 18:30 Hrs	572.74	9.30	2663.24	462.74	7.30	1,689.00
23rd May 2008	18:30 to 19:00 Hrs	564.52	9.30	2625.00	456.63	23.00	5,251.27
23rd May 2008	19:00 to 20:00 Hrs	457.56	9.30	4255.27	347.56	23.00	7,993.79
23rd May 2008	20:00 to 21:00 Hrs	461.68	9.30	4293.61	351.68	23.00	8,088.61
23rd May 2008	21:00 to 22:00 Hrs	435.88	9.30	4053.67	325.88	23.00	7,495.21
23rd May 2008	22:00 to 22:30 Hrs	375.07	9.30	1744.08	375.07	23.00	4,313.31
23rd May 2008	22:30 to 23:00 Hrs	358.62	9.30	1667.59	358.62	5.30	950.35
23rd May 2008	23:00 to 24:00 Hrs	357.39	9.30	3323.69	357.39	5.30	1,894.14
24th May 2008	00:00 to 01:00 Hrs	253.40	9.30	2356.62	363.40	5.30	1,926.02
24th May 2008	01:00 to 02:00 Hrs	313.14	9.30	2912.22	423.14	5.30	2,242.65
24th May 2008	02:00 to 03:00 Hrs	339.24	9.30	3154.95	449.24	5.30	2,380.98
24th May 2008	03:00 to 04:00 Hrs	287.27	9.30	2671.60	397.27	5.30	2,105.52
24th May 2008	04:00 to 04:30 Hrs	294.29	9.30	1368.44	404.29	5.30	1,071.37
24th May 2008	04:30 to 05:00 Hrs	376.51	9.30	1750.75	486.51	7.30	1,775.75
24th May 2008	05:00 to 06:00 Hrs	391.83	9.30	3644.00	501.83	7.30	3,663.34
24th May 2008	06:00 to 07:00 Hrs	366.39	9.30	3407.40	366.39	7.30	2,674.63
24th May 2008	07:00 to 08:00 Hrs	437.66	9.30	4070.27	437.66	7.30	3,194.94
24th May 2008	08:00 to 09:00 Hrs	546.18	9.30	5079.44	546.18	7.30	3,987.08
24th May 2008	09:00 to 10:00 Hrs	563.06	9.30	5236.44	563.06	7.30	4,110.33
24th May 2008	10:00 to 11:00 Hrs	464.45	9.30	4319.38	354.45	7.30	2,587.48
24th May 2008	11:00 to 12:00 Hrs	459.89	9.30	4277.01	349.89	7.30	2,554.22
24th May 2008	12:00 to 13:00 Hrs	461.81	9.30	4294.87	351.81	7.30	2,568.24
24th May 2008	13:00 to 14:00 Hrs	456.48	9.30	4245.24	346.48	7.30	2,529.29
24th May 2008	14:00 to 15:00 Hrs	460.36	9.30	4281.32	350.36	7.30	2,557.61
24th May 2008	15:00 to 16:00 Hrs	470.89	9.30	4379.31	360.89	7.30	2,634.52
24th May 2008	16:00 to 17:00 Hrs	524.84	9.30	4881.05	414.84	7.30	3,028.36
Total				96,069.70			88,474.41
Total for 26 days				2,497,812.31			2,300,334.57
Maximum Demand Charge				403,177.50			388,245.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				2,903,989.81			2,691,579.57
Saving due to transfer to the three part tariff							212,410.24
Percentage of saving							7.31

Table 4.2 - Calculation of Electricity Bill for Transformer No. 02 of Royal Ceramic PLC after the adjustments

At the end of this adjustment of loading pattern of transformer no. 02 the Royal Ceramics PLC will save the electricity cost of Rs. 212,410.24 and it will be 7.31% of the electricity cost of transformer no. 02.

Energy cost saving due to the changes	Rs. 526,039.57
Saving due to reduction of maximum demand	Rs. 104,000.00
Total Saving	Rs. 630,039.57

Extra cost incurred due to the changes

Labour charges (Labour charges increase due to additional labourers are needed to operate crusher in three shifts per day)	Rs. 124,180.50
Cost for transport	Rs. 0.00
Cost for foods and refreshments	Rs. 0.00
Total savings after deductions	Rs. 505,859.07
Percentage of total saving	9.03%

Though Royal Ceramics PLC has two electricity accounts (Two incoming transformers) request of three part time of day tariff for one transformer was not considered due to following reasons.

- Both transformers are loading up to 60% – 70% now the interchanging of two or three ball mills will lead to 100% loading of one transformer.
- Running of all ball mills from one transformer will affect to the reliability of the system.
- Benefit will be lost by the increase of maximum demand.



4.2 Proposals for Lanka Walltile PLC

Production process is almost the same as Royal Ceramics PLC and the transferable or stoppable loads identified in the Lanka Walltile PLC are as follows.

1. Ball Mills
2. Metal Crusher

Whole factory is operating 24 hours a day. Factory has three ball mills and two ball mills are always running in parallel. Normally they run their ball mills without considering the peak intervals because electricity billing is done using industrial flat rate tariff. If they transfer to three part time of day tariff they need to plan their loading pattern of ball mills and crusher. The time table to operate ball mills and crusher is attached in Appendix 4. The electricity bill was calculated according to the expected loading pattern as shown in Figure 4.3 and shown in Table 4.3.

The unit cost of standby generator is about Rs. 26.00 and therefore running of standby generator in peak hours was not considered.

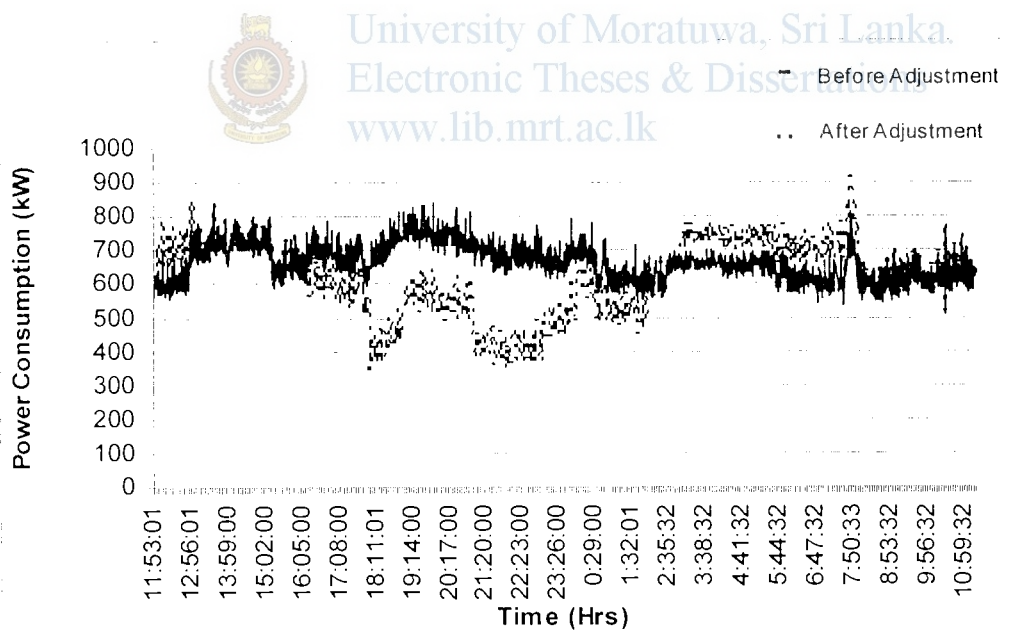


Figure 4.3 - Loading Pattern of Lanka Walltile PLC after the adjustments

Date	Time	Flat Rate Tariff			Three Part Tariff		
		Avg Power before adjust kWh	Unit Price Rs per kWh	Total Charge for the Duration Rs	Avg Power after adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
28th Oct 2008	17:00 to 18:00 Hrs	672.19	9.30	6251.35	579.19	7.30	4,228.07
28th Oct 2008	18:00 to 18:30 Hrs	686.14	9.30	3190.57	398.14	7.30	1,453.23
28th Oct 2008	18:30 to 19:00 Hrs	742.63	9.30	3453.25	454.63	23.00	5,228.30
28th Oct 2008	19:00 to 20:00 Hrs	761.01	9.30	7077.36	564.46	23.00	12,982.50
28th Oct 2008	20:00 to 21:00 Hrs	737.23	9.30	6856.20	542.23	23.00	12,471.18
28th Oct 2008	21:00 to 22:00 Hrs	691.04	9.30	6426.70	413.04	23.00	9,499.98
28th Oct 2008	22:00 to 22:30 Hrs	680.47	9.30	3164.17	402.47	23.00	4,628.37
28th Oct 2008	22:30 to 23:00 Hrs	685.00	9.30	3185.27	407.00	5.30	1,078.56
28th Oct 2008	23:00 to 24:00 Hrs	670.83	9.30	6238.75	494.83	5.30	2,622.62
28th Oct 2008	00:00 to 01:00 Hrs	663.91	9.30	6174.39	570.91	5.30	3,025.84
28th Oct 2008	01:00 to 02:00 Hrs	611.23	9.30	5684.47	518.23	5.30	2,746.64
28th Oct 2008	02:00 to 03:00 Hrs	631.17	9.30	5869.92	621.17	5.30	3,292.23
28th Oct 2008	03:00 to 04:00 Hrs	663.18	9.30	6167.59	746.18	5.30	3,954.76
28th Oct 2008	04:00 to 04:30 Hrs	658.21	9.30	3060.68	741.21	5.30	1,964.21
28th Oct 2008	04:30 to 05:00 Hrs	656.14	9.30	3051.04	739.14	7.30	2,697.85
28th Oct 2008	05:00 to 06:00 Hrs	651.28	9.30	6056.93	734.28	7.30	5,360.26
28th Oct 2008	06:00 to 07:00 Hrs	609.67	9.30	5669.90	702.67	7.30	5,129.47
28th Oct 2008	07:00 to 08:00 Hrs	694.35	9.30	6457.48	797.35	7.30	5,820.67
28th Oct 2008	08:00 to 09:00 Hrs	592.83	9.30	5513.36	602.83	7.30	4,400.69
28th Oct 2008	09:00 to 10:00 Hrs	616.84	9.30	5736.60	626.84	7.30	4,575.92
28th Oct 2008	10:00 to 11:00 Hrs	617.00	9.30	5738.14	627.00	7.30	4,577.13
28th Oct 2008	11:00 to 12:00 Hrs	606.25	9.30	5638.14	606.25	7.30	4,425.64
28th Oct 2008	12:00 to 13:00 Hrs	615.23	9.30	5721.63	708.23	7.30	5,170.07
28th Oct 2008	13:00 to 14:00 Hrs	714.08	9.30	6640.97	714.08	7.30	5,212.80
28th Oct 2008	14:00 to 15:00 Hrs	730.31	9.30	6791.91	730.31	7.30	5,331.29
28th Oct 2008	15:00 to 16:00 Hrs	669.55	9.30	6226.82	669.55	7.30	4,887.72
28th Oct 2008	16:00 to 17:00 Hrs	693.15	9.30	6446.30	620.30	7.30	4,528.19
Total				148,489.90			131,294.20
Total for 26 days				3,860,737.29			3,413,649.16
Maximum Demand Charge				565,650.00			598,000.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				4,429,387.29			4,014,649.16
Saving due to transfer to the three part tariff							414,738.13
Percentage of Saving							9.36

Table 4.3 - Calculation of Electricity Bill of Lanka Walltile PLC after the adjustments

The changes proposed for Lanka Walltile PLC is only the rearrangements of the operation pattern and therefore it won't incur any extra expenses and the total saving of electricity cost is Rs. 414,738.13. It will be 9.36% saving of current electricity bill.

4.3 Proposals for Associated Motorways PLC

The electricity billing of Associated Motorways PLC is done at the 11kV side and under the category of two part time of day tariff TD2 I3. They have adjusted their loading pattern well according to the time intervals defined in above tariff category and they can easily adjust their loading pattern to suit the three part time of day tariff without much changes.

