Report

on

Green Audit

at

Hooghly Engineering & Technology College,

Hooghly

(Year 2020-21)

Prepared by

Nutan Urja Solutions

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Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Pipulpati Hooghly.

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Acknowledgement

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

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures and green practices. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

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Executive Summary

Green Audit of Hooghly Engineering & Technology College, Hooghly is conducted by Nutan Urja Solutions, Pune. Based on the audit field study, the following important points can be presented.

1. Present Energy Consumption

Hooghly Engineering & Technology College, Hooghly uses electrical energy as the source of energy for various equipment in the college campus. In the following table, we present the details of energy consumption.

Table no 1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	8,295	6.6
2	Minimum	3,820	3.1
3	Average	5,487	4.4
4	Total	65,840	52.7

2. Various Measures Adopted for Energy Conservation

1. Usage of STAR rated ACs at new installations.
2. Usage of LED lights at some indoor locations.
3. Usage of LED lights for outdoor lighting.

3. Usage of Renewable Energy

The collage has installed **3.5 kW** Solar PV Power Plant and 18000 Liters capacity Solar Thermal Hot Water system.

4. Rain Water Harvesting

The College has installed the Rainwater harvesting project, to reduce dependency on municipal corporation water supply.

5. Waste Management

The College has already installed a bio composting plant, wherein the bio-degradable waste is composted and is used as soil conditioner for the garden.

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The internal communication is through emails and there is hardly any generation of e-waste in the premises.

6. Notes and Assumptions

1. Daily working hours-8 Nos
2. Annual working days-250 Nos
3. Average rate of electrical energy: **Rs 8 / kWh**

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Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	Kilo-Watt Hour
kVA	:	Active Power

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1. Introduction

Hooghly Engineering & Technology College, Hooghly is a degree engineering college, run by Hooghly Engineering & Technology College Society, a non-profit making organization engaged in the promotion of technical education amongst the students and the dissemination of scientific knowledge in the society. A good number of eminent social workers, educationists, public men are directly involved in the management of the society. The managing committee of the society consists of eminent professors and engineers looking after the different sectors of activities of the Society. Hooghly Engineering & Technology College has set from the very beginning, as its goal, quality technical education, which endeavors to achieve high levels of academic excellence. It is planned in such a way that a student can get all facilities and help to reach his destination. The laboratories have been setup not only according to the university syllabus, but also with the state-of-the-art equipment. The HETC can boast of teachers of quality. The discipline is the backbone of any system and the college is duty bound to produce hardcore professionals and an effective system can only give the desired result. The college consists of an academic and administrative building, a library and a vast area of open land, which helps the growth of young talents under healthy and natural environment.

1.1 Objectives

1. To study the present level of energy consumption
2. To study the present CO_2 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 energy consumption

1.2 Audit methodology

1. Study of connected load
2. Study of various electrical parameters
3. To prepare the report with various Energy Conservation Program (ENCON) measures with payback analysis

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2. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table 2.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jul-21	5,005	76,157
2	Jun-21	3,820	1,15,072
3	May-21	3,935	1,16,527
4	Apr-21	7,550	1,51,920
5	Mar-21	8,295	1,58,966
6	Feb-21	4,560	1,22,208
7	Jan-21	4,760	1,24,607
8	Dec-20	4,795	1,24,983
9	Nov-20	5,260	1,29,544
10	Oct-20	6,045	1,37,589
11	Sep-20	7,120	18,787
12	Aug-20	4,695	1,24,192
	Total	**65,840**	**14,00,552**

Variation in energy consumption is as follows,

Fig 2.1: Month wise energy consumption

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Monthly variation in electricity bill is as follows,

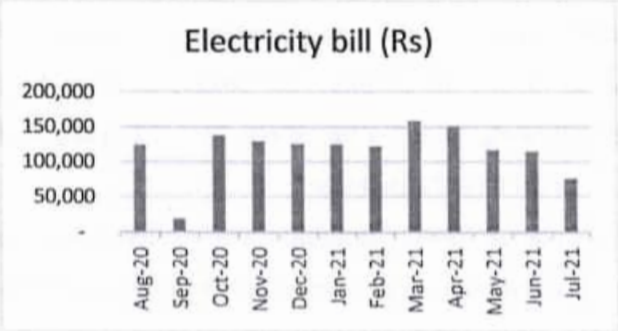

Fig 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	8,295	6.6
2	Minimum	3,820	3.1
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4	Total	65,840	52.7

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3. Carbon Footprint

1. A Carbon footprint is defined as the total greenhouse gas emissions (CO_2 emissions), emitted due to various activities. In this we compute the emissions of carbon dioxide, by usage of the various form of electrical energy used by the college for performing its day-to-day activities.

2. Basis for computation of CO_2 Emissions:

The basis of calculation for CO_2 emissions due to electrical energy is as under

- 1 Unit (kWh) of electrical energy releases **0.8 Kg of CO_2** into the atmosphere.

Based on the above data we compute the CO_2 emissions which are being released into the atmosphere by the college due to its day-to-day operations.

We herewith furnish the details of various forms of energy consumption as under

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions

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2	Jun-21	3,820	3.1
3	May-21	3,935	3.1
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5	Mar-21	8,295	6.6
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8	Dec-20	4,795	3.8
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In the following chart we present the CO_2 emissions due to usage of electrical energy.

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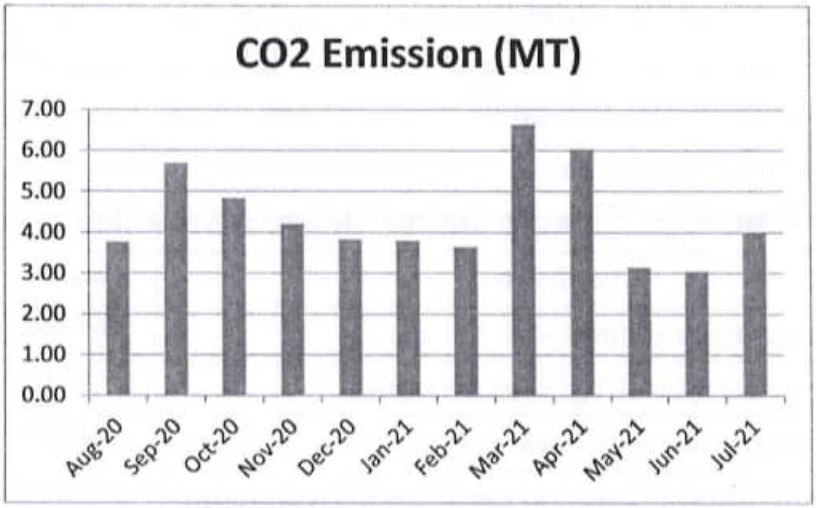

Fig 3.1: Month wise CO_2 Emission

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In this chapter, we compute the percentage of usage of Alternate/Renewable Energy to Annual Energy Requirement of the college. The college has installed a Roof Top Solar PV System. The installed capacity of Solar PV Plant is **3.5 kW**. College has also installed 18,000 liters of solar thermal hot water plant.

Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from WBSEDCL	65,840	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	5250	kWh/Annum
3	Total Energy Requirement of College	71,090	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	7	%

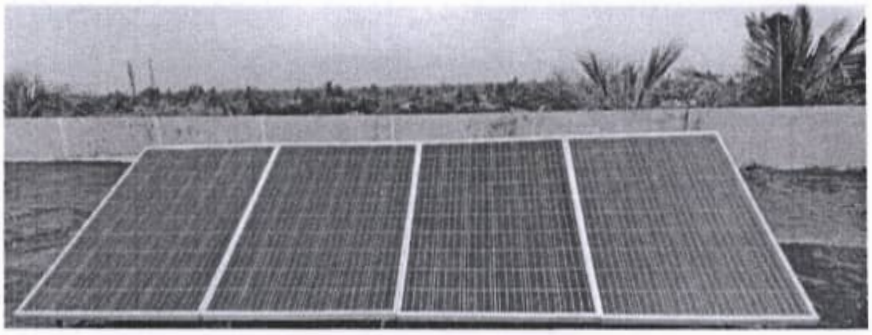

Fig 4.1 Solar PV plant

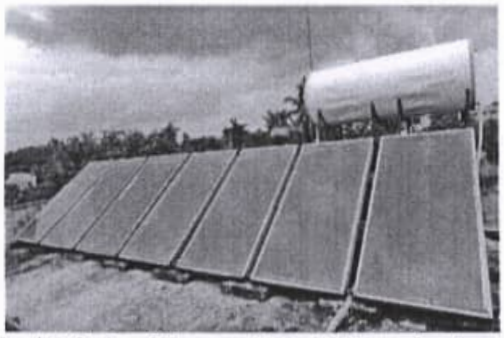

Fig 4.2 Solar Thermal Hot Water System

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Fig 5.1 Rainwater Harvesting

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The college has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

Fig 6.1 Bio Composting Storage Tanks

6.2 e-Waste Management

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7. Study of Green Practices

7.1 No of students who don't use own Vehicle for coming to Institute

Out of total students coming to institute, about 20% students use their own automobile.

7.2 Usage of Public Transport

During the students' transport study, it was revealed that the local students who are residing near areas make use of public transport like local buses, local sharing type auto rickshaws. Some students use bicycles. Institute encourages students to not to use automobiles.

7.3 Pedestrian Friendly Roads

The institute has well defined pedestrian foot paths as to facilitate the easy movement of the students within the campus.

Fig 7.1 Road within campus

7.4 Plastic Free Campus

The institute is an active participant in the Government of India's most prestigious project of SWATCHH BHART ABHIYAN. The institute has displayed boards in the campus, to make the campus plastic free. Various measures adopted for this purpose are as follows

- Installation of separate waste bins for dry waste & wet waste.
- Usage of paper teacups in the institute canteen.
- Display of boards in the campus for plastic free campus.

7.5 Paperless Office

The internal communication of the institute is through the internet. There are hardly any day-to-day operations, where printing is required.

7.6 Green Landscaping with Trees and Plants

The institute has beautiful, maintained Garden.

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Fig 7.2: Beautiful maintained Garden of college

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No	Month	Energy (kWh)	Bill Amount (Rs)
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2	May-22	15,885	2,25,462
3	Apr-22	7,753	1,53,068
4	Mar-22	7,815	1,54,466
5	Feb-22	6,070	86,273
6	Jan-22	5,515	81,279
7	Dec-21	6,980	95,144
8	Nov-21	6,905	94,388
9	Oct-21	7,380	1,11,623
10	Sep-21	9,005	1,16,161
11	Aug-21	9,550	1,25,261
12	Jul-21	5,005	76,157
	Total	**1,06,258**	**15,66,964**

Variation in energy consumption is as follows,

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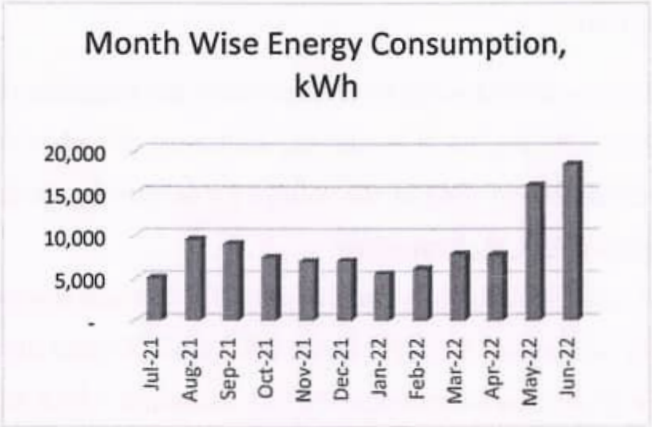

Fig 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

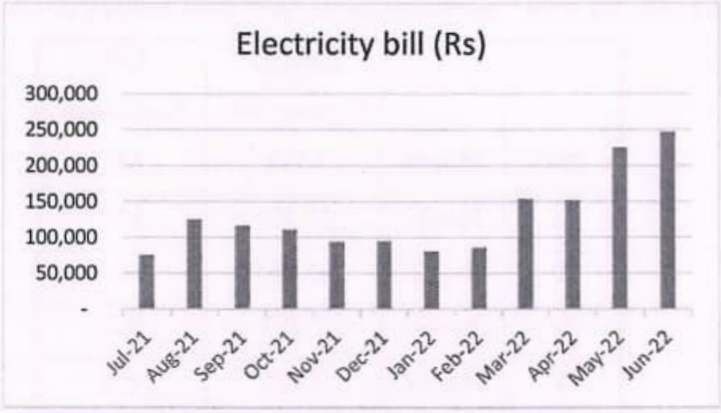

Fig 2.2: Month wise electricity bill

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Key observations of electricity bill are as follows,

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6	Jan-22	5,515	4.4
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8	Nov-21	6,905	5.5
9	Oct-21	7,380	5.9
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In the following chart we present the CO_2 emissions due to usage of electrical energy.

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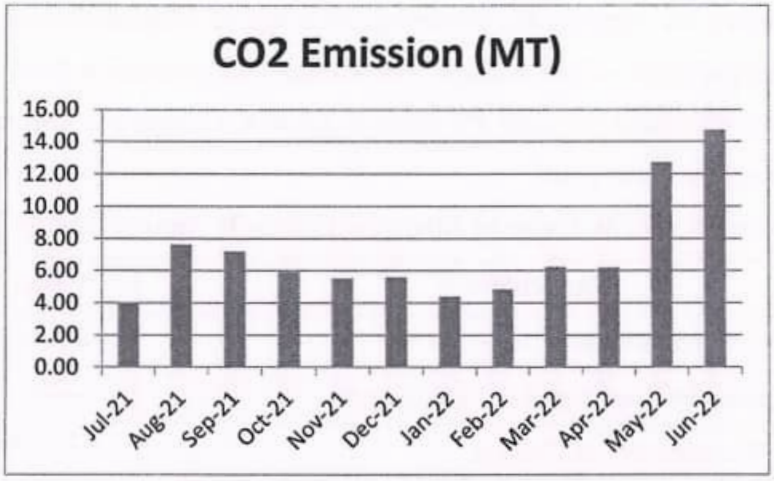

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No	Particulars	Value	Unit
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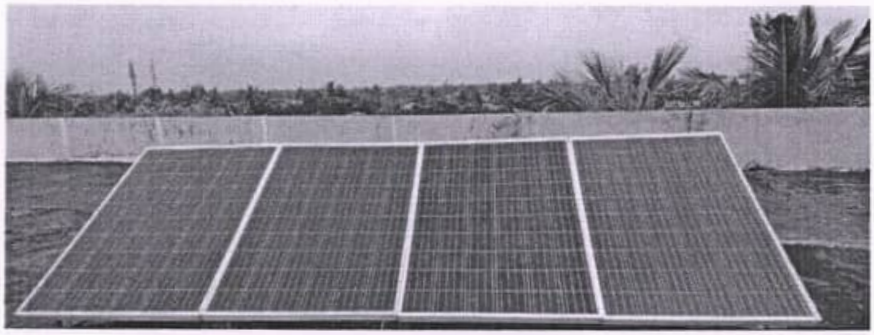

Fig 4.1 Solar PV plant

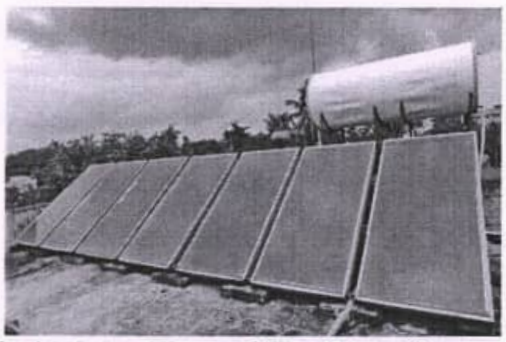

Fig 4.2 Solar Thermal Hot Water System

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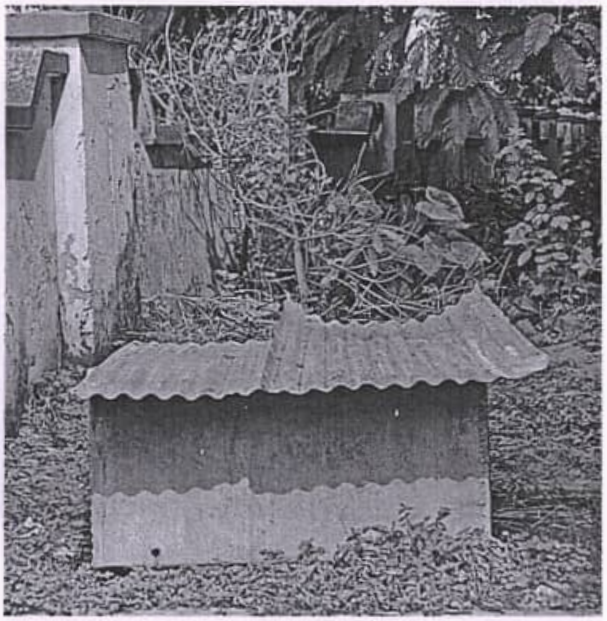

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7. Study of Green Practices

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The institute is an active participant in the Government of India's most prestigious project of SWATCHH BHART ABHIYAN. The institute has displayed boards in the campus, to make the campus plastic free. Various measures adopted for this purpose are as follows

- Installation of separate waste bins for dry waste & wet waste.
- Usage of paper teacups in the institute canteen.
- Display of boards in the campus for plastic free campus.

