SNM COLLEGE
MALIANKARA

March, 2023

ENERGY AUDIT REPORT

alenso energy

Energy Management Centre - Kerala
(Department of Power, Govt of Kerala)

CERTIFICATE OF EMPANELMENT

This is to certify that ***M/s. Alenso Energy*** *(N, Ground Floor, Brindavan Business Centre, Manimala Road, Kochi) is empanelled as Energy Audit firm in Energy Management Centre Kerala to conduct mandatory energy audit as per Government of Kerala G.O (Rt) No.2/2011/PD dated 01.01.2011.*

Empanelment No:
EMCEEA-3816F-1

Scope/Area	Building	Industry -Electrical	Industry Thermal
	Yes	Yes	Yes

This empanelment is valid up to 01/02/2024

Issuing Date: 02/02/2021

Place: Thiruvananthapuram

Director,
Energy Management Centre Kerala

ENERGY AUDIT REPORT

at

SNM College
Maliankara

March 2023

By

Alenso Energy
N, Brindavan Business Centre,
Manimala Road, Edappally PO
KOCHI – 682 024

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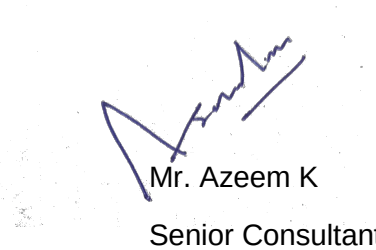
Acknowledgements

We sincerely thank the management, staff and students of SNM College, Maliankara for giving us an opportunity to evaluate the usage of energy in their facility and co-operating wholeheartedly throughout our audit program. We would like to place on record our special thanks to Dr. Jitha T.H, Principal and Dr. Lakshmi S Bose, Assistant Professor, Physics Department for entrusting this study with us. All employees co-operated wholeheartedly in accompanying us. Still, special mention is due for Ms. Nitha A U, Assistant Professor Economics Department & NAAC Coordinator, Dr. Baiju E C, Assistant Professor Botany Department & IQAC Coordinator, Mr. Dileep, Manager and Mr. Sanoop, Electrician who closely interacted with us on a daily basis. All of them participated enthusiastically in discussions on energy performance. This analysis and report would not have been possible without their inputs and involvement.



Kochi

17.03.2023

Mr. Azeem K

Senior Consultant

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2. Mr. Ahammed Kabeer T A , B. Tech (Ele), ME (Energy Engineering), Certified Energy Auditor – EA 1156
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Executive Summary

E.1: Energy Performance

The energy performance of the facility can be summarized as follows:

Table E-1: Summary of Energy Performance

Parameter	Electricity	Diesel	LPG	Total
Annual Consumption	84,000	612	1,140	85,897[#]
Unit of measurement	kWh	Ltr.	kg	kWh
Annual cost (₹)	5,23,946	57,709	1,24,440	7,06,094
Unit cost (₹ / unit)	Rs.6.2/kWh	Rs.94.3/Ltr	Rs.109.2/kg	
Annual equivalent emission (Tons of CO_2)	68.9	1.6	3.4	73.9
Built-up area (m2)	10740.53			
Energy Performance Index – EPI (kWh/m2/year)	7.8	0.2	-	8.0

[#]Based on equivalent power generation estimated from apportioned diesel consumption

The facility have carbon emission equivalent to 74 tons per year. It can be reduced by implementing the proposals recommended below.

E.2: Energy Saving Proposals

Table E-2: Energy Saving Proposals

Sl. No.	Energy Saving Opportunity	Category	Capital Investment Required	Annual Energy Savings	Annual Financial Savings	Simple Payback Period
Unit	-	-	₹	kWh	₹	months
1	Replace 105 existing tube lights with LED tubes	EE	47,250	3,629	25,039	23
2	Replace 268 existing ceiling fan with energy efficient BLDC fans	EE	8,57,600	15,437	1,06,514	97
3	Replace 3 existing 3 star AC to latest 5 star inverter AC	EE	1,17,000	2,135	14,730	95
4	Install 4 kW off grid solar pv on rooftop	RE	3,60,000	5,840	55,498	78

Sl. No.	Energy Saving Opportunity	Category	Capital Investment Required	Annual Energy Savings	Annual Financial Savings	Simple Payback Period
5	Install 15 kW on grid solar pv on rooftop	RE	11,25,000	21,900	1,51,110	90
	Total		**25,06,850**	**48,940**	**3,52,891**	**86**

Introduction

Sree Narayana Mangalam College, Maliankara, is a general degree college located in Maliankara, Kerala. It was established in the year 1964. The college is affiliated with Mahatma Gandhi University. This college offers different courses in arts, commerce and science.

SNM College Maliankara symbolises the steady advancement of an underdeveloped village, with its vast population belonging to the backward classes, towards social and cultural regeneration. Its mission has been, as enunciated by the great social revolutionary of Kerala, Sree Narayana Guru, emancipation through education. The institution upholds the message of the great Guru and strives to be a source of enlightenment to the people at large and poor and socially backward, in particular. From its inception in 1964, the college has been rendering commendable service as a centre of learning and culture.

The academic community of the college is totally committed to help evolve a new generation of young people who are just, kind and responsible. The institution's thrust is to impart holistic education to young men and women from all strata of society and develop in them employability and the other skills necessary for being successful in life. The area, where the college is situated, is no more an isolated, underdeveloped part and is on the wings of development and progress.

The college is the legacy of the Vadakkekara Hindu Matha Dharma Paripalana Sabha, a voluntary organisation formed in 1882, by the spirited youth of the backward Ezhava community in the Vadakkekara region. The H.M.D.P. Sabha, Moothakunnam as it is popularly known, launched a vigorous campaign for social justice and liberation from social bondage. The message and the benediction of Sree Narayana Guru provided Inspiration and the right direction to the activities. As part of the movement, the Sabha took initiative in the establishment of educational institutions. The institutions, run by the Sabha, have played a leading role in fighting the evils of illiteracy and ignorance among the poor and downtrodden and raising the cultural standards of the masses. The SNM College, Maliankara is another link in the tradition,

The College was inaugurated in 1964 by Sri.Sahodaran Ayyappan, an ardent disciple of Sree Narayana Guru and also leading public figure championing the cause of social liberty. It was in a cluster of thatched sheds near the Moothakunnam temple that the classes were held in the beginning. The foundation stone for the college building at Maliankara was also laid at that time by Sahodaran Ayyappan himself. The college was shifted to new campus at Maliankara in 1965. The present massive buildings were constructed in subsequent years, providing facilities for the expansion of the college.

Degree Courses were started in 1971, Post Graduate Courses in 1983 and Research centre in 2011. The college has a student strength of more than 2000 at the Under Graduate and Post Graduate levels comprising of 13 Degree Courses, 8 PG Cources, 1 Integrated PG Course and 2 research centres.

