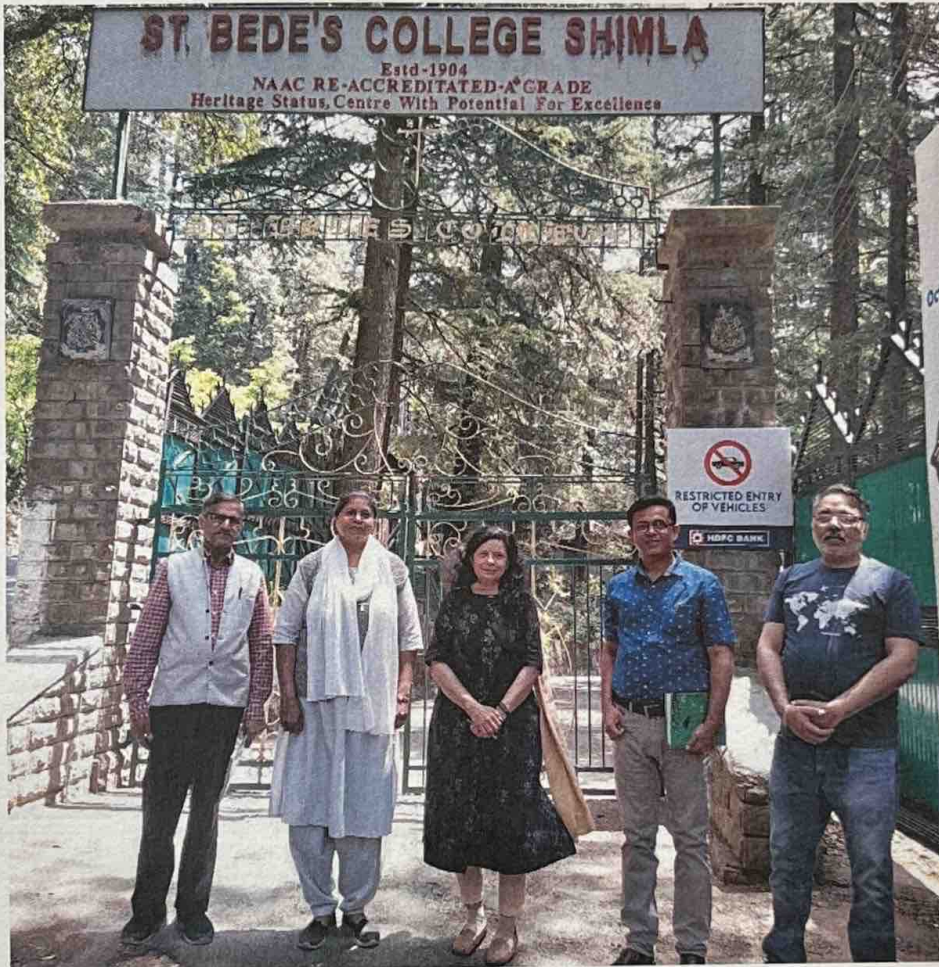


## Energy Audit Report



**St. Bede's College,**  
Shimla (Himachal Pradesh)



Prepared & Submitted By



**ECO LABORATORIES & CONSULTANTS PVT. LTD.**

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(May 2022)





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## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### Executive Summery





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### Executive Summary

A Nation's growth starts from its educational institutions, where the ecology is thought as a prime factor of development associated with environment. A clean and healthy environment aids effective learning and provides a conducive learning environment. Educational institutions now a day are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco-friendly.

Energy today has become a key factor in deciding the product cost at micro level as well as in dictating the inflation and the debt burden at the macro level. Energy cost is a significant factor in economic activity at par with factors of production like capital, land and labour. The imperatives of an energy shortage situation call for energy conservation measure, which essentially mean using less energy for the same level of activity. Energy Audit attempts to balance the total energy inputs with its use and serves to identify all the energy stream's in the systems and quantifies energy usage's according to its discrete function. Energy Audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating & maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation equipment's Instrumentation and technology.

Energy Audit is the key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions.

The Energy Audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programmes which are vital for production and utility activities. Such an audit programme will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. The present report shows the energy audit of St. Bede's College in terms of pre-audit phase, audit phase and post audit phase.





