

## Prathamesh Energy Solution

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To,  
The Principal,  
Jaihind College of Engineering  
Kuran Tal. Junnar, Dist. Pune-410511

Sub: Submission of Report on Energy Audit of College Campus

Respected Sir,

Please find enclosed herewith the report

Thanking you  
Yours faithfully

For Prathamesh Energy Solution

  
Authorized Signatory



Report on  
Energy Audit of  
Jaihind College of Engineering and Campus  
Kuran Tal. Junnar Dist. Pune-410511

Prepared by

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## **ACKNOWLEDGEMENT**

We at Prathamesh Energy Solution, Pune, express our sincere gratitude to the management of Jaihind College of Engineering, Kuran awarding us the assignment of Energy Audit of their College campus located at Kuran, Tal. Junnar Dist. Pune

We are very much thankful to

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- **Shri. Vijay Mahadeo Gunjal, Secretary, Jaihind Comprehensive Educational Institute's, Jaihind College of Engineering, Kuran, Tal. Junnar, Dist. Pune**
- **Shri. Jitendra Mahadeo Gunjal Treasurer, Jaihind Comprehensive Educational Institute's, Jaihind College of Engineering, Kuran, Tal. Junnar, Dist. Pune**
- **Shri. Nivrutti Murlidhar Kale, Member**
- **Shri. Dharmendra Mahadeo Gunjal, Member**
- **Shir. Dattatray Balshiram Date, Member**
- **Mrs. Kamal Mahadeo Gunjal, Member**
- **Mrs. Suman Mahadeo Gunjal, Member**
- **Shri. Vitthal Gangadhar Mandhare, Member**
- **Mrs. Anjali Jitendra Gunjal, Member**
- **Mrs. Shubhangi Dharmendra Gunjal, Member**
- **Mrs. Indumati Vijay Gunjal, Member**
- **Shri. Sanjay Mahadeo Gunjal, Member**
- **Mrs. Mandakini Janardhan Dangat, Member**
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- **Dr. B. R. Jadhavar, Principal, Jaihind College of Engineering, Kuran, Tal. Junnar, Dist. Pune**
- **Prof. Y. S. Gunjal, Principal, Jaihind Polytechnic, Kuran, Tal. Junnar, Dist. Pune**

for giving us opportunity to conduct detailed energy audit of the institute and provide all the required data and information promptly for the smooth conduction of detailed energy audit.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We are also thankful to all the technical staff and office staff for helping during the measurements at the electrical distribution center and control room.

## EXECUTIVE SUMMARY

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the Energy Consumption & mitigate the CO<sub>2</sub> emissions

1. Jaihind College of Engineering consumes electrical Energy in majority used for various gadgets & office operations.

2. The various projects already implemented by the College are

- Usage of Electronic chokes
- Usage of natural day lights and natural air circulation
- Usage of Natural Day light in corridors specifically
- Usage of sprinklers in garden for watering
- Segregation of garbage and its disposal
- Usage of technical team and their skill for fabrication of furniture and other items in house.

### 3. Important Parameters: Electrical Energy:

No	Parameter	Max	Min	Average
1	Units consumed, kWh	16889	6564	11726.5
2	Max Demand, kVA	69	19	44
3	Power Factor	0.995	0.968	0.981
4	Electricity Bill amount	132054	58535	95294.5

### 4. Important Parameters: CO<sub>2</sub> Emissions (Average, MT/Month)

No	Particulars	Value	Unit	%
1	CO <sub>2</sub> - Emissions- Electricity Usage	9.38	MT	80
2	CO <sub>2</sub> - Emissions- LPG Usage	2.34	MT	20

On the basis of average electricity usage and LPG usage CO<sub>2</sub> emission is 11.72 MT.

### 5. Benchmark: In terms of Electrical Energy & CO<sub>2</sub> emissions:

We now present two important benchmarks in respect of Electrical Energy & CO<sub>2</sub> emissions as under.

No	Particulars	Value	Unit
1	Electrical Energy consumed	0.042	kWh/sq ft
2	CO <sub>2</sub> - Emissions	0.042	Kg/sq ft

**6. Recommendations:**

We present herewith various proposals to reduce the Electrical Energy demand and reduce the CO<sub>2</sub> emissions

No	Recommendation	Annual saving potential in kWh /Kg of LPG	Annual Saving Potential in MT of CO <sub>2</sub>	Annual monetary gain, Rs.
1	Installation of 10 kWp Solar PV Pack	16800 kWh	13.44	168000.00

**Notes & assumptions:**

1. 1 Unit of Electrical Energy releases 0.8 Kg of CO<sub>2</sub> into atmosphere
2. 1 Kg of LPG releases 3 Kg of CO<sub>2</sub> into atmosphere
3. Daily working hours-10
4. Annual working Days-280
5. Average Rate of Electrical Energy- Rs 10 per kWh

## **ABBREVIATIONS**

COE	: College of Engineering
DP	: Double Pole
CFL	: Compact Fluorescent Lamp
EESL	: Energy Efficiency Services Limited
F P	: Feeder Pillar
MSEDCL	: Maharashtra State Electricity Distribution Company Ltd.
MEDA	: Maharashtra Energy Development Agency
MIDC	: Maharashtra Industrial Development Corporation
PDEA	: Pune District Education Associations
V	: Voltage
I	: Current
kW	: kilo-Watt
kVA	: Active Power
kVA <sub>r</sub>	: Reactive Power
P F	: Power Factor
kW <sub>p</sub>	: Kilo Watt peak



## CHAPTER-I INTRODUCTION

### 1.1 Objectives:

1. To study present level of Energy Consumption
2. To Study the present CO<sub>2</sub> emissions
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To measure various Electrical parameters
5. To study Scope for usage of Renewable Energy
6. To study various measures to reduce the Energy Consumption

### 1.2 Audit Methodology:

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various ENCON measures with payback analysis

### 1.3 Energy Audit Instruments:

1. Portable Power Analyzer
2. Lux meter
3. Anemometer
4. Digital Temperature Indicator

### 1.4 General Details of PDEA's College of Engineering Pune:

No	Head	Particulars
1	Name of Institution	Jaihind College of Engineering, Kuran, Tal. Junnar, Dist. Pune
2	Address	A/p Kuran, Tal. Junnar, Dist. Pune
3	Year of Establishment	2010
4	Salient Features	Affiliation to Savitribai Phule Pune University Recognized by AICTE, New Delhi
4	Courses offered	<ol style="list-style-type: none"> <li>1. Graduate Level courses in Civil, Mechanical , Computer Engg., Electronics &amp; Telecommunication Engineering</li> <li>2. Diploma Courses in Civil, Mechanical , Computer Engg., Electronics &amp; Telecommunication Engineering</li> </ol>
5	No of Students	Diploma-1050 Degree-1250
6	Total built up area	278909 Sq ft (Degree and Diploma)

## CHAPTER-II

### STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

#### 2.1.1 Study of Floor wise connected load:

##### Engineering College

Sr. No.	Name of item	First Floor	Second Floor	Third Floor	Workshop	Canteen	Hostel	Total
1	Tube 45 W	128	164	171	46	26	85	620
2	Fan 60 W	99	127	125	33	27	71	482
3	PC/Computer	98	201	24	1	1	1	326
4	A.C.	-	-	-	-	-	-	2
5	Refrigerator	-	-	-	-	-	-	-
6	Passage Light 14 W	-	-	-	-	-	-	21

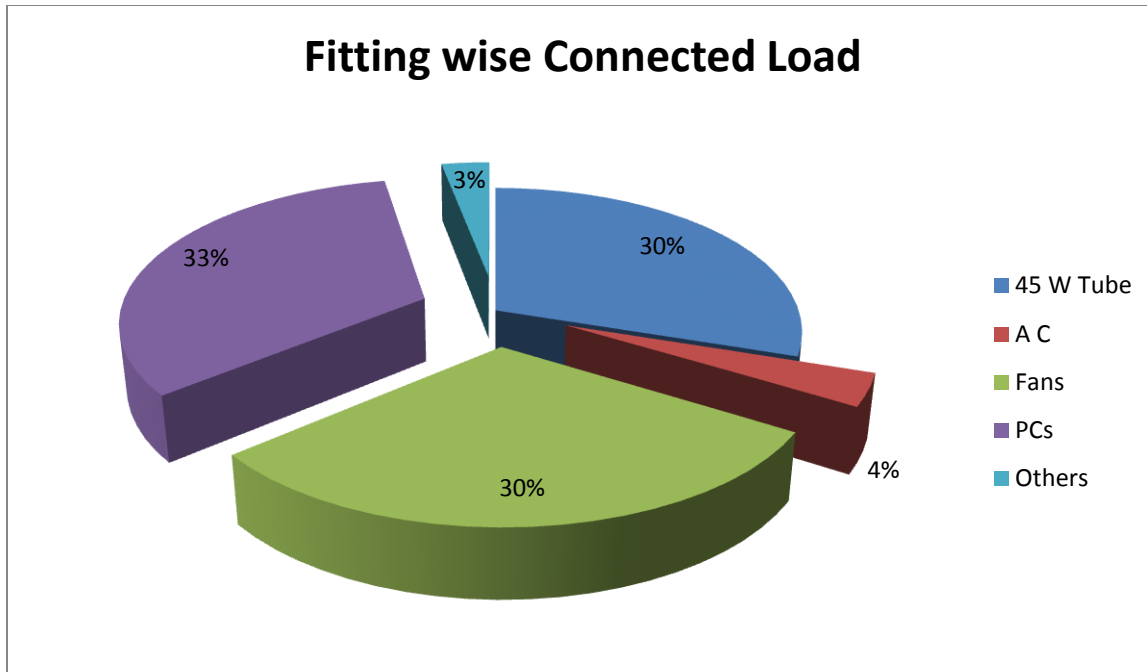
##### Polytechnic

Sr. No.	Name of item	Ground Floor	First Floor	Second Floor	Third Floor	Total
1	Tube 45 W	43	34	49	34	160
2	Fan 60 W	10	20	46	32	108
3	PC/Computer	1	27	03	29	60

#### 2.3 Study of Fitting wise Connected Load:

No	Type of Fitting	Load/Unit	Qty	Load in kW
1	45 W Tube	45	780	35.1
3	A C	2100	2	4.2
4	Fans	60	590	35.4
5	PCs	100	386	38.6
6	Others	50	70	3.5
	<b>Total</b>			<b>116.8</b>