As a common practice the compound department of AMW stops the operation from 18:30 hours to 21:30 hours every day. If they transfer to three part time of day tariff they will leave another one hour production of compound department. The company has enough storage for compound rubber and senior managers confirmed that it won't affect to the production targets.

Whole compound department and all possible loads in other departments were considered for stopped in peak time interval defined in three part time of day tariff and accordingly expected loading pattern was plotted as shown in Figure 4.4.

The electricity bill was calculated for the new loading pattern and it is shown in Table 4.4.

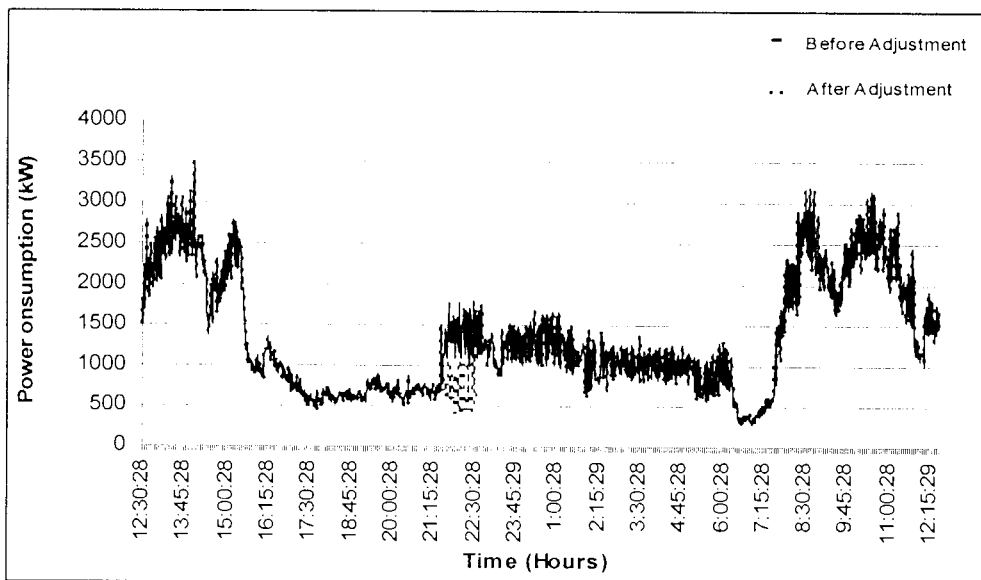


Figure 4.4 - Loading Pattern of Associated Motorways PLC after the adjustment

Date	Time	Two Interval Tariff			Three Interval Tariff		
		Avg Power before adjust kWh	Unit Price Rs per kWh	Total Charge for the Duration Rs	Avg Power after Adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
11th March 2009	12:00 to 13:00 Hrs	2188.47	8.00	17507.79	2188.47	6.90	15,100.47
11th March 2009	13:00 to 14:00 Hrs	2638.31	8.00	21106.48	2638.31	6.90	18,204.34
11th March 2009	14:00 to 15:00 Hrs	1968.34	8.00	15746.71	1968.34	6.90	13,581.54
11th March 2009	15:00 to 16:00 Hrs	1121.38	8.00	8971.02	1121.38	6.90	7,737.51
11th March 2009	16:00 to 17:00 Hrs	898.59	8.00	7188.72	898.59	6.90	6,200.27
11th March 2009	17:00 to 18:00 Hrs	580.48	8.00	4643.84	580.48	6.90	4,005.32
11th March 2009	18:00 to 18:30 Hrs	606.27	8.00	2425.09	606.27	6.90	2,091.64
11th March 2009	18:30 to 19:00 Hrs	613.13	23.00	7051.03	613.13	21.00	6,437.89
11th March 2009	19:00 to 20:00 Hrs	725.85	23.00	16694.55	725.85	21.00	15,242.85
11th March 2009	20:00 to 21:00 Hrs	696.16	23.00	16011.69	696.16	21.00	14,619.37
11th March 2009	21:00 to 21:30 Hrs	717.65	23.00	16506.05	717.65	21.00	15,070.74
11th March 2009	21:30 to 22:00 Hrs	1326.82	8.00	10614.56	753.49	21.00	15,823.23
11th March 2009	22:00 to 22:30 Hrs	1449.20	8.00	5796.80	762.53	21.00	8,006.59
11th March 2009	22:30 to 23:00 Hrs	1331.79	8.00	5327.16	1308.46	5.00	3,271.14
11th March 2009	23:00 to 24:00 Hrs	1294.30	8.00	10354.42	1294.30	5.00	6,471.51
12th March 2009	00:00 to 01:00 Hrs	1358.72	8.00	10869.80	1358.72	5.00	6,793.62
12th March 2009	01:00 to 02:00 Hrs	1041.99	8.00	8335.94	1041.99	5.00	5,209.96
12th March 2009	02:00 to 03:00 Hrs	1038.27	8.00	8306.20	1038.27	5.00	5,191.37
12th March 2009	03:00 to 04:00 Hrs	1032.15	8.00	8257.23	1032.15	5.00	5,160.77
12th March 2009	04:00 to 04:30 Hrs	1011.41	8.00	4045.64	1011.41	5.00	2,528.52
12th March 2009	04:30 to 05:00 Hrs	998.17	8.00	3992.69	998.17	6.90	3,443.70
12th March 2009	05:00 to 06:00 Hrs	869.29	8.00	6954.28	869.29	6.90	5,998.07
12th March 2009	06:00 to 07:00 Hrs	348.03	8.00	2784.23	348.03	6.90	2,401.40
12th March 2009	07:00 to 08:00 Hrs	1402.58	8.00	11220.65	1402.58	6.90	9,677.81
12th March 2009	08:00 to 09:00 Hrs	2538.39	8.00	20307.09	2538.39	6.90	17,514.87
12th March 2009	09:00 to 10:00 Hrs	2228.00	8.00	17823.98	2228.00	6.90	15,373.18
12th March 2009	10:00 to 11:00 Hrs	2496.22	8.00	19969.80	2496.22	6.90	17,223.95
12th March 2009	11:00 to 12:00 Hrs	1543.50	8.00	12348.03	1543.50	6.90	10,650.18
Total				230,640.76			198,207.69
Total for 26 days				5,996,659.78			5,153,400.07
Maximum Demand Charge				2,280,330.00			2,280,330.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				8,279,989.78			7,436,730.07
Saving due to transfer to the three part tariff							843,259.71
Percentage of saving							10.18

Table 4.4 - Calculation of Electricity Bill of Associated Motorways PLC after the adjustments

This is only a rearrangement of loading and it will not be incurred any additional cost for Associated Motorways PLC and net profit if they transferred to three part time of day tariff will be Rs. 843,259.71. It is about 10.18% of their current electricity bill.

4.4 Proposals for Nofalk Foods Pvt. Ltd.

Table 2.5 of section 2 “statement of the Problem” of this report has shown the saving of electricity charges of Nofalk Foods Pvt. Ltd. if electricity account is transferred to three part, time of day tariff. It is about Rs. 41,170.99 and amounting to 5.38% of their current electricity bill.

Due to the fact that the factory is operating day shifts only and the operating loads after 18:00 hours are compressors of cool rooms for food store the adjustments of loading pattern is not possible. Although the factory has standby diesel generator, the unit cost is more than Rs. 24.00 and there is no other option to maximize the benefit beyond 5.38%.

4.5 Proposals for Unidil Packaging Pvt. Ltd.

Main energy consumer of Unidil Packaging Pvt. Ltd. is a corrugating machine. It consumes about 45% of the total energy consumption. Therefore the considerable change of loading pattern can be expected by the change of the loading periods of the Corrugator. Normally Corrugator is operating from 07:00 hours to 22:00 hours a day and if Corrugator stops at 18:30 hours it will cause three hours loss of production per day and 15 hours loss per week. Proposals were given to operate corrugating machine another two night shifts from 22:30 hours to 07:00 hours per week to achieve targets and extra costs incurred was also considered in the calculations.

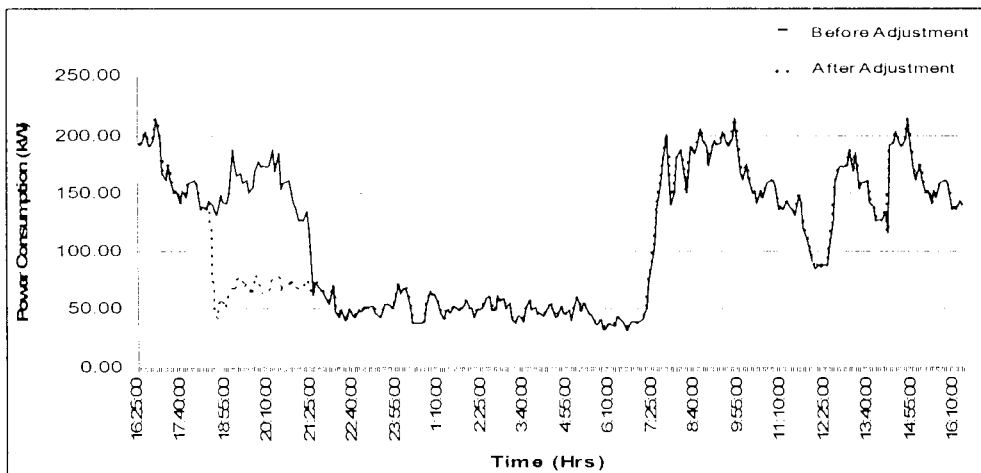


Figure 4.5 - Loading Pattern of Unidil Packaging Pvt. Ltd. after the adjustments

Date	Time	Flat Rate Tariff			Three Interval Tariff		
		Avg Power before adjust kWh	Unit Price RS per kWh	Total charge for the duration Rs	Avg Power after adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
27th June 2008	17:00 to 18:00 Hrs	160.72	9.30	1494.72	160.72	7.30	1,173.27
27th June 2008	18:00 to 18:30 Hrs	144.83	9.30	673.47	131.98	7.30	481.71
27th June 2008	18:30 to 19:00 Hrs	140.07	9.30	651.34	50.07	23.00	575.85
27th June 2008	19:00 to 20:00 Hrs	166.04	9.30	1544.15	68.54	23.00	1,576.36
27th June 2008	20:00 to 21:00 Hrs	165.11	9.30	1535.51	70.11	23.00	1,612.49
27th June 2008	21:00 to 22:00 Hrs	63.45	9.30	590.09	63.45	23.00	1,459.35
27th June 2008	22:00 to 22:30 Hrs	48.87	9.30	227.23	48.87	23.00	561.96
27th June 2008	22:30 to 23:00 Hrs	46.99	9.30	218.51	46.99	5.30	124.53
27th June 2008	23:00 to 24:00 Hrs	52.58	9.30	489.00	52.58	5.30	278.68
27th June 2008	00:00 to 01:00 Hrs	51.59	9.30	479.80	51.59	5.30	273.44
27th June 2008	01:00 to 02:00 Hrs	51.11	9.30	475.35	51.11	5.30	270.90
27th June 2008	02:00 to 03:00 Hrs	52.68	9.30	489.91	52.68	5.30	279.20
27th June 2008	03:00 to 04:00 Hrs	48.42	9.30	450.33	48.42	5.30	256.64
27th June 2008	04:00 to 04:30 Hrs	47.73	9.30	221.95	47.73	5.30	126.49
27th June 2008	04:30 to 05:00 Hrs	47.83	9.30	222.41	47.83	7.30	174.58
27th June 2008	05:00 to 06:00 Hrs	46.11	9.30	428.79	46.11	7.30	336.58
27th June 2008	06:00 to 07:00 Hrs	37.52	9.30	348.95	37.52	7.30	273.91
27th June 2008	07:00 to 08:00 Hrs	115.17	9.30	1071.10	115.17	7.30	840.76
27th June 2008	08:00 to 09:00 Hrs	181.21	9.30	1685.29	181.21	7.30	1,322.86
27th June 2008	09:00 to 10:00 Hrs	192.57	9.30	1790.93	192.57	7.30	1,405.79
27th June 2008	10:00 to 11:00 Hrs	156.84	9.30	1458.64	156.84	7.30	1,144.95
27th June 2008	11:00 to 12:00 Hrs	127.18	9.30	1182.79	127.18	7.30	928.42
27th June 2008	12:00 to 13:00 Hrs	119.18	9.30	1108.37	119.18	7.30	870.01
27th June 2008	13:00 to 14:00 Hrs	157.35	9.30	1463.39	157.35	7.30	1,148.69
27th June 2008	14:00 to 15:00 Hrs	177.22	9.30	1648.16	177.22	7.30	1,293.72
27th June 2008	15:00 to 16:00 Hrs	156.84	9.30	1458.64	156.84	7.30	1,144.95
27th June 2008	16:00 to 17:00 Hrs	138.95	9.30	1292.20	197.59	7.30	1,442.42
Total				24,701.02			21,378.49
Total for 26 days				642,226.55			555,840.77
Maximum Demand Charge				159,772.50			153,855.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				804,999.05			712,695.77
Saving due to transfer to the three part tariff							92,303.28
Percentage of saving							11.47

Table 4.5 - Calculation of Electricity Bill of Unidil Packaging Pvt. Ltd. after the adjustments

Saving of Electricity bill	Rs. 92,303.28
No. of working hours loss per month due to changes	70 Hours
Additional working hours per month covered by night sifts	100 Hours
Additional over time payment per month for employees	Rs. 39,600.00
Cost for the supply of meal and refreshments	Rs. 2,000.00
Total cost incurred due to changes	Rs. 41,600.00
Total saving after deductions	Rs. 50,703.28
Percentage of total saving	6.29%

4.6 Proposals for Orit Apparel Lanka Pvt. Ltd.

Most of day time operating loads like all air condition plants and cutting section of Orit apparel Lanka Pvt. Ltd. are consuming electricity through the transformer no.02. Washing and Drying section is running in 24 hours a day and it is also connected to transformer no 02. Finishing plant is running up to 18:00 hours only but it is connected to transformer no. 01.