Heritage Status

## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### About St. Bede's College





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### About St. Bede's College, Shimla

St. Bede's College, Shimla, established in 1904, is a historical and educational landmark of North India which aims primarily at providing quality higher education and training to women. It is engaged in equipping students with relevant and appropriate skills, attitudes and experiences, for meeting the challenges of the life. The institute was Re-Accredited with A+ grade third time by NAAC in 2016. It has also been granted College with Potential for Excellence and Heritage Status by UGC.

### Motto of College

"Non Nobis Solum"

*Means Not for Ourselves Alone*

### Vision of College

- To form well integrated individuals who are assets to contemporary society.

### Mission of College

- Inspire young women to achieve academic excellence. Teach discernment so that our students think for themselves and think correctly.
- Encourage and recognize talent in individual students.
- Create awareness that education is a continuous quest.

### Socially we work towards:

- Preparing young women for their role in the future as good career women, wives and mothers for creating happy homes.
- Fostering team spirit and encouraging a sense of responsibility and self-discipline.
- Teaching them to adjust to the changing social milieu while not forgetting the traditional values.
- Sensitizing them to reach out to the marginalized and the underprivileged.

### Spiritually we work towards:

- Leading them to have faith in God, themselves and others, who would live their lives in the light of faith.
- Exposing them to values that are eternal and nurturing them to become beacons of light and ambassadors of harmony.





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



- Women whose very presence anywhere would exude goodness and touch the lives of others.

### Values of college:

- Faith in God
- Moral Uprightness
- Love of Fellow Beings Social Responsibility
- Pursuit of Excellence





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### About Energy Audit





### About Energy Audit

In broad sense, Energy Efficiency means economizing on the use of energy without adversely affecting economic growth and development. It includes improving the efficiency of energy extraction, Transmission and Distribution and increasing the productivity of energy use.

#### Designated consumers

Central Govt. specify the following criteria for energy intensive Industries and other establishments. (As per EC Act 2001, Section 14(e)), for Industries Electrical connected load - 5000 KW and above Designated Consumers to get energy audit by Accredited energy audit firms

#### Bureau of Energy Efficiency (BEE)

The Bureau of Energy Efficiency is an agency of the Government of India, under the Ministry of Power created in March 2002 under the provisions of the nation's 2001 Energy Conservation Act The agency's function is to develop programs which will increase the conservation and efficient use of energy in India

### Methodology Adopted for Energy Audit

As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

There are three phases of Energy Audit

- Pre audit phase
- Audit phase
- Post audit phase

Above phases include following stages

#### Data Collection

Preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:

- The team went to each department, centres, Library, canteen etc.
- Data about the general information was collected by observation and interview.





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



- The power consumption of appliances was recorded by taking an average value in some cases.

### Data Analysis

Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the Himachal Power Corporation Limited. Data related to water usages were also analysed using appropriate methodology.

### Recommendation

On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health.

The above target areas particular to the college was evaluated through questionnaire circulated among the students for data collection. Five categories of questionnaires were distributed. The formats of these are given below.

### Pre audit Phase

#### Survey Form for data collection

- List ways that you use energy in your college. (Electricity, electric stove, kettle, microwave, and others).
- Electricity bill amount for the last One year
- Weight of firewood used per month and amount of money spent? Also mention the amount spent for petrol/diesel/ others for ~~generators~~
- Is there any energy saving methods employed in your college? If yes, please specify. If no, suggest some.
- How much money does your college spend on energy such as electricity etc. in a month? (Record monthly for the year 2021).
- How many CFL bulbs has your college installed? Mention use (Hours used/day for how many days in a month)
- Energy used by each bulb per month? (For example- 60 watt bulb x 4 hours x number of bulbs = kwh).
- How many LED bulbs are used in your college? Mention the use (Hours used/day for how many days in a month)





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



- Energy used by each bulb per month? (kwh).
- How many incandescent (tungsten) bulbs have your college installed? Mentions use (Hours used/day for how many days in a month)
- Energy used by each bulb per month? (kwh).
- How many fans are installed in your college? Mention use (Hours used/day for how many days in a month)
- Energy used by each fan per month? (kwh)
- How many air conditioners are installed in your college? Mention use (Hours used/day, for how many days' in a month)
- Energy used by each air conditioner per month? (kwh).
- How many electrical equipment's including weighing balance are installed your college?
- Mention the use (Hours used/day for how many days in a month)
- Energy used by each electrical equipment per month? (kwh).
- How many computers are there in your college? Mention the use (Hours used/day for how many days in a month)
- Energy used by each computer per month? (kwh)
- How many photocopiers are installed by your college? Mention use (Hours used/day for how many days in a month).
- How many cooling apparatuses are in installed in your college? Mention use (Hours used/day for how many days in a month)
- Energy used by each cooling apparatus per month? (kwh) Mention use (Hours used/day for how many days in a month)
- Energy used by each photocopier per month? (kwh) Mention the use (Hours used/day for how many days in a month) how many inverters your collage installed? Mentions use (Hours used/day for how many days in a month)
- Energy used by each inverter per month? (kwh)
- How many electrical equipment are used in different labs of your college? Mention use (Hours used/day for how many days in a month)