Vision of college

"Liberation through Education and empowerment through organisation"

Mission of college

- To institutionalize Guru's philosophy: One Caste, One Religion, One God for Man
- To provide value and need based education to all
- To infuse the spirit of nationalism and patriotism in young minds.
- To bring about an overall development of the students as a whole, especially those who hail from backward sections.
- To contribute to the moral and ethical enrichment of the society

Motto of College

"Enlightenment through Education"

1.1: Facility Details

Table 1-1: Facility Details

Particulars	Details
Facility Name	SNM College, Maliankara
Address	Maliankara P.O, (Via) Moothakunnam, Ernakulam Dist, Kerala, Pin - 683516
Contact	Ms. Jitha T H, Principal (Mob:+91 94957 42386)
Number of staff	136
Campus Area (Acres)	26.44
Built-up area (m²)	10740.53
Annual Electricity Consumption	85,897 kWh
Annual Energy Cost	Rs. 7,06,094

About Campus

The college campus is located in 26.44 acres of land. There are 13 building blocks and 63 classrooms in the campus. The layout of the campus is attached in Appendix III.

1.2: Energy Share

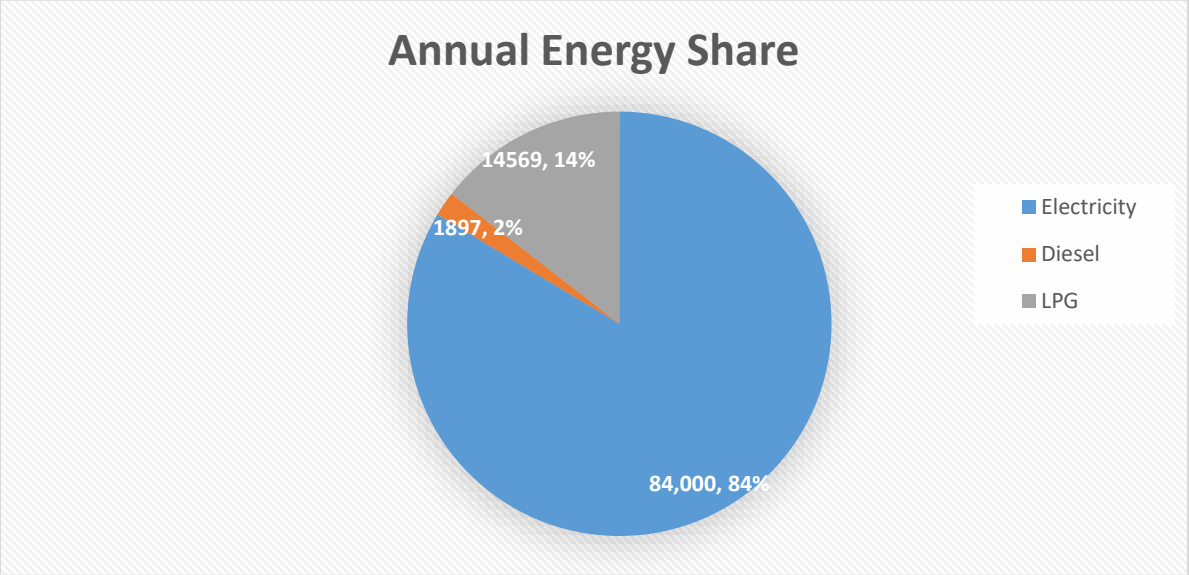


Figure 1.1: Share of energy cost from different sources

The purchased electricity, generated electricity and LPG comprises 80%, 2% and 18% of the total energy consumption respectively.

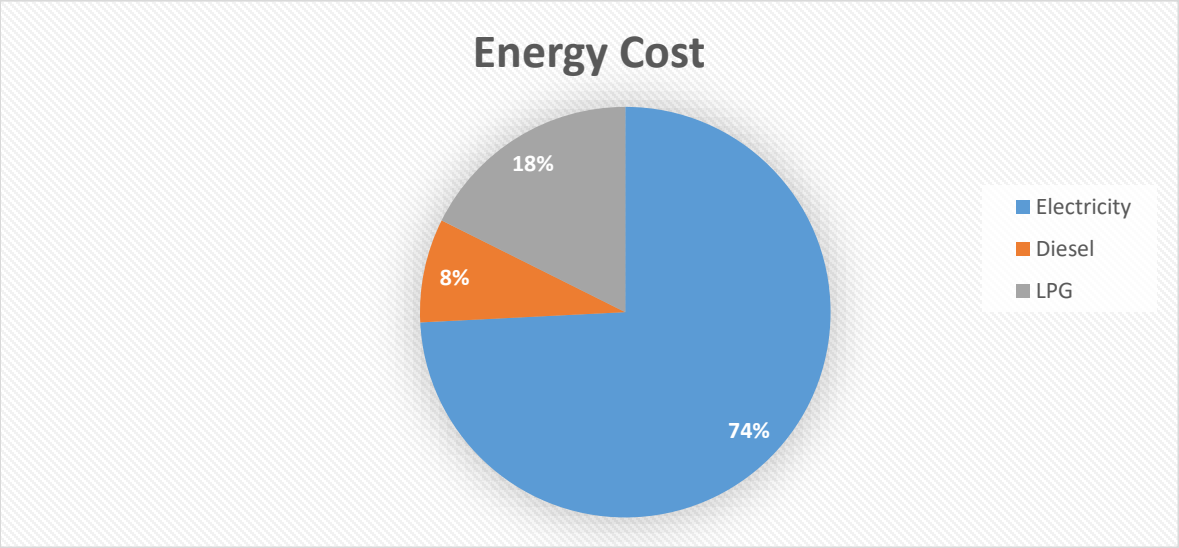


Figure 1.2: Share of energy cost from different sources

The 76%, 8% and 16% of the total energy cost comprises purchased electricity, generated electricity and LPG respectively.

Energy & Utility Description

2.1: Electricity

Electricity is supplied by Kerala State Electricity Board Limited (KSEBL). Supply falls under high tension category with tariff classification HT- II (B), three phase supply. This electrical supply is common for the SNM Institute of Management Technology, SNM Polytechnic College and SNM College. The details of this common electrical supply are given below.

Table 2-1: Details of Common Electrical Supply

Utility		**KSEBL**		
Consumer No.		1356080002773		
Consumer Name		SNM Institute of Management Technology		
Contract Demand		150 kVA		
Connected Load		739.19 kW		
Tariff category		HT-II (B)		
Tariff structure	Item	Rate (₹)		Amount – monthly average (₹)
	Demand Charge	Rs. 500/month		61,000
	Energy Charge	Normal	6.8	1,44,100
		Peak	10.2	
		Off Peak	5.1	

The energy charge of tariff HT- II (B) is divided into two slabs based on the telescopic consumption. The facility comes under the lower slab with monthly consumption around 20,100 units and the facility pays energy charge of Rs. 6.8 per unit (Normal zone).

The consumption of the facility is accounted on three time zones with different per unit energy charge in each zone. The energy charge in normal zone (i.e, from 6 am to 6 pm) is Rs. 6.8/unit, in peak zone (i.e, from 6 pm to 10 pm) it is Rs. 10.2/unit and in off peak zone (i.e, form 10 pm to 6 am) it is Rs. 5.1/unit. Apart from the unit power charges, the tariff includes duty on electricity charged at Rs. 0.10 of energy charges. The effective energy rate thus comes to ₹ 6.9 and each unit saved saves the same amount (in normal zone). These charges are likely to be revised upwards in the next financial year.