Orit Apparel Lanka Pvt. Ltd. has the facility to change the loads internally in between transformer no. 01 and transformer no. 02. Therefore transferring of all possible day time operating loads to transformer no. 02 will cut down its load between 18:30 hours to 07:00 hours to zero. The load of transformer no.01 is slightly increased during off peak hours by the changes and therefore the total benefit was calculated by transferring both transformers to the three part time of day tariff.

Discussions with Orit Apparel Lanka Pvt. Ltd. revealed only 120 kW day time loads can be shifted from transformer no. 01 to transformer no. 02 and that all 24 hours operating loads of transformer no. 02 can be transferred to transformer no.01 (Approximately 140kW). According to the above consideration the saving of electricity bill was calculated.

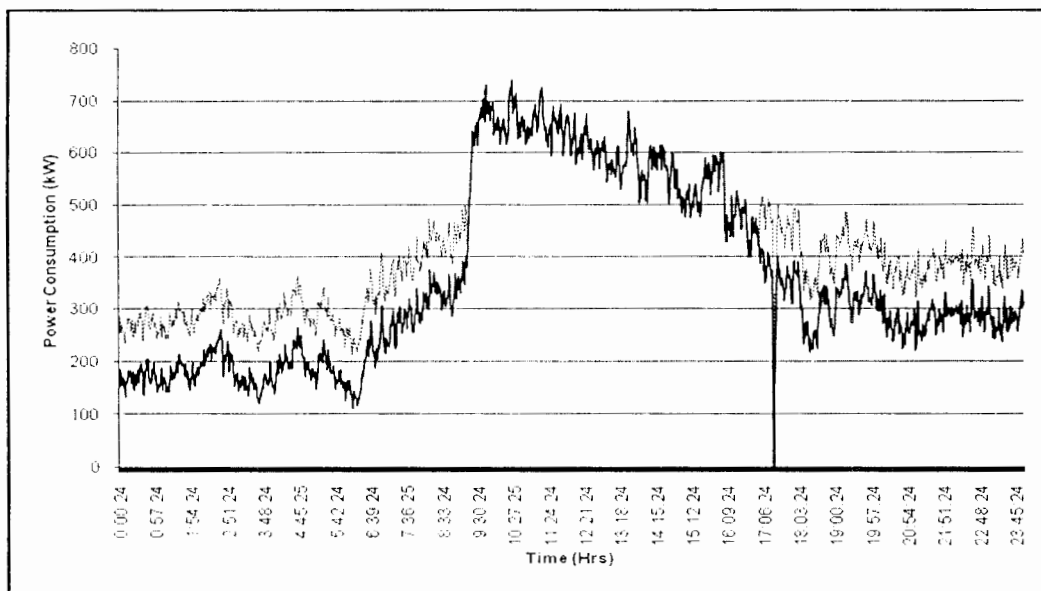


Figure 4.6 – Loading Pattern of Transformer No.01 of Orit Apparel Lanka Pvt. Ltd.

Transformer No. 01							
Date	Time	Avg Power after adjust kWh	Flat Rate Tariff		Avg Power after adjust kWh	Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs		Unit Price Rs per kWh	Total charge for the duration Rs
28th Oct 2008	17:00 to 18:00 Hrs	455.88	9.30	4239.72	455.88	7.30	3,327.95
28th Oct 2008	18:00 to 18:30 Hrs	369.65	9.30	1718.86	369.65	7.30	1,349.21
28th Oct 2008	18:30 to 19:00 Hrs	394.55	9.30	1834.68	394.55	22.00	4,340.09
28th Oct 2008	19:00 to 20:00 Hrs	427.02	9.30	3971.25	427.02	22.00	9,394.35
28th Oct 2008	20:00 to 21:00 Hrs	363.02	9.30	3376.05	363.02	22.00	7,986.35
28th Oct 2008	21:00 to 22:00 Hrs	389.13	9.30	3618.93	389.13	22.00	8,560.90
28th Oct 2008	22:00 to 22:30 Hrs	388.97	9.30	1808.70	388.97	22.00	4,278.65
28th Oct 2008	22:30 to 23:00 Hrs	393.19	9.30	1828.31	393.19	5.30	1,041.94
28th Oct 2008	23:00 to 24:00 Hrs	389.43	9.30	3621.67	389.43	5.30	2,063.96
28th Oct 2008	00:00 to 01:00 Hrs	275.37	9.30	2560.89	275.37	5.30	1,459.43
28th Oct 2008	01:00 to 02:00 Hrs	280.04	9.30	2604.39	280.04	5.30	1,484.22
28th Oct 2008	02:00 to 03:00 Hrs	318.62	9.30	2963.15	318.62	5.30	1,688.68
28th Oct 2008	03:00 to 04:00 Hrs	255.91	9.30	2379.96	255.91	5.30	1,356.32
28th Oct 2008	04:00 to 04:30 Hrs	286.79	9.30	1333.55	286.79	5.30	759.98
28th Oct 2008	04:30 to 05:00 Hrs	316.03	9.30	1469.54	316.03	7.30	1,153.51
28th Oct 2008	05:00 to 06:00 Hrs	269.30	9.30	2504.48	269.30	7.30	1,965.88
28th Oct 2008	06:00 to 07:00 Hrs	337.68	9.30	3140.45	337.68	7.30	2,465.09
28th Oct 2008	07:00 to 08:00 Hrs	387.63	9.30	3604.99	387.63	7.30	2,829.72
28th Oct 2008	08:00 to 09:00 Hrs	425.77	9.30	3959.70	425.77	7.30	3,108.15
28th Oct 2008	09:00 to 10:00 Hrs	675.27	9.30	6280.04	675.27	7.30	4,929.49
28th Oct 2008	10:00 to 11:00 Hrs	650.23	9.30	6047.10	650.23	7.30	4,746.65
28th Oct 2008	11:00 to 12:00 Hrs	649.19	9.30	6037.50	649.19	7.30	4,739.12
28th Oct 2008	12:00 to 13:00 Hrs	594.71	9.30	5530.78	594.71	7.30	4,341.37
28th Oct 2008	13:00 to 14:00 Hrs	583.48	9.30	5426.35	583.48	7.30	4,259.40
28th Oct 2008	14:00 to 15:00 Hrs	539.87	9.30	5020.78	539.87	7.30	3,941.04
28th Oct 2008	15:00 to 16:00 Hrs	565.74	9.30	5261.39	565.74	7.30	4,129.91
28th Oct 2008	16:00 to 17:00 Hrs	452.50	9.30	4208.26	452.50	7.30	3,303.26
Total				96,351.49			95,004.64
Total for 26 days				2,505,138.80			2,470,120.71
Maximum Demand Charge				498,777.75			480,304.50
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				3,006,916.55			2,953,425.21
Saving due to transfer to the three part tariff							53,491.34

Table 4.6 - Calculation of Electricity Bill of Transformer No. 01 of Orit Apparel Lanka Pvt. Ltd. after the adjustments



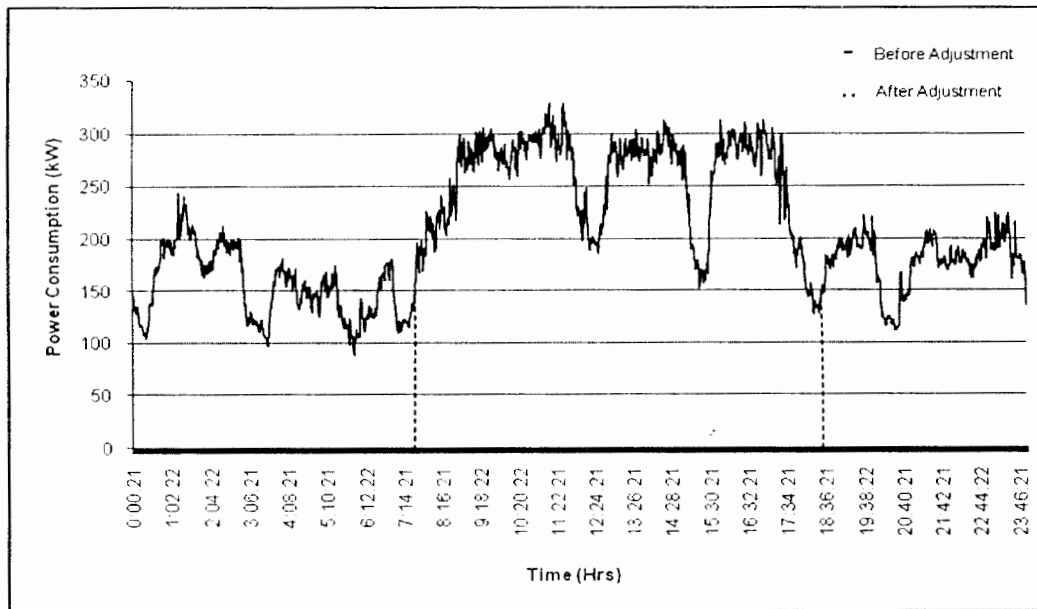
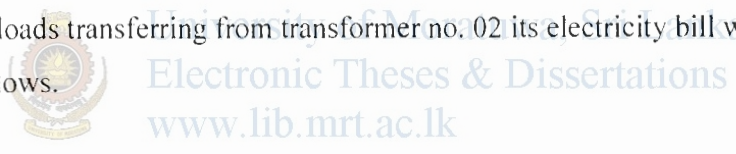


Figure 4.7 - Loading Pattern of Transformer No. 02 of Orit Apparel Lanka Pvt. Ltd.

As shown in Table 4.6 if transformer no. 01 transferred to three part time of day tariff with additional loads transferring from transformer no. 02 its electricity bill will be increased as follows.