We present the same in a PIE Chart as under



## CHAPTER-III

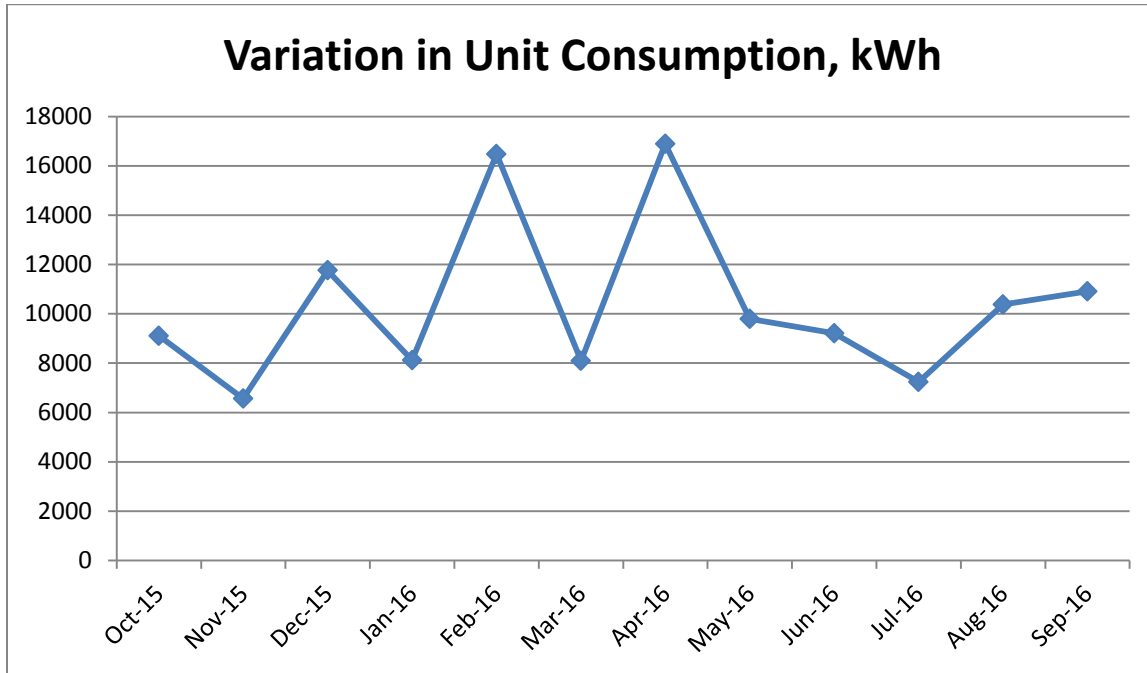
### HISTORICAL DATA ANALYSIS: ELECTRICAL ENERGY

In this chapter, we present the analysis of last year Electricity Bills

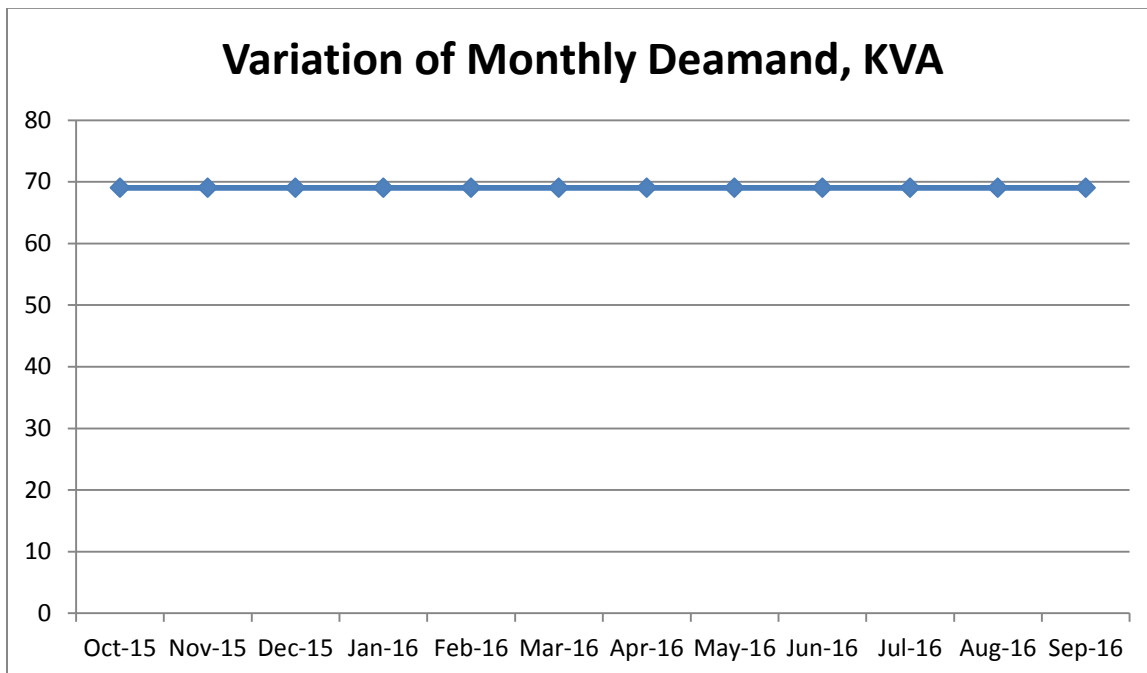
#### Electrical Bill Analysis- 2015-16:

Sr. No	Month	Demand kVA	kWh	PF	Amount
1	October- 2015	69	9106	0.988	78530
2	November-2015	69	6564	0.987	58540
3	December-2015	69	11760	0.974	100360
4	January-2016	69	8120	0.968	69880
5	February-2016	69	16476	0.988	128290
6	March-2016	69	8090	0.995	66660
7	April-2016	69	16889	0.993	130110
8	May-2016	69	9790	0.988	83200
9	June-2016	69	9207	0.989	76410
10	July-2016	69	7239	0.993	60220
11	August-2016	69	10373	0.993	81810
12	September-2016	69	10908	0.993	83230
13	Total		124522		1017240
14	Average	69	10376.8	0.987	84770
15	Max	69	16889	0.995	130110
16	Min	69	6564	0.968	58540

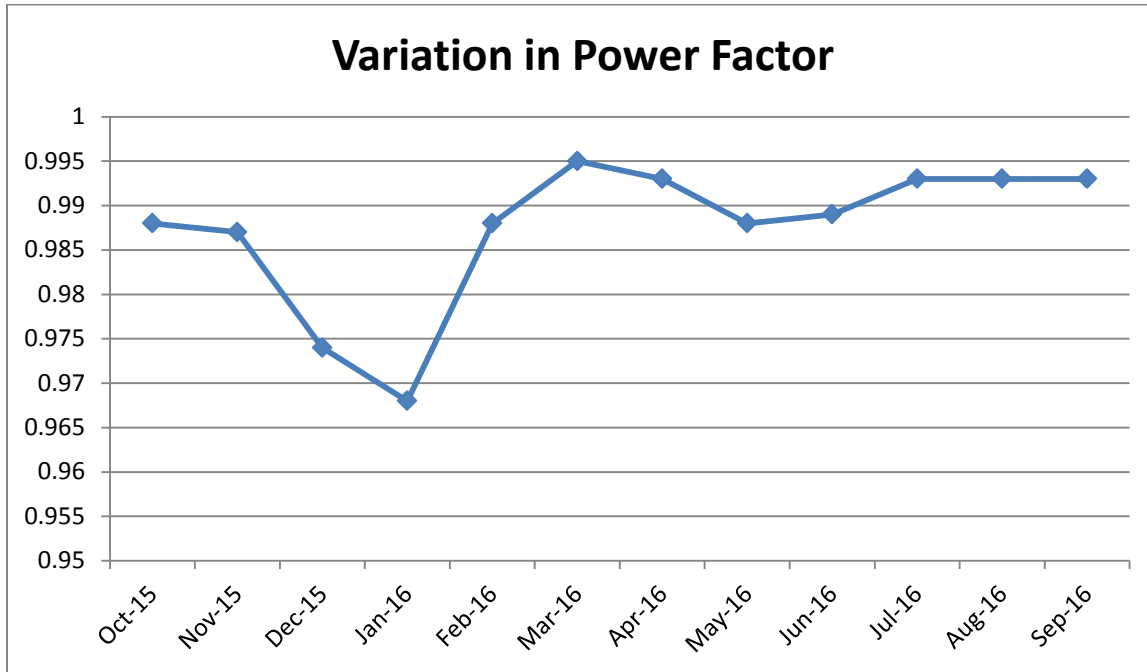
**3.1 To study the variation of Monthly Units' Consumption:**



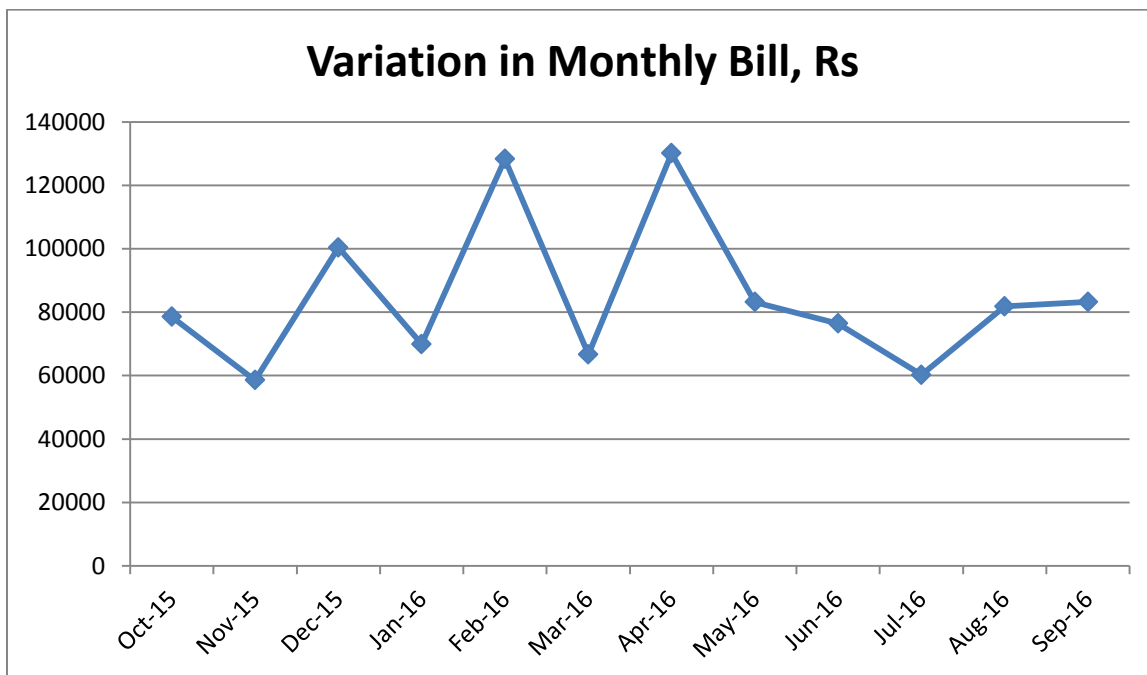
**3.2 To study the variation of Monthly Demand, kVA**