7.5 Paperless Office

The internal communication of the institute is through the internet. There are hardly any day-to-day operations, where printing is required.

7.6 Green Landscaping with Trees and Plants

The institute has beautiful, maintained Garden.

Fig 7.2: Beautiful maintained Garden of college

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Report

on

Green Audit

at

Hooghly Engineering & Technology College,

Hooghly

(Year 2022-23)

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Prepared by

Nutan Urja Solutions

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Pipulpati Hooghly.

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HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE Pipulpati Hooghly.

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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Hooghly Engineering & Technology College, Hooghly for awarding us the assignment of Green Audit of their college premises.

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

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures and green practices. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

Principal in Charge
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Executive Summary

Green Audit of Hooghly Engineering & Technology College, Hooghly is conducted by Nutan Urja Solutions, Pune. Based on the audit field study, the following important points can be presented.

1. Present Energy Consumption

Hooghly Engineering & Technology College, Hooghly uses electrical energy as the source of energy for various equipment in the college campus. In the following table, we present the details of energy consumption.

Table no 1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	18,395	14.72
2	Minimum	7,750	6.20
3	Average	13,582	10.87
4	Total	162,980	130.38

2. Various Measures Adopted for Energy Conservation

1. Usage of STAR rated ACs at new installations.
2. Usage of LED lights at some indoor locations.
3. Usage of LED lights for outdoor lighting.

3. Usage of Renewable Energy

The collage has installed **3.5 kW** Solar PV Power Plant and 18000 Liters capacity Solar Thermal Hot Water system.

4. Rain Water Harvesting

The College has installed the Rainwater harvesting project, to reduce dependency on municipal corporation water supply.

5. Waste Management

The College has already installed a bio composting plant, wherein the bio-degradable waste is composted and is used as soil conditioner for the garden.

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The internal communication is through emails and there is hardly any generation of e-waste in the premises.

6. Notes and Assumptions

1. Daily working hours-8 Nos
2. Annual working days-250 Nos
3. Average rate of electrical energy: **Rs 8 / kWh**

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Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	Kilo-Watt Hour
kVA	:	Active Power

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1. Introduction

Hooghly Engineering & Technology College, Hooghly is a degree engineering college, run by Hooghly Engineering & Technology College Society, a non-profit making organization engaged in the promotion of technical education amongst the students and the dissemination of scientific knowledge in the society. A good number of eminent social workers, educationists, public men are directly involved in the management of the society. The managing committee of the society consists of eminent professors and engineers looking after the different sectors of activities of the Society. Hooghly Engineering & Technology College has set from the very beginning, as its goal, quality technical education, which endeavors to achieve high levels of academic excellence. It is planned in such a way that a student can get all facilities and help to reach his destination. The laboratories have been setup not only according to the university syllabus, but also with the state-of-the-art equipment. The HETC can boast of teachers of quality. The discipline is the backbone of any system and the college is duty bound to produce hardcore professionals and an effective system can only give the desired result. The college consists of an academic and administrative building, a library and a vast area of open land, which helps the growth of young talents under healthy and natural environment.

1.1 Objectives

1. To study the present level of energy consumption
2. To study the present CO_2 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 energy consumption

1.2 Audit methodology

1. Study of connected load
2. Study of various electrical parameters
3. To prepare the report with various Energy Conservation Program (ENCON) measures with payback analysis

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2. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table 2.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Apr-23	17,230	138,244
2	Mar-23	14,650	117,549
3	Feb-23	8,750	162,297
4	Jan-23	7,750	153,068
5	Dec-22	7,800	153,566
6	Nov-22	9,630	171,114
7	Oct-22	11,360	187,180
8	Sep-22	16,830	233,044
9	Aug-22	16,530	230,637
10	Jul-22	18,170	245,226
11	Jun-22	18,395	247,682
12	May-22	15,885	225,462
	Total	**162,980**	**2,265,069**

Variation in energy consumption is as follows,

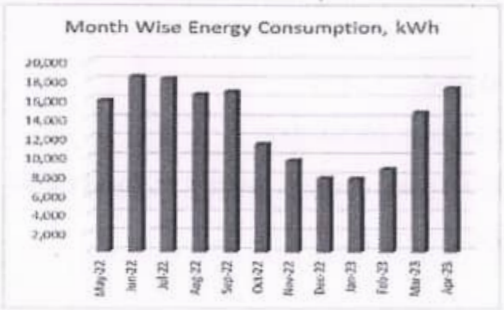

Fig 2.1: Month wise energy consumption

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Monthly variation in electricity bill is as follows,

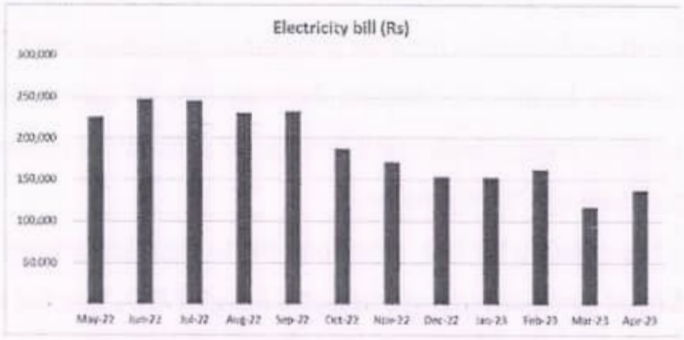

Fig 2.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table 2.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	18,395	14.7
2	Minimum	7,750	6.2
3	Average	13,582	10.9
4	Total	162,980	130.4

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3. Carbon Footprint

1. A Carbon footprint is defined as the total greenhouse gas emissions (CO_2 emissions), emitted due to various activities. In this we compute the emissions of carbon dioxide, by usage of the various form of electrical energy used by the college for performing its day-to-day activities.

2. Basis for computation of CO_2 Emissions:

The basis of calculation for CO_2 emissions due to electrical energy is as under

- 1 Unit (kWh) of electrical energy releases **0.8 Kg of CO_2** into the atmosphere.

Based on the above data we compute the CO_2 emissions which are being released into the atmosphere by the college due to its day-to-day operations.

We herewith furnish the details of various forms of energy consumption as under

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-23	17,230	13.8
2	Mar-23	14,650	11.7
3	Feb-23	8,750	7.0
4	Jan-23	7,750	6.2
5	Dec-22	7,800	6.2
6	Nov-22	9,630	7.7
7	Oct-22	11,360	9.1
8	Sep-22	16,830	13.5
9	Aug-22	16,530	13.2
10	Jul-22	18,170	14.5
11	Jun-22	18,395	14.7
12	May-22	15,885	12.7
	Total	**162,980**	**130.4**

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In the following chart we present the CO_2 emissions due to usage of electrical energy.

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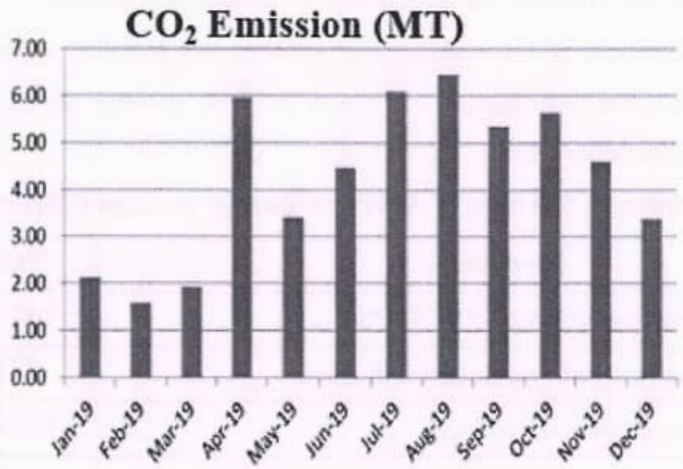

Fig 3.1: Month wise CO_2 Emission

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4. Study of Usage of Alternate Energy

In this chapter, we compute the percentage of usage of Alternate/Renewable Energy to Annual Energy Requirement of the college. The college has installed a Roof Top Solar PV System. The installed capacity of Solar PV Plant is **3.5 kW**. College has also installed 18,000 liters of solar thermal hot water plant.

Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from WBSEDCL	162,980	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	5250	kWh/Annum
3	Total Energy Requirement of College	168,230	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	3	%

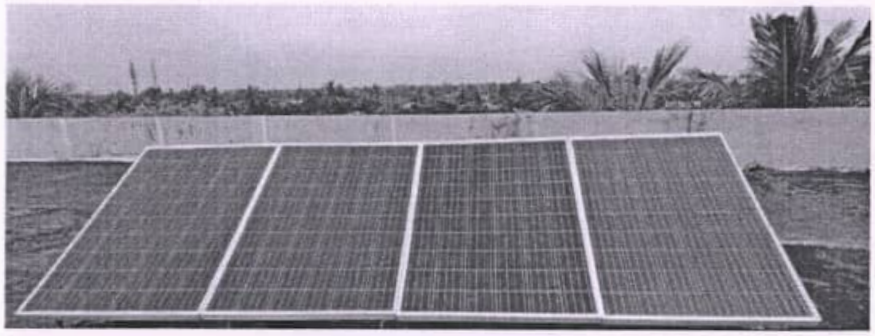

Fig 4.1 Solar PV plant

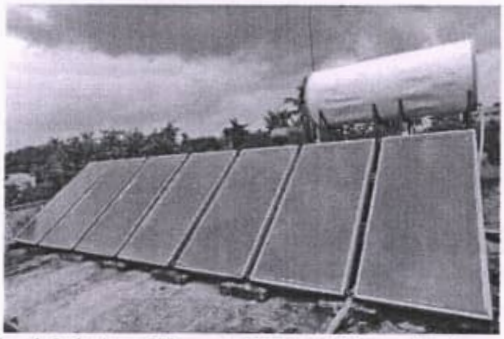

Fig 4.2 Solar Thermal Hot Water System

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5. Study of Rainwater Harvesting

The college has already installed the Rainwater Harvesting project, wherein the rainwater falling on the terrace is collected and through pipes it is fed to water pond. This stored water is then reused for domestic purpose.

Fig 5.1 Rainwater Harvesting

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6. Study of Waste Management

6.1 Solid Waste Management

The college has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

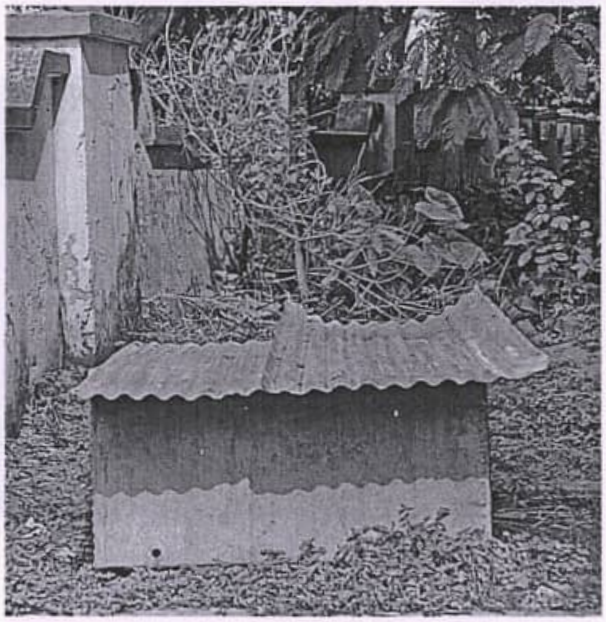

Fig 6.1 Bio Composting Storage Tanks

6.2 e-Waste Management

The internal communication is through emails and hence there is hardly any generation of e-waste on the premises.

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7. Study of Green Practices

7.1 No of students who don't use own Vehicle for coming to Institute

Out of total students coming to institute, about 20% students use their own automobile.

7.2 Usage of Public Transport

During the students' transport study, it was revealed that the local students who are residing near areas make use of public transport like local buses, local sharing type auto rickshaws. Some students use bicycles. Institute encourages students to not to use automobiles.

7.3 Pedestrian Friendly Roads

The institute has well defined pedestrian foot paths as to facilitate the easy movement of the students within the campus.

Fig 7.1 Road within campus

7.4 Plastic Free Campus

The institute is an active participant in the Government of India's most prestigious project of SWATCHH BHART ABHIYAN. The institute has displayed boards in the campus, to make the campus plastic free. Various measures adopted for this purpose are as follows

- Installation of separate waste bins for dry waste & wet waste.
- Usage of paper teacups in the institute canteen.
- Display of boards in the campus for plastic free campus.

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The internal communication of the institute is through the internet. There are hardly any day-to-day operations, where printing is required.

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The institute has beautiful, maintained Garden.

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Fig 7.2: Beautiful maintained Garden of college

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Report

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Acknowledgement

We at Nutan Urja Solutions, Pune wish to express our sincere gratitude to the management of Hooghly Engineering & Technology College, Hooghly for assigning the work of Environmental Audit of college campus.

We appreciate the co-operation and support extended to our team members during the entire tenure of field study.

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 other staff members who helped us during the measurements at the field and for giving us the necessary inputs to carry out this vital exercise.

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Executive Summary

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the dependency on natural resources & reduce the pollution.

Hooghly Engineering & Technology College, Hooghly consumes various resources for day-to-day operations, namely: Air, Water, Electrical Energy & LPG.

1. Various Pollution due to College Activities:

- Air pollution: Mainly CO_2 on account of electricity & LPG consumption.
- Solid Waste: Biodegradable kitchen waste, garden waste.
- Liquid Waste: Human liquid waste.

2. Present Level of CO_2 Emissions:

Sr no	Parameter	Energy consumed, (Units)	CO_2 emission (MT)
1	Maximum	8,295	6.6
2	Minimum	3,820	3.1
3	Average	5,487	4.4
4	Total	65,840	52.7

3. The various projects already implemented for environmental conservation:

- Usage of energy efficient BEE STAR rated ACs.
- Usage of natural day light in corridors.
- Implementation of Bio Composting pit for disposal of Biodegradable waste.
- Implementation of Rainwater Harvesting.
- Installation of **3.5 kW** Solar PV Power Plant.
- Installation of Solar Thermal Hot Water System.

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4. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.
2. Installation of Sewage Treatment Plant to make campus a Zero Discharge campus.

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5. Notes & Assumptions:

1. **1 kWh** of electrical energy releases **0.8 Kg of CO_2** into atmosphere
2. 1 kWh Solar PV plant generates 5 kWh/day electrical energy for 300 days in an year.