Electricity cost of transformer no. 01 before adjustments	Rs. 2,620,036.55
Electricity cost of transformer no. 01 after the adjustments	Rs. 2,953,425.21
The amount of increase	Rs. 333,388.66
Electricity cost of transformer no. 02 before adjustments	Rs. 1,447,462.24
Electricity cost of transformer no. 02 after the adjustments	Rs. 776,615.03
Saving of transformer no. 02	Rs. 670,847.21
Net saving from both transformers	Rs. 337,458.55
Percentage of saving of the factory total electricity cost	8.29%

Transformer No. 02							
Date	Time	Flat Rate Tariff			Three Part Tariff		
		Avg Power before adjust kWh	Unit Price Rs per kWh	Total Charge for the Duration Rs	Avg Power after adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
1st April 2009	17:00 to 18:00 Hrs	204.79	9.30	1904.53	204.79	7.30	1,494.95
1st April 2009	18:00 to 18:30 Hrs	144.87	9.30	673.64	141.54	7.30	516.61
1st April 2009	18:30 to 19:00 Hrs	177.02	9.30	823.15	0.00	23.00	0.00
1st April 2009	19:00 to 20:00 Hrs	196.01	9.30	1822.86	0.00	23.00	0.00
1st April 2009	20:00 to 21:00 Hrs	153.61	9.30	1428.57	0.00	23.00	0.00
1st April 2009	21:00 to 22:00 Hrs	181.19	9.30	1685.04	0.00	23.00	0.00
1st April 2009	22:00 to 22:30 Hrs	178.92	9.30	831.99	0.00	23.00	0.00
1st April 2009	22:30 to 23:00 Hrs	187.45	9.30	871.66	0.00	5.30	0.00
1st April 2009	23:00 to 24:00 Hrs	178.71	9.30	1662.02	0.00	5.30	0.00
1st April 2009	00:00 to 01:00 Hrs	181.79	9.30	1690.67	0.00	5.30	0.00
1st April 2009	01:00 to 02:00 Hrs	186.38	9.30	1733.30	0.00	5.30	0.00
1st April 2009	02:00 to 03:00 Hrs	182.24	9.30	1694.80	0.00	5.30	0.00
1st April 2009	03:00 to 04:00 Hrs	147.42	9.30	1371.03	0.00	5.30	0.00
1st April 2009	04:00 to 04:30 Hrs	155.34	9.30	722.32	0.00	5.30	0.00
1st April 2009	04:30 to 05:00 Hrs	144.16	9.30	670.33	0.00	7.30	0.00
1st April 2009	05:00 to 06:00 Hrs	111.93	9.30	1040.93	0.00	7.30	0.00
1st April 2009	06:00 to 07:00 Hrs	163.11	9.30	1516.95	0.00	7.30	0.00
1st April 2009	07:00 to 08:00 Hrs	192.05	9.30	1786.06	192.05	7.30	1,401.96
1st April 2009	08:00 to 09:00 Hrs	265.39	9.30	2468.09	265.39	7.30	1,937.32
1st April 2009	09:00 to 10:00 Hrs	285.35	9.30	2653.76	285.35	7.30	2,083.06
1st April 2009	10:00 to 11:00 Hrs	292.79	9.30	2722.96	292.79	7.30	2,137.37
1st April 2009	11:00 to 12:00 Hrs	277.54	9.30	2581.10	277.54	7.30	2,026.03
1st April 2009	12:00 to 13:00 Hrs	250.02	9.30	2325.20	250.02	7.30	1,825.15
1st April 2009	13:00 to 14:00 Hrs	282.04	9.30	2622.95	282.04	7.30	2,058.88
1st April 2009	14:00 to 15:00 Hrs	266.97	9.30	2482.84	266.97	7.30	1,948.90
1st April 2009	15:00 to 16:00 Hrs	275.32	9.30	2560.43	275.32	7.30	2,009.80
1st April 2009	16:00 to 17:00 Hrs	289.64	9.30	2693.69	289.64	7.30	2,114.40
Total				47,040.86			21,554.42
Total for 26 days				1,223,062.24			560,415.03
Maximum Demand Charge				221,400.00			213,200.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				1,447,462.24			776,615.03
Saving due to transfer to the three part tariff							670,847.22
Percentage of saving							46.35

Table 4.7 - Calculation of Electricity Bill of Transformer No. 02 of Orit Apparel Lanka Pvt. Ltd after the adjustments

4.7 Proposals for Hotel Riverina.

In the hotel industry large portion of energy is consumed by the lighting load and by the kitchen. Normally lighting load adding around 18:30 hours and also water heaters, water pumps and other loads in the kitchen also consumes electricity in the peak interval. Most of the guests arrive in the evening and therefore lighting is very important during the peak interval.

The hotel Riverina has enough water storage capacity for five hours of their over head water tanks and by the results obtained in this project it was found the water pumps can be stopped from 18:30 hours to 22:30 hours and accordingly modified the loading pattern as in Figure 4.7. The electricity bill was calculated using the data obtained and shown in Table 4.7.

The lighting load is a major portion of the electricity consumption of the hotel industry. But the transfer or stop of lighting load is not possible in hotel industry because the lighting and the lighting decorations are more related to the popularity of the hotel.

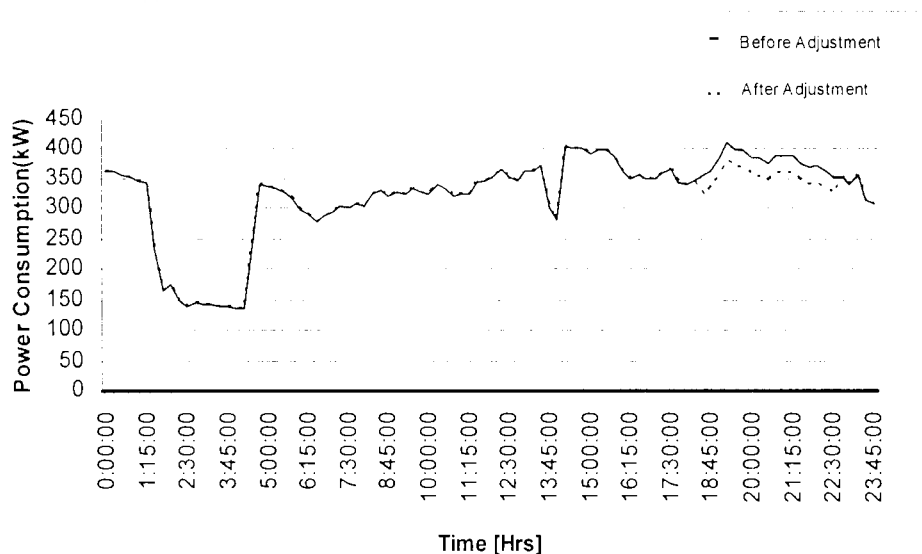


Figure 4.8 - Loading Pattern of Hotel Riverina after the adjustments



Date	Time	Avg Power before adjust kWh	Flat Rate Tariff			Three Interval Tariff	
			Unit Price Rs per kWh	Total Charge for the Duration Rs	Avg Power after adjust kWh	Unit Price Rs per kWh	Total charge for the duration Rs
27th Feb 2009	17:00 to 18:00 Hrs	353.75	9.30	3289.88	353.75	7.30	2,582.38
27th Feb 2009	18:00 to 18:30 Hrs	343.50	9.30	1597.28	343.50	7.30	1,253.78
27th Feb 2009	18:30 to 19:00 Hrs	343.50	9.30	1597.28	336.50	23.00	3,869.75
27th Feb 2009	19:00 to 20:00 Hrs	398.75	9.30	3708.38	368.75	23.00	8,481.25
27th Feb 2009	20:00 to 21:00 Hrs	383.75	9.30	3568.88	353.75	23.00	8,136.25
27th Feb 2009	21:00 to 22:00 Hrs	380.75	9.30	3540.98	350.75	23.00	8,067.25
27th Feb 2009	22:00 to 22:30 Hrs	368.00	9.30	1711.20	338.00	23.00	3,887.00
27th Feb 2009	22:30 to 23:00 Hrs	352.50	9.30	1639.13	337.50	5.30	894.38
27th Feb 2009	23:00 to 24:00 Hrs	329.00	9.30	3059.70	329.00	5.30	1,743.70
28th Oct 2009	00:00 to 01:00 Hrs	357.75	9.30	3327.08	357.75	5.30	1,896.08
28th Oct 2009	01:00 to 02:00 Hrs	272.50	9.30	2534.25	272.50	5.30	1,444.25
28th Oct 2009	02:00 to 03:00 Hrs	152.25	9.30	1415.93	152.25	5.30	806.93
28th Oct 2009	03:00 to 04:00 Hrs	140.00	9.30	1302.00	140.00	5.30	742.00
28th Oct 2009	04:00 to 04:30 Hrs	136.50	9.30	634.73	136.50	5.30	361.73
28th Oct 2009	04:30 to 05:00 Hrs	290.50	9.30	1350.83	290.50	7.30	1,060.33
28th Oct 2009	05:00 to 06:00 Hrs	328.50	9.30	3055.05	328.50	7.30	2,398.05
28th Oct 2009	06:00 to 07:00 Hrs	288.50	9.30	2683.05	288.50	7.30	2,106.05
28th Oct 2009	07:00 to 08:00 Hrs	301.75	9.30	2806.28	301.75	7.30	2,202.78
28th Oct 2009	08:00 to 09:00 Hrs	319.50	9.30	2971.35	319.50	7.30	2,332.35
28th Oct 2009	09:00 to 10:00 Hrs	328.25	9.30	3052.73	328.25	7.30	2,396.23
28th Oct 2009	10:00 to 11:00 Hrs	330.25	9.30	3071.33	330.25	7.30	2,410.83
28th Oct 2009	11:00 to 12:00 Hrs	334.50	9.30	3110.85	334.50	7.30	2,441.85
28th Oct 2009	12:00 to 13:00 Hrs	354.50	9.30	3296.85	354.50	7.30	2,587.85
28th Oct 2009	13:00 to 14:00 Hrs	349.00	9.30	3245.70	349.00	7.30	2,547.70
28th Oct 2009	14:00 to 15:00 Hrs	372.25	9.30	3461.93	372.25	7.30	2,717.43
28th Oct 2009	15:00 to 16:00 Hrs	394.00	9.30	3664.20	394.00	7.30	2,876.20
28th Oct 2009	16:00 to 17:00 Hrs	355.00	9.30	3301.50	355.00	7.30	2,591.50
Total				71,998.28			74,835.83
Total for 26 days				1,871,955.15			1,945,731.45
Maximum Demand Charge				565,650.00			544,700.00
Fix Charge				3,000.00			3,000.00
Total Electricity Billing Amount				2,440,605.15			2,493,431.45
Saving due to transfer to the three part tariff							-52,826.30
Percentage of Saving							-2.16

Table 4.8 - Calculation of Electricity Bill of Hotel Riverina after the adjustments

Hotel Riverina will loss another Rs. 52,826.30 by shifting to the three part, time of day tariff and it will be 2.16% of their current electricity bill.

4.8 Proposals for Hydramani Garments Pvt. Ltd.

Hydramani Garments Pvt. Ltd. has already well distributed their loads internally between transformer no. 01, 02 and 03. All the energy consumers of transformer no. 01 are stopped after 18:30 hours and the energy consumption of transformer no. 02 almost come to zero from 18:30 hours to 07:00 hours of the next morning. All 24 hours operating loads are connected to transformer no. 03.

As shown in Table 2.10 and 2.11 Hydramani Garments Pvt. Ltd. will save Rs. 537,650.64 if they request three part time of day tariff for their transformer no. 01 & 02. The total saving will be 20.08% of previous electricity cost. This much of saving can be obtained without making any changes to the loading patterns of transformer no.01 & 02 and therefore it will not be incurred any extra costs.



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Summary of Expected Savings after the proposed modifications

No.	Name of the Industry	Before Adjustments			After Adjustments		
		Saving if transferred to three part tariff	Loss if transferred to three part tariff	Percentage of saving / (Loss)	Total saving if transferred to three part tariff	Total loss if transferred to three part tariff	Total percentage of saving / (Loss)
01	Royal Ceramic Lanka Pvt Ltd. Transformer No. 01 Transformer No. 02		209,801.93 92,812.14	(7.79) (3.13)	505,859.07	-	9.03
02	Lanka Walltile PLC		129,479.70	(2.92)	414,738.13	-	9.36
03	Associated Motorways PLC	341,243.05		4.12	843,259.71	-	10.18
04	NoFalk Foods Pvt Ltd.	41,170.99		5.38	41,170.99	-	5.38
05	Unidil Packaging Pvt Ltd.		39,810.96	(4.95)	50,703.28	-	6.29
06	Orit Apparel Pvt Ltd. Transformer No. 01 Transformer No. 02	61,527.29 36,395.01		2.35 2.51	337,458.55	-	8.29
07	Hotel Riverina		118,742.80	(4.87)	-	52,826.30	(2.16)
08	Hyderamany Garments Pvt Ltd. Transformer No. 01 Transformer No. 02	196,863.13 340,787.51		17.31 22.14	537,650.64	-	20.08

5. Results and Analysis

In the previous chapter the calculations were done for the predicted situations in the industries mentioned in section 2 “Statement of the Problem”. Then the optimum solutions identified were summarized in the sheet attached at the end of previous chapter.