**3.3 To study the variation of Monthly Power Factor:**



**3.4 To study the variation of Monthly Electricity Bill:**



**3.5 Key Inference drawn:**

From the above analysis, we present following important parameters:

**Table No: Variation in Important Parameters:**

No	Parameter	Max	Min	Average
1	Units consumed, kWh	16889	6564	10376.8
2	Max Demand, kVA	69	69	69
3	Power Factor	0.995	0.968	0.987
4	Electricity Bill amount	130110	58540	84770

**3.6 Benchmarking:**

Now we compute the Electrical Energy Consumed per square feet of the College Building as under

No	Parameter	Value/Month	Unit
1	Units consumed, kWh	10376.8	kWh
2	College area	278909	Sq ft
<b>3</b>	<b>Unit consumed/sq ft</b>	<b>0.037</b>	<b>kWh/sq ft</b>

## CHAPTER-IV

### CARBON FOOTPRINTING

**4.1 A Carbon Foot print** is defined as the Total Greenhouse Gas emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the College for performing its day to day activities. The college uses electrical energy for operating various electrical gadgets.

We herewith furnish the details of electrical Energy consumption as under

**4.2 Table: Month wise Consumption of Electrical Energy:**

Sr. No.	Month	Electrical Energy Consumed kWh
1	October- 2015	9106
2	November-2015	6564
3	December-2015	11760
4	January-2016	8120
5	February-2016	16476
6	March-2016	8090
7	April-2016	16889
8	May-2016	9790
9	June-2016	9207
10	July-2016	7239
11	August-2016	10373
12	September-2016	10908
13	<b>Total</b>	<b>124522</b>
14	<b>Average</b>	<b>10376.8</b>
15	<b>Max</b>	<b>16889</b>
16	<b>Min</b>	<b>6564</b>

#### 4.3 Basis for computation of CO<sub>2</sub> Emissions:

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy are as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO<sub>2</sub>** into atmosphere

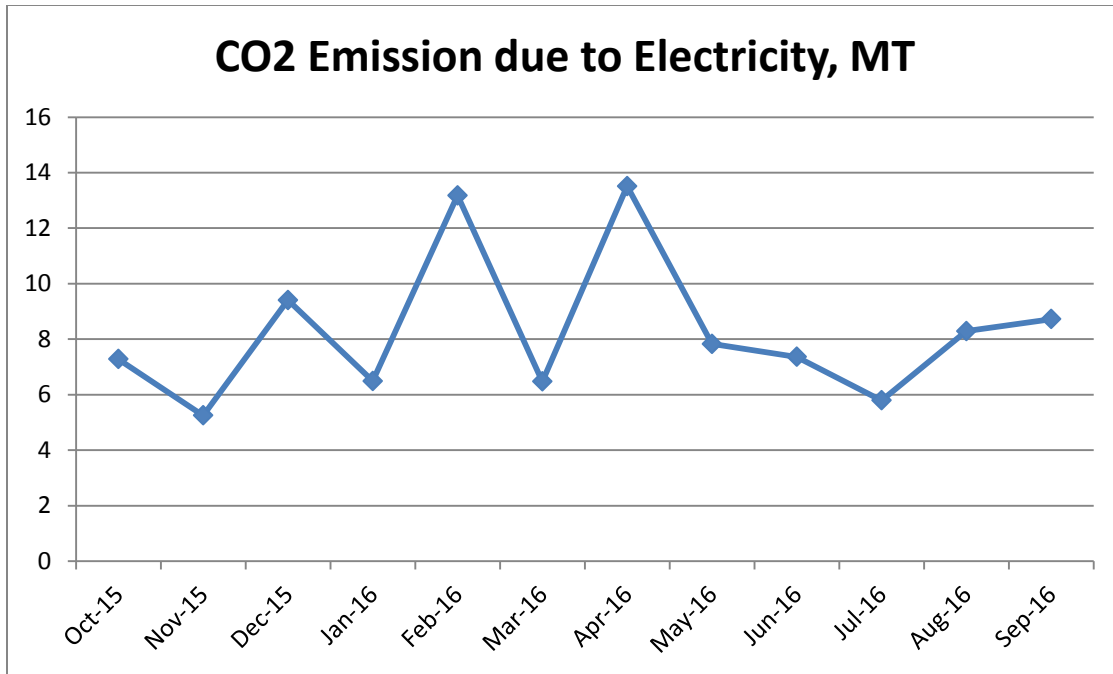


Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations.

#### 4.4 Table No: Month wise CO<sub>2</sub> Emissions:

Sr. No.	Month	Electrical Energy Consumed kWh	CO <sub>2</sub> Emissions due to Electricity, MT
1	October- 2015	9106	7.28
2	November-2015	6564	5.25
3	December-2015	11760	9.408
4	January-2016	8120	6.49
5	February-2016	16476	13.18
6	March-2016	8090	6.47
7	April-2016	16889	13.511
8	May-2016	9790	7.83
9	June-2016	9207	7.36
10	July-2016	7239	5.79
11	August-2016	10373	8.29
12	September-2016	10908	8.72
13	<b>Total</b>	<b>124522</b>	<b>99.62</b>
14	<b>Average</b>	<b>10376.8</b>	<b>8.30</b>

#### 4.5 Representation of Month wise CO<sub>2</sub> emissions:



**4.6 Key Inference Drawn:**

From the above Table and graph, we find that the total CO<sub>2</sub> emission is 99.62 MT and average monthly CO<sub>2</sub> emissions is 8.30 **MT**.

**4.7 Benchmarking:**

Now we compute the CO<sub>2</sub> emissions per sq ft basis as under:

No	Parameter	Value	Unit
1	CO <sub>2</sub> emissions due to electricity	<b>8.30</b>	MT/Month
2	CO <sub>2</sub> emission due to LPG usage	<b>2.34</b>	MT/Month
2	College area	278909	Sq ft
<b>3</b>	<b>CO<sub>2</sub> emissions/sq ft</b>	<b>0.0381</b>	<b>Kg of CO<sub>2</sub>/sq ft/Month</b>

## CHAPTER-V

### ELECTRICAL MEASUREMENTS

In this Chapter, we present the details of measurements at the LT side

#### 5.1 Measurement at Main Incomer feeder:

With the help of power analyzer various electrical parameters like voltage, current, KVA, KW and PF are measured. The sample measured data is as follows.

Date	Time	V	A	W	Hz	V L1	V L2	V L3	A L1	A L2	A L3	W L1	W L2	W L3
02-07-2017	11:21:49	376.198	45.144	28351.2	49.982	370.761	380.515	377.319	46.567	43.98	44.884	9574.465	9259.245	9517.491
02-07-2017	11:22:49	379.347	43.686	27603.7	49.954	374.043	383.621	380.376	44.594	44.425	42.04	9246.605	9438.758	8918.336
02-07-2017	11:23:49	379.33	42.531	26834.44	49.967	373.685	383.761	380.546	45.165	43.564	38.862	9371.233	9248.607	8214.6
02-07-2017	11:24:49	380.505	41.129	25995.13	49.988	375.016	384.65	381.85	41.26	42.629	39.499	8544.96	9078.155	8372.011
02-07-2017	11:25:49	378.971	41.987	26458.41	49.977	373.18	383.482	380.251	44.843	42.187	38.932	9299.842	8941.051	8217.522
02-07-2017	11:26:49	379.621	40.808	25722.51	49.998	373.846	383.853	381.165	41.562	42.211	38.65	8597.741	8951.914	8172.852
02-07-2017	11:27:49	381.58	39.727	25141.73	49.98	375.844	386.31	382.585	42.331	39.421	37.428	8821.35	8412.245	7908.134
02-07-2017	11:28:49	379.543	39.638	24905.34	49.983	374.156	383.771	380.702	39.949	39.664	39.3	8204.806	8409.467	8291.062
02-07-2017	11:29:49	378.4	41.464	26131.59	49.99	372.207	383.315	379.679	46.707	40.174	37.511	9714.813	8502.788	7913.99
02-07-2017	11:30:49	378.34	41.377	26037.35	49.985	372.174	383.264	379.581	46.916	39.889	37.327	9738.633	8429.544	7869.17
02-07-2017	11:31:49	377.198	40.826	25634.17	49.974	371.245	381.678	378.671	44.116	40.678	37.684	9136.261	8571.52	7926.388
02-07-2017	11:32:49	380.76	41.666	26444.49	50.004	374.126	386.425	381.728	50.388	38.112	36.497	10612.41	8102.651	7729.423
02-07-2017	11:33:50	381.342	44.057	28133.53	50.035	375.012	386.252	382.762	50.515	41.758	39.898	10683.94	8909.504	8540.092
02-07-2017	11:34:51	380.62	44.023	28036.44	50.08	373.838	386.36	381.663	54.643	39.503	37.922	11543.07	8406.197	8087.173
02-07-2017	11:35:53	381.976	39.512	25068.48	50.091	376.283	386.528	383.117	41.879	39.414	37.243	8722.195	8402.135	7944.151
02-07-2017	11:36:54	382.619	40.626	25866.33	50.055	376.66	387.451	383.744	45.474	39.168	37.238	9543.37	8377.409	7945.55
02-07-2017	11:37:55	382.873	40.573	25846.59	50.036	376.503	388.048	384.067	48.501	38.178	35.039	10241.35	8150.075	7455.162
02-07-2017	11:38:56	382.346	38.116	24106.62	49.973	376.682	386.72	383.637	40.315	38.441	35.592	8360.805	8181.622	7564.193
02-07-2017	11:39:56	382.34	39.352	24987.88	49.965	376.371	386.879	383.771	43.415	38.839	35.801	9097.922	8284.082	7605.879
02-07-2017	11:40:56	383.694	39.777	25380.18	49.982	378.143	388.354	384.585	41.613	37.44	40.279	8697.739	8003.854	8678.59
02-07-2017	11:41:56	382.62	41.197	26293.12	49.942	376.883	387.642	383.334	44.938	37.881	40.772	9440.995	8087.58	8764.549
02-07-2017	11:42:56	383.285	39.508	25139.69	49.962	378.05	387.587	384.217	39.939	37.576	41.009	8291.584	8031.737	8816.37
02-07-2017	11:43:56	382.109	42.703	27268.32	49.94	376.547	386.933	382.848	44.783	40.791	42.536	9372.076	8711.611	9184.634
02-07-2017	11:44:56	381.144	42.116	26877.57	49.961	375.624	385.573	382.235	43.31	41.372	41.666	9062.021	8830.728	8984.821
02-07-2017	11:45:56	378.329	45.311	28778.17	49.931	372.414	382.543	380.03	47.06	46.885	41.99	9814.923	9951.328	9011.923
02-07-2017	11:46:56	381.02	43.017	27387.11	49.939	374.774	385.282	383.005	46.87	45.155	37.026	9831.717	9631.303	7924.095