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



- Energy used by each equipment per month? (kwh)
- How many heaters are used in the canteen of your college? Mention the use (Hours used/day for how many days in a month)
- Energy used by each heater per month? (kwh)
- No of street lights in your college?
- Energy used by each street light per month? (kwh)
- No. of TV in your college and hostels?
- Energy used by each TV per month? (kwh)
- Any other item that uses energy (Please write the energy used per month) Mention the use (Hours used/day for how many days in a month)
- Are any alternative energy sources/nonconventional energy sources employed / installed in your college? (i.e. photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.
- Do you run "switch off" drills at college?
- Are your computers and other equipment put on power-saving mode?
- Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby mode most of the time? If yes, how many hours?
- What are the energy conservation methods adapted by your college?
- How many boards displayed for saving energy awareness?
- How much ash is collected after burning fire wood per day in the canteen?
- Write a note on the methods/practices/adaptations by which you can reduce the energy use in your college campus in future.

### Audit Phase

In St. Bede's College of Shimla, energy auditing was done with the help of team teaching staff. The energy audit began with the teams walking through all the different facilities at the college, determining the different types of appliances and utilities (lights, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts.





The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances.

### **Data collection**

Data collection was done in the sectors such as sources of Energy and energy consumption pattern, College records and documents were verified several times to clarify the data received through survey and discussions.

### **Site Tour**

Site inspection was done along with staff. Questionnaires were answered during site tour the relevant documents were collected.

### **Review of Documents and Records**

Documents such as electricity bills, registers of electricity, fuel consumption were collected and reviewed.

### **Site inspection**

College and its premises were visited and analyzed by the audit-teams several times to gather information. Campus trees were counted and identified. Play grounds, canteen, library, office rooms and parking grounds were also visited to collect data. canteen and hostel kitchen mess were counted.





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



## **Auditing of Energy Management**



## **Auditing for Energy Management**

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also it can be said as "the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems". The energy audit is key to a systematic approach for decision making in the area of energy management. It attempts to balance the total energy inputs with its use, and serve to identify all the energy streams in a facility.

### **a) Electrical Energy**

Energy resources utilized by all the departments, support services and the administrative buildings of St. Bede's College, Shimla, include electricity, solar energy and liquid fuels as petroleum. Major use of the energy is at office, canteen, hostel and laboratories, for lighting, transportation, cooking and workshop instruments. Electricity is also supplied to the College campus by Himachal Pradesh Electricity Board. The communication process for awareness in relation to energy conservation is found inadequate.

- Regular monitoring of equipment's and immediate rectification of any problems.
- Employment of more solar panels and other renewable energy sources.
- Conduct more save energy awareness programs for students and staff.
- Observe a power saving day every year.
- Automatic power switch off systems may be introduced.

### **b) Fuel Energy**

The fuel energy audit determines the approximate use of petrol or diesel by the vehicles inside the College. It also includes the efforts taken by the College to conserve the fuel. The conventional source of fuel for the vehicle is petrol and diesel. Number of vehicles used by students, teaching and non-teaching staff of College and visitors are considered as source of fuel consumption and air emissions. So, the data regarding fuel utilization for students, teaching and non-teaching staff of College and visitor are monitored in the study. For the purpose of the fuel energy audit the entire College campus with infrastructure is divided into groups. With respect to the mentioned classes the survey was carried out regarding the petrol/diesel fuel use in by students, teaching and non-teaching staff and visitors coming with vehicles on the campus.



As the part of fuel energy management and reduction of carbon footprints, the institute has initiated some efforts as introduced electric bike for campus use

### c) Solar Energy

The institute has installed solar power plant solar water heating systems.