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Abbreviations

AC	:	Air conditioner
PES	:	Progressive Education Society
CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PF	:	Power Factor
M D	:	Maximum Demand
PC	:	Personal Computer
MSEDCL	:	Maharashtra State Electricity Distribution Company Ltd

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1. Introduction

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India

Table 1: Relevant Environmental Laws in India

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India

Table 2: Some Important Environmental Rules in India

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules

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1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents

Table 3: National Environmental Plans & Policy Documents

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives

1. To study present usage of natural resources the college is consuming
2. To study the present pollution sources
3. To study various measures to make the campus self-sustainable in respect of natural resources
4. To suggest the various measures to reduce the pollution: Air, Water, Noise

1.3 Audit Methodology:

1. Study of college as system
2. Study of electrical energy consumption
3. Study of CO_2 emissions
4. Suggestions on usage of renewable energy

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1.4 General Details of College

No	Head	Particulars
1	Name of Institution	Hooghly Engineering & Technology College, Hooghly
2	Address	Hooghly Engineering & Technology College, Hooghly, Vivekananda Road, Pipulpati P.O. & Dist. Hooghly,Pin 712103. West Bengal.
3	Affiliation	Maulana Abul Kalam Azad University of Technology, West Bengal

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2. Study of Consumption of Various Resources

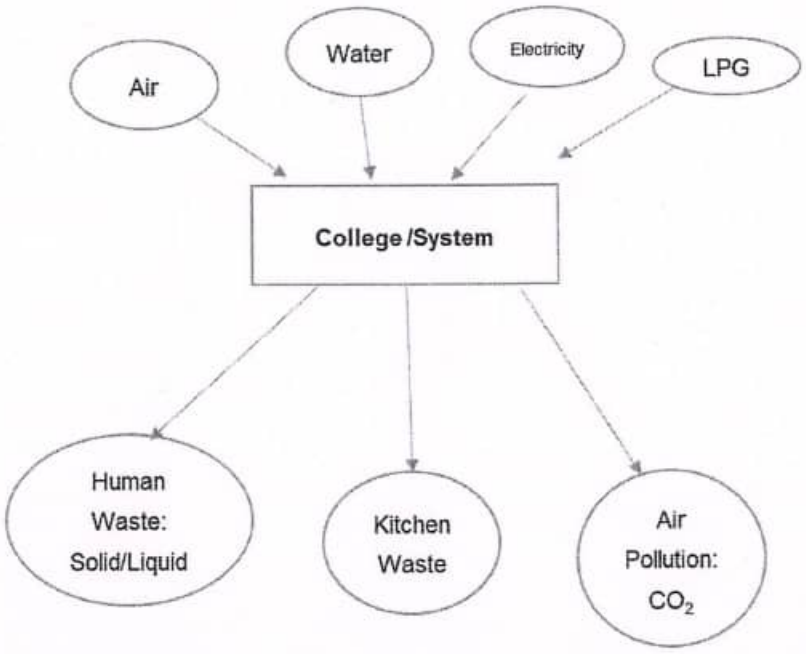
The institute consumes following basic/derived resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

Also, college emits following pollutants to environment

1. Human Waste: Solid/ Liquid
2. Kitchen waste
3. Air pollution

We try to draw a schematic diagram for the College System & Environment as under.



Now we compute the generation of CO_2 on account of consumption of electrical energy & LPG as under.

The calculation of electrical energy consumption by college can be given as

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Table 2.1: Electrical Energy Consumption

No	Month	Energy (kWh)
1	Jul-21	5,005
2	Jun-21	3,820
3	May-21	3,935
4	Apr-21	7,550
5	Mar-21	8,295
6	Feb-21	4,560
7	Jan-21	4,760
8	Dec-20	4,795
9	Nov-20	5,260
10	Oct-20	6,045
11	Sep-20	7,120
12	Aug-20	4,695
	Total	**65,840**
	Maximum	8,295
	Minimum	3,820
	Average	5,487

2.1 Variation of Monthly Electrical Energy Consumption

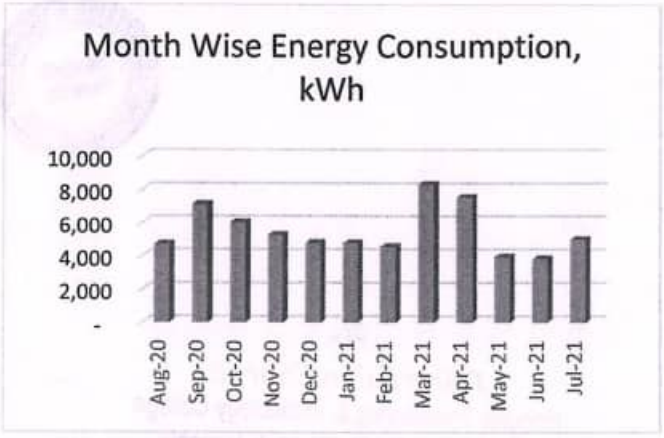

Fig 2.1 : Monthly Electrical Energy Consumption

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2.2 Key Inference drawn

From the above analysis, we present following important parameters:

Table 2.2: Variation in Important Parameters

No	Parameter/ Value	Energy Consumed, kWh
1	**Maximum**	8,295
2	**Minimum**	3,820
3	**Average**	5,487
4	**Total**	65,840

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3. Study of Environmental Pollution

In this chapter, we present the various types of pollution as under:

3.1 Air Pollution

The college uses two forms of energy, namely: thermal in the form of LPG and electrical energy used for day-to-day operations of the college. The major pollutant on account of the above energy forms is carbon dioxide.

- 1 unit (kWh) of electrical energy emits 0.8 Kg of CO_2 in the atmosphere.
- 1 kg of LPG emits 3 kg of CO_2 into the atmosphere.

In the following table, we present the CO_2 emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Jul-21	5,005	4.0
2	Jun-21	3,820	3.1
3	May-21	3,935	3.1
4	Apr-21	7,550	6.0
5	Mar-21	8,295	6.6
6	Feb-21	4,560	3.6
7	Jan-21	4,760	3.8
8	Dec-20	4,795	3.8
9	Nov-20	5,260	4.2
10	Oct-20	6,045	4.8
11	Sep-20	7,120	5.7
12	Aug-20	4,695	3.8
	Total	**65,840**	**52.7**
	Maximum	8,295	6.6
	Minimum	3,820	3.1
	Average	5,487	4.4

In the following chart we present the CO_2 emissions due to usage of electrical energy.

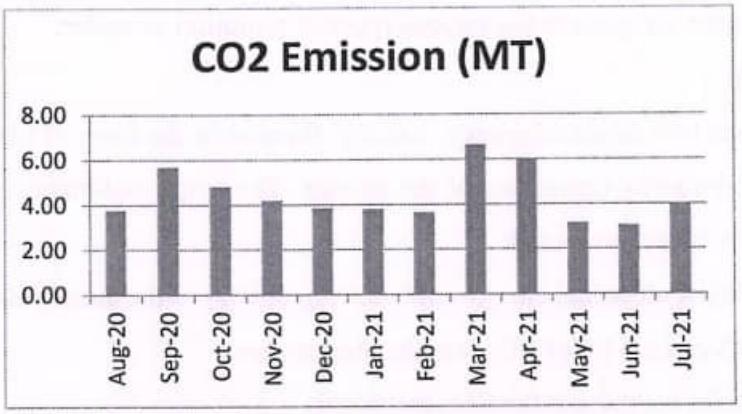

Fig 2.1: CO_2 emission due to usage of electrical energy.

3.2 Study of Solid Waste Generation

The college has already installed a bio composting plant, wherein the bio-degradable waste is composted & is used as fertilizer for the garden.

Fig 3.1 Bio Composting Processing Tanks

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3.3 Study of Liquid Waste Generation

At present the liquid waste generated due to day-to-day operations is drained off to the municipal corporation through a pipe.

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3.4 Study of e-Waste Management:

The internal communication is through emails and hence there is hardly any generation of e-waste in the premises.

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4. Study of Rainwater Harvesting

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HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE
Pipulpati
Hooghly.

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Vivekananda Road, Pipulpati, Hooghly.

Report

on

Environmental Audit

at

Hooghly Engineering & Technology College,

Hooghly

(Year 2021-22)

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Prepared by

Nutan Urja Solutions

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HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE Pipulpati Hooghly.

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Hooghly Engineering & Technology College, Hooghly consumes various resources for day-to-day operations, namely: Air, Water, Electrical Energy & LPG.

1. Various Pollution due to College Activities:

- Air pollution: Mainly CO_2 on account of electricity & LPG consumption.
- Solid Waste: Biodegradable kitchen waste, garden waste.
- Liquid Waste: Human liquid waste.

2. Present Level of CO_2 Emissions:

Sr no	Parameter	Energy consumed, (Units)	CO_2 emission (MT)
1	Maximum	18,395	14.7
2	Minimum	5,005	4.0
3	Average	8,855	7.1
4	Total	1,06,258	85.0

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- Usage of natural day light in corridors.
- Implementation of Bio Composting pit for disposal of Biodegradable waste.
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Hooghly Engineering & Technology College Pipulpati Hooghly

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5. Notes & Assumptions:

1. **1 kWh** of electrical energy releases **0.8 Kg of CO_2** into atmosphere
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Principal in Charge
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Abbreviations

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kW	:	Kilo Watt
PF	:	Power Factor
M D	:	Maximum Demand
PC	:	Personal Computer
MSEDCL	:	Maharashtra State Electricity Distribution Company Ltd

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE Pipulpati Hooghly.

Principal in Charge
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Vivekananda Road, Pipulpati, Hooghly.

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1. Introduction

1.1 Important Definitions:

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An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

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2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
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2.	National Water Policy, 2002
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2. To study the present pollution sources
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1.3 Audit Methodology:

1. Study of college as system
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3. Study of CO_2 emissions
4. Suggestions on usage of renewable energy

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1.4 General Details of College

No	Head	Particulars
1	Name of Institution	Hooghly Engineering & Technology College, Hooghly
2	Address	Hooghly Engineering & Technology College, Hooghly, Vivekananda Road, Pipulpati P.O. & Dist. Hooghly,Pin 712103. West Bengal.
3	Affiliation	Maulana Abul Kalam Azad University of Technology, West Bengal

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

2. Study of Consumption of Various Resources

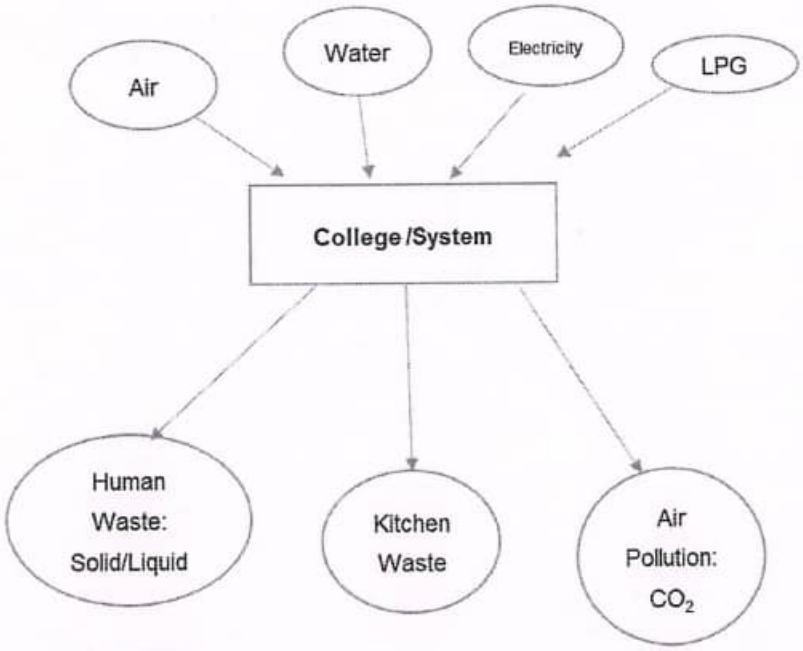
The institute consumes following basic/derived resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

Also, college emits following pollutants to environment

1. Human Waste: Solid/ Liquid
2. Kitchen waste
3. Air pollution

We try to draw a schematic diagram for the College System & Environment as under.



Now we compute the generation of CO_2 on account of consumption of electrical energy & LPG as under.

The calculation of electrical energy consumption by college can be given as

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Table 2.1: Electrical Energy Consumption

No	Month	Energy (kWh)
1	Jun-22	18,395
2	May-22	15,885
3	Apr-22	7,753
4	Mar-22	7,815
5	Feb-22	6,070
6	Jan-22	5,515
7	Dec-21	6,980
8	Nov-21	6,905
9	Oct-21	7,380
10	Sep-21	9,005
11	Aug-21	9,550
12	Jul-21	5,005
	Total	**1,06,258**
	Maximum	18,395
	Minimum	5,005
	Average	8,855

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2.1 Variation of Monthly Electrical Energy Consumption

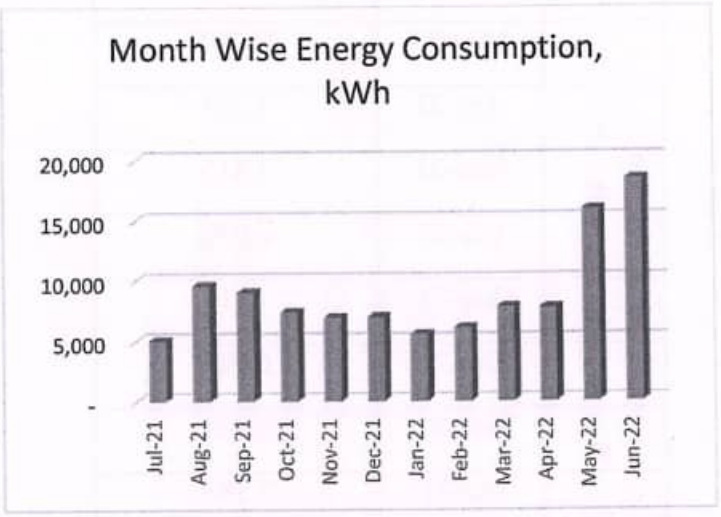

Fig 2.1 : Monthly Electrical Energy Consumption

2.2 Key Inference drawn

From the above analysis, we present following important parameters:

Table 2.2: Variation in Important Parameters

No	Parameter/ Value	Energy Consumed, kWh
1	**Maximum**	18,395
2	**Minimum**	5,005
3	**Average**	8,855
4	**Total**	1,06,258

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3. Study of Environmental Pollution

In this chapter, we present the various types of pollution as under:

3.1 Air Pollution

The college uses two forms of energy, namely: thermal in the form of LPG and electrical energy used for day-to-day operations of the college. The major pollutant on account of the above energy forms is carbon dioxide.

- 1 unit (kWh) of electrical energy emits 0.8 Kg of CO_2 in the atmosphere.
- 1 kg of LPG emits 3 kg of CO_2 into the atmosphere.

In the following table, we present the CO_2 emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
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2	May-22	15,885	12.7
3	Apr-22	7,753	6.2
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5	Feb-22	6,070	4.9
6	Jan-22	5,515	4.4
7	Dec-21	6,980	5.6
8	Nov-21	6,905	5.5
9	Oct-21	7,380	5.9
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In the following chart we present the CO_2 emissions due to usage of electrical energy.

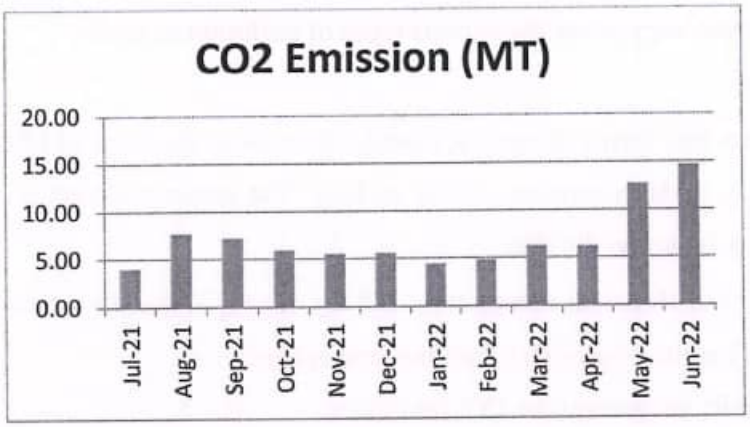

Fig 2.1: CO_2 emission due to usage of electrical energy.

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The college has already installed a bio composting plant, wherein the bio-degradable waste is composted & is used as fertilizer for the garden.

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3.3 Study of Liquid Waste Generation

At present the liquid waste generated due to day-to-day operations is drained off to the municipal corporation through a pipe.

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The internal communication is through emails and hence there is hardly any generation of e-waste in the premises.