Five industries (other than last two) out of ten selected will have savings of around 10% of their current electricity cost if they transferred to three part time of day tariff. The possible method to adjust the loading pattern is load shifting and also it is possible only in industries that operate three shifts per day.

In the hotel industry it is not possible to have considerable benefits due to most of their operations as cooking, lighting, water heating, water pumping, air conditioning are starting in the peak interval because the guests are arriving in the evening.

If it is estimated that around 75% of medium scale industrial consumers of CEB transferred 10% of their electricity demand from peak hours to off peak hours the reduction of peak demand of CEB can be calculated as follows.



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Monthly average energy consumption of industrial medium scale consumers =31,520 kWh

[Ref. [3]]

No. of consumers in industrial medium scale category	=3271 Nos.
Total energy consumption of above category per month	=103,101,920 kWh
Average energy consumption per hour	=143,197.11 kW
[The number of hours per month was taken as 720]	
The 10% of saving of 75% of total industrial medium scale consumers	=10,739.78 kW
Total number of industrial consumers in flat rate tariff category	=39,609 Nos.
Total saving of all industrial consumers in flat rate tariff category per hour	=130,049.50 kW

According to the result obtained above about 130 MW reduction of peak demand per hour can be estimated.

Assumptions:

- Energy consumption of industries is taken as equally distributed hourly.

- The saving of each industrial consumer by transferring to three part time of day tariff of 75% of them is taken as 10% as same as the saving of industrial medium scale category.

The results obtained in the investigation in Hydramani Garments Pvt. Ltd. shows the different result than others. The above factory is operating only in day shifts and after 18:30 hours the loads of both transformers are almost zero. Due to they are consuming energy in day time only they can transfer their both accounts to three part time of day tariff directly without changes and can be achieved around 20% of saving easily. Most of the apparel industries in Sri Lanka are operating in day time only other than in the festival seasons. By assuming 75% of total apparel industries are operating in day time only and requested three part time of day tariff in the industry point of view 20% saving can be calculated as follows. But it will be the lost to Ceylon Electricity Board because it is only a tariff change.

The annual electricity consumption in Rupees of Apparel Industries [4] = Rs. 4,889,403,296

The percentage of medium scale consumer accounts of industrial total [3] = 8.258%

The Electricity consumption of the medium scale apparel

industrial consumers in flat rate tariff category = Rs. 403,766,924.20

Electricity consumption of 75% of apparel industries in above category = Rs. 302,825,193.20

20% of above consumption = Rs 60,565,038.63

According to the above results obtained the annual electricity savings in rupees of day time operate medium scale industrial consumers in flat rate tariff category if they transferred to three part, time of day tariff can be expected as approximately 60.5 million. It will be a Rs. 60.5 million annual loss to Ceylon Electricity Board.

The last two industries mentioned in section 2.1 “Preliminaries” of this report are experiencing the benefits of three part, time of day tariff and the information gathered in the investigation is shown below.

Mona Plastic Pvt. Ltd. of Homagama has already transferred to three part, time of day tariff since April 2009 and the details of electricity charges were tabulated as follows.

Month	Units	Billing Amount	Per Unit Cost (Rs)	Tariff Applicable
Jan - 08	31616	274,298.00	8.68	I-2 (T.D.2)
Feb-08	50680	438,564.00	8.65	I-2 (T.D.2)
Mar-08	55772	503,376.00	9.03	I-2 (T.D.2)
Apr - 08	34268	305,266.00	8.91	I-2 (T.D.2)
May - 08	32304	262,638.00	8.13	I-2 (T.D.2)
Jun - 08	45772	403,610.00	8.82	I-2 (T.D.2)
Jul - 08	26388	226,156.00	8.57	I-2 (T.D.2)
Aug - 08	28628	243,826.00	8.52	I-2 (T.D.2)
Sep - 08	49176	427,400.00	8.69	I-2 (T.D.2)
Oct - 08	45300	339,750.00	7.50	I-2 (T.D.2)
Nov - 08	24852	235,324.00	9.47	I-2 (T.D.2)
Dec - 08	33932	320,149.60	9.44	I-2 (T.D.2)
Jan - 09	33584	322,540.80	9.60	I-2 (T.D.2)
Feb - 09	31736	303,518.40	9.56	I-2 (T.D.2)
Mar - 09	33687	294,100.20	8.73	I-2 (T.D.2)
Apr - 09	11588	99,160.00	8.56	I-2 (T.D.3)
May - 09	24391	205,195.10	8.41	I-2 (T.D.3)
Jun - 09	26866	217,822.50	8.11	I-2 (T.D.3)
Jul - 09	23822	201,374.40	8.45	I-2 (T.D.3)
Aug-09	33819	298,587.00	8.83	I-2 (T.D.3)

Table 5.1 – Electricity Charges of Mona Plastic Pvt. Ltd. Before and After the Tariff Change

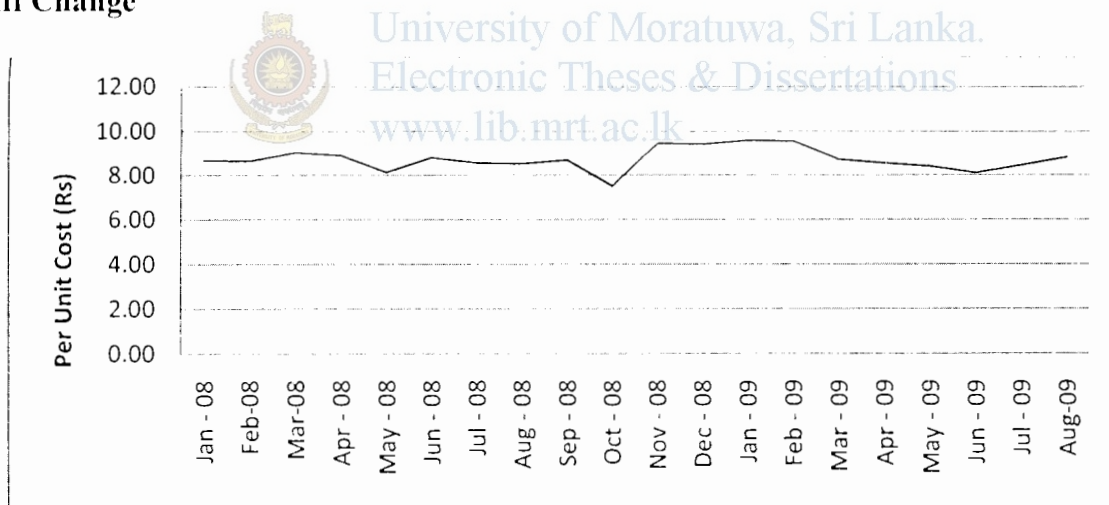


Figure 5.1 – Monthly Per Unit Electricity Charges of Mona Plastic Pvt. Ltd.

After the tariff change from two part, time of day tariff to three part, time of day tariff Mona Plastic Pvt. Ltd. has expanded their production and for the comparison per unit costs in rupees were calculated. Also the calculated monthly per unit electricity cost were plotted to see the variation in Figure 6.1 as shown above.

Merbok MDF Lanka Private Limited – Horana

Also two electricity accounts of Merbok MDF Lanka Pvt. Ltd. transferred to three part, time of day tariff since June 2009 and the variations of per unit costs were tabulated as follows.

Electricity Account No. 01

Month	Units	Billing Amount	Per Unit Cost (Rs)	Tariff Applicable
Jan - 08	74,798.00	613,263.00	8.20	I-2
Feb - 08	14,500.00	124,270.00	8.57	I-2
Mar - 08	10,208.00	82,684.80	8.10	I-2
Apr - 08	44,843.00	363,228.30	8.10	I-2
May - 08	58,881.00	476,936.10	8.10	I-2
Jun - 08	78,106.00	632,658.60	8.10	I-2
Jul - 08	74,715.00	605,191.50	8.10	I-2
Aug - 08	63,091.00	511,037.10	8.10	I-2
Sep - 08	55,567.00	450,092.70	8.10	I-2
Oct - 08	52,736.00	427,161.60	8.10	I-2
Nov - 08	56,203.00	522,687.90	9.30	I-2
Dec - 08	11,632.00	108,177.60	9.30	I-2
Jan - 09	22,011.00	204,702.30	9.30	I-2
Feb - 09	20,257.00	188,390.10	9.30	I-2
Mar - 09	4,940.00	45,942.00	9.30	I-2
Apr - 09	15,678.00	145,805.40	9.30	I-2
May - 09	11,728.00	109,070.40	9.30	I-2
Jun - 09	11,760.00	85,848.00	7.30	I-2 (T.D.3)
Jul - 09	17,532.00	116,569.60	6.65	I-2 (T.D.3)
Aug - 09	35,458.00	237,572.20	6.70	I-2 (T.D.3)

Table 5.2 – Electricity Charges of Account No. 01 of Merbok MDF Lanka Private Limited – Horana Before and After the Tariff Change

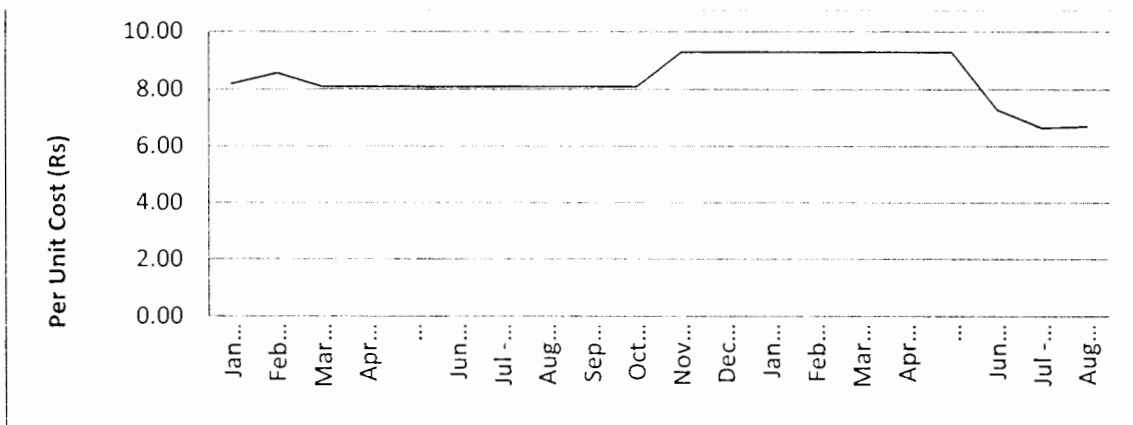


Figure 5.2 – The Variation of Monthly Per Unit Electricity Charges of Account No. 01 of Merbok MDF Lanka Pvt. Ltd.