#### Energy Sources and Consumption Area in Collage

There is hostel and supporting infrastructures like library, administrative block, auditorium and cafeteria.

#### Energy Source

Power supply from State Power Supply Department. In case of power cut supply power to be fulfil demands with help of generator which runs on diesel as fuel

- ✚ Generator Set No. 1 (250 KVA)
- ✚ Generator Set No. 2 (63KVA)
- ✚ Power efficiency of generator is 80%

### Energy consumption in College

Month wise Energy consumption by the college is shown in **table 2**.

**Table 2: Meter wise Energy Consumption Record of College**

Meter No 1111404107					
S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	4478	4927	449	2523.6
2	April	4927	5186	259	1507.13
3	May	5186	5412	226	1302.88
4	June	5412	5611	199	1192.41
5	July	5611	5674	63	469.41
6	August	5674	5767	93	643.24
7	September	5767	5995	228	4335.49
8	October	5995	6209	214	1286.08





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9	November	6209	6501	292	1661.8
10	December	6501	6772	271	1575.1
11	January	6772	6855	83	583.63
12	February	6855	7144	289	1658.8

**Meter No 1111404108**

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	24832	25511	679	3731.29
2	April	25511	25967	456	2542.07
3	May	25967	26322	355	1966.07
4	June	26322	26658	336	1911.85
5	July	26658	27086	428	2305.1
6	August	27086	27502	416	2366.05
7	September	27502	27963	461	2558.55
8	October	27963	28493	530	2939.36
9	November	28493	29137	644	3514.86
10	December	29137	29893	756	4121.41
11	January	29893	30489	596	3277.19
12	February	30489	31102	613	3398.84

**Meter No 1111404109**

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	134339	136157	1818	9711.36
2	April	136157	137311	1154	6206.64
3	May	137311	138283	972	5152.89
4	June	138283	139504	1221	6557.92





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



**Meter No 1111404262**

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	297546	304692	7146	37683.04
2	April	304692	308523	3831	20206.57
3	May	308523	309974	1451	7466.57
4	June	309974	311986	2012	10710.35
5	July	311986	314644	2658	14093.1
6	August	314644	316433	1789	9741.55
7	September	316433	320402	3969	20975.05
8	October	320402	325636	5234	27635.86
9	November	325636	331674	6038	32227.75
10	December	331674	337814	6140	32387.3
11	January	337814	339516	1702	9083.08
12	February	339516	345078	5562	29463.43

**Meter No 1111404626**

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	43326	44079	753	4119.88
2	April	44079	44219	140	882.66
3	May	44219	44219	0	125.91
4	June	44219	44475	256	1342.01
5	July	44475	44894	419	2338.01
6	August	44894	45306	412	2344.29
7	September	45306	46171	865	4679.79
8	October	46171	46859	688	3773.88





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9	November	46859	47710	851	4596.35
10	December	47710	48393	683	3738.65
11	January			0	
12	February	48338	345078	296740	4263.45

**Meter No 1111404739**

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	52763	53699	936	5415.74
2	April	53699	54451	752	4364.74
3	May	54451	55085	634	3634.46
4	June	55085	55717	632	3692.5
5	July	55717	56281	564	3301
6	August	56281	56882	601	3563.06
7	September	56882	57483	601	3508.72
8	October	57483	58222	739	4301.34
9	November	58222	58878	656	3871.56
10	December	58878	59641	763	4431.01
11	January	59641	60340	699	4068
12	February	60340	60930	590	3497.67

**Meter No 1111404872**

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	48396	48396	0	166.39
2	April	48396	48396	0	148.18
3	May	48396	48396	0	136.43
4	June	48396	48396	0	-42.97





# Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



5	July	48396	48399	3	112.18
6	August	48399	48399	0	149.54
7	September	48399	48399	0	137.79
8	October	48399	48399	0	157.18
9	November	48399	48399	0	135.94
10	December	48399	48399	0	152.49
11	January	48399	48400	1	153.89
12	February	48400	48470	70	528.23

## Meter No 1111401049

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	2662.3	4042.7	1380.4	9517
2	April	4042.7	5149.2	1106.5	8163.72
3	May	5149.2	5149.2	0	2696
4	June	5149.2	5149.2	0	2696
5	July	5149.2	5182.9	33.7	2862.5
6	August	5182.9	5203.7	20.8	2798.3
7	September	5203.7	5225.1	21.4	2801.74
8	October	5225.1	5235	9.9	2744.92
9	November	5235	5260	25	2821.5
10	December	5260	5330	70	3039.89
11	January	5330	5333	3	
12	February	5333	5394.4	61.4	2999