2017

02-07-2017	11:47:56	381.441	39.687	25187.62	49.933	375.699	384.918	383.707	39.169	44.154	35.739	8137.173	9441.221	7609.225
02-07-2017	11:48:57	382.325	41.259	26346.64	49.934	376.244	386.35	384.381	43.298	44.146	36.334	9110.126	9451.619	7784.888
02-07-2017	11:49:57	382.443	40.257	25673.37	49.961	376.638	386.209	384.481	39.78	44.142	36.849	8303.278	9475.773	7894.315
02-07-2017	11:50:57	380.875	42.686	27225.55	49.972	374.352	385.426	382.847	47.961	43.721	36.375	10119.31	9333.47	7772.776
02-07-2017	11:51:57	383.095	39.92	25446.47	49.966	377.287	386.838	385.158	39.488	43.554	36.719	8221.525	9351.335	7873.606
02-07-2017	11:52:57	383.504	42.307	27034.71	50.004	376.773	387.731	386.007	45.867	45.375	35.678	9698.363	9705.348	7631.002
02-07-2017	11:53:58	383.811	40.586	25954.59	50.036	377.82	387.82	385.794	41.18	44.632	35.947	8660.306	9618.531	7675.756
02-07-2017	11:54:59	384.848	40.154	25727.86	50.054	378.874	388.829	386.841	41.033	43.421	36.009	8645.405	9368.576	7713.881
02-07-2017	11:56:00	384.166	41.194	26416.68	50.023	377.906	388.512	386.08	43.867	43.283	36.432	9285.152	9327.569	7803.96
02-07-2017	11:57:01	385.06	40.132	25707.5	50.052	379.034	389.005	387.14	41.041	43.142	36.213	8648.313	9306.005	7753.179
02-07-2017	11:58:03	383.713	41.912	26863.62	50.035	377.191	388.284	385.663	46.702	43.073	35.961	9918.349	9267.775	7677.495
02-07-2017	11:59:04	385.544	40.16	25748.41	50.03	379.318	389.601	387.714	41.461	42.877	36.142	8759.647	9260.19	7728.575
02-07-2017	12:00:05	383.773	42.444	27280.95	50.037	377.672	388.268	385.378	44.405	43.252	39.675	9409.781	9312.469	8558.703
02-07-2017	12:01:06	384.097	42.142	27062.98	50.05	377.891	388.645	385.753	44.935	43.155	38.335	9523.064	9304.882	8235.035
02-07-2017	12:02:07	385.84	41.865	26981.64	50.059	379.632	390.326	387.562	43.899	42.44	39.256	9299.434	9190.189	8492.017
02-07-2017	12:03:08	385.909	42.122	27203.58	50.095	379.807	390.231	387.689	44.141	43.061	39.162	9381.957	9330.199	8491.424
02-07-2017	12:04:09	388.792	40.861	26500.47	50.071	383.027	392.521	390.828	40.209	43.712	38.662	8539.025	9550.928	8410.513
02-07-2017	12:05:10	388.829	41.382	26852.08	50.07	382.337	393.089	391.063	45.829	43.608	34.709	9855.361	9516.635	7480.084
02-07-2017	12:06:12	390.39	39.803	25848.75	50.083	384.161	394.113	392.896	40.851	44.05	34.509	8760.367	9636.537	7451.849
02-07-2017	12:07:13	390.986	40.699	26511.16	50.076	384.338	395.054	393.568	43.924	44.506	33.666	9488.222	9752.301	7270.634
02-07-2017	12:08:14	390.217	39.786	25822.24	50.047	383.91	394.071	392.671	41.37	44.386	33.602	8867.786	9709.114	7245.339
02-07-2017	12:09:15	391.168	38.791	25140.92	50.042	385.031	394.843	393.629	39.138	43.763	33.472	8332.394	9582.344	7226.182
02-07-2017	12:10:16	393.135	34.724	22693.63	50.019	386.553	396.996	395.855	36.764	39.585	27.822	7984.02	8660.914	6048.7
02-07-2017	12:11:16	393.18	31.799	20767.16	49.976	386.734	396.865	395.94	33.62	38.085	23.692	7314.678	8289.36	5163.126
02-07-2017	12:12:16	394.459	28.964	18914.69	49.933	388.578	397.785	397.014	27.754	36.862	22.275	6012.499	8029.881	4872.313
02-07-2017	12:13:16	395.185	29.374	19255.76	49.916	389.087	398.653	397.815	29.499	36.663	21.959	6442.939	7992.648	4820.171
02-07-2017	12:14:16	394.933	30.088	19686.63	49.917	388.573	398.661	397.565	31.657	36.359	22.248	6924.282	7898.355	4863.996
02-07-2017	12:15:16	395.025	28.152	18328.99	49.932	388.93	398.407	397.739	27.501	36.09	20.864	5964.905	7847.843	4516.242
02-07-2017	12:16:17	394.172	30.782	20140.14	49.941	387.306	398.436	396.774	34.748	35.213	22.385	7636.5	7628.806	4874.836
02-07-2017	12:17:17	393.25	28.539	18539.89	49.951	387.002	396.957	395.79	28.609	35.361	21.646	6204.49	7643.808	4691.589
02-07-2017	12:18:17	394.339	28.543	18578.34	49.959	388.112	398.132	396.774	29.48	34.722	21.428	6428.979	7514.235	4635.13
02-07-2017	12:19:17	393.157	29.251	19028.03	49.967	386.541	397.328	395.601	31.708	35.12	20.926	6923.241	7598.905	4505.878

02-07-2017	12:20:17	394.653	28.316	18473.53	49.945	388.381	398.496	397.083	29.092	35.169	20.687	6363.706	7637.367	4472.46
02-07-2017	12:21:17	394.985	27.626	18009.56	49.966	388.812	398.713	397.43	27.937	34.806	20.134	6104.053	7547.302	4358.208
02-07-2017	12:22:17	395.685	27.335	17808.89	49.968	389.611	399.321	398.123	26.486	35.322	20.196	5774.986	7669.052	4364.849
02-07-2017	12:23:17	396.119	27.222	17754.02	50.004	390.034	399.624	398.699	26.557	35.455	19.654	5796.454	7715.733	4241.83
02-07-2017	12:24:18	395.522	27.558	18017.28	50.036	389.535	399.065	397.968	26.729	35.15	20.795	5851.426	7618.738	4547.115
02-07-2017	12:25:19	395.829	27.907	18260.27	50.056	389.684	399.573	398.229	27.663	34.756	21.301	6073.641	7543.003	4643.622
02-07-2017	12:26:20	395.521	29.008	18988.23	50.032	389.101	399.55	397.912	30.477	34.837	21.711	6702.82	7552.356	4733.056
02-07-2017	12:27:22	393.544	35.97	23065.6	50.007	386.341	398.883	395.408	45.698	34.539	27.672	9614.202	7406.469	6044.932
02-07-2017	12:28:23	395.234	30.588	20169.75	50.011	389.097	399.469	397.136	30.956	34.42	26.388	6802.818	7456.569	5910.366
02-07-2017	12:29:23	395.94	31.304	20697.36	49.947	389.927	400.599	397.296	33.127	33.817	26.968	7318.602	7330.872	6047.89
02-07-2017	12:30:23	396.483	31.924	21147.45	49.978	390.016	401.448	397.985	35.795	33.937	26.041	7935.03	7365.703	5846.719
02-07-2017	12:31:23	397.281	30.799	20410.52	49.958	391.038	402.034	398.772	32.125	34.091	26.18	7108.333	7416.987	5885.201
02-07-2017	12:32:23	397.462	30.317	20094.02	49.963	391.335	402.022	399.029	30.549	33.754	26.646	6755.226	7341.51	5997.287
02-07-2017	12:33:23	397.527	34.604	22216.56	50.002	390.274	403.194	399.113	43.326	34.385	26.1	9324.809	7370.042	5521.707
02-07-2017	12:34:24	396.893	31.488	20850.06	50.016	390.396	401.975	398.309	34.272	34.503	25.688	7587.736	7517.594	5744.731
02-07-2017	12:35:25	398.14	30.901	20475.25	50.035	391.033	403.417	399.971	36.534	34.336	21.832	8135.288	7497.153	4842.813
02-07-2017	12:36:26	398.689	30.565	20208.45	50.018	391.705	403.548	400.812	35.219	34.547	21.929	7838.5	7534.337	4835.608
02-07-2017	12:37:28	397.234	29.435	19405.66	49.994	390.587	401.755	399.358	32.306	34.095	21.904	7164.197	7433.192	4808.271
02-07-2017	12:38:28	396.634	31.55	20813.73	49.991	389.352	402.062	398.489	39.868	32.866	21.916	8882.06	7130.349	4801.324
02-07-2017	12:39:28	396.858	30.863	19877.36	49.981	390.249	401.439	398.888	34.497	34.117	23.975	7427.27	7395.951	5054.144
02-07-2017	12:40:28	396.181	29.998	19700.37	49.983	389.815	400.926	397.804	32.41	33.681	23.903	7133.601	7338.56	5228.208
02-07-2017	12:41:28	395.719	30.504	19859.6	49.981	389.202	399.871	398.084	32.033	36.204	23.275	7017.813	7806.437	5035.353
02-07-2017	12:42:29	394.358	31.995	20951.68	50.035	387.362	399.205	396.508	36.359	35.72	23.906	8019.209	7702.039	5230.433
02-07-2017	12:43:30	394.429	33.066	21718.02	50.035	387.937	399.321	396.029	35.62	35.82	27.759	7835.179	7718.73	6164.109
02-07-2017	12:44:31	395.054	31.972	21132.87	50.063	388.829	399.92	396.413	35.123	33.998	26.795	7767.079	7405.307	5960.481
02-07-2017	12:45:32	395.162	33.97	21394.5	50.047	389.285	400.268	395.933	35.982	35.248	30.681	7429.826	7497.179	6467.5
02-07-2017	12:46:34	396.674	31.751	20971.16	50.033	390.315	401.358	398.349	34.042	34.935	26.277	7527.525	7596.608	5847.022
02-07-2017	12:47:35	396.871	33.768	22289.95	49.999	390.878	402.527	397.208	37.955	33.592	29.758	8298.292	7344.351	6647.302
02-07-2017	12:48:35	398.919	29.702	19488	49.963	392.815	403.397	400.547	30.483	34.835	23.789	6712.34	7606.015	5169.644
02-07-2017	12:49:35	397.731	32.843	21691.27	49.958	392.233	402.446	398.515	32.644	35.511	30.375	7175.938	7749.074	6766.263
02-07-2017	12:50:35	397.23	32.712	21576.75	49.945	392.204	401.577	397.91	28.822	35.169	34.145	6289.38	7653.804	7633.563
02-07-2017	12:51:35	397.783	33.366	22130.88	49.936	392.271	402.237	398.842	31.83	36.648	31.62	6995.904	8077.907	7057.065
02-07-2017	12:52:35	397.227	33.451	22212.96	49.935	392.088	401.792	397.801	31.628	35.674	33.052	6936.146	7921.967	7354.849