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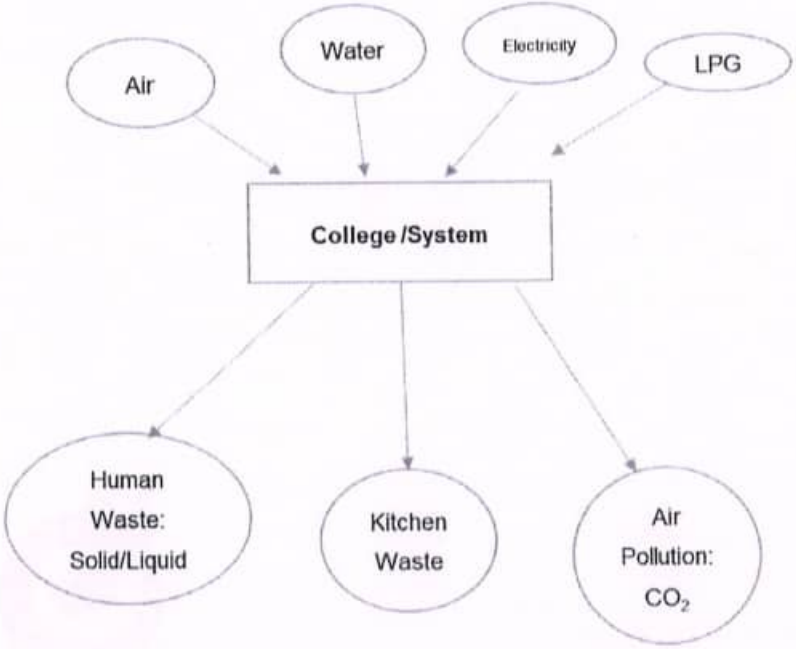

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Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Pipulpati Hooghly.

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Table 2.1: Electrical Energy Consumption

No	Month	Energy (kWh)
1	Apr-23	17,230
2	Mar-23	14,650
3	Feb-23	8,750
4	Jan-23	7,750
5	Dec-22	7,800
6	Nov-22	9,630
7	Oct-22	11,360
8	Sep-22	16,830
9	Aug-22	16,530
10	Jul-22	18,170
11	Jun-22	18,395
12	May-22	15,885
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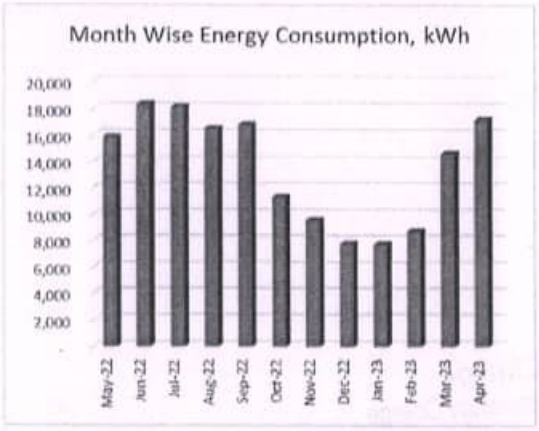
	Maximum	18,395
	Minimum	7,750
	Average	13,582

2.1 Variation of Monthly Electrical Energy Consumption



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Principal in Charge
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HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE Pipulpati Hooghly.

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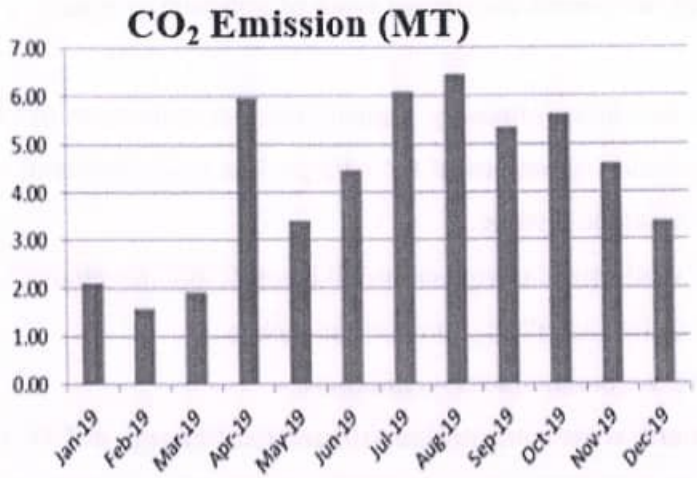

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4. Study of Rainwater Harvesting

The college has already installed the Rainwater Harvesting project, wherein the rainwater falling on the terrace is collected and through pipes it is fed to a water pond. This stored water is then reused for domestic purpose.

Fig 4.1 Rainwater Harvesting

5. Recommendations

In order to reduce the dependency on natural resources and in order to reduce the various pollutions arising due to the day-to-day operations of the college we herewith recommend following recommendations.

- Installation of Bio Gas Generator Plant instead of Bio composting Plant.
- Installation of Sewage Treatment Plant to make campus a Zero Discharge campus.

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Report

on

Energy Audit

at

Hooghly Engineering & Technology College,

Hooghly

(Year 2020-21)

Prepared by

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,

Sus Road, Sus, Pune 411 021

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We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures through energy savings. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

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Executive Summary

After the field measurements & analysis, we present herewith important observations made and various measures to reduce the energy consumption & mitigate the CO_2 emissions. College consumes energy in the form of electrical energy used for various gadgets, offices & other facilities.

1. Present Energy Consumption

In the following table, we present the details of energy consumption.

Table no 2.1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	8,295	6.6
2	Minimum	3,820	3.1
3	Average	5,487	4.4
4	Total	65,840	52.7

2. Energy Conservation Projects already installed

1. Usage of STAR rated ACs at new installations
2. Usage of LED lights at some indoor locations
3. Usage of LED Lights for outdoor lighting.

3. Key Observations

1. Usage of LED lights.
2. Usage of star rated equipment.
3. Maintained a good power factor.

4. Percentage of Usage of Alternate Energy

The college has installed a roof top solar PV plant of 3.5kW capacity and 18,000 liters of solar thermal hot water plant. The percentage of usage of alternate energy to annual energy requirement is 3 %.

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5. Percentage of Usage of LED Lighting

The college has various types of light fittings. The percentage of annual LED lighting usage to annual lighting requirement works out to be 16 %.

6. Recommendations

Table 1: Recommendations for energy savings

No	Recommendation	Annual saving potential, kWh/Annum	Annual monetary gain, Rs.	Investment required, Rs.	Payback period, Months
1	Replacement of 630 Nos T-8 fittings with 20W LED fittings	12,600	138,600	403,830	35
2	Replacement of 727 Nos old ceiling fans with STAR rating fans	36,350	399,850	1,580,498	47
3	Replacement of 19 Nos of metal street lights with 100W LED	4,275	47,025	57,000	15
4	Installation of 100kW grid connected PV panel	150,000	1,650,000	5,000,000	36
	Total	**154,275**	**1,697,025**	**5,057,000**	**36**

7. Notes & Assumptions

1. Daily working hours-8 Nos
2. Annual working Days-250 Nos
3. Average Rate of Electrical Energy: **Rs 8 / kWh**

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Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo-Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power

ENGINEERING & TECHNOLOGY COLLEGE HOOGHLY
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1.1 Objectives

1. To study present level of energy consumption
2. To study electrical consumption
3. To assess the various equipment/facilities from energy efficiency aspect
4. 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 Energy Conservation Program (ENCON) measures with payback analysis

Principal in Charge
Hooghly Engineering & Technology College
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1.3 General Details of College

Table 1.1: Details of college

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1	Name of institution	Hooghly Engineering & Technology College, Hooghly
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HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE Pipulpati Hooghly.

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2. Study of connected load

In this chapter, we present details of various connected electrical equipment and electrical load.

Table 2.1: Location wise study of electrical fittings in various buildings

No	Location	FTL (40W)	CFL	LED tube (20W)	LED bulb (12W)	Computers (65W)	Fans	1.5 Tr AC
1	Administrative Building	124	4	52	28	210	158	44
2	Workshop Building	125	6	48	31	16	122	0
3	Academic Building	145	8	50	36	66	178	12
4	Library Building	50	-	10	10	15	64	3
5	North- East Building	70	-	30	15	36	103	5
6	Ladies Hostel	116	6	40	30	-	102	-
	Total	**630**	**24**	**230**	**150**	**343**	**727**	**64**

Apart from above load, the college has pumps, street lights. Individual fitting wise load is as under.

Table 2.2: Equipment wise connected load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	630	40	25.2
2	CFL	24	24	0.6
3	LED Tube-20W	230	20	4.6
4	LED bulb	150	12	1.8
5	Computers	343	65	22.3
6	Ceiling Fan	727	65	47.3
7	AC (1.5Tr)	64	1838	117.6
8	Metal street lights	19	400	7.6
9	Pumps (10 nos. 2HP, 2*5HP, 4*0.5HP, 2*7.5HP)	-	-	21.6
	Total			**248.6**

Data can be represented in terms of PIE chart as under,

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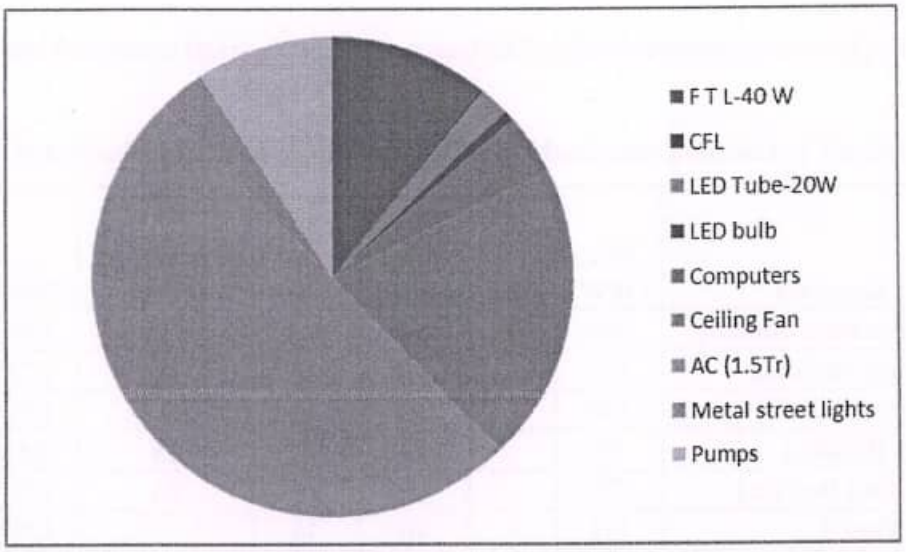

Fig 2.1: Distribution of connected load.

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3. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table 3.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jul-21	5,005	76,157
2	Jun-21	3,820	1,15,072
3	May-21	3,935	1,16,527
4	Apr-21	7,550	1,51,920
5	Mar-21	8,295	1,58,966
6	Feb-21	4,560	1,22,208
7	Jan-21	4,760	1,24,607
8	Dec-20	4,795	1,24,983
9	Nov-20	5,260	1,29,544
10	Oct-20	6,045	1,37,589
11	Sep-20	7,120	18,787
12	Aug-20	4,695	1,24,192
	Total	**65,840**	**14,00,552**

Variation in energy consumption is as follows,

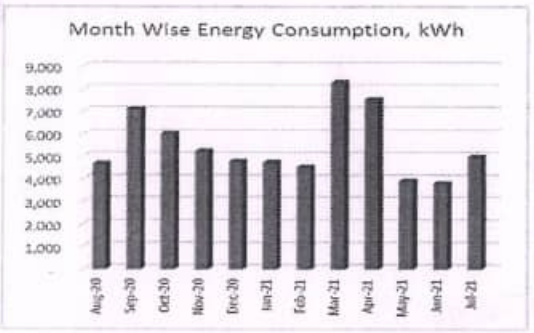

Fig 3.1: Month wise energy consumption

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Monthly variation in electricity bill is as follows,

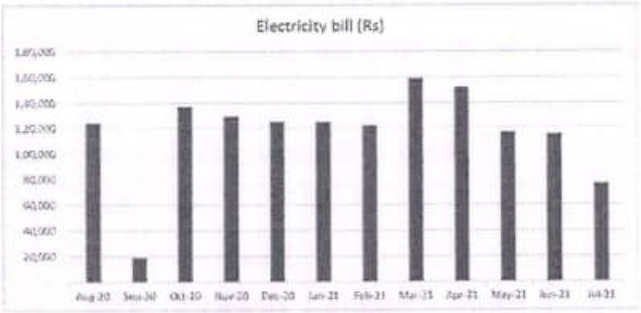

Fig 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	8,295	6.6
2	Minimum	3,820	3.1
3	Average	5,487	4.4
4	Total	65,840	52.7

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4. Carbon footprint

1. A Carbon footprint is defined as the total greenhouse gas emissions (CO_2 emissions), emitted due to various activities. In this we compute the emissions of carbon dioxide, by usage of the various form of electrical energy used by the college for performing its day-to-day activities.

2. Basis for computation of CO_2 emissions:

The basis of calculation for CO_2 emissions due to electrical energy is as under:

- 1 Unit (kWh) of electrical energy releases **0.8 kg of CO_2** into atmosphere.

Based on the above data we compute the CO_2 emissions which are being released into the atmosphere by the college due to its day-to-day operations.

We herewith furnish the details of various forms of energy consumption as under:

Table 4.1: Month wise Consumption of Electrical Energy & CO_2 Emissions

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jul-21	5,005	4.0
2	Jun-21	3,820	3.1
3	May-21	3,935	3.1
4	Apr-21	7,550	6.0
5	Mar-21	8,295	6.6
6	Feb-21	4,560	3.6
7	Jan-21	4,760	3.8
8	Dec-20	4,795	3.8
9	Nov-20	5,260	4.2
10	Oct-20	6,045	4.8
11	Sep-20	7,120	5.7
12	Aug-20	4,695	3.8
	Total	**65,840**	**52.7**

In the following chart we present the CO_2 emissions due to usage of electrical energy.

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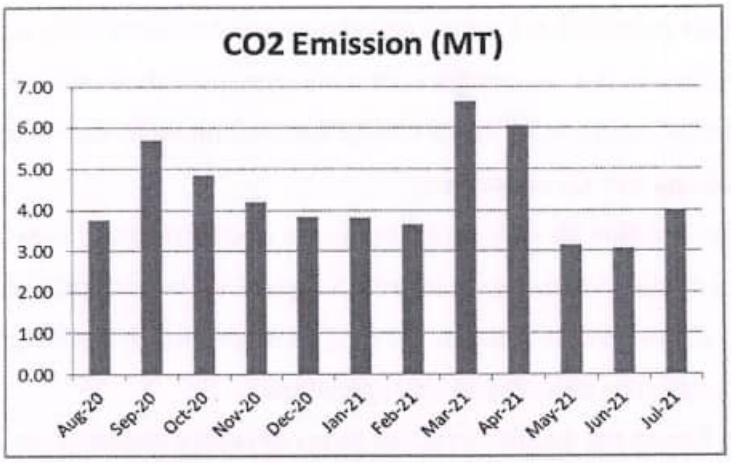

Fig 4.1: Month wise CO_2 Emission

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5. Study of usage of alternate energy

In this chapter, we compute the percentage of usage of alternate/renewable energy to annual energy requirement of the college. The college has installed roof top solar PV system. The installed capacity of solar PV plant is **3.5 kWh**. College has also installed 18,000 liters of solar thermal hot water plant.