## Meter No 1111401050

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
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# Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



1	March	110389	112252.5	1863.5	12809.59
2	April	112252.5	113417.7	1165.2	9461.25
3	May	113417.7	114085.7	668	7004.5
4	June	114085.7	114617.3	531.6	6429.46
5	July	114617.3	115249.7	632.4	6327.51
6	August	115249.7	116140.9	891.2	7909.76
7	September	116140.9	117753.9	1613	11673.63
8	October	117753.9	119468.9	1715	12177.82
9	November	119468.9	120894.8	1425.9	10749.37
10	December	120894.8	123071.3	2176.5	14458.09
11	January	123071.3	125001.2	1929.9	
12	February	125001.2	127700.4	2699.2	17040.75

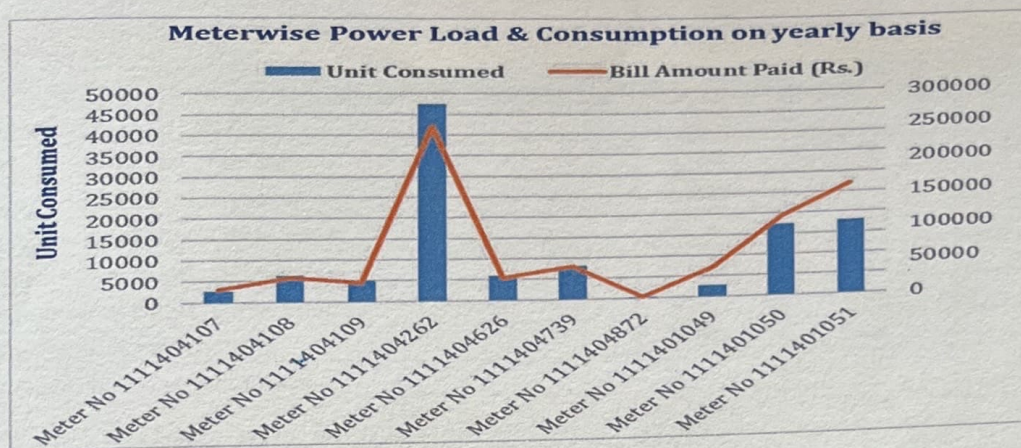
## Meter No 1111401051

S.NO	Description	Old Reading	Meter Reading	consumed unit	Amount
1	March	67337.5	69245.1	1907.6	16500.94
2	April	69238.1	69839	600.9	
3	May	69839	69548.3	-290.7	6674.8
4	June	69548.3	70073	524.7	7791.24
5	July	70073	70710.6	637.6	9927.42
6	August	70710.6	71243.1	532.5	9363.42
7	September	71243.1	72902.3	1659.2	15215.22
8	October	72902.3	74397.1	1494.8	14364
9	November	74397.1	76294.1	1897	16444
10	December	76294.1	79050	2755.9	20992
11	January	79050	82183.7	3133.7	22219



12	February	79171	82183	3012	22219
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### Yearly Power Load and Billing Cost



**Fig. Graphical Presentation of yearly Power Load/ Consumption and Billing cost**

**Table: Yearly Power Load/ Consumption and Billing cost**

Energy Meter	Unit Consumed	Charges per unit @ 4.70	Bill Amount Paid	Surcharges
Meter No 1111404107	2666	12530.2	18739	6208.8
Meter No 1111404108	6270	29469	34632	5163
Meter No 1111404109	5165	24275.5	27628	3352.5
Meter No 1111404262	47532	223400.4	251674	28273.6
Meter No 1111404626	5861	27546.7	32205	4658.3
Meter No 1111404739	8167	38384.9	47650	9265.1
Meter No 1111404739	8167	38384.9	47650	9265.1
Meter No 1111404872	74	347.8	1935	1587.2
Meter No 1111404872	74	347.8	1935	1587.2
Meter No 1111401049	2732	12840.4	43141	30300.6
Meter No 1111401049	2732	12840.4	43141	30300.6
Meter No 1111401050	17311	81361.7	116042	34680.3
Meter No 1111401050	17311	81361.7	116042	34680.3
Meter No 1111401051	17865	83965.5	161711	77745.5
Meter No 1111401051	17865	83965.5	161711	77745.5
<b>Yearly Paid Amount</b>			<b>735357</b>	<b>201234.9</b>