02-07-2017	12:53:35	397.495	35.55	23690.17	49.911	392.605	402.302	397.579	33.77	36.219	36.661	7460.434	8072.334	8157.405
02-07-2017	12:54:35	397.654	37.508	24998.19	49.92	392.116	402.777	398.069	37.984	37.922	36.617	8417.722	8421.647	8158.819
02-07-2017	12:55:35	399.189	37.28	25011.33	49.989	394.216	403.682	399.669	34.835	37.458	39.546	7719.406	8404.979	8886.941
02-07-2017	12:56:35	398.284	39.575	26471.53	50.02	393.009	403.496	398.346	40.368	37.723	40.634	8918.174	8452.654	9100.705
02-07-2017	12:57:36	397.614	39.305	26260.41	50.028	392.891	402.079	397.873	36.561	38.655	42.698	8065.258	8654.012	9541.138
02-07-2017	12:58:38	398.837	40.275	27025.48	50.059	393.918	403.444	399.148	38.585	39.333	42.907	8539.593	8865.5	9620.383
02-07-2017	12:59:39	399.348	41.818	28142.32	50.041	394.656	404.982	398.407	42.534	39.439	43.483	9458.503	8909.463	9774.355
02-07-2017	13:00:40	400.001	43.885	29548.91	50.035	395.673	405.405	398.925	41.168	42.183	48.304	9115.21	9490.904	10942.8
02-07-2017	13:01:41	401.214	79.722	28470.77	50.025	396.441	405.873	401.329	83.772	75.027	80.366	8300.223	9552.683	10617.87
02-07-2017	13:02:42	402.66	42.935	29151.34	50.051	398.003	407.786	402.191	40.631	40.274	47.9	9098.032	9137.691	10915.62
02-07-2017	13:03:43	402.839	44.721	30371.16	50.079	397.568	408.455	402.493	45.184	40.548	48.432	10153.28	9147.496	11070.38
02-07-2017	13:04:44	402.52	46.002	31186.26	50.105	396.62	408.831	402.108	51.935	38.654	47.415	11631.93	8749.395	10804.93
02-07-2017	13:05:45	405.346	41.932	28444.12	50.148	400.418	410.301	405.32	40.799	40.529	44.468	9128.535	9205.262	10110.32
02-07-2017	13:06:47	406.645	42.706	29140.54	50.145	401.626	411.445	406.863	42.293	40.979	44.848	9514.44	9402.114	10223.99
02-07-2017	13:07:48	405.49	43.051	29290.15	50.143	400.854	410.638	404.978	43.308	39.703	46.143	9720.922	9092.448	10476.78
02-07-2017	13:08:49	406.248	41.696	28395.02	50.112	401.894	410.805	406.045	39.349	39.922	45.818	8808.834	9154.743	10431.44
02-07-2017	13:09:50	405.516	42.937	29140.47	50.068	400.616	410.967	404.965	44.968	38.787	45.055	10078.13	8839.41	10222.93
02-07-2017	13:10:51	404.679	43.028	29204.3	50.018	399.747	409.678	404.613	45.731	38.902	44.452	10274.87	8867.912	10061.52
02-07-2017	13:11:51	402.581	43.923	29667.11	49.987	397.597	408.336	401.809	48.682	38.569	44.519	10877.79	8757.017	10032.31
02-07-2017	13:12:51	402.467	44.708	30139.57	49.973	397.511	407.001	402.889	45.249	43.292	45.581	10071.15	9841.694	10226.73
02-07-2017	13:13:51	401.737	47.012	31658.06	49.921	396.435	406.564	402.212	50.041	43.759	47.234	11121.83	9903.398	10632.83
02-07-2017	13:14:51	401.433	49.476	33477.27	49.931	396.436	406.483	401.38	54.059	43.944	50.426	12064.33	9980.803	11432.14
02-07-2017	13:15:51	399.708	52.762	35503.11	49.944	393.885	404.79	400.448	61.815	47.02	49.451	13769.03	10636.75	11097.34
02-07-2017	13:16:51	397.197	58.663	39162.8	49.948	394.677	400.674	396.24	54.696	47.28	74.013	12105.7	10672.05	16385.05
02-07-2017	13:17:51	397.994	53.788	36098.06	50.01	392.703	402.861	398.419	58.146	48.66	54.558	12848.85	10982.97	12266.23
02-07-2017	13:18:51	398.335	53.16	35746.87	49.978	393.137	402.963	398.906	56.561	48.301	54.618	12511.6	10916.48	12318.8
02-07-2017	13:19:51	398.032	55.026	36925.76	50.02	392.274	401.698	400.125	60.754	56.47	47.855	13502.87	12761.38	10661.51
02-07-2017	13:20:52	393.495	59.958	39826.24	50.025	386.667	398.257	395.559	73.757	57.235	48.882	16183.07	12810.38	10832.8
02-07-2017	13:21:54	395.491	53.963	35895.63	50	389.511	399.075	397.888	59.145	57.21	45.532	13032.21	12838.72	10024.7
02-07-2017	13:22:55	394.385	55.564	36884.63	50.014	388.269	398.291	396.595	62.772	57.486	46.433	13809.6	12888.1	10186.93
02-07-2017	13:23:56	394.963	55.774	36938.82	49.978	389.795	398.169	396.925	58.948	55.839	52.535	12987.14	12515.65	11436.04
02-07-2017	13:24:56	391.337	65.318	42747.82	49.957	388.165	394.113	391.734	63.404	58.861	73.688	13840.04	13166.75	15741.03
02-07-2017	13:25:56	394.648	57.288	38203.59	49.993	389.047	398.299	396.598	61.386	58.768	51.712	13540.28	13195.51	11467.8

02-07-2017	13:26:57	391.233	66.042	42696.9	50.021	388.898	393.324	391.477	62.277	66.669	69.181	13117.14	14922.56	14657.2
02-07-2017	13:27:58	393.663	58.92	38886.84	50.017	389.435	396.131	395.422	57.669	59.329	59.762	12679.29	13275.71	12931.85
02-07-2017	13:28:58	394.236	56.096	37312.77	49.99	388.14	397.679	396.89	61.675	59.999	46.612	13598.07	13445.02	10269.67
02-07-2017	13:29:58	393.247	55.94	37089.09	50	386.855	397.293	395.594	61.36	58.253	48.208	13517.1	12951.31	10620.69
02-07-2017	13:30:58	393.592	56.745	37660.58	49.999	387.044	397.904	395.827	64.259	58.622	47.354	14164.97	13072.16	10423.45
02-07-2017	13:32:00	393.854	58.418	38949.29	49.993	388.042	397.641	395.878	62.123	59.48	53.651	13719.16	13293.61	11936.52
02-07-2017	13:33:00	392.094	62.87	41712.97	49.982	387.274	396.15	392.856	65.023	60.073	63.515	14257.08	13405.66	14050.23
02-07-2017	13:34:00	391.895	65.33	42626.84	50.02	388.104	394.95	392.629	64.398	60.537	71.054	14058.4	13491.96	15076.48
02-07-2017	13:35:01	394.645	60.301	40047.64	50.018	388.405	399.059	396.471	66.486	61.153	53.263	14598.84	13649.77	11799.03
02-07-2017	13:36:02	396.064	58.781	39107.91	49.998	389.958	400.293	397.94	63.635	60.361	52.347	13995.58	13487.7	11624.63
02-07-2017	13:37:02	395.382	59.942	40053.67	49.986	389.789	399.477	396.879	61.382	60.562	57.882	13553.41	13553.94	12946.33
02-07-2017	13:38:02	391.19	70.618	46003.5	49.955	388.224	394.619	390.728	65.627	62.796	83.432	14064.01	13987.54	17951.94
02-07-2017	13:39:02	393.052	61.044	39737.67	49.945	387.43	396.438	395.288	62.875	63.723	56.534	13530.55	14087.84	12119.28
02-07-2017	13:40:02	391.555	63.559	41100.99	49.946	387.159	394.772	392.735	64.209	59.934	66.532	13932.93	13281.99	13886.07
02-07-2017	13:41:02	392.754	59.985	39414.2	49.968	387.817	396.184	394.262	59.886	59.941	60.129	13014.85	13361.21	13038.15
02-07-2017	13:42:02	391.083	65.983	43204.93	49.931	384.316	395.848	393.086	71.301	62.651	63.996	15586.42	13674.89	13943.63
02-07-2017	13:43:02	392.719	59.185	39252.43	49.957	386.545	396.997	394.615	63.417	59.186	54.951	13936.1	13144.46	12171.87
02-07-2017	13:44:02	392.195	60.215	39570.79	49.938	385.917	396.564	394.105	66.256	59.444	54.943	14518.51	13190.94	11861.34
02-07-2017	13:45:03	384.593	74.442	46329.26	49.927	381.421	387.465	384.894	71.132	71.122	81.071	14370.11	15415.06	16544.09
02-07-2017	13:46:03	388.989	63.139	41107.93	49.955	380.312	393.916	392.738	73.062	66.661	49.695	15889.06	14377.28	10841.59
02-07-2017	13:47:03	390.566	58.877	38934.01	49.958	384.125	395.35	392.223	66.088	57.23	53.313	14478.16	12667.52	11788.33
02-07-2017	13:48:03	391.599	55.913	36804.38	49.961	385.285	395.58	393.933	60.13	58.425	49.185	13148.19	12939.32	10716.87
02-07-2017	13:49:03	388.522	64.62	41218.56	50.023	378.992	395.457	391.115	79.666	63.369	50.825	17003.41	13108.69	11106.46
02-07-2017	13:50:04	385.739	68.685	44578.94	50.003	380.177	390.096	386.944	69.698	62.361	73.995	15031.23	13446.17	16101.54
02-07-2017	13:51:05	388.617	63.025	41318.78	50.009	383.3	393.279	389.273	65.504	57.182	66.389	14201.27	12604.89	14512.62
02-07-2017	13:52:06	387.103	62.997	41151.7	49.987	382.996	391.1	387.212	59.132	56.815	73.044	12748.64	12497.45	15905.62
02-07-2017	13:53:06	386.49	61.896	40218.54	49.988	381.5	390.843	387.127	62.664	57.049	65.974	13478.96	12507.35	14232.24
02-07-2017	13:54:06	388.179	58.623	38506.8	49.991	381.26	393.454	389.824	67.132	55.763	52.974	14600.04	12293.87	11612.89
02-07-2017	13:55:06	386.502	56.05	36440.59	49.975	379.808	391.072	388.626	62.247	56.817	49.085	13421.77	12425.53	10593.29
02-07-2017	13:56:06	387.488	57.612	37758.46	49.97	381.324	392.251	388.887	62.325	55.793	54.718	13485.49	12279.67	11993.3
02-07-2017	13:57:06	388.952	58.885	38524.61	49.964	384.291	392.878	389.686	59.104	54.75	62.801	12862.94	12110.72	13550.95
02-07-2017	13:58:06	385.945	66.346	42175.93	50.009	381.357	390.075	386.404	69.91	57.52	71.608	14953.68	12480.54	14741.71
02-07-2017	13:59:08	387.463	61.731	40043.14	50.011	378.947	392.829	390.614	72.844	62.738	49.613	15756.95	13476.47	10809.72