Table 5.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from WBSEDCL	65,840	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	5250	kWh/Annum
3	Total Energy Requirement of College	71,090	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	7	%

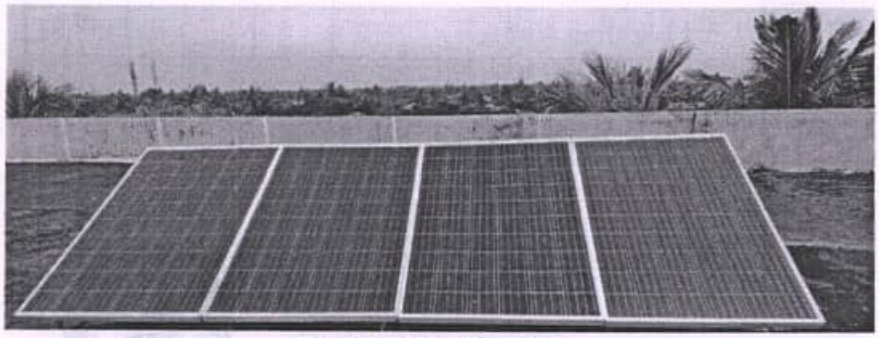

Fig 5.1 Solar PV plant

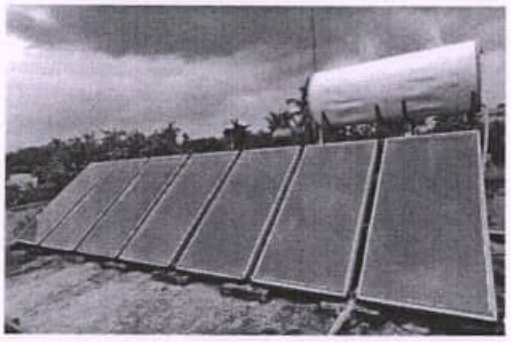

Fig 5.2 Solar Thermal Hot Water System

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6. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

Table 6.1: Total lighting load

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	630	40	25.2
2	CFL	24	24	0.6
3	Metal street lights	19	400	7.6
	LED lighting load			
1	LED tube	230	20	4.6
2	LED bulbs	150	12	1.8
	Total LED lighting load			**6.4**
	Total Lighting load			**39.8**

It can be seen that out of total lighting load 16% load is LED lighting load.

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7. Energy conservation proposals

7.1 Replacement of old T-8 FTLs with 20 W LED fittings

In the facility, there are about 630 Nos, T-8, FTL fittings with electronic/magnetic chokes. It is recommended to install the 20 W LED tube light fittings in place of these old T-8 fittings. In the following table, we present the savings, investment required & payback analysis.

Table 7.1: Savings, investment required & payback analysis (light)

No	Particulars	Value	Unit
1	Present Qty of T-8 fittings	630	Nos
2	Energy Demand of T-8 fitting	40	W/Unit
3	Energy Demand of 20 W LED fitting	20	W/Unit
4	Reduction in demand	20	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	50.4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	12600	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	138600	Rs/Annum
11	Cost of 20 W LED Tube	641	Rs/Unit
12	Investment required	403830	Rs lump sum
13	Simple Payback period	35	Months

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7.2 Replacement of old fans with STAR rated fans

During the audit, it was observed that there are 727 no of fans. It is recommended to replace these old fans with STAR rated fans. In the following table, we present the savings, investment required & payback analysis.

Table 7.2: Savings, investment required & payback analysis (fans)

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	727	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	40	W/Unit
4	Reduction in demand	25	W/Unit
5	Average Daily Usage period	8	Hrs/Day
6	Daily saving in Energy	145.4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	36350	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	399850	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	1580498	Rs lump sum
13	Simple Payback period	47	Months

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7.3 Replacement of metal street lights with 100W LED

In the facility, there are about 19 Nos, halogen street lights. It is recommended to install the 100 W LED flood in place of these old halogen street lights. In the following table, we present the savings, investment required & payback analysis.

Table 7.3: Savings, investment required & payback analysis (street light)

No	Particulars	Value	Unit
1	Present Qty of Metal Street lights	19	Nos
2	Energy Demand of Metal Street lights	400	W/Unit
3	Energy Demand of LED flood lights	100	W/Unit
4	Reduction in demand	300	W/Unit
5	Average Daily Usage period	3	Hrs/Day
6	Daily saving in Energy	17.1	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	4275	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	47025	Rs/Annum
11	Cost of LED flood light	3000	Rs/Unit
12	Investment required	57000	Rs lump sum
13	Simple Payback period	15	Months

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7.4 Installation of Solar PV panel

It is recommended to install 100 kW solar PV panel. In the following table, we present the savings, investment required & payback analysis.

Table 7.4: Savings, investment required & payback analysis (solar PV panel)

No	Particulars	Value	Unit
1	Installation of 100kW PV unit	100	kW
2	Energy saving	150000	kWh/Annum
3	Rate of electrical energy	11	Rs
4	Annual monetary savings	1650000	Rs/ Annum
5	Investment required	5000000	Rs lump sum
6	Simple payback period	36	Months

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7.5 Summary of Savings

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4	Installation of 100kW grid connected PV panel	150,000	1,650,000	5,000,000	36
	Total	**1,54,275**	**16,97,025**	**50,57,000**	**36**

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	Total	**203,225**	**2,235,475**	**7,041,328**	**38**

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2. Study of connected load

In this chapter, we present details of various connected electrical equipment and electrical load.

Table 2.1: Location wise study of electrical fittings in various buildings

No	Location	FTL (40W)	CFL	LED tube (20W)	LED bulb (12W)	Computers (65W)	Fans	1.5 Tr AC
1	Administrative Building	124	4	52	28	210	158	44
2	Workshop Building	125	6	48	31	16	122	0
3	Academic Building	145	8	50	36	66	178	12
4	Library Building	50	-	10	10	15	64	3
5	North- East Building	70	-	30	15	36	103	5
6	Ladies Hostel	116	6	40	30	-	102	-
	Total	**630**	**24**	**230**	**150**	**343**	**727**	**64**

Apart from above load, the college has pumps, street lights. Individual fitting wise load is as under.

Table 2.2: Equipment wise connected load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	630	40	25.2
2	CFL	24	24	0.6
3	LED Tube-20W	230	20	4.6
4	LED bulb	150	12	1.8
5	Computers	343	65	22.3
6	Ceiling Fan	727	65	47.3
7	AC (1.5Tr)	64	1838	117.6
8	Metal street lights	19	400	7.6
9	Pumps (10 nos. 2HP, 2*5HP, 4*0.5HP, 2*7.5HP)	-	-	21.6
	Total			**248.6**

Data can be represented in terms of PIE chart as under,

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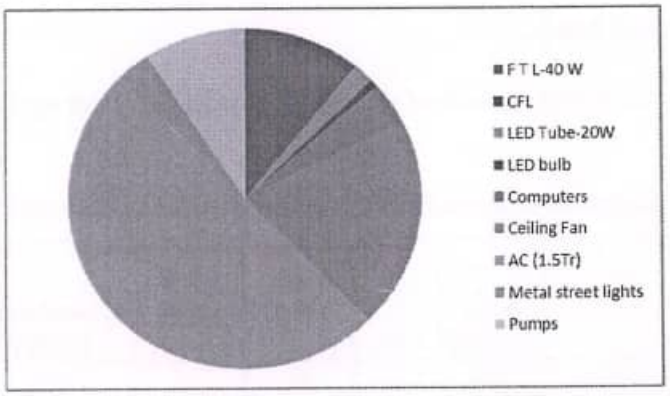

Fig 2.1: Distribution of connected load.

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3. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table 3.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	Jun-22	18,395	247,682
2	May-22	15,885	225,462
3	Apr-22	7,753	153,068
4	Mar-22	7,815	154,466
5	Feb-22	6,070	86,273
6	Jan-22	5,515	81,279
7	Dec-21	6,980	95,144
8	Nov-21	6,905	94,388
9	Oct-21	7,380	111,623
10	Sep-21	9,005	116,161
11	Aug-21	9,550	125,261
12	Jul-21	5,005	76,157
	Total	**1,06,258**	**1,566,964**

Variation in energy consumption is as follows,

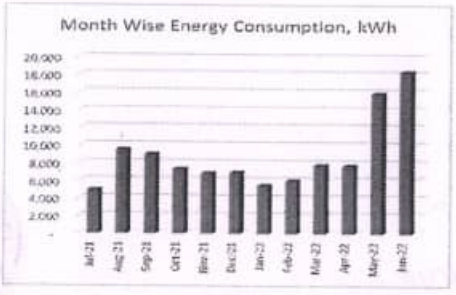

Fig 3.1: Month wise energy consumption

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Monthly variation in electricity bill is as follows,

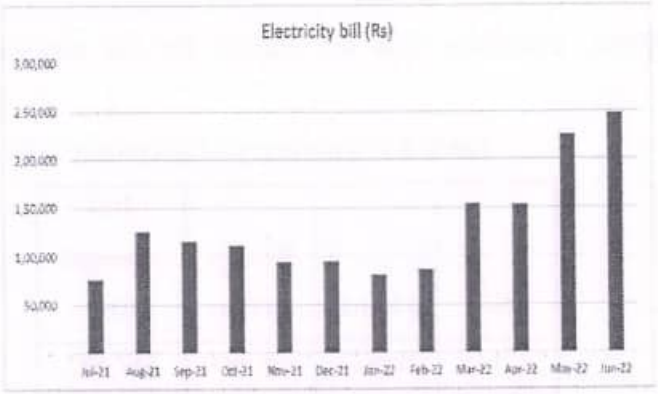

Fig 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	18,395	14.7
2	Minimum	5,005	4.0
3	Average	8,855	7.1
4	Total	1,06,258	85.0

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4. Carbon footprint

1. A Carbon footprint is defined as the total greenhouse gas emissions (CO_2 emissions), emitted due to various activities. In this we compute the emissions of carbon dioxide, by usage of the various form of electrical energy used by the college for performing its day-to-day activities.

2. Basis for computation of CO_2 emissions:

The basis of calculation for CO_2 emissions due to electrical energy is as under:

- 1 Unit (kWh) of electrical energy releases **0.8 kg of CO_2** into atmosphere.

Based on the above data we compute the CO_2 emissions which are being released into the atmosphere by the college due to its day-to-day operations.

We herewith furnish the details of various forms of energy consumption as under:

Table 4.1: Month wise Consumption of Electrical Energy & CO_2 Emissions

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Jun-22	18,395	14.7
2	May-22	15,885	12.7
3	Apr-22	7,753	6.2
4	Mar-22	7,815	6.3
5	Feb-22	6,070	4.9
6	Jan-22	5,515	4.4
7	Dec-21	6,980	5.6
8	Nov-21	6,905	5.5
9	Oct-21	7,380	5.9
10	Sep-21	9,005	7.2
11	Aug-21	9,550	7.6
12	Jul-21	5,005	4.0
	Total	**1,06,258**	**85.0**

In the following chart we present the CO_2 emissions due to usage of electrical energy.

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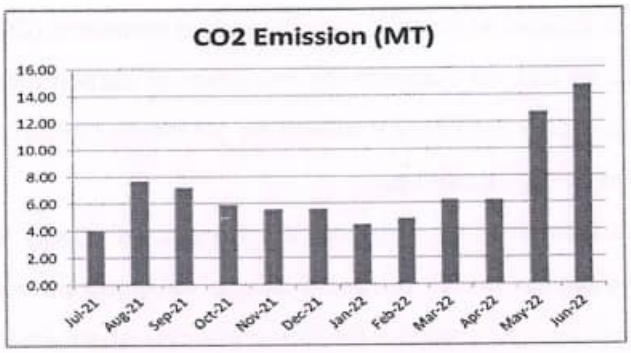

Fig 4.1: Month wise CO_2 Emission

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5. Study of usage of alternate energy

In this chapter, we compute the percentage of usage of alternate/renewable energy to annual energy requirement of the college. The college has installed roof top solar PV system. The installed capacity of solar PV plant is **3.5 kWh**. College has also installed 18,000 liters of solar thermal hot water plant.

Table 5.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from WBSEDCL	1,06,258	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	5250	kWh/Annum
3	Total Energy Requirement of College	1,11,508	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	5	%

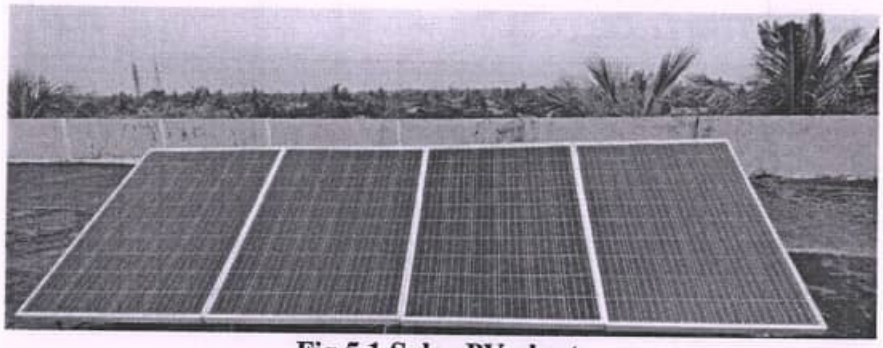

Fig 5.1 Solar PV plant

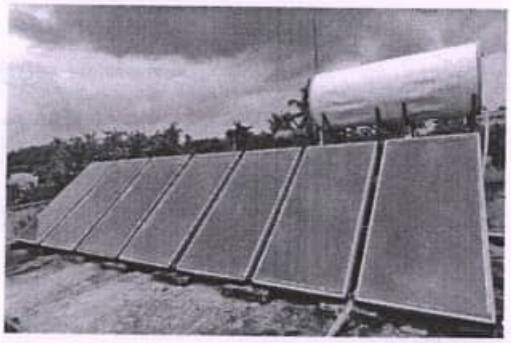

Fig 5.2 Solar Thermal Hot Water System

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6. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

Table 6.1: Total lighting load

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	630	40	25.2
2	CFL	24	24	0.6
3	Metal street lights	19	400	7.6
	LED lighting load			
1	LED tube	230	20	4.6
2	LED bulbs	150	12	1.8
	Total LED lighting load			**6.4**
	Total Lighting load			**39.8**

It can be seen that out of total lighting load 16% load is LED lighting load.

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7. Energy conservation proposals

7.1 Replacement of old T-8 FTLs with 20 W LED fittings

In the facility, there are about 630 Nos, T-8, FTL fittings with electronic/magnetic chokes. It is recommended to install the 20 W LED tube light fittings in place of these old T-8 fittings. In the following table, we present the savings, investment required & payback analysis.

Table 7.1: Savings, investment required & payback analysis (light)

No	Particulars	Value	Unit
1	Present Qty of T-8 fittings	630	Nos
2	Energy Demand of T-8 fitting	40	W/Unit
3	Energy Demand of 20 W LED fitting	20	W/Unit
4	Reduction in demand	20	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	50.4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	12600	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	138600	Rs/Annum
11	Cost of 20 W LED Tube	641	Rs/Unit
12	Investment required	403830	Rs lump sum
13	Simple Payback period	35	Months

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7.2 Replacement of old fans with STAR rated fans

During the audit, it was observed that there are 727 no of fans. It is recommended to replace these old fans with STAR rated fans. In the following table, we present the savings, investment required & payback analysis.

Table 7.2: Savings, investment required & payback analysis (fans)

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	727	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	40	W/Unit
4	Reduction in demand	25	W/Unit
5	Average Daily Usage period	8	Hrs/Day
6	Daily saving in Energy	145.4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	36350	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	399850	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	1580498	Rs lump sum
13	Simple Payback period	47	Months

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7.3 Replacement of metal street lights with 100W LED

In the facility, there are about 19 Nos, halogen street lights. It is recommended to install the 100 W LED flood in place of these old halogen street lights. In the following table, we present the savings, investment required & payback analysis.

Table 7.3: Savings, investment required & payback analysis (street light)

No	Particulars	Value	Unit
1	Present Qty of Metal Street lights	19	Nos
2	Energy Demand of Metal Street lights	400	W/Unit
3	Energy Demand of LED flood lights	100	W/Unit
4	Reduction in demand	300	W/Unit
5	Average Daily Usage period	3	Hrs/Day
6	Daily saving in Energy	17.1	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	4275	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	47025	Rs/Annum
11	Cost of LED flood light	3000	Rs/Unit
12	Investment required	57000	Rs lump sum
13	Simple Payback period	15	Months

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7.4 Installation of Solar PV panel

It is recommended to install 100 kW solar PV panel. In the following table, we present the savings, investment required & payback analysis.

Table 7.4: Savings, investment required & payback analysis (solar PV panel)

No	Particulars	Value	Unit
1	Installation of 100kW PV unit	100	kW
2	Energy saving	150000	kWh/Annum
3	Rate of electrical energy	11	Rs
4	Annual monetary savings	1650000	Rs/ Annum
5	Investment required	5000000	Rs lump sum
6	Simple payback period	36	Months

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7.5 Summary of Savings

Table 7.5: Summary of Savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 630 Nos T-8 fittings with 20W LED fittings	12,600	138,600	403,830	35
2	Replacement of 727 Nos Old Ceiling Fans with STAR rating fans	36,350	399,850	1,580,498	47
3	Replacement of 19 Nos of Metal Street lights with 100W LED	4,275	47,025	57,000	15
4	Installation of 100kW grid connected PV panel	150,000	1,650,000	5,000,000	36
	Total	**203,225**	**2,235,475**	**7,041,328**	**38**

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Report

on

Energy Audit

at

Hooghly Engineering & Technology College,

Hooghly

(Year 2022-23)

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

Prepared by

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Contents

Principal in Charge
Hooghly Engineering & Technology College
Vivekananda Road, Pipulpati, Hooghly.