### Estimation of Electrical Load

Computer lab 1-2, Office, Staff Room				
S. No	Description	Running Load	Intermediate Load	Standby Load
1	Lighting Load	1100	1720	180



38	Coffee Machine		100	
	<b>Total Load</b>	<b>720</b>	<b>490</b>	<b>0</b>
Library				
39	Lighting Load	7164		
40	Other Load	100	100	
	<b>Total Load</b>	<b>7264</b>	<b>100</b>	<b>0</b>
Yard (Campus Lights)				
41	LED Flood Light 100W	2000		
42	LED 20W Bulb	120		
	<b>Total Load</b>	<b>2120</b>	<b>0</b>	<b>0</b>
Hostel				
43	Lighting Load	6791	6963	540
44	Exhaust Fan	300		
55	Geyser	38000	38000	22000
46	Iron (Press)	800	400	
47	Heater 1500W	16500	24000	9000
48	Other Load	225	200	200
49	Pantry	6600	650	
	<b>Total Load</b>	<b>69216</b>	<b>70213</b>	<b>31740</b>
Canteen				
50	Lighting Load	120	180	
51	Exhaust Fan	75		
52	Geyser	2000		
53	Pantry	680		
	<b>Total Load</b>	<b>2875</b>	<b>180</b>	<b>0</b>

Total Lighting Load	37 KW
Conventional Light	4.1 KW
CFL Light	25 KW
LED Light	7.4 Kw
Heaters	72 KW
Geyser	10 KW
Office Equipment & Other Load	25.5 Kw
Misc. Load	15 KW

## Key Findings and Observations of Energy Use

The base of energy audit is that its findings are supported by documents and verifiable information. The audit process seeks, on a sampled basis, to track past actions, activities, events, and procedures to ensure that they are carried out according to systems



requirements and in the correct manner. Energy audits form a part of a process. Although they are individual events, the real value of energy audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time.

Although audits are carried out using policies, procedures, documented systems and objectives as a test, there is always an element of subjectivity in an audit. The essence of any energy audit is to find out how well energy management equipment is performing. Each of the three components are crucial in ensuring that the organizations energy performance meets the goals set in its energy policy.

## Costing of Energy Consumption:

- ✚ Electricity charges Rs.7,35,358/month
- ✚ Number of Generators =2 Nos. (250kVA &63kVA)
- ✚ Cost of generator fuel = Rs.10,000 /month
- ✚ **Total cost of energy consumed =Rs. 7,45,358/month**

## Equipment Load of College

College (Meter No. 1 & Meter NO. 2)	
Sr. No.	Name of the Equipment
1	Laptop (18)
2	Heater (14)
Geography Lab (Meter NO. 2)	
Sr. No.	Name of the Equipment
1	Tracing Table (2)
2	Globe (2)
3	Overhead Projector (1)
4	Desktops (9)
5	Printer (1)
6	Smart Board (1)
Music (Meter NO. 8)	
Sr. No.	Name of the Equipment
1	Digital Tanpura
2	Desktop
Psychology Lab (Meter NO. 3)	





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



Sr. No.	Name of the Equipment
1	Depth Perception Apparatus
2	Memory Drum
3	Mirror Drawing Apparatus
4	Steadiness Tester
5	Human Maze Learning
6	Division of Attention Board
7	Colour Mixture Apparatus
8	Tapping Board
9	reaction Time Apparatus
<b>Zoology Lab (Meter NO. 2)</b>	
Sr. No.	Name of the Equipment
1	Trinocular Olympus Microscope
2	Binocular Light Microscope
3	Stereo Zoom Trinocular Microscope
4	Incubator
5	Geyser
<b>Computer Lab (Meter NO. 1)</b>	
Sr. No.	Name of the Equipment
1	UPS (Desktop-69), Firewall, Server, Router, Printer Connected
2	Projector
3	Visualizer (1)
<b>Physics Lab (Meter NO. 2)</b>	
Sr. No.	Name of the Equipment
1	Ionization Pot.
2	Dielectric Constant
3	Hysteresis Loop
4	Digital Storage Oscilloscope
5	Varic
6	Hot air Sterilizer Oven
7	Charge & Discharge Of Capacitor
8	Milikan Oil Drop
9	Rectifier
10	LCR