02-07-2017	14:00:08	388.771	58.639	38541.51	49.98	382.503	393.458	390.351	64.944	56.559	54.415	14132.79	12476.28	11932.44
02-07-2017	14:01:08	388.396	60.376	39456.67	49.988	383.144	391.811	390.233	61.518	59.713	59.898	13383.64	13157.96	12915.07
02-07-2017	14:02:08	389.059	61.173	40070.42	50.016	385.511	392.251	389.413	56.424	56.872	70.225	12251.08	12612.94	15206.4
02-07-2017	14:03:09	390.549	58.803	38711.84	50.047	385.69	394.227	391.731	58.454	56.77	61.185	12742.42	12623.62	13345.8
02-07-2017	14:04:10	390.644	58.804	38765.8	50.039	385.787	394.399	391.746	57.606	58.002	60.804	12524.53	12875.23	13366.03
02-07-2017	14:05:11	386.232	70.516	45309.97	50.062	379.434	391.174	388.088	75.508	67.465	68.576	16048.34	14474.73	14786.9
02-07-2017	14:06:12	389.306	62.342	40718.59	50.059	384.176	393.127	390.615	64.19	60.104	62.731	13906.66	13269.12	13542.82
02-07-2017	14:07:13	388.705	58.787	38397.79	50.005	382.791	392.549	390.775	61.74	61.271	53.35	13304.15	13467.64	11626
02-07-2017	14:08:13	389.646	55.393	36262.84	49.987	383.462	393.518	391.957	59.019	58.663	48.498	12782.32	12948.65	10531.87
02-07-2017	14:09:14	387.212	58.471	38189.61	49.96	381.605	391.245	388.788	60.606	59.913	54.894	13035.59	13160	11994.02
02-07-2017	14:10:14	388.121	55.279	36092.49	49.951	381.857	391.947	390.558	59.087	58.62	48.129	12821.28	12868.86	10402.35
02-07-2017	14:11:14	385.288	60.331	38977.18	49.913	380.306	388.754	386.803	60.745	60.834	59.413	12988.53	13294.25	12694.4
02-07-2017	14:12:14	384.259	58.961	37969.13	49.925	378.911	387.56	386.306	58.811	62.367	55.705	12540.8	13552.89	11875.44
02-07-2017	14:13:14	382.989	65.301	41941.62	49.91	378.812	386.287	383.869	64.042	61.012	70.85	13704.47	13266.52	14970.63
02-07-2017	14:14:14	381.908	66.609	42213.84	49.904	378.092	384.266	383.365	62.138	63.089	74.6	13246.47	13555.75	15411.63
02-07-2017	14:15:14	379.857	73.971	46298.21	49.921	379.702	381.307	378.562	60.301	69.682	91.93	12043.38	15204.39	19050.44
02-07-2017	14:16:14	385.84	56.464	36746.09	49.906	380.082	389.295	388.143	56.212	59.755	53.424	12093.51	13048.61	11603.98
02-07-2017	14:17:14	380.605	65.788	42112.7	49.899	371.985	386.319	383.51	75.741	64.935	56.688	16096.46	13620.83	12395.42
02-07-2017	14:18:14	383.752	58.584	38107.25	49.903	377.846	387.204	386.207	57.896	61.193	56.663	12464.1	13251.48	12391.67
02-07-2017	14:19:15	380.7	67.194	42672.16	49.928	378.308	383.81	379.982	59.4	64.064	78.119	12005.75	13949.69	16716.72
02-07-2017	14:20:15	385.008	57.614	37560.57	49.924	379.422	389.414	386.189	56.278	55.713	60.852	12068.94	12148.84	13342.78
02-07-2017	14:21:15	385.176	55.867	36282.52	49.916	379.075	389.646	386.808	56.622	56.168	54.813	12138.49	12195.31	11948.71
02-07-2017	14:22:15	387.615	52.824	34419.3	49.93	382.493	391.089	389.262	50.078	54.153	54.242	10710.6	11871.65	11837.05
02-07-2017	14:23:15	385.575	56.051	36463.51	49.915	379.822	389.585	387.318	57.436	55.582	55.135	12343.42	12121	11999.08
02-07-2017	14:24:15	384.725	56.679	36993.18	49.923	379.645	388.279	386.252	54.292	55.963	59.781	11659.82	12213.13	13120.23
02-07-2017	14:25:15	387.659	51.627	33762.89	49.927	381.524	392.005	389.449	54.369	51.141	49.371	11753.43	11219.47	10789.99
02-07-2017	14:26:15	386.483	53.975	35179.59	49.952	379.386	391.506	388.557	62.523	51.41	47.993	13517.01	11237	10425.58
02-07-2017	14:27:15	387.657	53.252	34883.18	49.941	381.999	391.85	389.122	54.012	51.972	53.772	11649.94	11412.93	11820.32
02-07-2017	14:28:15	387.339	54.306	35649.33	49.95	382.152	391.295	388.569	51.626	53.102	58.191	11142.28	11657.69	12849.37
02-07-2017	14:29:15	388.003	53.464	35078.28	49.928	382.715	392.109	389.185	51.969	52.118	56.306	11174.69	11467.63	12435.95
02-07-2017	14:30:15	387.207	53.811	34486.41	49.923	381.361	391.17	389.089	55.465	54.559	51.409	11602.77	11768.46	11115.17
02-07-2017	14:31:16	386.286	54.876	35514.88	49.931	379.701	390.72	388.437	61.288	53.408	49.933	12960.92	11686.19	10867.77
02-07-2017	14:32:16	384.816	53.211	34501.6	49.951	378.983	388.677	386.788	53.86	54.926	50.848	11475.18	11954.85	11071.57