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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Hooghly Engineering & Technology College, Hooghly for awarding us the assignment of Energy Audit of their college premises.

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

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures through energy savings. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

Principal in Charge
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Executive Summary

After the field measurements & analysis, we present herewith important observations made and various measures to reduce the energy consumption & mitigate the CO_2 emissions. College consumes energy in the form of electrical energy used for various gadgets, offices & other facilities.

1. Present Energy Consumption

In the following table, we present the details of energy consumption.

Table no 2.1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
1	Maximum	18,395	14.72
2	Minimum	7,750	6.20
3	Average	13,582	10.87
4	Total	162,980	130.38

2. Energy Conservation Projects already installed

1. Usage of STAR rated ACs at new installations
2. Usage of LED lights at some indoor locations
3. Usage of LED Lights for outdoor lighting.

3. Key Observations

1. Usage of LED lights.
2. Usage of star rated equipment.
3. Maintained a good power factor.

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4. Percentage of Usage of Alternate Energy

The college has installed a roof top solar PV plant of 3.5kW capacity and 18,000 liters of solar thermal hot water plant. The percentage of usage of alternate energy to annual energy requirement is 3 %.

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5. Percentage of Usage of LED Lighting

The college has various types of light fittings. The percentage of annual LED lighting usage to annual lighting requirement works out to be 16 %.

6. Recommendations

Table 1: Recommendations for energy savings

No	Recommendation	Annual saving potential, kWh/Annum	Annual monetary gain, Rs.	Investment required, Rs.	Payback period, Months
1	Replacement of 630 Nos T-8 fittings with 20W LED fittings	12,600	138,600	403,830	35
2	Replacement of 727 Nos old ceiling fans with STAR rating fans	36,350	399,850	1,580,498	47
3	Replacement of 19 Nos of metal street lights with 100W LED	4,275	47,025	57,000	15
4	Installation of 100kW grid connected PV panel	150,000	1,650,000	5,000,000	36
	Total	**154,275**	**1,697,025**	**5,057,000**	**36**

7. Notes & Assumptions

1. Daily working hours-8 Nos
2. Annual working Days-250 Nos
3. Average Rate of Electrical Energy: **Rs 8 / kWh**

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Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo-Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power

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1. Introduction

Hooghly Engineering & Technology College, Hooghly is a degree engineering college, run by Hooghly Engineering & Technology College Society, a non-profit making organization engaged in the promotion of technical education amongst the students and the dissemination of scientific knowledge in the society. A good number of eminent social workers, educationists, public men are directly involved in the management of the society. The managing committee of the society consists of eminent professors and engineers looking after the different sector of activities of the society. Hooghly Engineering & Technology College has set from the very beginning, as its goal, quality technical education, which endeavors to achieve high levels of academic excellence. It is planned in such a way that a student can get all facilities and help to reach his destination. The laboratories have been setup not only according to the university syllabus, but also with the state-of-the-art equipment. The HETC can boast of teachers of quality. The discipline is the backbone of any system and the college is duty bound to produce hardcore professionals and an effective system can only give the desired result. The college consists of an academic and administrative building, a library and a vast area of open land, which helps the growth of young talents under healthy and natural environment.

1.1 Objectives

1. To study present level of energy consumption
2. To study electrical consumption
3. To assess the various equipment/facilities from energy efficiency aspect
4. 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 Energy Conservation Program (ENCON) measures with payback analysis

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Pipulpati Hooghly. HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE

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1.3 General Details of College

Table 1.1: Details of college

No	Head	Particulars
1	Name of institution	Hooghly Engineering & Technology College, Hooghly
2	Address	Hooghly Engineering & Technology College, Hooghly, Vivekananda Road, Pipulpati, P.O. & Dist. Hooghly, Pin-712103, West Bengal.
3	Affiliation	Maulana Abul Kalam Azad University of Technology, West Bengal

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2. Study of connected load

In this chapter, we present details of various connected electrical equipment and electrical load.

Table 2.1: Location wise study of electrical fittings in various buildings

No	Location	FTL (40W)	CFL	LED tube (20W)	LED bulb (12W)	Computers (65W)	Fans	1.5 Tr AC
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4	Library Building	50	-	10	10	15	64	3
5	North- East Building	70	-	30	15	36	103	5
6	Ladies Hostel	116	6	40	30	-	102	-
	Total	**630**	**24**	**230**	**150**	**343**	**727**	**64**

Apart from above load, the college has pumps, street lights. Individual fitting wise load is as under.

Table 2.2: Equipment wise connected load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	630	40	25.2
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4	LED bulb	150	12	1.8
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9	Pumps (10 nos. 2HP, 2*5HP, 4*0.5HP, 2*7.5HP)	-	-	21.6
	Total			**248.6**

Data can be represented in terms of PIE chart as under,

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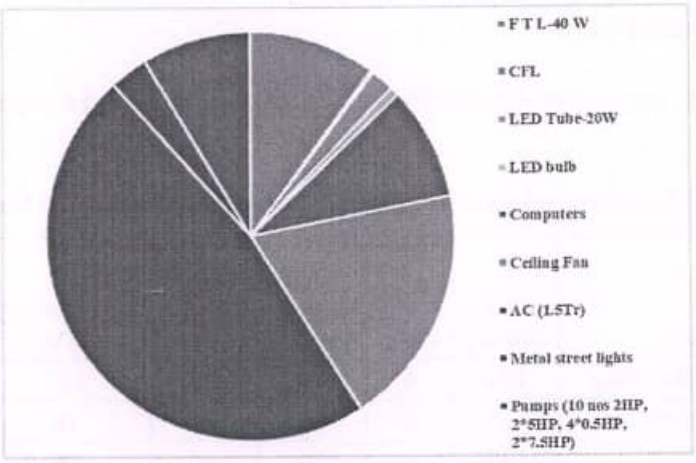

Fig 2.1: Distribution of connected load.

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3. Study of Electrical Energy Consumption

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No	Month	Energy (kWh)	Bill Amount (Rs)
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3	Feb-23	8,750	162,297
4	Jan-23	7,750	153,068
5	Dec-22	7,800	153,566
6	Nov-22	9,630	171,114
7	Oct-22	11,360	187,180
8	Sep-22	16,830	233,044
9	Aug-22	16,530	230,637
10	Jul-22	18,170	245,226
11	Jun-22	18,395	247,682
12	May-22	15,885	225,462
	Total	**162,980**	**2,265,069**

Variation in energy consumption is as follows,

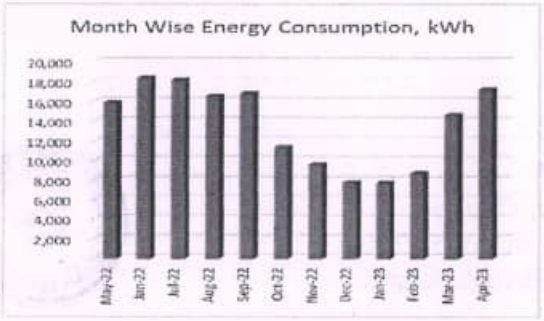

Fig 3.1: Month wise energy consumption

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Monthly variation in electricity bill is as follows,

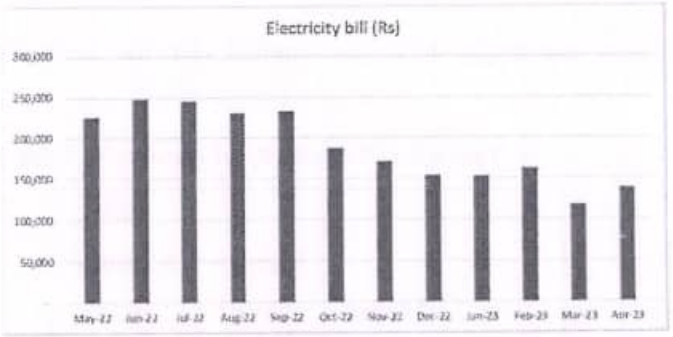

Fig 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO_2 Emission (MT)
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4. Carbon footprint

1. A Carbon footprint is defined as the total greenhouse gas emissions (CO_2 emissions), emitted due to various activities. In this we compute the emissions of carbon dioxide, by usage of the various form of electrical energy used by the college for performing its day-to-day activities.

2. Basis for computation of CO_2 emissions:

The basis of calculation for CO_2 emissions due to electrical energy is as under:

- 1 Unit (kWh) of electrical energy releases **0.8 kg of CO_2** into atmosphere.

Based on the above data we compute the CO_2 emissions which are being released into the atmosphere by the college due to its day-to-day operations.

We herewith furnish the details of various forms of energy consumption as under:

Table 4.1: Month wise Consumption of Electrical Energy & CO_2 Emissions

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-23	17,230	13.8
2	Mar-23	14,650	11.7
3	Feb-23	8,750	7.0
4	Jan-23	7,750	6.2
5	Dec-22	7,800	6.2
6	Nov-22	9,630	7.7
7	Oct-22	11,360	9.1
8	Sep-22	16,830	13.5
9	Aug-22	16,530	13.2
10	Jul-22	18,170	14.5
11	Jun-22	18,395	14.7
12	May-22	15,885	12.7
	Total	**162,980**	**130.4**

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In the following chart we present the CO_2 emissions due to usage of electrical energy.

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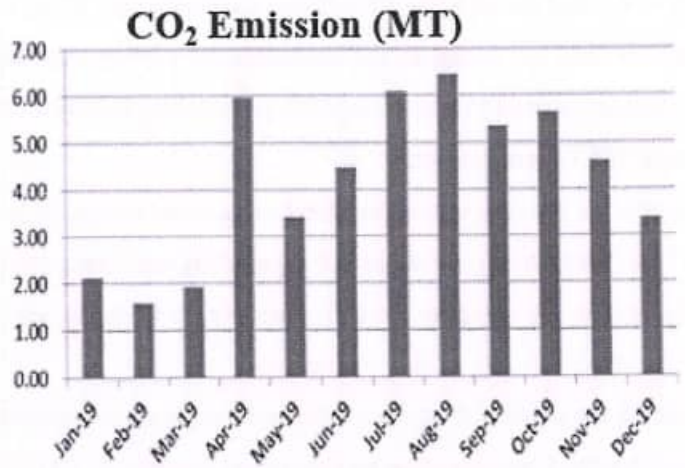

Fig 4.1: Month wise CO_2 Emission

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5. Study of usage of alternate energy

In this chapter, we compute the percentage of usage of alternate/renewable energy to annual energy requirement of the college. The college has installed roof top solar PV system. The installed capacity of solar PV plant is **3.5 kWh**. College has also installed 18,000 liters of solar thermal hot water plant.

Table 5.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from WBSEDCL	162,980	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	5250	kWh/Annum
3	Total Energy Requirement of College	168,230	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	3	%

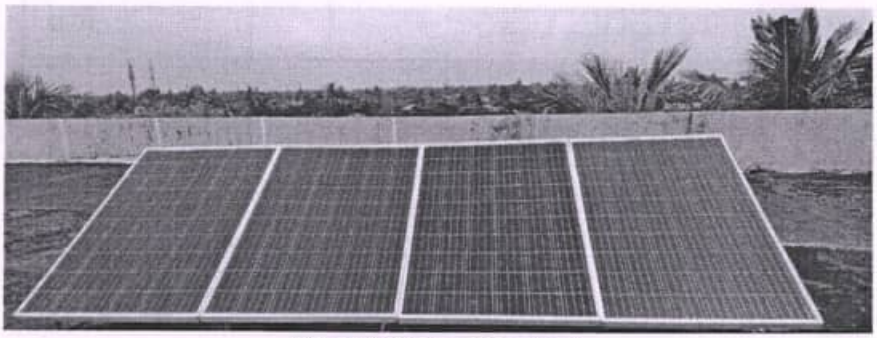

Fig 5.1 Solar PV plant

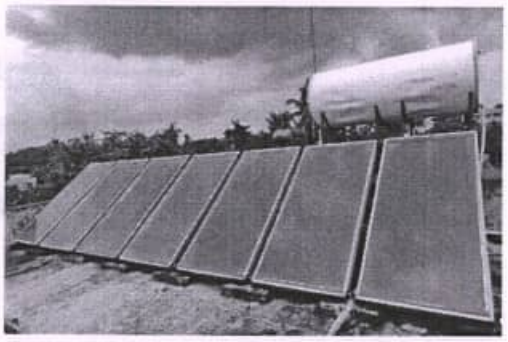

Fig 5.2 Solar Thermal Hot Water System

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6. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

Table 6.1: Total lighting load

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	630	40	25.2
2	CFL	24	24	0.6
3	Metal street lights	19	400	7.6
	LED lighting load			
1	LED tube	230	20	4.6
2	LED bulbs	150	12	1.8
	Total LED lighting load			**6.4**
	Total Lighting load			**39.8**

It can be seen that out of total lighting load 16% load is LED lighting load.

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7. Energy conservation proposals

7.1 Replacement of old T-8 FTLs with 20 W LED fittings

In the facility, there are about 630 Nos, T-8, FTL fittings with electronic/magnetic chokes. It is recommended to install the 20 W LED tube light fittings in place of these old T-8 fittings. In the following table, we present the savings, investment required & payback analysis.

Table 7.1: Savings, investment required & payback analysis (light)

No	Particulars	Value	Unit
1	Present Qty of T-8 fittings	630	Nos
2	Energy Demand of T-8 fitting	40	W/Unit
3	Energy Demand of 20 W LED fitting	20	W/Unit
4	Reduction in demand	20	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	50.4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	12600	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	138600	Rs/Annum
11	Cost of 20 W LED Tube	641	Rs/Unit
12	Investment required	403830	Rs lump sum
13	Simple Payback period	35	Months

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7.2 Replacement of old fans with STAR rated fans

During the audit, it was observed that there are 727 no of fans. It is recommended to replace these old fans with STAR rated fans. In the following table, we present the savings, investment required & payback analysis.

Table 7.2: Savings, investment required & payback analysis (fans)

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	727	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	40	W/Unit
4	Reduction in demand	25	W/Unit
5	Average Daily Usage period	8	Hrs/Day
6	Daily saving in Energy	145.4	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	36350	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	399850	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	1580498	Rs lump sum
13	Simple Payback period	47	Months

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7.3 Replacement of metal street lights with 100W LED

In the facility, there are about 19 Nos, halogen street lights. It is recommended to install the 100 W LED flood in place of these old halogen street lights. In the following table, we present the savings, investment required & payback analysis.

Table 7.3: Savings, investment required & payback analysis (street light)

No	Particulars	Value	Unit
1	Present Qty of Metal Street lights	19	Nos
2	Energy Demand of Metal Street lights	400	W/Unit
3	Energy Demand of LED flood lights	100	W/Unit
4	Reduction in demand	300	W/Unit
5	Average Daily Usage period	3	Hrs/Day
6	Daily saving in Energy	17.1	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	4275	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	47025	Rs/Annum
11	Cost of LED flood light	3000	Rs/Unit
12	Investment required	57000	Rs lump sum
13	Simple Payback period	15	Months

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7.4 Installation of Solar PV panel

It is recommended to install 100 kW solar PV panel. In the following table, we present the savings, investment required & payback analysis.