11	Na Lamp
12	Hg Lamp
13	Planks Constant Using LED
14	Network Theorem
15	Fet Characteristics
16	Thermistors Characteristics
17	Semi-Conductor Diode
18	e/m Helical Method
19	e/m by Magnetron valve method
20	Charging Discharging Of Capacitor
21	Transistor Characteristics
22	Frequency of AC Supply Using Vibrator
23	Wavelength Of Laser Light
24	Zener Diode
25	Over Head Projector
26	Slide Projector
27	Amplifier Model OPA/3
28	Energy Gap
29	Flashing & Quenching
30	Kelvin Bridge
31	Hartley Oscillator
32	PN Junction Diode
33	Common Emitter Amplifier
34	Function Generator
35	Lee Disc Using 1000W heater
36	Semiconductor Diode
<b>Microbiology/Biotech Lab (Meter NO. 2)</b>	
Sr. No.	Name of the Equipment
1	Laminar Air Flow Chamber
2	Distillation Plant
3	Autoclave
4	Hot air Oven
5	Micro Centrifuge Machine
6	Water Bath





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



7	Refrigerator (2)
8	Magnetic Stirrer cum Hot Plate
9	Electronic Weighing Balance
10	Gel Doc System
11	Orbital Shaking Incubator
12	Thermocycler
13	Electrophoresis Unit
14	High Speed Centrifuge
15	Vortex machine
16	Laptop
17	Spectrophotometer UV-Visible
18	pH Meter
19	BOD Incubator
20	Deep Freezer
21	Incubator Shaker

**Chemistry (Meter NO. 2)**

Sr. No.	Name of the Equipment
1	Conductivity meter (3 UNITS)
2	PH meter (2 UNITS)
3	Colorimeter (2 UNITS)
4	Magnetic Stirrer (4 UNITS)
5	Melting Point Apparatus (2 UNITS)
6	Hot air oven ( 2 UNITS)
7	Electric shaker
8	Electric Geyser
9	Flame photometer
10	UV/VIS Spectrophotometer
11	Muffle furnace
12	Electric Heater (2 UNITS)
13	Analytical Balance (2UNITS)
14	Water Bath

**Botany (Meter NO. 2)**

Sr. No.	Name of the Equipment
1	Laminar Air Flow





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



2	Hot plate
3	UV- Spectrophotometer
4	Refrigerator (1)
5	Research Binocular microscope
6	Research Binocular microscope
7	Projector
8	Water bath
9	Medical Centrifuge
10	Digital Balance
11	Oven
12	Autoclave
13	Printer

### Power Saving Measures adopted by College

- Solar Geysers installed in hostels
- Manual turn off electrical equipment's when not in use.
- Master switches installed outside rooms in hostels & Class Rooms.
- CFLs are being replaced by more efficient LEDs
- Use computers and electronic equipment's in power saving mode





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### Recommendations for Energy Management



## Recommendations for Energy Management

Based on the analysis of the power consumption data, certain steps have been recommended for improving energy efficiency of the campus. Complete cost analysis of implementation of recommended measures has been performed wherever necessary. Also, a number of general measures for energy efficiency have been listed. As described below are some important recommendations for better energy efficiency with *Low / No Investment* {Immediate Replacements}

### Replacing CFLs with LEDs lamps

Dominant light source at most places in the campus is traditional 23W CFLs. As per our data collection, the campus has 300. CFLs. If these CFLs are replaced by LEDs 10-12W power can be saved per CFL as:

#### Cost Analysis of Replacing CFLs with LEDs

- Total No. of CFLs in Campus = 300
- Average Power of CFL = 23W
- Average Power of LED= 12W
- Power saved per LED=  $(23-12)W = 11W$
- Total Power saving =  $300 \times 11W = 3300W = 3.3Kw$
- Average Use of CFL per year =  $270 \times 7h = 1890 h$
- Total Energy saved per year =  $3.3 \times 1890 kWh = 6237kWh$
- Saving in Rs. Per year =  $6237 \times 4 = Rs. 24,948$
- Average Cost of Replacing each CFL = Rs. 110
- To total Cost of Replacing all CFLs =  $300 \times 110 = Rs. 33,000$
- Capital Cost Recovery time =  $(33000/24948) = 1.322 yr$

Hence, the capital cost recovery time for replacing all CFLs of the campus is around 1.322 years is *Medium Investment / Short Term Ref* Placements.