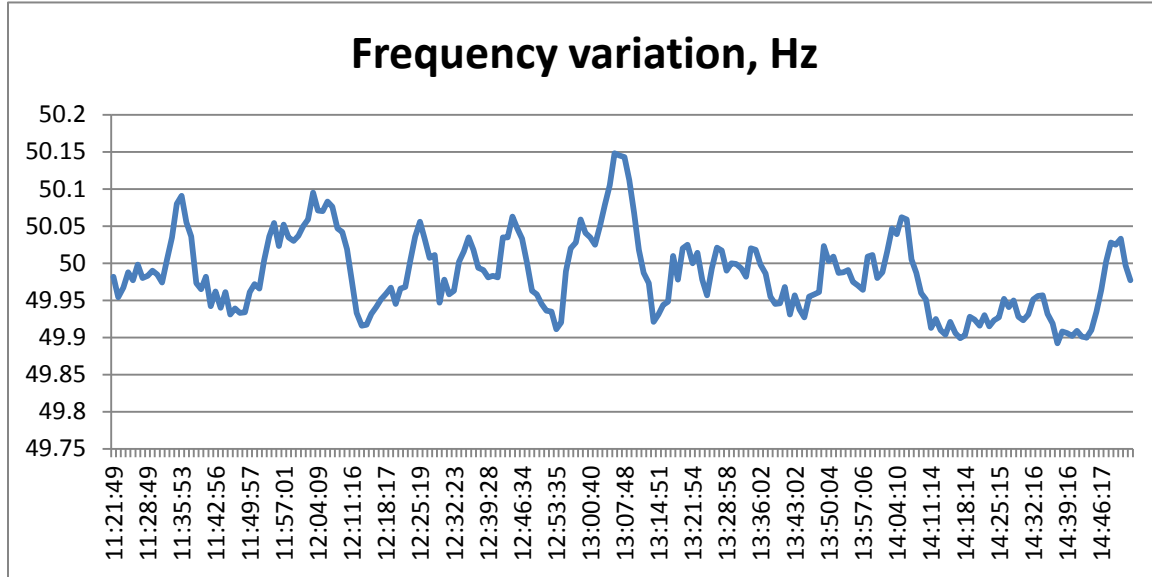


02-07-2017	14:33:16	384.464	56.137	36454.55	49.956	379.26	388.206	385.927	53.827	55.396	59.189	11425.17	12046.22	12983.16
02-07-2017	14:34:16	385.623	53.183	34450.05	49.957	379.964	389.433	387.471	53.674	54.871	51.005	11439.25	11936.18	11074.63
02-07-2017	14:35:16	383.807	53.993	34884.86	49.932	378.398	387.017	386.007	51.112	57.612	53.255	10833.56	12491.52	11559.79
02-07-2017	14:36:16	385.296	52.747	34162.67	49.919	379.687	389.131	387.069	52.886	54.26	51.094	11249.88	11827.58	11085.21
02-07-2017	14:37:16	384.7	55.302	35898.77	49.892	380.23	388.39	385.481	52.019	53.7	60.186	11030.89	11701.04	13166.84
02-07-2017	14:38:16	385.438	53.293	34568.43	49.908	380.295	388.445	387.574	49.09	56.382	54.406	10386.27	12310.97	11871.19
02-07-2017	14:39:16	386.223	54.142	35234.95	49.906	381.089	389.575	388.004	51.778	56.107	54.541	11045.48	12270.1	11919.38
02-07-2017	14:40:16	385.989	56.297	36634.56	49.902	380.152	389.91	387.906	58.647	56.407	53.837	12565.07	12327.89	11741.6
02-07-2017	14:41:16	384.714	58.591	38209.36	49.909	379.338	388.603	386.2	58.381	57.557	59.834	12500.12	12578.75	13130.5
02-07-2017	14:42:17	384.995	56.783	36994.1	49.901	379.638	388.508	386.838	55.941	57.833	56.575	11974.98	12633.35	12385.77
02-07-2017	14:43:17	384.371	56.49	36659.13	49.9	378.195	388.252	386.664	60.981	57.663	50.826	13045.59	12549.2	11064.34
02-07-2017	14:44:17	385.302	54.705	35520.55	49.91	379.885	388.236	387.785	54.792	59.059	50.263	11732.86	12883.86	10903.83
02-07-2017	14:45:17	387.074	53.547	34699.93	49.935	380.952	390.324	389.945	54.857	57.093	48.69	11688.44	12472.17	10539.33
02-07-2017	14:46:17	386.516	55.902	36366.05	49.964	381.29	389.76	388.5	54.063	58.832	54.812	11532.62	12862.43	11971
02-07-2017	14:47:17	386.511	53.82	35074.32	50.002	380.583	389.804	389.147	54.587	58.708	48.165	11751.13	12825.97	10497.22
02-07-2017	14:48:18	386.18	52.652	34303.48	50.028	380.347	389.498	388.694	53.672	57.261	47.024	11530.85	12518.98	10253.65
02-07-2017	14:49:19	386.291	52.05	33820.88	50.025	380.112	390.038	388.723	54.979	54.907	46.264	11747.3	11994.57	10079.01
02-07-2017	14:50:21	388.199	48.945	32013.52	50.033	382.918	391.521	390.16	46.528	51.746	48.56	9932.227	11374.69	10706.6
02-07-2017	14:51:22	388.405	48.18	31534.82	49.997	382.365	392.245	390.605	50.66	50.511	43.368	10962.11	11074.54	9498.175
02-07-2017	14:52:22	387.859	48.696	31810.3	49.977	381.689	392.115	389.774	52.934	49.457	43.698	11357.52	10858.96	9593.823

### 5.2 Variation in Electrical Parameters

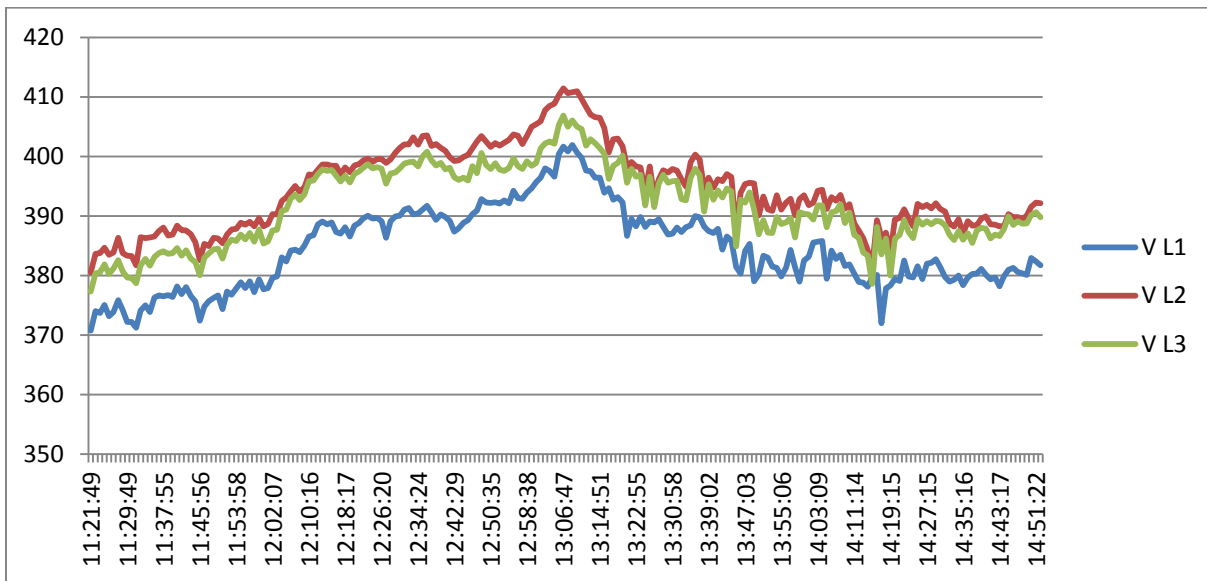
Now we present the variation in various Electrical parameters as under

#### 5.2.1 FREQUENCY VARIATION



FREQUENCY	MINIMUM	AVERAGE	MAXIMUM
	49.89	49.98	50.14

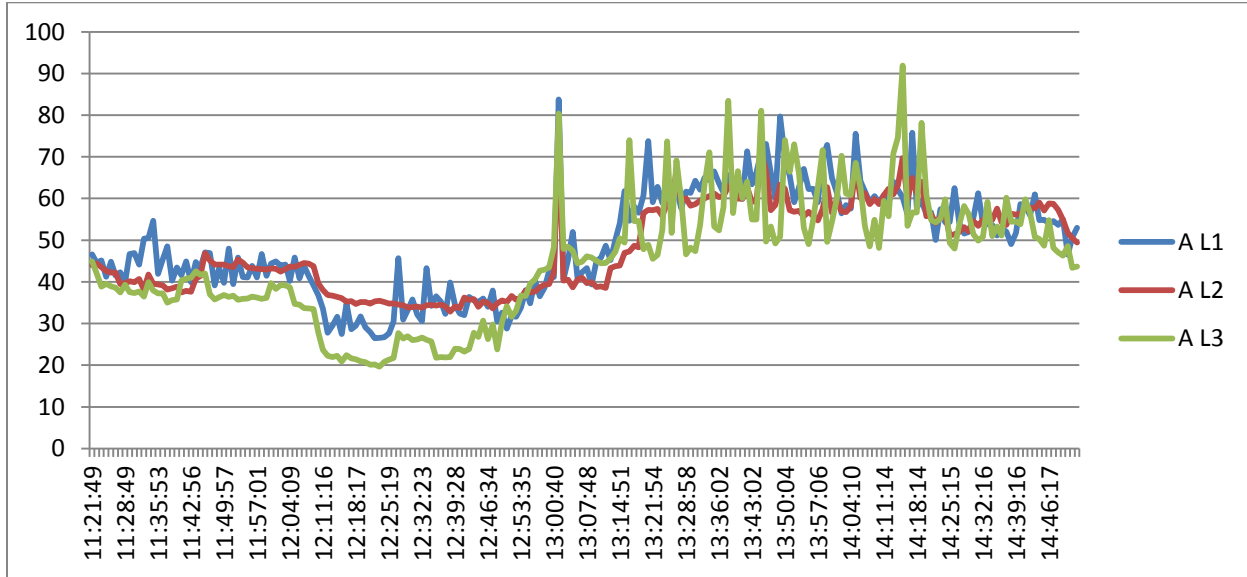
#### 5.2.2 VOLTAGE VARIATION



VOLTAGE	AVERAGE	MINIMUM	MAXIMUM
V L1 R Phase	384.50	376.51	401.89

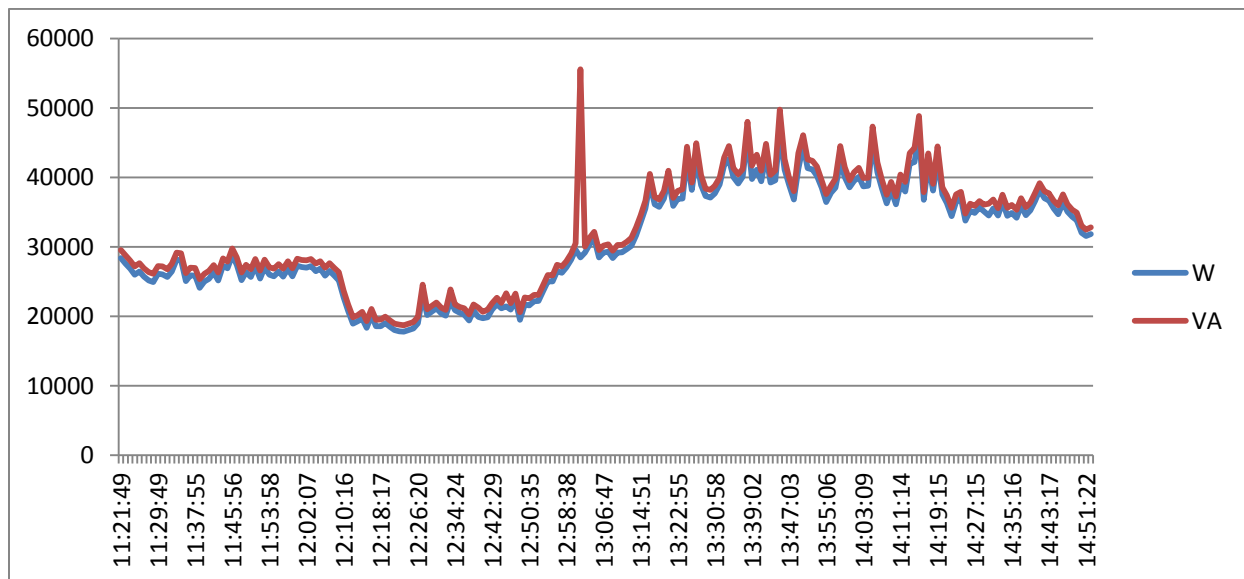
VL 2 Y Phase	394.45	380.51	411.44
VL 3 B Phase	391.71	377.31	406.86