Table 7.4: Savings, investment required & payback analysis (solar PV panel)

No	Particulars	Value	Unit
1	Installation of 100kW PV unit	100	kW
2	Energy saving	150000	kWh/Annum
3	Rate of electrical energy	11	Rs
4	Annual monetary savings	1650000	Rs/ Annum
5	Investment required	5000000	Rs lump sum
6	Simple payback period	36	Months

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7.5 Summary of Savings

Table 7.5: Summary of Savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 630 Nos T-8 fittings with 20W LED fittings	12,600	138,600	403,830	35
2	Replacement of 727 Nos Old Ceiling Fans with STAR rating fans	36,350	399,850	1,580,498	47
3	Replacement of 19 Nos of Metal Street lights with 100W LED	4,275	47,025	57,000	15
4	Installation of 100kW grid connected PV panel	150,000	1,650,000	5,000,000	36
	Total	**203,225**	**2,235,475**	**7,041,328**	**38**

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Green Campus

Green campus initiatives:


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chinsurah, new hospital Road, W92R+3VQ, Chinsurah R S, Chinsurah, West Bengal 712101, India
Lat 22.900135°
Long 88.392549°
24/09/22 12:16 PM GMT +05:30
Google


NSS Unit
of
Hooghly Engineering & Technology College
Organizing

Swachh Bharat in colaboration with MAKAUT


GPS Map C
Chinsurah, West Bengal, India
KARGIL
Chinsurah


Chinsurah, West Bengal, India
Chinsurah, West Bengal, India
Chinsurah, West Bengal, India
Chinsurah, West Bengal, India

NSS Hooghly Engineering & Technolo @nss · Nov 2, 2022 **Promote** ···

#NSSUnit of HETC, Hooghly organised a #treeplantation event & planted 20+ saplings involving all the first year students on 01.11.2022 as part of #inductionprogram. #GoGreen #savetheplanet
@_NSSIndia @rdnss_kolkata @ianuragthakur @YASMinistry
@NisithPramanik @pankajsinghips


Tree Plantation
Chinsurah
West Bengal
India
2022-11-02(Wed) 12:43(PM)


Chinsurah
West Bengal
India
2022-11-02(Wed) 12:42(PM)


Chinsurah
West Bengal
India
2022/11-02(Wed) 01:02(PM)


Chinsurah
West Bengal
India
2022-11-02(Wed) 12:42(PM)

NSS Hooghly Engineering & Technolo @ns · Oct 22, 2022 **Promote** ···

#NSSUnit of Hooghly Engineering & Technology College, Hooghly organised a clean campus drive on 22.10.2022.

@_NSSIndia @rdnss_kolkata @Anuragthakur @YASMinistry @NisithPramanik @pankajsinghips @swachhbharat


Chinsurah
West Bengal
India
2022-10-22(Sat) 02:26(pm)


Chinsurah
West Bengal
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2022-10-22(Sat) 02:24(pm)


Chinsurah


Chinsurah
West Bengal
India


Chinsurah
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Kolkata
West Bengal
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West Bengal
India
2022-10-22(Sat) 02:19(pm)

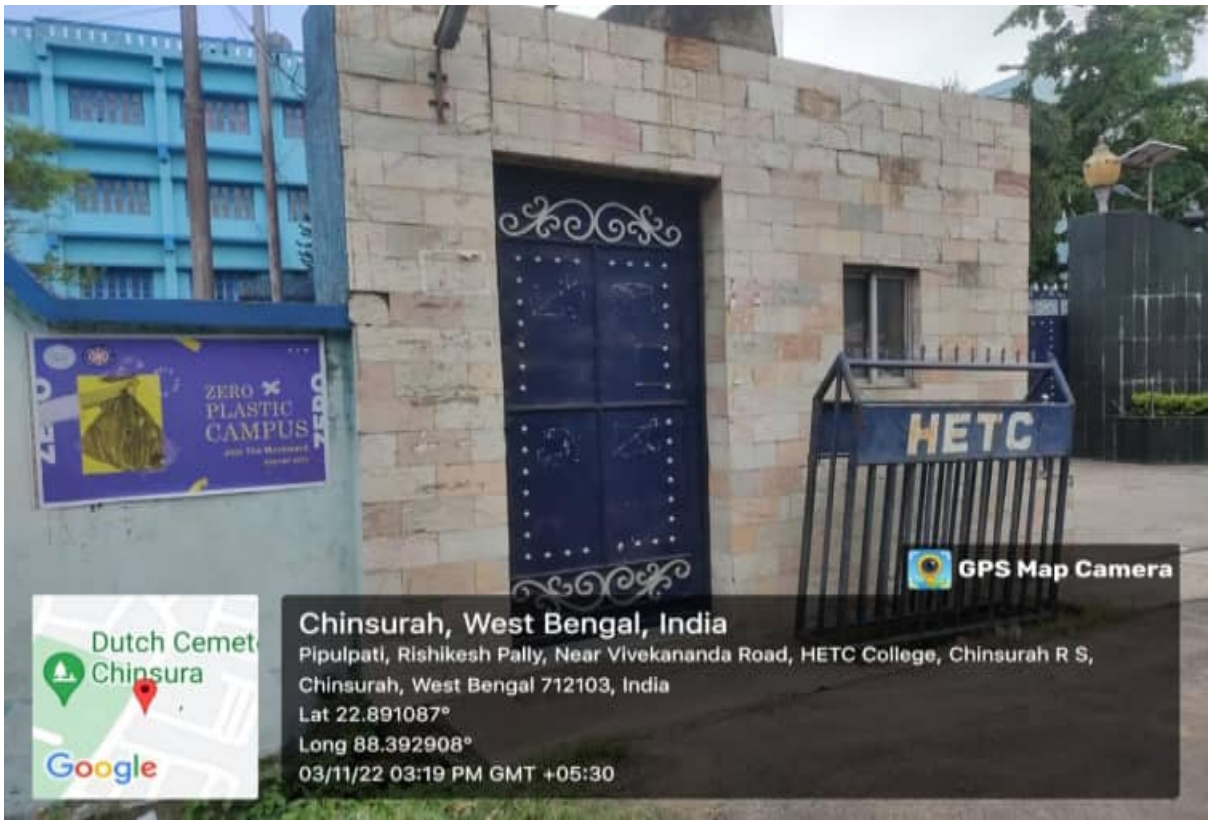
NSS Hooghly Engineering & Technolo @ns · Aug 14, 2022 **Promote** ···

On the occasion #AzadiKaAmritMahotsav, NSS Volunteers of Hooghly Engineering & Technology College painted flower pots to prepare for #IndependenceDay2022
#HarGharTiranga #IndiaAt75
@_NSSIndia @rdnss_kolkata @Anurag_Office @NitishPramanik @ianuragthakur @pibyas @YASMinistry

2nd October (Mahatma Gandhi Birth Anniversary):

The 150th Birth Anniversary of Mahatma Gandhi, the father of the nation was celebrated in 2019 with due honour along with the conduction of a workshop on Utilization of Solar Energy as part of the green initiative.

Plastic Free Campus

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To create a dynamic and innovative teaching-learning process with focus on continuous up-gradation of teaching resources, tools and technologies.
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Pipulpati, Rishikesh Pally, Near Vivekananda Road, HETC College,
Chinsurah R S, Chinsurah, West Bengal 712103, India
Lat 22.891087°
Long 88.392908°
03/11/22 03:21 PM GMT +05:30
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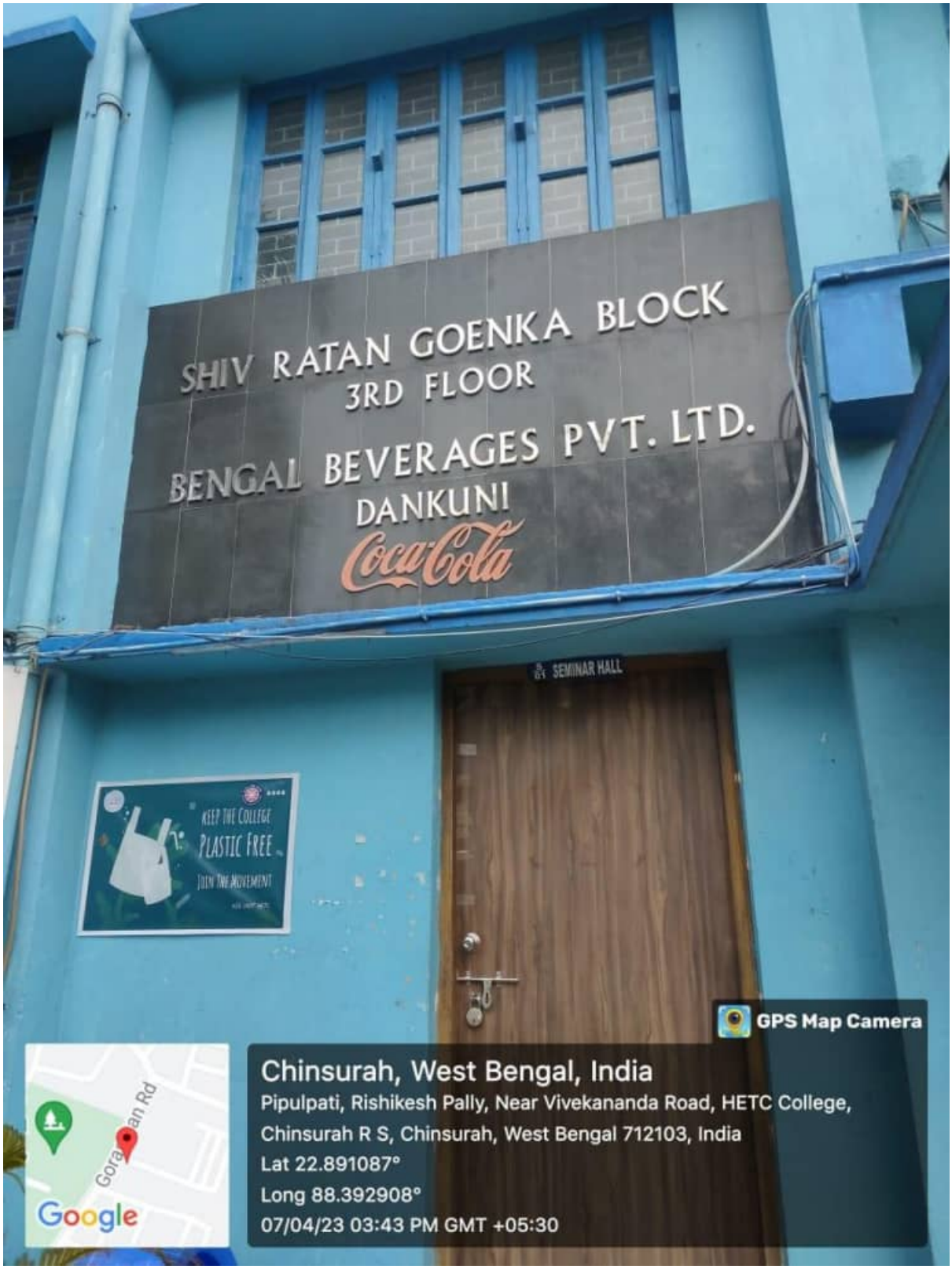
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3	HARIPADA SARKAR ✓	0847110000834	PSIB0000847	2575
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ক্যাশ ক্রেডিট মেমো

ফোন ঃ ৯৪৩৩২৩৯২৮১
তাং 5.11.22
লাঃ নং

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ঠিকানা Vivekananda Road Pipulpati, Hooghly.

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লাঃ নং

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ঠিকানা Vivekananda Road, P.P.W.Path, Hooghly.

মালের বিবরণ	পরিমাণ				দর প্রতি	দাম	
	বস্তা	কুইঃ	কেজি	গ্রাম	বস্তা/কুইঃ	টাকা	পঃ
P. Nitrate 1kg x 3	—	—			250/-	750	00
M.ol Calc. 10kg	—	—			35/-	350	00
Sodium Nitrate 1kg	—	—			140/-	140	00
Fair	—	—				100	00
					মোট	1340	00

মাল বুঝিয়া পাইয়া সহি করিলাম
ক্রেতার স্বাক্ষর ঃ

স্বাক্ষর ঃ

Vendor Signature
22/11/22

মঙ্গলবার পূর্ণ দিবস বন্ধ থাকে।

গুদাম হইতে মাল ডেলিভারীর পর কোন ওজর আপত্তি চলিবে না
সমস্ত রাসায়নিক সার কৃষি কার্য্যে ব্যবহারের জন্য

...dhukhan Sar Kendra

BANDEL BAZAR,
P.O. BANDEL ◌ DIST. HOOGHLY

Dealers in ALL Kinds of Chemical Fertilizer.

Licence No. .....

Serial No. .....

Date 05.11.2022.

Hooghly Engineering & Technology College.
Vivekananda Road, Pipulpati, Hooghly.

Cash Memo NO = 1572 Rs. 3110-00 ✓
" = 1573 Rs - 1790-00 ✓
" = 1574 Rs. 1305=00 ✓
" = 1575 Rs - 1340-00 ✓

Total Rs. 7545-00 ✓

Verified
Somin Ghosh
23/11/22

Seven Thousand five hundred Forty five only.

Amount may be credited to Sadhukhan sar kendra as agreed PB

Our Bank Details =

INDIAN BANK
BANDEL BAZAR BRANCH
IFSC code:- IDIB000B599.
A/c NO - 213373455255.
SADHUKHAN SAR KENDRA.

Tapas Sadhukhan
Proprietor

Approved by

ukhan Sar Kendra

BANDEL BAZAR,
P.O. BANDEL ✪ DIST. HOOGHLY

Dealers in ALL Kinds of Chemical Fertilizer.

Licence No. .....

Serial No. ..... *Date* 5/11/22

Hooghly Engineering & Technology College.
Vivekananda Road, Pipulpati, Hooghly.

1. Bavistin 100×1
2. D-M 45 - 250×1
3. TataCap - 500×1
4. Paramount - 1000×5
5. Confidor - 100×1
6. Rogar - 250×1
7. Omite - 250×1
8. Furadan - 1K×2
9. F. Dust - 500×2
10. Vermi Compost - 25K×20
11. Neem Khol - 5K.
12. Gromor - 5K
13. Suphala - 5K
14. Phosphate - 10K
15. Agromin - 1K×2.
16. Amonium Salfate 10K
17. Mag Salf - 1K×3
18. P. Nitrate - 1K×3
19. M. Sulcate - 10K
20. Sodium Nitrate - 1K

Four - Rs = 300/-

Received
Amrita Adhikari
5/11/22

Bijwokarma Maheti

(Signature of Requisitionist)

Approved By
(Principal/Administrative

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE

VIVEKANANDA ROAD, PIPULPATI, P.O. & DIST.- HOOGHLY, PIN - 712103.

PAYMENT VOUCHER

V. No. : 386

Dated :

PARTICULARS	Amount ₹
Account :	
Mode of Payment : Cash/Cheque 1111 on Bandhan dt- 13/4/22	
On Account of : Narayan Chandra Shaw towards cost of flower tree for Gardening	
Rupees (in words): Five thousand two hundred thirty only	TOTAL 5,230/-

RB 24/6/22

Tamir Adhikari
13/04/2022

Authorized Signatory

Prepared by

Receiver's Signature

Narayan Chandra Shaw

155, Bipin Behari Ganguly Street,
(New Baitakkhana Market)
Kolkata-700 012

Ref. No. .....