Electricity Account No. 02

Month	Units	Billing Amount	Per Unit Cost (Rs)	Tariff Applicable
Jan - 08	92274	754,599.40	8.18	I-2
Feb-08	82951	679,960.00	8.20	I-2
Mar-08	89705	726,610.50	8.10	I-2
Apr - 08	94417	994,211.01	8.10	I-2
May - 08	103208	835,984.80	8.10	I-2
Jun - 08	82508	668,314.80	8.10	I-2
Jul - 08	83862	679,282.20	8.10	I-2
Aug - 08	70854	573,917.40	8.10	I-2
Sep - 08	62681	507,716.10	8.10	I-2
Oct - 08	58190	471,339.00	8.10	I-2
Nov - 08	60097	558,902.10	9.30	I-2
Dec - 08	12560	116,808.00	9.30	I-2
Jan - 09	22967	213,593.10	9.30	I-2
Feb - 09	20043	186,399.90	9.30	I-2
Mar - 09	6079	56,534.70	9.30	I-2
Apr - 09	7226	67,201.80	9.30	I-2
May - 09	7168	66,662.40	9.30	I-2
Jun - 09	12658	92,403.40	7.30	I-2 (T.D.3)
Jul - 09	14970	99,324.50	6.63	I-2 (T.D.3)
9-Aug	31241	208,943.40	6.69	I-2 (T.D.3)

Table 5.3 – Electricity Charges of Account No. 02 of Merbok MDF Lanka Private Limited Horana Before and After the Tariff Change

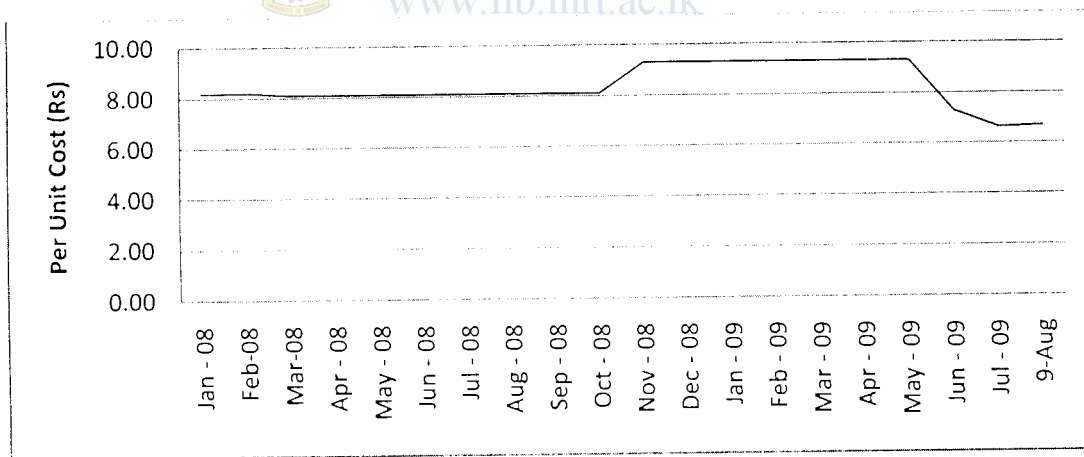


Figure 5.3 – The Variation of Monthly Per Unit Electricity Charges of Account No. 02 of Merbok MDF Lanka Pvt. Ltd.

According to the results obtained above more than 10% of electricity cost reduction can be expected to the consumers by transferring to the three part, time of day tariff.

Conclusions

The research of the impacts of three part time of day tariff on industries can be concluded with the following observations and the recommendations.

- Three part time of day tariff is more suitable for the industries which operate in round o' clock. If the industries that are operating only in day shifts, apply three part time of day tariff with operation of extra hours in night it would not be beneficial for them due to extra cost for wages and over time of the workers. It will be greater than the savings of electricity cost.
- If an industry has two electricity accounts, one of them can be transferred to three part, time of day tariff with internally arranged all day time loads to the same transformer. It will deduct the electricity cost of this account but it will be a loss of income of the CEB. Therefore CEB has to take necessary actions to stop this type of transfers and otherwise three part, time of day tariff will never help to meet the CEB requirements.
- If 75% of total industrial consumers shift their 10% of loads from peak hours to off peak hours the CEB will experience 130 MW reduction of peak demand. If CEB arrange the awareness programs and motivate the consumers this amount can be maximized with the benefits to the both parties.



References

- [1] The Government Notifications of Democratic Socialist Republic of Sri Lanka, "Part I: Section (I) – General of Gazette No. 1540/17," pp. 4A-10A, Saturday, March 15, 2008.
- [2] Ceylon Electricity Board, "Tariff Rates Effective from 1st November 2008," in CEB web site www.ceb.lk.
- [3] Ceylon Electricity Board, "Statistical Digest," the section "Electricity Sales by Tariff in GWh," 2008.
- [4] The Department of Census & Statistics Sri Lanka, "The report of Annual Survey of Industries – 2008," the official web site of the department of Census & Statistics Sri Lanka, www.gov.lk
- [5] Commercial Branch of Western Province (South-II), 644, R3, Head Quarters, Sri Jayawardanapura Mawatha, Ethulkotte, "Electricity Bill Ledgers of Mona Plastic Pvt Ltd. for years 2008 & 2009".
- [6] Commercial Branch of Western Province (South-II), 644, R3, Head Quarters, Sri Jayawardanapura Mawatha, Ethulkotte, "Electricity Bill Ledgers of Merbok MDF Lanka Pvt Ltd. for years 2008 and 2009".
- [7] Royal Ceramic PLC, Eheliyagoda, "Annual Report – 2008," Salary & Wages Analysis for the month of March 2008, p 32.
- [8] Grid Sense, "PM 30 Manual," Operation Manual of Data Logger in Grid Sense web site www.gridsense.net
- [9] System Control Centre, Ceylon Electricity Board, Kent Road, Colombo 9, "Daily Generation Data" Computerized Data of daily load curves 2008 & 2009.

Rate GP-2.

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below :
- (i) A maximum demand charge at the rate of Rs. 750.00 per kVA of the maximum demand made during the billing period ;
 - (ii) A unit charge at the basic rate of Rs. 13.80 per unit ;
 - (iii) A fixed charge of Rs. 3,000.00 per billing period.

Rate GP-3

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below :
- (i) A maximum demand charge at the rate of Rs. 675.00 per kVA of the maximum demand made during the billing period ;
 - (ii) A unit charge at the basic rate of Rs. 13.60 per unit ;
 - (iii) A fixed charge of Rs. 3,000.00 per billing period.

SECTION 5



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This rate I.1, I.2 and I.3 set out below shall be applicable to a supply of electricity used wholly or mainly for motive power or for electro-chemical process in factories, workshops, foundries, oil mills, spinning and weaving mills, water supply and irrigation pumping stations, port and dock installations and other similar industrial installations but shall not be applicable to a supply of electricity covered under Section 6 of this schedule.

Rate I-1

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand is less than or equal to 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i) and (ii) given below :
- (i) A unit charge at the basic rate of Rs. 10.00 per unit ; 10 / 100
 - (ii) A fixed charge of Rs. 240.00 per billing period.

All consumers who were being charged under the Industrial Time of Day Tariff - IPTD) will be charged at the rates of I-1 as given above :

Rate I-2.

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below :

- (i) A unit charge at the basic rate of Rs. 8.10 per unit; 9/30
- (ii) A Maximum Demand Charge at the rate of Rs. 675.00 per kVA of the maximum demand made during a billing period;
- (iii) A fixed charge of Rs. 3,000.00 per billing period.

Rate I-3.

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below:
 - (i) A unit charge at the basic rate of Rs. 8.00 per unit; 9/10
 - (ii) A Maximum Demand Charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period;
 - (iii) A fixed charge of Rs. 3,000.00 per billing period.

SECTION 6

INDUSTRIAL TIME OF DAY TARIFF (TWO PART)

The rates, I-2 (T.D.2) and I-3 (T.D.2) set out below shall be applicable to a supply of electricity at each individual point of supply used wholly or mainly for motive power or for electro-chemical processes in factories, workshops, foundries, oil mills, spinning and weaving mills, water supply and irrigation pumping stations, port and dock installations and other similar industrial installations. These rates I-2 (T.D.2) and I-3 (T.D.2) are applicable to a supply of electricity for Industrial Consumers where Ceylon Electricity Board and the consumer mutually agree to one of these optional rates in lieu of the corresponding rates I-2 and I-3 described in the Section 5 of this notice. The General Manager, Ceylon Electricity Board shall take into consideration the time taken for procurement of suitable metering equipment and other factors, determine at his discretion the date from which the relevant rate shall become effective in respect of each supply on the case by case basis.

Rate I-2 (T.D.2)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400-230 Volts nominal and where the contract demand exceeds 42kVA
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii) and (iv) given below:
 - (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period.
 - (ii) A unit charge at the basic rate of Rs. 7.50 per unit for units consumed within the hours from 9.30 p.m. to 6.30 p.m. the following day.
 - (iii) A unit charge at the basic rate of Rs. 22.00 per unit for units consumed within the hours from 6.30 p.m. to 9.30 p.m. each day.
 - (iv) A fixed charge of Rs. 3,000.00 per billing period

Rate I-3 (T.D.2)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii) and (iv) given below :
- (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 7.10 per unit for units consumed within the hours from 9.30 p.m. to 6.30 p.m. the following day ;
 - (iii) A unit charge at the basic rate of Rs. 20.00 per unit for units consumed within the hours from 6.30 p.m. to 9.30 p.m. each day ;
 - (iv) A fixed charge of Rs. 3,000.00 per billing period.

SECTION 7

* * INDUSTRIAL TIME OF DAY TARIFF (THREE PART)

The rates, I-2 (T.D.3) and I-3 (T.D.3) set out below shall be applicable to a supply of electricity at each individual point of supply used wholly or mainly for motive power or for electro-chemical processes in factories, workshops, foundries, oil mills, spinning and weaving mills, water supply and irrigation pumping stations, port and dock installations and other similar industrial installations. These rates I-2 (T.D.3) and I-3 (T.D.3) are applicable to a supply of electricity for Industrial Consumers where Ceylon Electricity Board and the consumer mutually agree to one of these optional rates in lieu of the corresponding rates I-2, I-3 and I-2 (T.D.2), I-3 (T.D.2) described in the Sections 5 and 6 of this notice. The General Manager, Ceylon Electricity Board shall take into consideration the time taken for procurement of suitable metering equipment and other factors, determine at his discretion the date from which the relevant rate shall become effective in respect of each supply on the case by case basis.

Rate I-2 (T.D.3)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii), (iv) and (v) given below :
- (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 7.30 per units for units consumed within the hours from 4.30 a.m. to 6.30 p.m. each day ;
 - (iii) A unit charge at the basic rate of Rs. 23.00 per unit for units consumed within the hours from 6.30 p.m. to 10.30 p.m. each day ;
 - (iv) A unit charge at the basic rate of Rs. 5.30 per unit for units consumed within the hours from 10.30 p.m. to 4.30 a.m. the following day ;
 - (v) A fixed charge of Rs. 3,000.00 per billing period.



Rate I-3 (T.D.3)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii), (iv) and (v) given below :
- (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 6.90 per unit for units consumed within the hours from 4.30 a.m. to 6.30 p.m. each day ;
 - (iii) A unit charge at the basic rate of Rs. 21.00 per unit for units consumed within the hours from 6.30 p.m. to 10.30 p.m. each day ;
 - (iv) A unit charge at the basic rate of Rs. 5.00 per unit for units consumed within the hours from 10.30 p.m. to 4.30 a.m. the following day ;
 - (v) A fixed charge of Rs. 3,000.00 per billing period.

SECTION 8

HOTEL TARIFF — GENERAL PURPOSE

This rate H.1(GP) and H.2(GP) set out below shall be applicable to a supply of electricity used in hotels but shall not be applicable to a supply of electricity covered under Section 8(I) of this schedule.

Rate H-1 (GP)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand is less than or equal to 42 kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i) and (ii) given below :
- (i) A unit charge at the basic rate of Rs. 15.00 per unit ;
 - (ii) A fixed charge of Rs. 240.00 per billing period

Rate H-2 (GP)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below :
- (i) A unit charge at the basic rate of Rs. 13.80 per unit ;
 - (ii) A Maximum Demand Charge at the rate of Rs. 750.00 per kVA of the maximum demand made during a billing period ;
 - (iii) A fixed charge of Rs. 3,000.00 per billing period

SECTION 8(I)

HOTEL TARIFF — INDUSTRIAL

This rate H.2(I) and H.3(I) set out below shall be applicable to a supply of electricity used wholly or mainly for motive power in hotels approved by the Tourist Board, but shall not be applicable to a supply of electricity covered under Section 8 of this schedule.

Rate H-2 (I)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below :
- (i) A unit charge at the basic rate of Rs. 8.10 per unit ;
 - (ii) A Maximum Demand Charge at the rate of Rs.675.00 per kVA of the maximum demand made during a billing period ;
 - (iii) A fixed charge of Rs. 3000.00 per billing period.