5.2.3 LINE CURRENT VARIATION



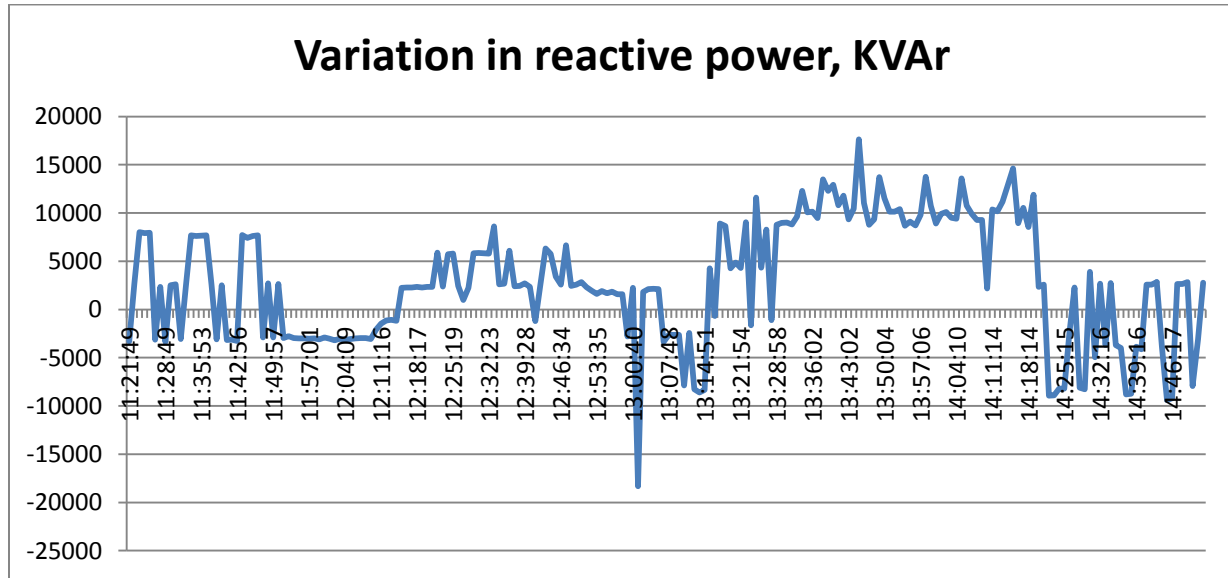
CURRENT	AVERAGE	MINIMUM	MAXIMUM
A L1 R Phase	40.23	26.48	83.77
AL 2 Y Phase	47.89	32.66	75.02
AL 3 B Phase	44.90	19.50	91.93

5.2.4 POWER VARIATION



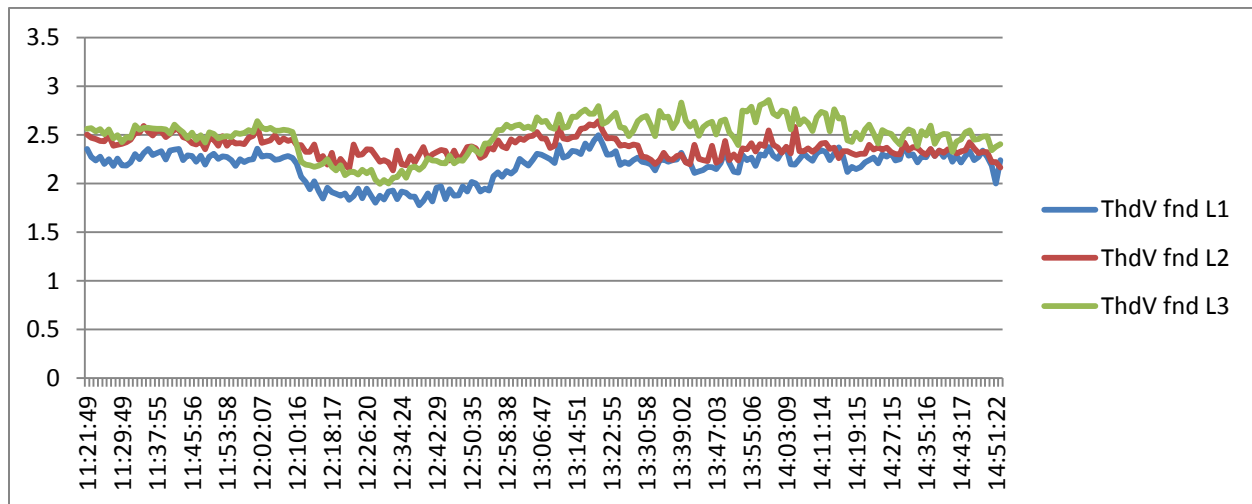
POWER VARIATION	AVERAGE	MINIMUM	MAXIMUM
Active Power kW	30.765	17.754	46.329
Apparent Power kVA	32.049	18.708	55.567

5.2.5 REACTIVE POWER



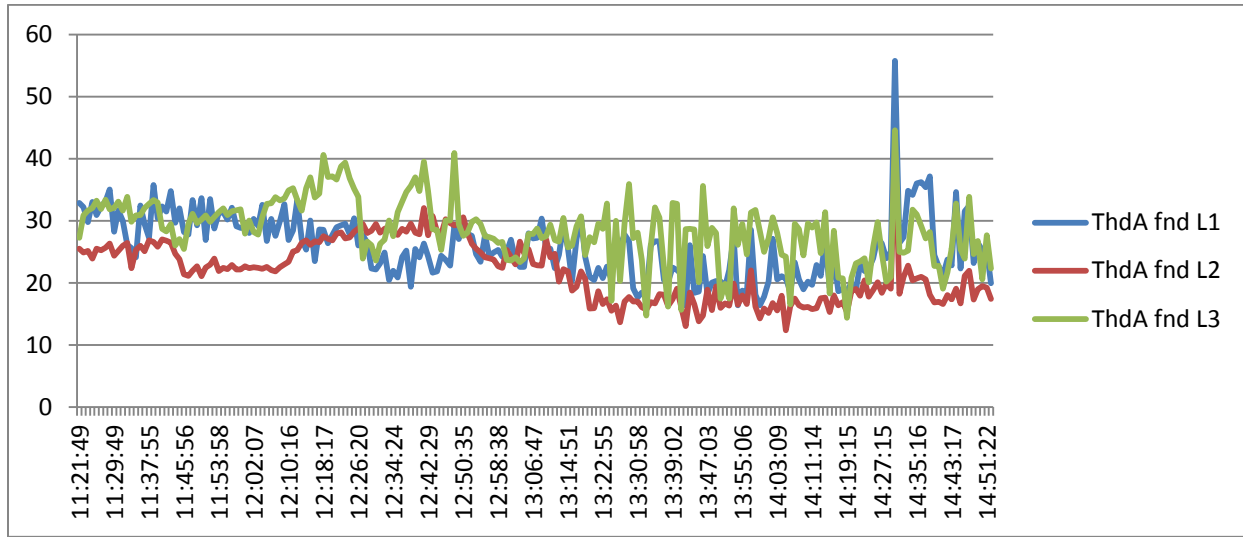
POWER VARIATION	AVERAGE	MINIMUM	MAXIMUM
Reactive Power kVAR	2.891	-18.332	17.638

5.2.6 TOTAL VOLATGE HARMONIC DISTORTION



VOLTAGETHD %	AVERAGE	MINIMUM	MAXIMUM
THDV L1 R Phase	2.18	1.77	2.49
THDVL 2 Y Phase	2.37	2.13	2.64
THDVL 3 B Phase	2.48	1.99	2.85

5.2.7 TOTAL CURRENT HARMONIC DISTORTION



CURRENT	MINIMUM	AVERAGE	MAXIMUM
THD A L1 R Phase	25.86	16.365	55.76
THD AL 2 Y Phase	21.94	12.36	42.06
THD AL 3 B Phase	28.59	14.41	44.58

## **CHAPTER-VI**

### **STUDY FOR SCOPE FOR USAGE OF RENEWABLE ENERGY**

#### **6.1 Installation of 10 kWp Solar PV Power Pack:**

During the Audit, it was revealed that the College has ample space on the Terrace.

It is proposed to install a Standalone type Solar Photovoltaic Power pack of capacity **10 kWp**.

The system will cater the Day load Demand of the College.

We furnish herewith the saving potential as under

<b>No</b>	<b>Particulars</b>	<b>Value</b>	<b>Unit</b>
1	Installed Capacity of Solar PV Pack	10	kWp
2	Daily working period	6	Hrs/Day
3	Daily units generated	60	kWh/Day
4	Annual working days	280	Day/annum
5	Annual saving in Grid Electrical Energy	16800	kWh/annum
6	Annual CO <sub>2</sub> saving potential	13.44	MT/Annum
7	Present Energy Charges	10	Rs/kWh
8	Annual monetary Gain	168000	Rs/Annum
9	Investment required	1100000	Rs lump sum

## **CHAPTER-VII**

### **ENERGY CONSERVATION PROPOSALS**

Following are the energy conservation opportunities are possible as per the detailed energy audit. These energy conservation opportunities are of the type of no and low cost investment.

- Water management system must be in place. Reduction in water consumption by addressing leakages of taps and other miscellaneous utilities. Installation of flow meters which will help in reduction of water consumption. TOD can be implemented for pumping application.
- As per the survey of connected load in the campus approved electrical demand is too large. It is suggested to reduce maximum demand (MD), if possible.
- Rain water harvesting can be implemented for reducing pumping hours and ultimately for save in electrical energy.
- Replacement of CRT monitors with LED.
- Display Sign boards at different eminent locations in the building to create awareness amongst staff and students
- Install solar street lights in the institute and hostel campus.
- Replace old electric fans by energy efficient fans in hostel and institute building
- Small wind mills can be placed on institute and hostel building as institute location is away from population and sufficient wind velocity available.
- Electric distribution must be renovated and all safety features are required to consider. It is suggested to have firefighting system to be installed in the distribution room.