Date 28/03/2022

Hooghly Engineering & Technology College
Vivekananda Road Pipulpati Hooghly
LIST OF PLANTS FOR 2021-2022

Sl No	Name Of Plant	Type	Rate/Pc RS	Quantity	Amount
1	CHRESEN THEMUM	GIANT	8	60	480
2	DALIA	GIANT	8	90	720
3	MERRY GOLD	INCA ORANGE	4	200	800
4	DO	YELLOW	4	100	400
5	DO	GOLD	5	50	250
6	SALVIA	F1 MIX	5	50	250
7	PETUNIA	F1 GRANDIFLORA	6	50	300
8	ANTIRINUM	F1 DWARF	5	25	125
9	ANTRINIUM	GIANT LOOSE	1	200	200
10	ALLYSUM	F1 WHITE LOOSE	1	300	300
11	SALVIA	F1 M.C.	4	50	200
12	POPY	LOOSE	1	100	100
13	FLOX	LOOSE	0.8	150	120
14	STOCK	MIXED	5	50	250
15	RUDBEKIA	MIXED	5	25	125
16	HOLY HOCK	MIXED	5	50	250
17	ROAD SIDE FLOWERING PLANT (ASHOK,SONAJHURI, PALASH ETC)		60	6	360
	TOTAL				5230

Received & Verified
Jaman Adhikari

Rupees five thousand two hundred thirty only

GREEN IS THE SYMBOL OF PLANET EARTH * COLOUR IS THE SYMBOL OF LIFE

BILLS REGIS

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE SOCIETY
VIVEKANANDA ROAD, PIPULPATI, HOOGHLY

NEFT/RTGS as follows:

PARTY NAME	AMOUNT
Jaiswal & Company	14038
Bank Name- Union Bank Of India	
A/C No- 346721010000060	
IFSC- UBIN0934674	
A/C Holder name: Sayan Mukherjee	6400.00
A/C no: 20400519454	
IFSC code SBIN0004776	
Cheque no 1167 on Bandhan dated 14/07/22	20438

RM 22/7/22

Bandhan Bank
Chinsurah
Chinsurah - 712103
IFS Code : BCBL0001500

VALID FOR THREE MONTHS FROM THE DATE OF ISSUE
1 4 0 7 2 0 2 2
D D M M Y Y Y Y

Pay Yourself या धारक को Or Bearer

रुपये Rupees Twenty Thousand four hundred thirty Eight only

अदा करें ₹ 20,438.00

A/c No. 50180010232772

HETCS

Payable at par at all branches Aishwarya Mukherjee
Member (HETCS)

Avijit Maity
Secretary

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE SOCIETY

⑈001167⑈ 700750024⑆ 03566 2⑈ 31

Bandhan Bank Ltd. Chinsurah

14/07/2022

NOTE SHEET

Hooghly Engineering & Technology College

As directed by the President of HETC - Prof (Dr. Tarak Kumar Bandyopadhyay, it have urgently require of (10) Ten fencing (for tree Plantation) in the college ground.

Preliminary estimated amount for the work is approximately Rs. 30000 (Thirty Thousand).

Uttam Kr. Samanta 12/07/2022
Shantabrata Pal 12/07/22

PRINCIPAL INCHARGE HOOGHLY

Noted & forwarded for necessary approval. SG 12.07.22

Secretary, HETCS

Try to complete this less than the said amount. It may be made portable type. Payment would be made as per need base.

13/7/22

Principal in-charge

Forwarded for necessary action. SG 13.07.22

F/P, HETC
UKS, SEP

Noted. For the related work, Iron channels, MS Flat, welding Rod Purchased by the ~~a~~ initiation of Rs 14038/- may be disbursed for the said purpose & forwarded for necessary approval.

RB 14/7/22

Noted & forwarded for necessary approval. SG 14.07.22

Principal in charge HETC

Payment may be made

14/7/22

Secretary, HETCS

Forwarded for n.a. as.....

TAX INVOICE

& Company
osh Sarani, Chinsurah, Hooghly
UIN: 19AFFPJ7279C1Z9
Name : West Bengal, Code : 19
: sanatanjaiswal1959@gmail.com

Invoice No
JC/209/22-23
Delivery Note

Dated
14-Jul-2022
Mode/Terms of Payment

Supplier's Ref

Other Reference(s)

Buyer's Order No

Dated

Despatch Document No

Delivery Note Date

Despatched through
HAND CART
Terms of Delivery

Destination

oghly Engineering & Technology College
ekananda Road, Pipulpati, Hooghly - 712103
ate Name : West Bengal, Code : 19
lace of Supply : West Bengal

Sl No.	Description of Goods	HSN/SAC	Quantity	Rate	per	Amount
1	**MS ANGLE & CHANNELS** *25 * 3 ANGLE*	72162100	**111.500 Kg.**	63.56	Kg	**7,086.94**
2	**MS FLAT** *25 * 3 PATI*	72111910	**51.300 Kg.**	62.71	Kg	**3,217.02**
3	**Wealding Rod** *10 NO WELDING ROD*	8311	**322 Pcs.**	4.42	Pcs	**1,423.24**
4	**Freight / Delivery** *VAN FARE*	9965				**169.00**
						11,896.20
	CGST					**1,070.65**
	SGST					**1,070.65**
	Rounded Off					**0.50**
	Total					**₹ 14,038.00**

RB 14/7/22

E & O E

Amount Chargeable (in words)
INR Fourteen Thousand Thirty Eight Only

HSN/SAC	Taxable Value	Central Tax Rate	Central Tax Amount	State Tax Rate	State Tax Amount	Total Tax Amount
72162100	7,086.94	9%	637.82	9%	637.82	1,275.64
72111910	3,217.02	9%	289.53	9%	289.53	579.06
8311	1,423.24	9%	128.09	9%	128.09	256.18
9965	169.00	9%	15.21	9%	15.21	30.42
Total	11,896.20		1,070.65		1,070.65	2,141.30

Tax Amount (in words) **INR Two Thousand One Hundred Forty One and Thirty paise Only**

Declaration
We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct. Goods once sold can not be taken back

Company's Bank Details
Bank Name : **Union Bank of India (C.A.) 0060**
A/c No : **346721010000060**
Branch & IFS Code : **Chinsurah & UBIN0934674**

Customer's Seal and Signature

for Jaiswal & Company

Shantab Auth. Sig.
14/7/22

SUBJECT TO CHINSURAH JURISDICTION

This is a Computer Generated Invoice

Jaiswal & Company Hooghly Chinsurah

Sadhukhan Sarkendra

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE SOCIETY
VIVEKANANDA ROAD, PIPURPATI, HOOGHLY

PARTY NAME	AMOUNT	BANK NAME	BANK BRANCH	A/C NO	IFSC CODE
WBSEDCL	169608.00	ICICI BANK		WBB9416422003461514	ICIC0000104
PARTY NAME	AMOUNT	BANK NAME	BANK BRANCH	A/C NO	IFSC CODE
NETCOM INFOTECH (P) LTD	23364	PNB	KOLKATA	1435003700300046	PUNB0143500
PARTY NAME	AMOUNT	BANK NAME	BANK BRANCH	A/C NO	IFSC CODE
SOUVIK MONDAL	9000	SBI	BANDEL	36178412109	SBIN0010425
PARTY NAME	AMOUNT	BANK NAME	BANK BRANCH	A/C NO	IFSC CODE
SADHUKHAN SARKENDRA IN	10817	INDIAN BANK	BANDEL BAZAR	OCC 21337345255	IDIB000B599
TOTAL	212785.00				

RD 23/6/22

Bandhan Bank
Chinsurah
Chinsurah - 712103
IFS Code BDBL0001925

Pay yourself
रुपये Rupees Two lac Twelve thousand seven hundred eighty five only

A/c No. 50100010232772

08/06/2022

Bandhan Bank Ltd. Chinsurah Branch

2 6 0 6 2 0 2 2
D D M M Y Y Y Y

Or Bearer

अदा करें ₹ 2,12,785.00

HETCS

Member (HETCS)

⑈001109⑈ 700750024⑆ 0156626⑈ 11

জদাতা গণেশায় নমঃ ফোনঃ ৯৪৩৩২৩৯২৮১
ক্রেডিট মেমো তাং 24.03.2022
লাঃ নং

ধুখাঁ সার কেন্দ্র

নুমোদিত খুচরা রাসায়নিক সার, বীজ, খইল বিক্রেতা

ব্যান্ডেল বাজার পোঃ ব্যান্ডেল, জেলাঃ হুগলী

Hooghly Engineering & Technd
Chandk Road Pipulpati

মালের বিবরণ	পরিমাণ বস্তা	কুইঃ	কেজি	গ্রাম	দর প্রতি বস্তা/কুইঃ	দাম টাকা	পঃ
Bondhu	1	-	50	-	2200/-	2200	00
Homithpo	—	10	K		100/-	1000	00
Homflex	—	10	K		50/-	500	00
Neemal Cake	1	-	25	K	62/-	1550	00
Dolomite	1	-	10	K	13/-	130	00
S.S.P	—		10	K	12/-	120	00
M.O/Cake	—		5	K	34/-	170	00
Grower	—		5	K	45/-	225	00
					মোট	5895	00

মাল বুঝিয়া পাইয়া সহি করিলাম
ক্রেতার স্বাক্ষর ঃ

স্বাক্ষর ঃ

মঙ্গলবার পূর্ণ দিবস বন্ধ থাকে।

মদাম বহুতে মাল ডেলিভারীর পর কোন ওজর আপত্তি চলিবে না
সমস্ত রাসায়নিক সার কৃষি কার্য্যে ব্যবহারের জন্য

6/04/22

...তা গণেশায় নমঃ ফোনঃ ৯৪৩৩২৩৯২৮১

...ক্রেডিট মেমো তাং 24.03.2022

লাঃ নং

...ধুখাঁ সার কেন্দ্র

...অনুমোদিত খুচরা রাসায়নিক সার, বীজ, খইল বিক্রেতা

ব্যান্ডেল বাজার, পোঃ ব্যান্ডেল, জেলাঃ হুগলী

...tooshly Engineering & Technology
...vekanda Road pipulpati / College

মালের বিবরণ	পরিমাণ বস্তা	কুইঃ	কেজি	গ্রাম	দর প্রতি বস্তা/কুইঃ	দাম টাকা	পঃ
White Plastic 10.900 m					215/-	2343	80
Black Plastic 10 150 gm					165/-	1674	75
						220	-
T/V 1000 g					220/-		
Herbicide 1000 x 2					340/-	680	-
					মোট	4918	25

মাল বুঝিয়া পাইয়া সহি করিলাম

ক্রেতার স্বাক্ষর ঃ স্বাক্ষর ঃ

5/4/22

মঙ্গলবার পূর্ণ দিবস বন্ধ থাকে।

গুদাম হইতে মাল ডেলিভারীর পর কোন ওজর আপত্তি চলিবে না

সমস্ত রাসায়নিক সার কৃষি কার্য্যে ব্যবহারের জন্য

Biswokarma Malwali

No. 5023

99A, Park Street
Kolkata - 700 016

Date 29:03:19

Hooghly Engineering & Technology College
Society
Vivekananda Road, P. Pipulpati, Post & Dist - Hooghly. W.B - Pin-712103

PLEASE RECEIVE FROM

Nundy's

Order No. HETCS/2019/18

Date 19:03:/2019

THE UNDER MENTIONED GOODS / SERVICE IN GOOD ORDER & CONDITION / SATISFACTION

	RATE	Rs.	P.
1) 12 pcs Waste Bin. Make - Nilkamal - 80 Ltr.			
2) 16 pcs Waste Bin. Make - Nilkamal - 100 Ltr			
TOTAL Rs.			

Checked RB (F.O) 28.05.19

Received 29/3/19

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE Pipulpati Hooghly.

Verified 29.05.19

Please retain.

For NUNDY'S

Beyond the campus Tree Plantation Program Report

On August 21, 2019, the Induction Committee of Hooghly Engineering & Technology College organized a tree plantation drive as part of our green initiative at the end of Induction Program. The event took place both inside the campus and in the neighbouring area of Goaltuli, Hooghly. Around 70 enthusiastic 1st year students participated in the program, showcasing their commitment to environmental sustainability. Some faculties and other staff members were present during the event. The activity not only aimed to enhance the greenery of the region but also to raise awareness about the importance of trees in our ecosystem. The event was a significant step towards promoting eco-friendly practices among the students and the local community.

A Mukherjee 28/08/2019

Dr. Aishwarya Mukherjee

Coordinator, Induction Program

S Bhattacharyya

Prof. (Dr.) Sumanta Bhattacharyya
Principal
Hooghly Engineering & Technology College

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE
Pipulpati
Hooghly.

Principal's Column

HETC Chronicle, the Half-yearly e-newsletter of Hooghly Engineering & Technology College, is all set to be published for the December 2019 issue. It brings me pleasure to mention that the entire Odd Semester of 2019-20 (July to December 2019) has been an eventful period for the college. The newly introduced Induction Programme for the fresh entrants, that came into existence since last academic session, went off quite satisfactorily with varied and relevant contents for the new aspirants.

HETC Chronicle, with its aims and objectives, had been an attractive publication of HETC in the past years and the present issue is going to be of no exception to that.

It also gives me pleasure to mention that the present facilities of this college are being utilized for conduction of different vocational skill development programmes, sanctioned by either West Bengal Government or Govt. of India to facilitate young citizens in the vicinity as well as from distant places of the state and country.

I congratulate the entire team of "HETC Chronicle" for a timely and quality publication of the newsletter for the period from July to December 2019 which would definitely inspire us all to strive for a still better work in the future.

Dr. Sumanta Bhattacharyya
Principal, HETC

Induction Programme 2019 for Freshers

The mandatory 3-week Induction Programme was held for the newly admitted 1st year students during 1st to 21st August, 2019 to acclimatize them to the environment of their engineering institution.

Highlights

The Orientation Programme for newly admitted 1st Year students was held on 1st August, 2019.

Paschimbanga Vigyan Mancha organized a Science Awareness Camp on 3rd August, 2019.

A workshop on Universal Human Values was held during 7th to 10th August, 2019.

A Tree Plantation programme was organized on 21st August, 2019 in the college campus and beyond to spread awareness about our environment.

Self-Defense training was held during 2nd to 16th August, 2019.

Mr. Chandan Clement Singh, a Nature Activist, delivered a speech on 6th August, 2019.

A workshop on "Locating Human in Every Gender and Religion" was held on 8th August, 2019.

Phone : 9830557073
9836566352

KISHALAYA NURSERY

Plants Suppliers & Garden Contractor
Vill.- Korola, P.O.- Debanandapur, Dist.- Hooghly,
Pin-712123 (W.B.)

Ref. No. ....

Date ১৮/৮/২৩

H.E.T.C
Chinsurah, Hooghly.

১	রাধাচূড়া	২ x ২৫.	৫০=০০
২	বিলাতী খেজুর	২ x ৫০.	১০০=০০
৩	প্লুমেরিয়া	১ x ৩০.	৩০=০০
৪	কুলগাছ	১ x ৪০.	৪০=০০
৫	পাতিলেবু	১ x ৩০.	৩০=০০
৬	কাগজী লেবু	১ x ৫০.	৫০=০০
৭	কাঁঠাল	৪ x ৩০.	১২০=০০
৮	অশোক	১ x ৪০.	৪০=০০
৯	লাল জবা	২ x ৬০.	১২০=০০
১০	আপেল	৬ x ৩৫.	২১০=০০
১১	টিকোমা	৪ x ২৫.	১০০=০০
১২	বেলী ফুল	৩ x ২০.	৬০=০০
১৩	বোগেনভেলিয়া	১০ x ৪০.	৪০০=০০
১৪	সুপারি	৫০ x ১৫.	৭৫০=০০
১৫	কেশরাজ	৪ x ২৫.	১০০=০০
১৬	নারিকেল (বেঁটে)	৪ x ৮০.	৩২০=০০
১৭	রঙ্গন, ...	৩ x ৭০.	২১০=০০
১৮	অমলতাস	১ x ১০০.	১০০=০০
১৯	জামরুল	৩ x ৪০.	১২০=০০

মোট = ২৯৫০=০০

(দুই বছরের মধ্যে ... দেওয়া হবে)

Samir Adhikari

Phone : 9830557073
9836566352

HIMALAYA NURSERY

Plants Suppliers & Garden Contractor
Vill.- Korola, P.O.- Debanandapur, Dist.- Hooghly,
Pin-712123 (W.B.)

Ref. No. .....

Date ২৩/৮/২২

H. E. T. C
Chinsurah, Hooghly

১) কৃষ্ণচূড়া ৫০ x ৪০ = ৪০০/-
২) নারিকেল ৪ x ৮০ = ৬২০/-
৩) অর্জুনগাছ ৪ x ৭০ = ২৮০/-

(একুশশো পঞ্চাশ টাকা) মোট- ২১০০/-

২৮০

Jamir Akhtar

HOOGHLY ENGINEERING & TECHNOLOGY COLLEGE

VIVEKANANDA ROAD, PIPULPATI, P.O. & DIST.- HOOGHLY, PIN - 712103.

PAYMENT VOUCHER

241

V. No. : 665

Dated : 16/8/19

PARTICULARS	Amount ₹
Account : ~~Orientation Program '19~~ Induction program '19	3980.00
Mode of Payment : Cash/Cheque	
On Account of : To Samir Adhikari towards purchasing three for Induction programme 2019	
Rupees (in words) : Three thousand nine hundred eighty Only	TOTAL 3980.00