The SNM College bears only 20% of KSEB bill amount as its share.

2.1.1: Details of Electrical Panels & Distribution Boards

The 315 KVA transformer, KSEB meter and Main panel including feeder for the SNM College are located in substation of SNM Institute of Management Technology. The 11 kV KSEB supply is step down to 420 V by 315 kVA transformer and fed to the main panel and then to the feeders in the individual campuses.

The SNM College have a separate generator for its own usage, having capacity of 125 KVA for the backup power.

Figure 2.2: (a): Transformer, (b): Main Panel, (c): APFC Panel, (d): SNM College Feeder

Figure 2.2: (e): AMF Panel (Main Panel- SNM College), (f): SSB 1, (g): SSB 1A

2.2: Water

The facility uses water for drinking, cooking and sanitation requirements. The sources of water are Municipal water supply and open well. The facility employs a rain water harvesting tank also.

Figure 2.3 (a): Well, (b): Storage tank, (C): Rain Water Harvesting tank

2.3: Diesel

The facility uses diesel for the operation of generator. The facility have a 125 kVA diesel generator for backup power.

Figure 2.4: Generator

2.4: Biogas

The facility employs a biogas plant for the fuel usage in canteen in addition to LPG and wood.

Figure 2.5: Biogas Plant

Energy Performance

3.1: Energy Consumption

Annual Energy Consumption details and trend are given below.

Table 3-1: Energy Performance

Parameter	Electricity	Diesel	LPG	Total
Annual Consumption	84,000	612	1,140	85,897
Unit of measurement	kWh	Ltr.	kg	kWh
Annual cost (₹)	5,23,946	57,709	1,24,440	7,06,094
Built-up area (m2)	10740.53			
Energy Performance Index – EPI (kWh/m2/year)	7.8	0.2	-	8.0

The Energy Performance Index (EPI) is the key metric used for benchmarking energy usage in any commercial building or occupied office spaces. EPI is the energy used per unit area measured on an annual basis in kWh/m²/year.

3.2: Load Distribution

A load refers to the amount of power that a system or device consumes, while energy consumption refers to the amount of energy consumed by the system over a period of time. There are different types of loads employed in the facility such as pumps, lighting, AC etc. These loads vary depending on the operational requirements of the facility. The average load and consumption for different category of the loads is estimated from measured data and the summary for load and energy consumption is presented below.

Table 3-2: Category Wise Power Rating and Energy Consumption

Category	Load (kW)	Daily Consumption (kWh)
Fan	30.2	104.8
Plug Load	1.2	9.7
Lighting	13.4	48.1
UPS Load	23.0	78.2
AC	16.8	35.1
Pump	6.4	3.0
Total	91	279

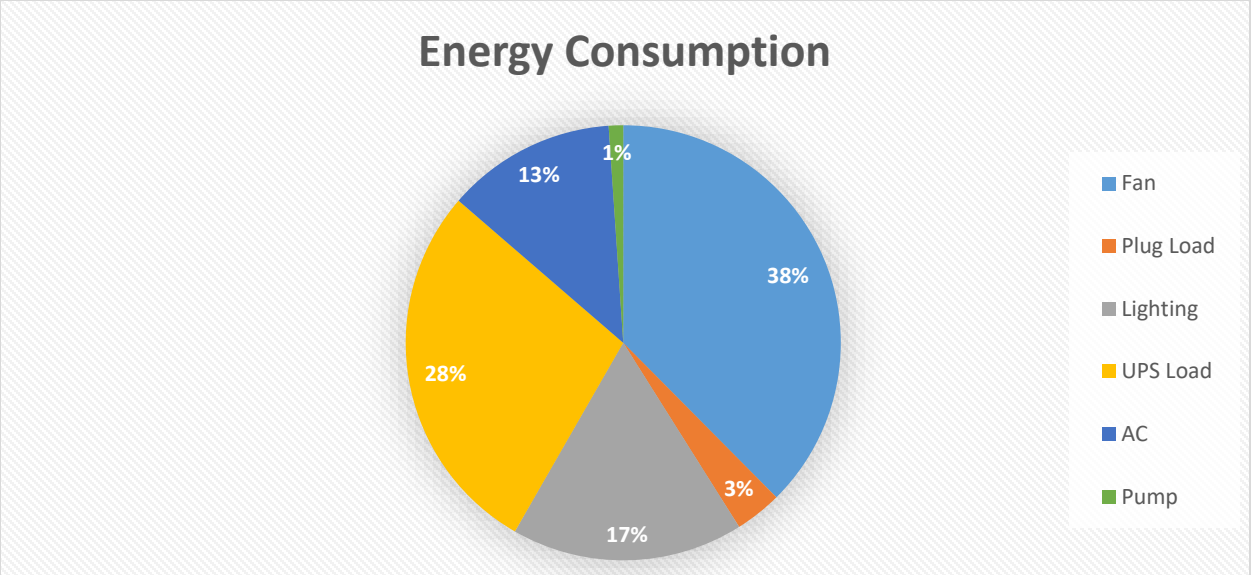


Figure 3.1: Energy Consumption Category wise

The fans and the UPS load consumes more energy on daily basis which is 38 % and 28 % of total energy consumption.

Equipment Performance

4.1: Lighting

The lighting of the facility includes LED tubes, fluorescent tubes and halogen lights. The total lighting load of the facility is around 13.4 kW and consumes 48 units of energy daily. The street lighting of the facility is around 0.6 kW. The details of lights are given below.

Table 4-1: Lighting Details

Light Fitting	Nos	Load (kW)	Daily Consumption (kWh)
LED Tube	154	3.4	17.2
Tube	221	8.8	26.7
Halogen Bulb	2	0.1	1.2
LED Bulb	11	0.2	1.8
Square LED	32	0.6	0.6
LED Flood light	3	0.1	0.6
Total	**423**	**13.2**	**48.1**

4.2: Pumps

The facility employs 8 water pumps and more than 6 storage tanks. The details of pumps employed by the facility is given below.

Table 4-2: Pump Details

Sl. No	Area		Duty	Watts	Nos	kWh
1	Canteen	Pump	Upward pumping	370	1	0.10
2		Pump	Upward pumping	370	1	0.07
3	Main Block	Pump	Upward pumping	1100	1	0.44
4		Pump	Upward pumping	750	1	0.15
5		Filter Pump	Downward pumping	1500	1	0.36
6		Pump	Upward pumping	750	1	0.45
7		Pump	Upward pumping	500	1	0.10
8		Pump	Upward/Downward pumping	1100	1	1.32
	Total			**6.44 kW**		**2.99 kWh**

4.3: Air Conditioners

The facility employs 10 split air conditioners in different sections. The details of air conditioners employed in the facility are given below.