Rate H-3 (I)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of charges (i), (ii) and (iii) given below :
- (i) A unit charge at the basic rate of Rs.8.00 per unit ;
 - (ii) A Maximum Demand Charge at the rate of Rs.650.00 per kVA of the maximum demand made during a billing period ;
 - (iii) A fixed charge of Rs. 3,000.00 per billing period.



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SECTION 9

HOTEL TARIFF — INDUSTRIAL TIME OF DAY (TWO PART)

The rates, H.2 (I-TD2) and H.3 (I-TD2) set out below shall be applicable to a supply of electricity at each individual point of supply used wholly or mainly for motive power in Hotels approved by the Tourist Board. These rates H.2 (I-TD2) and H.3 (I-TD2) are applicable to a supply of electricity for Hotel Consumers where Ceylon Electricity Board and the consumer mutually agree to one of these optional rates in lieu of the corresponding rates H.2(I) and H.3(I) described in the section 8(I) of this notice. The General Manager, Ceylon Electricity Board shall take into consideration the time taken for procurement of suitable metering equipment and other factors, determine at his discretion the date from which the relevant rate shall become effective in respect of each supply on the case by case basis.

Rate H-2 (I-TD2)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii) and (iv) given below :
- (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 7.50 per unit for units consumed within the hours from 9.30 p.m. to 6.30 p.m. the following day ;

- (iii) A unit charge at the basic rate of Rs. 22.00 per unit for units consumed in the hours from 6.30 p.m. to 9.30 p.m. each day ;
- (iv) A fixed charge of Rs. 3000.00 per billing period.

Rate H-3 (I-TD2)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii) and (iv) given below :
 - (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 7.10 per unit for units consumed within the hours from 9.30 p.m. to 6.30 p.m. the following day ;
 - (iii) A unit charge at the basic rate of Rs.20.00 per unit for units consumed in the hours from 6.30 p.m. to 9.30 p.m. each day ;
 - (iv) A fixed charge of Rs. 3,000.00 per billing period.

SECTION 10

HOTEL TARIFF — INDUSTRIAL TIME OF DAY (THREE PART)

The rates, H.2 (I-TD3) and H.3 (I-TD3) set out below shall be applicable to a supply of electricity at each individual point of supply used wholly or mainly for motive power in Hotels approved by the Tourist Board. These rates H.2 (I-TD3) and H.3 (I-TD3) are applicable to a supply of electricity for Hotel Consumers where Ceylon Electricity Board and the consumer mutually agree to one of these optional rates in lieu of the corresponding rates H.2(I), H.3(I) and H.2 (I-TD2), H.3 (I-TD2) described in the sections 8(I) and 9 of this notice. The General Manager, Ceylon Electricity Board shall take into consideration the time taken for procurement of suitable metering equipment and other factors, determine at his discretion the date from which the relevant rate shall become effective in respect of each supply on the case by case basis.

Rate H-2 (I-TD3)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 400 230 Volts nominal and where the contract demand exceeds 42kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii), (iv) and (v) given below
 - (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 7.30 per unit for units consumed within the hours from 4.30 a.m. to 6.30 p.m. each day ;
 - (iii) A unit charge at the basic rate of Rs. 23.00 per unit for units consumed within the hours from 6.30 p.m. to 10.30 p.m. each day ;
 - (iv) A unit charge at the basic rate of Rs. 5.30 per unit for units consumed within the hours from 10.30 p.m. to 4.30 a.m. the following day ;
 - (v) A fixed charge of Rs. 3000.00 per billing period.

Rate H-3 (I-TD3)

- (a) This rate shall apply to supplies at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), (iii), (iv) and (v) given below :
- (i) A maximum demand charge at the rate of Rs. 650.00 per kVA of the maximum demand made during a billing period ;
 - (ii) A unit charge at the basic rate of Rs. 6.90 per unit for units consumed within the hours from 4.30 a.m. to 6.30 p.m. each day ;
 - (iii) A unit charge at the basic rate of Rs. 21.00 per unit for units consumed within the hours from 6.30 p.m. to 10.30 p.m. each day ;
 - (iv) A unit charge at the basic rate of Rs. 5.00 per unit for units consumed within the hours from 10.30 p.m. to 4.30 a.m. the following day ;
 - (v) A fixed charge of Rs. 3000.00 per billing period.

SECTION 11

STANDBY SUPPLY TARIFF

- (a) Electricity supplied on a standby basis shall apply to Industrial consumers where the Ceylon Electricity Board and the consumer mutually agree to one of these optional rates in lieu of the corresponding rates I.2 and I.3. in Section 5 of this Notice. The General Manager, Ceylon Electricity Board shall, taking into consideration the time taken for procurement of suitable metering equipment and other factors, determine at his discretion the date from which the relevant rate shall be applicable to each supply of electricity on a case by case basis.
- (b) The rates I.2 (ST) and I.3 (ST) set out below shall be applicable to a supply of electricity on a standby basis, at each individual point of supply used wholly or mainly for motive power or for electro-chemical processes in factories, workshops, foundries, oil mills, spinning and weaving mills, water supply and irrigation pumping stations, port and dock installations and other similar industrial installations.
- (c) The Standby Tariff is applicable only when the energy consumed from the CEB supply does not exceed 15% of the consumer's estimated consumption in a billing period.

Rate I-2 (S.T)

- (a) This rate shall apply to supplies on standby basis at each individual point of supply delivered and metered at 400/230 Volts nominal and where the contract demand exceeds 42 kVA.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii) and (iii) given below :
- (i) A demand charge at the rate of Rs. 675.00 per kVA of the contract demand for each billing period ;
 - (ii) A unit charge at the basic rate of Rs. 8.10 per unit for units consumed ;
 - (iii) A fixed charge of Rs. 3000.00 per billing period.

Rate I-3 (S.T)

- (a) This rate shall apply to supplies on Standby Basis at each individual point of supply delivered and metered at 11,000 Volts nominal and above.
- (b) The charges in each billing period for supplies under this tariff shall be the sum of the charges (i), (ii), and (iii) given below :
- (i) A demand charge at the rate of Rs. 650.00 per kVA of the contract demand for each billing period .
 - (ii) A unit charge at the basic rate of Rs. 8.00 per unit for units consumed ;
 - (iii) A fixed charge of Rs. 3,000.00 per billing period.

Tariff rates effective from 1st November 2008

Tariff category		Unit charge (Rs/kWh)	Fixed charge (Rs/month)	Demand charge (Rs/kVA)
Industrial Purpose				
I-1		10.5	240	
I-2		9.3	3000	675
I-3		9.1	3000	650
I-2(TD)	peak	24.6	3000	650
	off peak	8.4		
I-3(TD)	peak	23	3000	650
	off peak	8		
Hotel Purpose				
H-1(GP)		15	240	
H-2(GP)		13.8	3000	750
H-2 (I)		9.3	3000	675
H-3 (I)		9.1	3000	650
H-2(I-TD)	peak	24.6	3000	650
	off peak	8.4		
H-3(I-TD)	peak	23	3000	650
	off peak	8		
3 part Time of Day tariff				
Industrial/ Hotel Purpose				
I-2(TD3)	peak (18.30hrs - 22.30 hrs)	23	3000	650
	day (04.30hrs -18.30hrs)	7.3		
	off peak (rest of the time)	5.3		
I-3(TD3)	peak(18.30hrs- 22.30hrs)	21	3000	650
	day (04.30hrs -18.30hrs)	6.9		
	off peak (rest of the time)	5		



Adjustments to the Loading Pattern of Milling Department Royal Ceramics PLC

Operating pattern of Ball Mills and Crusher before the adjustment	
Day	2
Hours	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Ball Mill No. 01	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Ball Mill No. 03	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Ball Mill No. 04	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Ball Mill No. 05	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Crusher	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Operating Pattern of Ball Mills and Crusher after the adjustment	
Day	2
Hours	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Ball Mill No. 01	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Ball Mill No. 03	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Ball Mill No. 04	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Ball Mill No. 05	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>
Crusher	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"><input type="checkbox"/></div> <div style="width: 60%;"><input type="checkbox"/></div> <div style="width: 20%;"><input type="checkbox"/></div> </div>

- Operating
- Unloading
- Loading

Adjustment to the Loading Pattern of Milling Department Lanka Walltile PLC

Operating pattern of Ball Mills and Crusher before the adjustment																								
Day	1																							2
Hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Ball Mill A	[Loading]																							[Loading]
Ball Mill B	[Operating]																							[Unloading]
Ball Mill C	[Loading]																							[Loading]
Crusher	[Operating]																							[Operating]

Operating Pattern of Ball Mills and Crusher after the adjustment																								
Day	1																							2
Hours	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Ball Mill A	[Loading]																							[Loading]
Ball Mill B	[Operating]																							[Unloading]
Ball Mill C	[Loading]																							[Loading]
Crusher	[Operating]																							[Operating]

- Operating
- Unloading
- Loading

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Table 17 : Value of electricity & type of fuel classified by industry - 2007
(Establishments with 6 or more persons engaged)

Type of industry	Fuel & Electricity Total (Rs.)	Electricity (Rs.)	Furnace (Rs.)	Diesel (Rs.)	Kerosene (Rs.)	Petrol (Rs.)	L.P.G. (Rs.)	Charcoal (Rs.)	Firewood (Rs.)	Water (Rs.)	Other fuel (Rs.)
1731 Manufacture of knitted garments	61,216,197,141	14,225,645,847	46,560,814,653	283,023,831	47,875	7,391,889	992,772	-	-	87,872,240	80,000,333
1732 Manufacture of knitted socks, puttees and hand gloves	59,661,759,891	13,449,212,558	46,205,296,325	11,038,228	-	5,298,028	-	-	-	10,913,951	-
1733 Manufacture of knitted lace	620,747,222	364,175,831	256,571,391	159,082,834	47,675	2,562,961	962,772	-	-	13,849,015	80,000,333
1739 Elastomeric Yarn & other rubber thread based products	207,819,278	90,098,520	99,988,753	5,543,158	-	-	-	-	-	12,817,846	-
Group Total	8,348,821,227	4,889,403,296	844,204,215	1,483,196,334	177,020,899	434,893,490	83,330,278	1,005,000	354,271	50,581,208	34,279,898
1811 Manufacture of weaving Apparel, except for apparels	8,356,621,227	4,889,403,296	844,204,215	1,483,196,334	177,020,899	434,893,490	83,330,278	1,005,000	354,271	450,723,658	34,279,898
191 Tanning & dressing of leather; manu. of luggage, Hand b	8,718,317	7,482,587	538,150	538,150	-	882,828	108,008	-	-	872,383	10,000
1912 Manu. of luggage, hand bags	2,341,400	2,309,400	-	25,000	-	-	-	-	-	-	10,000
1913 Manu. of Bags & rain coats, artificial leather product	7,374,917	5,186,187	-	514,750	-	862,828	108,008	-	-	872,383	-
Group Total	152,811,470	97,878,858	34,882,504	9,288,191	12,000	3,636,174	31,200	-	-	4,890,987	2,485,846
1920 Manufacturing of footwear	152,811,470	97,878,858	34,882,504	9,288,191	12,000	3,636,174	31,200	-	-	4,890,987	2,485,846
Group Total	178,803,712	106,751,505	10,000	85,888,325	10,774	808,802	-	-	-	4,850,597	2,455,846
2010 Saw-milling and planning of wood	178,803,712	106,751,505	10,000	85,888,325	10,774	808,802	-	-	-	1,813,718	1,418,590
Group Total	137,542,734	75,973,890	500,000	36,850,289	606,152	4,802,340	-	-	15,811,200	3,281,873	581,010
2021 Manufacture of veneer sheets, plywood, lamin board, particle board	86,727,725	47,657,626	500,000	19,216,692	200,000	2,052,340	-	-	15,800,000	1,301,087	-
2022 Manufacture of builders carpentry and joinery	4,089,320	4,011,720	-	4,000	-	-	-	-	-	-	73,000
2024 Manu. of prodn. by cork barks, wood utensils from reed, bamboo	224,130	158,740	-	1,106	1,106	-	-	-	-	11,000	-
2025 Manu. of Household utensils of other wooden article and	37,014,290	20,972,865	-	11,479,654	271,965	2,750,000	-	-	11,200	1,978,907	-
2028 Manu. of other office equipment & wood articles	9,487,269	2,811,930	6,303,923	129,381	-	-	-	-	-	-	-
Group Total	842,778,848	364,487,130	218,088,106	139,417,851	388,180	78,417,830	59,438	-	2,835,281	18,115,814	442,028
2101 Manufacture of pulp, paper and paperboards	202,007,026	67,875,068	67,809,350	32,398,801	207,040	1,367,794	56,558	-	1,995,988	3,757,467	1,487,425
2102 Manu. of corrugated paper & paperboard & containers of	294,028,148	128,132,226	94,777,810	3,936,000	52,180	34,240,235	-	-	-	4,408,313	-
2103 Manufacture of cards, files, books and pads	13,088,457	7,397,215	-	3,936,000	-	823,589	2,880	-	939,293	135,220	-
2104 Manu. of toys, plates, caps, spoons, knives & ornaments	123,472	118,757	-	-	-	-	-	-	-	4,715	-
2109 Manu. of pulp paper and paper boards articles n.e.c	333,473,543	180,983,831	-	98,533,701	-	43,106,012	-	-	-	9,809,999	-
Group Total	1,334,975	596,880	783,295	783,295	-	-	-	-	-	-	-
2211 Publishing of books, brochures, musical books	1,334,975	596,880	783,295	783,295	-	-	-	-	-	-	-
Group Total	714,344,832	480,481,158	2,507,411	106,294,038	13,588,050	105,392,871	3,839,890	-	-	30,413,548	1,894,868
2221 Printing of newspapers, journals & periodicals for other	625,289,189	371,518,628	2,507,411	106,294,038	13,588,050	101,145,421	3,839,890	-	-	24,505,965	1,904,868
2222 Service activities related to printing	86,055,643	78,962,530	2,507,411	106,294,038	-	4,247,248	-	-	-	5,907,981	-
Group Total	122,744,605	73,075,887	-	-	44,305,437	-	-	-	-	5,363,301	-
2320 Manu. of refined petroleum products	122,744,605	73,075,887	-	-	44,305,437	-	-	-	-	1,022,788	-
Group Total	86,101,017	58,362,043	-	8,605,090	-	-	-	-	-	882,941	-
2412 Manu. of fertilizer & nitrogen compounds	1,869,548	1,869,780	-	181,788	-	-	-	-	-	129,857	-
2413 Manu. of plastic in primary forms and synthetic rubber	47,867,528	42,946,588	3,878,000	-	-	-	-	-	-	-	-
2414 Manu. of Natural carbonic fertilizers	19,564,940	14,726,895	4,565,302	-	-	-	-	-	-	-	-
Group Total	76,432,476	243,878,936	232,802,603	134,065,038	4,233,159	44,178,374	8,124,532	25,438,874	18,071,575	12,313,987	31,381,447
2421 Manu. of pesticides and other agro-chemical products	19,357,453	16,803,720	-	-	-	-	-	-	-	-	-
2422 Manu. of paints, varnishes & similar coatings, printing	106,509,787	28,173,100	-	75,208,690	-	5,155,258	-	-	-	972,770	-
2423 Manu. of pharmaceuticals, medicinal chemicals & botanics	236,448,448	111,445,168	25,184,074	23,483,117	1,085,878	35,607,091	8,927,199	-	13,428,833	7,439,618	9,837,690
2424 Manu. of soap & detergent, cleaning, perfumery & toilet	82,035,192	17,565,437	9,438,263	7,973,983	3,006,178	1,401,748	98,857	-	955,000	871,320	20,754,408
2425 Manu. of explosives, crackers and other fireworks	3,627,000	1,365,000	-	117,000	-	-	-	195,000	975,000	975,000	-
2426 Manu. of mosquito-coils, camphor, naphthalene balls, incense	3,642,544	1,292,333	-	1,298,210	-	-	-	-	-	18,000	-
2427 Manu. of processed salt (for food)	302,992,149	60,908,278	198,058,138	15,597,204	28,105	908,857	98,476	-	1,016,000	1,881,870	789,398
2428 Manu. of chemicals and activated carbon	1,170,000	450,000	-	-	-	1,103,822	-	-	1,926,842	155,089	-
2429 Manu. of other chemical products n.e.c	-	-	-	-	-	-	-	-	720,000	-	-

(cont.)

ELECTRICITY SALES BY PROVINCE IN GWh (million kWh)

Province	C.E.B.	Percentage Change	C.E.B. 2008	Percentage of Total	Monthly Av Sales kWh/Cons
Colombo City	1117	6.5%	1112	33.2%	629
North Western	759	3.1%	762	9.3%	121
North Central	292	4.0%	281	3.1%	95
North Eastern	106	3.5%	112	3.3%	73
on - 1 Total	2237	1.4%	2268	26.9%	176
Western-North	1787	1.4%	1812	27.5%	132
Central	595	4.6%	624	4.4%	94
Eastern	333	4.1%	347	4.1%	107
on - 2 Total	2715	2.4%	2782	33.0%	177
Western-South II	1094	2.3%	1120	13.3%	105
Uva	296	5.0%	311	4.7%	81
Sabaragamuwa	300	4.5%	316	4.5%	95
on - 3 Total	1750	3.2%	1807	21.5%	158
Western-South I	853	3.0%	827	9.6%	328
Southern	721	1.8%	734	8.7%	132
on - 4 Total	1574	-0.8%	1561	18.5%	172
AL	8276	1.7%	8417	100.0%	172

NO. OF CONSUMER ACCOUNTS BY PROVINCE

Province	C.E.B.	Increase in Accounts	Percentage Change	C.E.B. 2008	Percentage of Total
Colombo City	144,024	3,304	2.3%	147,328	3.6%
North Western	599,269	30,565	6.0%	539,834	13.2%
North Central	42,665	15,313	6.3%	257,965	6.3%
North Eastern	142,449	4,436	3.6%	126,887	3.1%
Region - 1 Total	1,018,397	53,617	5.3%	1,072,014	26.2%
Western-North	406,204	17,187	3.7%	483,441	11.8%
Central	342,635	30,196	5.8%	554,833	13.6%
Eastern	242,602	24,813	10.1%	270,475	6.6%
Region - 2 Total	1,236,551	72,198	5.8%	1,308,748	32.0%
Western-South II	296,592	15,299	5.3%	305,891	7.5%
Uva	302,111	16,783	5.6%	318,894	7.8%
Sabaragamuwa	306,527	22,327	7.3%	329,254	8.1%
Region - 3 Total	899,630	54,409	6.0%	954,039	23.3%
Western-South I	401,544	8,606	4.3%	210,150	5.1%
Southern	510,864	33,083	6.5%	543,947	13.3%
Region - 4 Total	710,408	41,689	5.9%	754,097	18.4%
TOTAL	3,866,987	221,913	5.7%	4,088,900	100.0%

REVENUE FROM ELECTRICITY SALES BY PROVINCE IN m.Rs.

Province	C.E.B.	Percentage Change	C.E.B. 2008	Percentage of Total	Ave Price Rs./kWh
Colombo City	16,056	26.3%	20,273	18.3%	15.24
North Western	7,376	29.5%	9,551	8.6%	12.21
North Central	2,484	28.4%	3,190	2.9%	12.16
North Eastern	1,162	22.0%	1,417	1.3%	12.66
Region - 1 Total	27,078	27.2%	34,431	31.0%	15.18
Western-North	17,731	27.5%	22,614	20.4%	12.48
Central	3,256	26.5%	7,563	6.8%	12.15
Eastern	3,256	29.4%	4,212	3.8%	12.14
Region - 2 Total	26,965	27.4%	34,389	31.0%	12.36
Western-South II	11,209	28.2%	14,366	13.0%	12.83
Uva	2,860	26.5%	3,617	3.3%	11.63
Sabaragamuwa	3,503	26.8%	4,443	4.0%	11.83
Region - 3 Total	17,572	27.6%	22,425	20.2%	12.41
Western-South I	8,907	24.1%	11,052	10.0%	13.37
Southern	6,879	25.0%	8,599	7.8%	11.72
Region - 4 Total	15,786	24.5%	19,651	17.7%	12.59
TOTAL	87,400	26.9%	110,886	100.0%	13.17

ELECTRICITY SALES BY TARIFF IN GWh (million kWh)

Tariff	C.E.B.	Percentage Change	C.E.B. 2008	Percentage of Total	Monthly Av Sales kWh/Cons
Domestic	2728	1.1%	2757	32.8%	64
Religious	43	-3.4%	42	0.5%	144
General Total	1504	4.4%	1570	18.6%	315
Small	775	3.6%	803	9.5%	162
Medium	552	0.1%	585	7.0%	17,946
Large	177	2.6%	182	2.2%	265,675
Hotel Total	122	9.4%	133	1.6%	23,777
Small	22	10.5%	24	0.3%	5,677
Medium	0	-	0	0.0%	0
Large	0	-	0	0.0%	0
Industrial Total	2677	1.9%	2678	31.8%	5,575
Small	194	3.5%	201	2.4%	483
Medium	0	-	0	0.0%	0
Large	45	27.1%	57	0.7%	6,742
Bulk Supply to LECO	1130	-1.3%	1130	13.4%	2,477,752
L1 - LT Supply	1	92.5%	1	0.0%	6,613
L2 - 11kV & above	108	0.0%	108	1.3%	2,44,644
Street Lighting	108	0.0%	108	1.3%	9,010,167
AL	8276	1.7%	8417	100.0%	172

NO. OF CONSUMER ACCOUNTS BY TARIFF

Tariff	C.E.B.	Increase in Accounts	Percentage Change	C.E.B. 2008	Percentage of Total
Domestic	3,409,440	198,907	5.8%	3,608,347	88.2%
Religious	22,804	1,346	5.9%	24,150	0.6%
General Total	396,933	18,934	4.8%	415,867	10.2%
Small	394,393	18,659	4.7%	413,692	10.1%
Medium	2,489	229	9.2%	2,718	0.1%
Large	51	6	11.8%	57	negl.%
Hotel Total	502	(35)	-7.0%	467	0.01%
Small	392	(37)	9.4%	355	0.01%
Medium	0	0	-	0	0.0%
Large	0	0	-	0	0.0%
Industrial Total	37,270	2,760	7.4%	40,030	1.0%
Small	33,561	2,643	7.9%	36,204	0.9%
Medium	0	0	0.0%	6	0.0%
Large	3,134	137	4.4%	3,271	0.1%
Bulk Supply to LECO	37	1	2.7%	38	negl.%
L1 - LT Supply	1	0	0.0%	1	negl.%
L2 - 11kV & above	36	1	2.8%	37	negl.%
Street Lighting	1	0	0.0%	1	0.0%
TOTAL	3,866,987	221,913	5.7%	4,088,900	100.0%

REVENUE FROM ELECTRICITY SALES BY TARIFF IN m.Rs.

Tariff	C.E.B.	Percentage Change	C.E.B. 2008	Percentage of Total	Ave Price Rs./kWh
Domestic	24,591	16.4%	28,821	25.8%	10.38
Religious	348	86.0%	644	0.6%	15.47
General Total	23,910	30.1%	31,096	28.0%	19.81
Small	12,264	29.1%	15,834	14.3%	19.73
Medium	8,939	32.6%	11,856	10.7%	20.25
Large	2,707	25.8%	3,406	3.1%	18.75
Hotel Total	1,310	26.7%	1,660	1.5%	12.46
Small	248	25.0%	310	0.3%	12.83
Medium	2	-	548	0.5%	13.05
Large	385	42.1%	124	0.1%	14.19
Industrial Total	25,268	28.6%	32,750	29.5%	12.23
Small	1,824	36.9%	2,498	2.3%	12.41
Medium	1	-18.6%	1	0.0%	12.27
Large	11,922	29.9%	15,490	14.0%	12.52
Bulk Supply to LECO	10,690	28.4%	13,724	12.4%	12.15
L1 - LT Supply	14	-90.4%	1	0.0%	16.72
L2 - 11kV & above	10,676	28.5%	13,722	12.4%	12.15
Street Lighting	1,284	87.0%	2,400	2.2%	22.20
TOTAL	87,400	26.9%	110,886	100.0%	13.17