Table 4-3: AC Details

Sl. No	Location	Make	TR	Star	EER	Power (W)	Year	No
1	Plant Tissue Culture Lab	Voltas	1.5			1650		1
2	Microalgal Culture Lab	Lloyd	1.0	3	3.60	1170	2018	1
3	Seminar Hall	Voltas	1.5	3	2.71	1860	2011	2
4	Seminar Hall	Lloyd	2.0	3	3.39	1890	2018	2
5	Multimedia Room	Daikin	1.5	3	3.25	1970	2014	2
6	Principal Room	Daikin	1.5	3	3.25	1970	2014	1
7	Principal Room - Office	Voltas	1.5	3	2.71	1860	2011	1

Climate Impact

The carbon footprint of the facility is the total amount of carbon dioxide (CO2) and other greenhouse gas emissions produced by the operations of the facility. The main sources of carbon emissions of common utility in the facility are the energy consumed by the pumps, lighting, AC and the fuel used to power the generators. The carbon footprint of of the facility is calculated by assessing the emissions associated with the energy consumed and fuel used during the operation of the facility. The annual energy carbon footprint can be tabulated as below:

Table 5-1: Carbon Emission Details

Parameter	Electricity	Diesel	LPG	Total
Annual Consumption	84,000	612	1,140	85,897
Unit of measurement	kWh	Ltr.	Kg	kWh
Annual equivalent emission (Tons of CO_2)	68.9	1.6	3.4	73.9

The facility causes emission equivalent to 74 tons of carbon dioxide every year.

The share of different sources in carbon emission can be graphically represented as

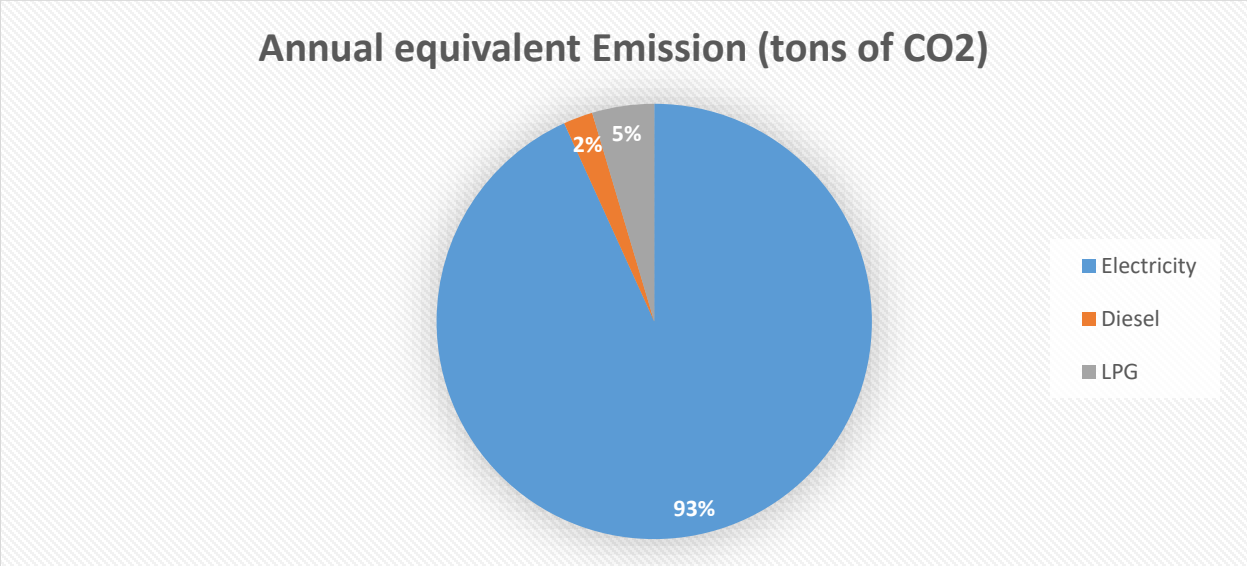


Figure 5.1: Share of carbon emission equivalent from different sources

The 92% of carbon emission taken place as a result of usage of purchased electricity, 6% of carbon emission from the LPG and 2% of emission take place as the result of usage of backup power.

Recommendations for Energy Conservation

Our country strives to achieve Net Zero in the future. It is suggested that all our public and private buildings set a model by progressive reduction in energy consumption reflected by the EPI, adopting energy efficient measures and tapping renewable energy potential. The proposals are summarised below.

Table 6-1: Summary of Recommendations

Sl. No.	Energy Saving Option	Category	Annual Energy Saving	Reduction in emission (Tons of CO_2)	Remarks
1	Replace existing tube lights with LED tubes	EE	3,629 kWh	3.0	
2	Replace existing ceiling fan with energy efficient BLDC fans	EE	15,437 kWh	12.6	
3	Replace existing 3 star AC to latest 5 star inverter AC	EE	2,135 kWh	1.8	
4	Install 4 kW off grid solar PV on rooftop	RE	5,840 kWh	4.8	
5	Install 15 kW on grid solar PV on rooftop	RE	21,900 kWh	18.0	
Total			48,940	40.1	

Minor Recommendations:

1. Avoid wastages by switching off lights in day-lit areas.
2. Switch off extra lights.
3. Human behavior place an important part in energy and equipment usage. Creating awareness among staffs and students thus place an important part in energy conservation. It is recommended to identify innovative ways to improve awareness of staffs and students.
4. Energy conservation posters can be displayed in corridors
5. Measurement forms the first step in energy monitoring and conservation. Monitor the energy consumption of the facility from the meter provided in the AMF feeder in the main panel located in the SNM Institute of Management Technology. For effective monitoring a metering facility may be introduced at the incomer of the facility.
6. Energy efficient pumps to be purchased while replacing the pumps

Detailed calculation and cost benefit analysis of recommendations for energy saving wherever quantified are listed below.

ENERGY SAVING PROPOSAL – 1

Replacement of Fluorescent Tubes with LED (EEM)

Background: Presently the facility employs fluorescent tubes, halogen lights and LED tubes.

Proposal: By replacing the fluorescent tubes with LED of similar length the power consumption will reduce considerably by approximate 50% even with the present operating hours. The calculation for the savings, approximate investment cost and payback period is tabulated below.

Particulars	Unit	Value
Power of present tube lights	Watts	40
Proposed LED tube	Watts	22
Difference in Wattage	Watts	18
Average No: of working hours/tube/day	Hrs	8
No. of tubes	No.	105
Daily power saving	kWh	15.12
No: of working days per year (Average)	Nos	240
kWh Saving per Annum	kWh	3629
Cost per kWh (Average)	Rs	6.90
Annual Financial Savings	Rs	25039
Cost of LED tube	Rs	450
Investment for LED lights	Rs	47250
Simple Payback period	Months	23
Saving in emission	Tons of CO2	2.98

ENERGY SAVING PROPOSAL – 2

Replacement of existing ceiling fans with energy efficient 5-star rated BLDC fans

Background: Star rating of ceiling fans is a recent development. Presently star rating is based on AC induction motor design improvement. For normal air flow they consume around 55 W of power compared to 75 W consumed by conventional fans. Now fans using BLDC technology are also commercially available which consume around 35 W power only for similar air flow and offer higher saving. These fans take in AC power and internally converts it into DC using SMPS. The main difference between BLDC and ordinary DC fans is the commutation method. A commutation is basically the technique of changing the direction of current in the motor for the rotational movement. In a BLDC motor, as there are no brushes, so the commutation is done by the driving algorithm in the Electronics. The 1200 mm size BLDC fan at dull speed consumes only around 22 to 27W instead of the present ceiling fan with induction motors that takes 60 to 70W as per the manufactures.

Proposal: Replace the ceiling fans with BLDC/BEE star rated fans in main sections of the facility. There are many ceiling fans in the facility. The calculation for the savings is given in the table below.

Ceiling Fan

Particulars	Unit	With BLDC
Power of existing ceiling fans at full speed	Watts	75
Power of replacing fan	Watts	35
Difference in Wattage	Watts	40
Avg No: of working hours/day	Hrs	6
Number of Ceiling Fans operating	Nos	268
No: of working days per year (Average)	Days	240
Daily energy saving	kWh/day	64.32
kWh Saving per Annum	kWh	15436.8
Cost per kWh (Average)	Rs	6.90
Annual Financial Savings	Rs	106514
Cost of replacing Fan per piece	Rs	3200
Investment for replacing Fan	Rs	857600
Simple Payback period*	Months	97
Saving in emission	Tons of CO_2	12.7

ENERGY SAVING PROPOSAL – 3

Replacement of existing 3 star Air Conditioners with energy efficient 5-star rated Air Conditioners

Background: Presently the facility employs 3 star rated AC (as per previous classification) in their working areas.

Proposal: Replace 3 star rated Air Conditioners with energy efficient new 5-star rated Air Conditioners. The calculation for the savings is given in the table below.

Air Conditioner

Particulars	Unit	Plant Tissue Culture Lab	Microalgal Culture Lab	Principal	Total
Power of present 3 Star AC	Watts	1650	1170	1170	3990
Power of Proposed 5 Star AC	Watts	1290	860	860	3010
Difference in Wattage	Watts	360	310	310	980
Average No: of working hours/AC/day	Hrs	12	12	6	10
No. of AC	No.	1	1	1	3
No: of working days per year (Average)	kWh	210	210	240	220
Daily power saving	Nos	4.3	3.7	1.9	9.9
kWh Saving per Annum	kWh	907	781	446	2135
Cost per kWh (Average)	Rs	6.90	6.90	6.90	6.90
Annual Financial Savings	Rs	6260	5390	3080	14730
Cost of AC	Rs	45000	36000	36000	117000

Particulars	Unit	Plant Tissue Culture Lab	Microalgal Culture Lab	Principal	Total
Investment for AC	Rs	45000	36000	36000	117000
Simple Payback period	Months	86	80	140	95
Saving in emission	Tons of CO2	0.7	0.6	0.4	1.8

ENERGY SAVING PROPOSAL – 4

Install 4 kW off grid solar PV on rooftop

The Sun is an inexhaustible, reliable and non-polluting source of power. Since the inception of life on earth, the only energy that was available came from the sun. Of the numerous renewable sources of energy known to mankind, Solar Photo Voltaic or SPV is one that has the potential to supply power for our future needs.

The facility not have its own KSEB connection and meter. The energy meter is located in another campus, SNM Institute of Management Technology across the road. So, in order to install ongrid solar plant, the facility have its limitations and procedures. So, in first stage we recommend to install a 4 kW off grid solar plant in the roof main building. Investment and saving are summarised below.

Particulars	Unit	Value
Proposed plant capacity	kWp	4
Average Energy Generation	kWh/day	16
Average Energy Generation	kWh/year	5840
Present annual unit consumption	kWh/year	84,000
Average utility electricity cost	Rs	9.50
Annual Financial Savings from generation	Rs	55,498
Investment (subsidized & in grid tied mode)	Rs	360,000
Simple payback period	Months	78
Saving in emission	Tons of CO2	4.8

ENERGY SAVING PROPOSAL – 5

Install 15 kW solar PV on rooftop

The Sun is an inexhaustible, reliable and non-polluting source of power. Since the inception of life on earth, the only energy that was available came from the sun. Of the numerous renewable sources of energy known to mankind, Solar Photo Voltaic or SPV is one that has the potential to supply power for our future needs.

If the facility overcomes its limitations to install on grid solar system, then we suggest to install a 15 kw on grid solar Pv on rooftop of main building. Investment and saving are summarized below.

Particulars	Unit	Value
Proposed plant capacity	kWp	15
Average Energy Generation	kWh/day	60
Average Energy Generation	kWh/year	21900
Present annual unit consumption	kWh/year	84,000
Average utility electricity cost	Rs	6.9
Annual Financial Savings	Rs	151,110
Investment (subsidized & in grid tied mode)	Rs	1,125,000
Simple payback period	Months	90
Saving in emission	Tons of CO_2	18.0

Appendix

Appendix I – Electricity Bill

KERALA STATE ELECTRICITY BOARD LIMITED

Office of the Special Officer(Revenue), Pattom,Thiruvananthapuram

DEMAND NOTICE FOR MARCH 2023

(As per CHAPTER VII OF KERALA ELETRICITY SUPPLY CODE -2014)

Con.	1356080002773	Bill Date	01-Mar-2023	Due Date	08-Mar-2023	Bill No	21028111047494 Ver : 0		
Tariff	HT II (B) GENERAL			Last Date	23-Mar-2023	CD	371900	BG	0

SNM INSTITUTE OF MANAGEMENT TECHNOLOGY
SNM Institute of management Technology Malliankara,B No. VIII/622B,
Moothakunnam,North Paravoor,Malliankara,
ERNAKULAM,,
Mobile no--9446054205 **LCN :17/4584**

SBI Virtual A/c No(IFS Code:SBIN0070493)-KSEBHT17C4584

Consumer GSTIN_ID- /KSEB (L)GST ID=32AAECK2277NBZ1
Fuel Surcharge@/0.09

Arrears as on 31-Jan-2023				Date of Previous Reading	31-Jan-2023	Email: ao@snmimt.edu.in	
Disputed	0	Undisputed	0	Date of Present Reading	28-Feb-2023	Supply Voltage	11 kV HT

Contract Demand(kVA)	75% of CD (KVA)	130% of CD (KVA)	Connected Load (KW)
150.0	112.5	195.0	739.191

Average				
MD (kVA)	Consumption (kWh)	PF	Billing Type	DPS
112.44	20877	0.99	Section	Moothakunnam
			Circle	Ernakulam

Reading Details of meter 20002743-Working (KVA,KWh,KVAh & KVArh) for 02-2023

1. Energy Consumption(KWh)

Zone	FR	IR	MF	Units
1	146649.00	139712.00	2.000	13874
2	29083.00	27945.00	2.000	2276
3	54114.00	52016.00	2.000	4196
			Total	20346

2. Energy Consumption(KVAh)

Zone	FR	IR	MF	Units
1	149824.00	142844.00	2.000	13960
2	29761.00	28607.00	2.000	2308
3	55469.00	53336.00	2.000	4266
			Total	20534
Ave.PF=KWh/KVAh			0.99	

3. Energy Consumption(KVArh) Lag and kVARh (Lead)

Zone	FR	IR	MF	Units	FR	IR	Units
1	7352.00	6855.00	2.000	994	13503.00	13366.00	274
2	2027.00	1868.00	2.000	318	3136.00	3133.00	6
3	4709.00	4375.00	2.000	668	5468.00	5460.00	16
			Total kVArh(Lag)	1980	kVArh(Lead)		296

4. Demand (KVA)

	Readings	MF	Units
1	51.699	2.000	103.4
2	13.263	2.000	26.53
3	11.841	2.000	23.68
5.Factory Lighting			0.0
6.Colony Lighting			0.0
7.Generator			0

INVOICE

	Unit	Rate	Amount (Rs)
1.Total Demand Charge			
a. Demand Charge - Normal	113.0	500.000	56500.00
b. Demand Charge - Peak	0.0	500.000	0.00
c. Demand Charge - Off peak	0.0	500.000	0.00
d. Excess Demand Charge	0.0	250.000	0.00
e. Excess Demand Charge(Peak)	0.0	250.000	0.00
f. Excess Demand Charge (Off	0.0	250.000	0.00
Sub Total (a+b+c+d+e+f)			**56500.00**
2.Total Energy Charges			
a. Energy charges - Normal	13874	6.80000	94343.20
b. Energy charges - Peak	2276.0	10.2000	23215.20
c. Energy charges - Off peak	4196.0	5.10000	21399.60
Sub Total(a+b+c)			**138958.00**
3.PF Incentive / Disincentive			-2779.16
Total Energy Charge			**136178.84**
4.Energy Charges on Lighting load			
a.Factory Lighting	0	0.2	
b.Colony Lighting	0	0.2	0.00
Sub Total(a+b)			
5.Electricity Duty	138958	0.100	13895.80
6.Ele. Surcharge	20346	0.025	508.65
7.Duty on self generated energy	0	0.012	0.00
8.Penalty for non-segn. of light load			

	Amount
9.Other Charges	
Fuel Surcharge	1831.14
Reconnection Fee	0.00
Charges for Belated Payments	2393.00
10.Total(add 1 to 9)	**211307.43**
Plus/Minus (Round off)	-0.43
UnDisputed Arr Amount	0.00
Less 1. Advance / Credit	0
2. CD Interest	0.00
3. CD Refund	0.00
Net Payable	**211307.00**

(Rupees Two Lakh Eleven Thousand Three Hundred Seven Only)

E & O.E

Balance Advance at Credit, if any

As per Regulation 130 of Kerala Electricity Supply Code 2014 any complaint regarding accuracy of a bill shall be first taken up wih the officer designated to issue the bill (Special Officer(Revenue)). Please follow our official Facebook page fb.com/ksebl for information &announcements.(Please see the instructions overleaf)

SPECIAL OFFICER (REVENUE)

Please Detach and enclose with the DD

1356080002773 **21028111047494** **Rs.211307.00** **March 2023**

SNM INSTITUTE OF MANAGEMENT TECHNOLOGY

DD/Payment Instruction | Name of the | Date D D M M Y Y Y Y | Signature

Appendix II – Load Matrix

Sl. No.	Area Group	Area	Equipment Category	Equipment	Power Rating (W)	No. Of Devices	No. of rooms	Total No. of Devices	Total Power (W)
1	Main Block	Plant Tissue Culture Lab	Lighting	LED Tube	22	4	1	4	88
2	Main Block		Lighting	LED Tube	22	2	1	2	44
3	Main Block		UPS Load	UPS	6000	1	1	1	6000
4	Main Block		AC	AC	1650	1	1	1	1650
5	Main Block	Microalgal Culture Lab	Lighting	LED Tube	22	14	1	14	308
6	Main Block		Lighting	LED Tube	22	2	1	2	44
7	Main Block		Lighting	Tube	40	1	1	1	40
8	Main Block		AC	AC	1170	1	1	1	1170
9	Main Block	Fist Funded Centralised Instrumentation & Computer Lab	Lighting	LED Tube	22	1	1	1	22
10	Main Block		Lighting	Tube	40	5	1	5	200
11	Main Block		AC	AC	2500	1	1	1	2500
12	Main Block	Room	Lighting	LED Tube	22	1	1	1	22
13	Main Block		Lighting	Tube	40	2	1	2	80
14	Main Block		Fan	Ceiling Fan	75	3	1	3	225
15	Main Block	Staff Room	Lighting	Tube	40	2	1	2	80
16	Main Block		Fan	Ceiling Fan	75	4	1	4	300
17	Main Block	Physiochemistry Lab	Lighting	Tube	40	2	1	2	80
18	Main Block		Fan	Ceiling Fan	75	4	1	4	300
19	Main Block		Plug Load	Refrigerator	250	1	1	1	250

20	Main Block	Research Lab	Lighting	LED Tube	22	2	1	2	44
21	Main Block		Lighting	Tube	40	2	1	2	80
22	Main Block		Fan	Ceiling Fan	75	4	1	4	300
23	Main Block	BSC Lab	Lighting	LED Tube	22	2	1	2	44
24	Main Block		Lighting	Tube	40	2	1	2	80
25	Main Block		Fan	Ceiling Fan	75	4	1	4	300
26	Main Block	Class Room	Lighting	LED Tube	22	1	1	1	22
27	Main Block		Lighting	Tube	40	1	1	1	40
28	Main Block		Fan	Ceiling Fan	75	4	1	4	300
29	Main Block	Zoology BSC Lab	Lighting	Tube	40	16	1	16	640
30	Main Block		Fan	Ceiling Fan	75	4	1	4	300
31	Main Block		Lighting	Incandescent lamp	60	2	1	2	120
32	Main Block		Lighting	CFL	30	1	1	1	30
33	Main Block		Plug Load	Refrigerator	250	1	1	1	250
34	Main Block	Zoology MSC Lab	Lighting	LED Tube	22	2	1	2	44
35	Main Block		Lighting	Tube	40	5	1	5	200
36	Main Block		Fan	Ceiling Fan	75	5	1	5	375
37	Main Block	Class Room	Lighting	LED Tube	22	1	1	1	22
38	Main Block		Lighting	Tube	40	1	1	1	40
39	Main Block		Fan	Ceiling Fan	75	4	1	4	300
40	Main Block	Staff Room	Lighting	Tube	40	2	1	2	80
41	Main Block		UPS Load	UPS	600	1	1	1	600
42	Main Block		Fan	Ceiling Fan	75	4	1	4	300

43	Main Block	Office	Lighting	LED Tube	22	8	1	8	176
44	Main Block		Fan	Ceiling Fan	75	9	1	9	675
45	Main Block		UPS Load	UPS	600	6	1	6	3600
46	Main Block		Lighting	Square LED	20	8	1	8	160
47	Main Block	Principal Room, Manager Room	Lighting	LED Tube	22	2	1	2	44
48	Main Block		UPS Load	UPS	600	1	1	1	600
49	Main Block		Lighting	LED Flood light	50	2	1	2	100
50	Main Block	Principal Room	AC	AC	1860	1	1	1	1860
51	Main Block		AC	AC	1890	1	1	1	1890
52	Main Block	Office Room	Lighting	LED Tube	22	2	1	2	44
53	Main Block		Fan	Ceiling Fan	75	5	1	5	375
54	Main Block	Chemistry Lab	Lighting	Tube	40	15	1	15	600
55	Main Block		Fan	Ceiling Fan	75	3	1	3	225
56	Main Block		Fan	Exhaust Fan	30	2	1	2	60
57	Main Block		Plug Load	Refrigerator	250	1	1	1	250
58	Main Block	Chemistry Instruments & Comp Lab	Lighting	Tube	40	6	1	6	240
59	Main Block		Fan	Ceiling Fan	75	3	1	3	225
60	Main Block	Multimedia Room	AC	AC	1970	2	1	2	3940
61	Main Block		Lighting	LED Tube	22	1	1	1	22
62	Main Block		Lighting	LED Flood light	30	1	1	1	30
63	Main Block		Fan	Ceiling Fan	75	1	1	1	75
64	Main Block	Staff Room	Lighting	Tube	40	2	1	2	80
65	Main Block		UPS Load	UPS	600	1	1	1	600

66	Main Block		Fan	Ceiling Fan	75	4	1	4	300
67	Main Block	Store & Gas Hall	Lighting	Tube	40	4	1	4	160
68	Main Block		Fan	Ceiling Fan	75	2	1	2	150
69	Main Block	BSC Physics Lab	Lighting	Tube	40	15	1	15	600
70	Main Block		Fan	Ceiling Fan	75	3	1	3	225
71	Main Block		Fan	Exhaust Fan	30	2	1	2	60
72	Main Block	MSC Physics Lab	Lighting	Tube	40	6	1	6	240
73	Main Block		UPS Load	UPS	600	1	1	1	600
74	Main Block		Fan	Ceiling Fan	75	3	1	3	225
75	Main Block	Staff Room	Lighting	Tube	40	2	1	2	80
76	Main Block		Fan	Ceiling Fan	75	4	1	4	300
77	Main Block	Electronics Lab	Lighting	Tube	40	6	1	6	240
78	Main Block		Fan	Ceiling Fan	75	3	1	3	225
79	Main Block	MSC Physics Class Room	Lighting	LED Tube	22	1	1	1	22
80	Main Block		Lighting	Tube	40	1	1	1	40
81	Main Block		Fan	Ceiling Fan	75	4	1	4	300
82	Centinary Block	Library	Lighting	Tube	40	20	1	20	800
83	Centinary Block		Fan	Ceiling Fan	75	16	1	16	1200
84	Centinary Block		UPS Load	UPS	2000	1	1	1	2000
85	Centinary Block	Seminar Hall	AC	AC	1860	1	1	1	1860
86	Centinary Block		AC	AC	1890	1	1	1	1890
87	Centinary Block		Lighting	Square LED	20	6	1	6	120
88	Centinary Block		Fan	Ceiling Fan	75	3	1	3	225

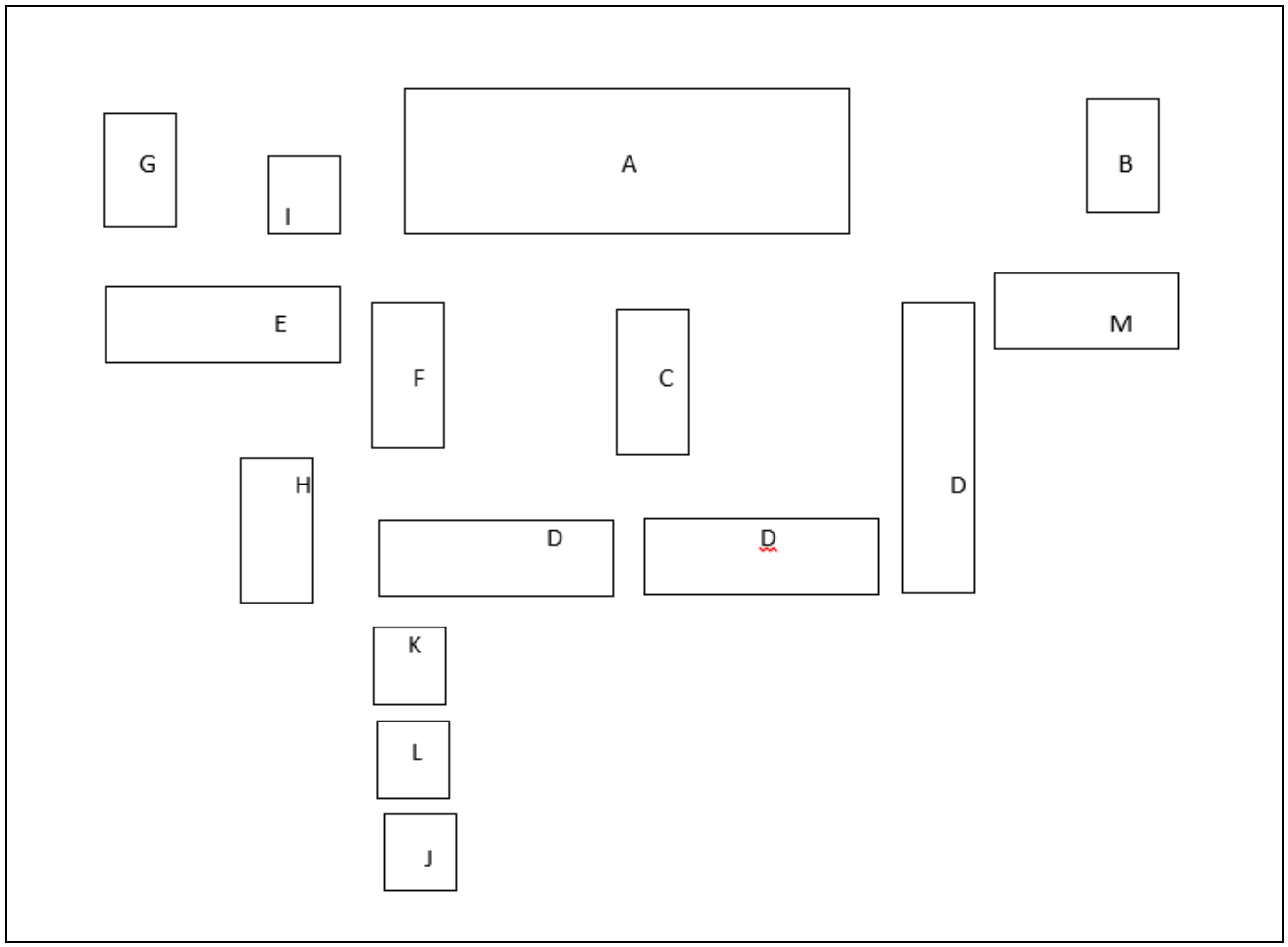
89	Centinary Block	Sree narayana Research centre	Lighting	LED Tube	22	2	1	2	44
90	Centinary Block		Lighting	Tube	40	2	1	2	80
91	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300
92	Centinary Block	Staff Cooperative society	Lighting	LED Tube	22	2	1	2	44
93	Centinary Block		Lighting	Tube	40	2	1	2	80
94	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300
95	Centinary Block	Toilet	Lighting	LED Tube	22	2	2	4	88
96	Centinary Block		Lighting	Tube	40	2	2	4	160
97	Centinary Block	Hindi Department	Lighting	Tube	40	2	1	2	80
98	Centinary Block		UPS Load	UPS	600	1	1	1	600
99	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300
100	Centinary Block	English Department	Lighting	Tube	40	2	1	2	80
101	Centinary Block		UPS Load	UPS	600	1	1	1	600
102	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300
103	Centinary Block	Malayalam Department	Lighting	Tube	40	2	1	2	80
104	Centinary Block		UPS Load	UPS	600	1	1	1	600
105	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300
106	Centinary Block	Class Room	Lighting	LED Tube	22	1	13	13	286
107	Centinary Block		Lighting	Tube	40	1	13	13	520
108	Centinary Block		Fan	Ceiling Fan	75	4	13	52	3900
109	Centinary Block	Staff Room	Lighting	Tube	40	2	1	2	80
110	Centinary Block		UPS Load	UPS	600	1	1	1	600
111	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300

112	Centinary Block	Class Room	Lighting	LED Tube	22	1	9	9	198
113	Centinary Block		Lighting	Tube	40	1	9	9	360
114	Centinary Block		Fan	Ceiling Fan	75	4	9	36	2700
115	Centinary Block	Health Department	Lighting	Tube	40	2	1	2	80
116	Centinary Block		Fan	Ceiling Fan	75	4	1	4	300
117	Centinary Block	Toilet	Lighting	LED Tube	22	2	1	2	44
118	Centinary Block		Lighting	Tube	40	2	1	2	80
119	Centinary Block	Class Room	Lighting	LED Tube	22	1	9	9	198
120	Centinary Block		Lighting	Tube	40	1	9	9	360
121	Centinary Block		UPS Load	UPS	600	1	1	1	600
122	Centinary Block		Fan	Ceiling Fan	75	4	9	36	2700
123	Centinary Block	Toilet	Lighting	LED Tube	22	2	2	4	88
124	Centinary Block		Lighting	Tube	40	2	2	4	160
125	Auditorium	Auditorium	Lighting	Square LED	20	18	1	18	360
126	Auditorium		Fan	Ceiling Fan	75	21	1	21	1575
127	Old Block	Class Room	Lighting	LED Tube	22	1	9	9	198
128	Old Block		Lighting	Tube	40	1	9	9	360
129	Old Block		Fan	Ceiling Fan	75	4	9	36	2700
130	Old Block	Chemistry Lab	Lighting	Tube	40	6	1	6	240
131	Old Block		Fan	Ceiling Fan	75	3	1	3	225
132	Old Block	Canteen	Plug Load	Refrigerator	250	1	1	1	250
133	Old Block		Plug Load	Cooler	200	1	1	1	200
134	Old Block - A	Class Room	Lighting	LED Tube	22	1	4	4	88
135	Old Block - A		Lighting	Tube	40	1	4	4	160
136	Old Block - A		Fan	Ceiling Fan	75	4	4	16	1200

137	NCC Building	Room	Lighting	LED Tube	22	2	5	10	220
138	NCC Building		Lighting	Tube	40	1	5	5	200
139	SF Block		UPS Load	UPS	600	5	1	5	3000
140	NCC Building		Fan	Ceiling Fan	75	4	5	20	1500
141	RUSA Building	Class Room	Lighting	LED Tube	22	1	3	3	66
142	RUSA Building		Lighting	Tube	40	1	3	3	120
143	RUSA Building		Fan	Ceiling Fan	75	3	3	9	675
144	SF Block	Class Room	Lighting	LED Tube	22	1	8	8	176
145	SF Block		Lighting	Tube	40	1	8	8	320
146	SF Block		UPS Load	UPS	3000	1	1	1	3000
147	SF Block		Fan	Ceiling Fan	75	3	8	24	1800
148	Block 9	Class Room	Lighting	LED Tube	22	1	3	3	66
149	Block 9		Lighting	Tube	40	1	3	3	120
150	Block 9		Fan	Ceiling Fan	75	3	3	9	675
151	Block 10 (Toilet)	Toilet	Lighting	LED Tube	22	2	1	2	44
152	Block 10 (Toilet)		Lighting	Tube	40	2	1	2	80
153	Block 11 (Store)	Store	Lighting	LED Tube	22	2	1	2	44
154	Block 11 (Store)		Fan	Ceiling Fan	75	1	1	1	75
155	Block 11 (Store)		Lighting	Tube	40	2	1	2	80
156	Block 12	Womens Rest Room	Lighting	LED Tube	22	1	3	3	66
157	Block 12		Lighting	Tube	40	1	3	3	120
158	Block 12		Fan	Ceiling Fan	75	2	3	6	450
159	Block 13	Workshop	Lighting	LED Tube	22	2	1	2	44
160	Block 13		Fan	Ceiling Fan	75	1	1	1	75
161	Block 13		Lighting	Tube	40	2	1	2	80
162	Common	CB	Lighting	LED Tube	22	4	1	4	88
163	Common		Lighting	LED Bulb	10	1	1	1	10
164	Common		Lighting	Halogen Bulb	50	1	1	1	50
165	Common	Main Block	Lighting	LED Tube	22	9	1	9	198
166	Common		Lighting	LED Bulb	10	4	1	4	40
167	Common		Lighting	LED Bulb	50	1	1	1	50

168	Common		Lighting	Tube	40	1	1	1	40
169	Common	Physical Bldg	Lighting	LED Tube	22	2	1	2	44
170	Common	Canteen	Lighting	LED Tube	22	1	1	1	22
171	Common	Resting Room	Lighting	LED Tube	22	1	1	1	22
172	Common	Statue	Lighting	LED Bulb	10	4	1	4	40
173	Common		Lighting	Halogen Bulb	50	1	1	1	50
174	Common	Watchhouse	Lighting	LED Bulb	10	1	1	1	10
175	Common	Canteen	Pump	Pump	370	1	1	1	370
176	Common		Pump	Pump	370	1	1	1	370
177	Common	Main Block	Pump	Pump	1100	1	1	1	1100
178	Common		Pump	Pump	750	1	1	1	750
179	Common		Pump	Filter Pump	1500	1	1	1	1500
180	Common		Pump	Pump	750	1	1	1	750
181	Common		Pump	Pump	500	1	1	1	500
182	Common		Pump	Pump	1100	1	1	1	1100
		Total							**90.9 kW**

Appendix III – Layout



A	Main Block
B	Centinary Block
C	Auditorium
D	Old Block
E	Old Block - A
F	NCC Building
G	RUSA Building
H	SF Block
I	Block 9
J	Block 10 (Toilet)
K	Block 11 (Store)
L	Block 12
M	Block 13

Appendix III - Abbreviations

CO2 – Carbon dioxide
DB – Distribution Board
EC – Energy Consumption
EE – Energy Efficiency
EEM – Energy Efficiency Measures
EER – Energy Efficiency Rating
EPI – Energy Performance Index
Hrs – Hours
HT – High Tension
IECC – International Energy Conservation Code
ISO – International Organization for Standardization
KSEBL – Kerala State Electricity Board Limited
kVA – Kilo Volt Ampere
kW – Kilowatt
kWh – Kilowatt hour
LDB – Lighting Distribution Boards
LED – Light emitting diode
Ltr – Liter
M2 – Meter Square
MDB – Main Distribution Board
Nos – Numbers
PF – Power Factor
RE – Renewable Energy
Rs – Rupees
Sq. m – Square Meter
Std – Standard
THD – Total Harmonic Distortion
UPS – Uninterrupted Power Supply
V – Volts
W – Watt