### Replacing the LCD monitors with LED monitors

Computers with LCD monitor are 50 in total used in the college. On an average LCD monitors consume 150W while LED monitors consume only 50W. This saving of 100W per monitor





is very large. But the LED monitor is also costlier by Rs. 2000.

### Cost Analysis of Replacing LCD monitors with LED monitors

- Total no. of computers with LCD monitors in Campus = 50 Nos.
- Power consumption by each LCD monitor = 150W
- Power consumption by each LED monitor = 50W
- Power saved by LED monitor =  $150W - 50W = 100W$
- Total Power saving =  $50 \text{ Nos.} \times 100W = 5000W = 5.0 \text{ kW}$
- Average use of computers per year =  $6h \times 270 \text{ days} = 1620h$
- Total Energy saved per year =  $5 \text{ kW} \times 1620h = 8100 \text{ kWh}$
- Cost saving per year =  $8100 \times 4 = \text{Rs. } 32,400$
- Average Cost of Replacing each Monitor = Rs. 5,000
- Total Cost of Replacing all monitors =  $50 \text{ Nos.} \times \text{Rs. } 5000 = \text{Rs. } 2,50,000$
- Capital Cost Recovery time =  $2,50,000 / 32400 = 7.8 \text{ yr}$

The capital cost recovery time for replacing LCD monitors by LED monitors is 7.8 years. Since the product life is much more hence, the move is economically beneficial.

### Use of Master Switch outside each Room

Installation of a master switch outside a room can make it easy for a person to switch off all the appliances of a room in case someone forgets to switch off while leaving the room. This can help improving energy efficiency.

### Use of Motion Sensors in Toilets

Toilets have large potential of saving energy by use of automation tools. Motion sensors can be used there to automatically switch on the light when there is any movement and switch off the light when there is no movement. This can greatly reduce the total load in toilets, each toilet has 4 tube lights in average. There will be 2 sensors required in a toilet

Cost analysis of Installing Motion Sensors in a Typical Toilets:

- Approx. number of tube lights in a Toilets = 40
- Average power of the tube lights = 40W



- Average number of motion sensors required = 2
- Average reduction in usage per day by motion sensor = 4h
- Total energy saved in Toilets per year =  $(40 \times 40 \times 2 \times 365) / 1000 = 1168 \text{ kWh}$
- Saving in Rs. Per year =  $1168 \times 4 = \text{Rs. } 4672$
- Cost of installation per motion sensor = Rs. 250
- Total cost of installing motion sensors in Toilets =  $20 \times 250 = \text{Rs. } 5000$
- Capital Cost Recovery Time =  $(5000 / 4672) = 1 \text{ yr}$

Hence, the capital cost recovery time for installing motion sensors in toilets is 1 years. Hence, this is a highly recommended step to largely reduce the consumption in toilets.

*High Investment / Long Term Replacement*

**Energy substitution (electrical energy to solar energy)**

As we know in campus there is a huge consumption of electrical energy which is not economical so instead of using electrical energy, we switch to alternate energy source which is solar energy.





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



## **Consolidation of Audit Findings**





### Consolidation of Audit Findings

- The communication process for awareness in relation to energy conservation is found adequate.
- Average power factor of 0.9 is maintained
- Assessment of electrical load calculation has been done by the college.
- Annual use of electricity in the college (Rs. 7,35,358/- per year) is much high.
- Objectives for reducing energy, water and fuel consumption are insufficient
- Adoption of energy efficient equipment's by replacing LCD with LED monitors, replacing conventional tube lights with LED lights and the old non-energy efficient fans and bulbs with energy efficient appliances.
- Regular monitoring of equipment's and rectification of any problems is being done.
- Adoption of green energy resources (i.e. solar and or wind power stations) for the objective of energy conservation with sustainable development and to reduce carbon footprints.
- Isolate the leech Loads from power when not in use.
- Recommend the centralized HVAC system instead of Individual Room Heater and AC.
- Establish Energy Efficiency and Conservation steering committee to take with energy efficiency initiative and management within the building.

### Post audit phase

#### Follow Up and Action Plans

Energy audits form a part of an on-going process. Innovative energy saving initiatives has to be designed and implemented every year to make the college environmentally sustainable. Follow up programs of energy auditing recommendations should be done meticulously before the next audit.

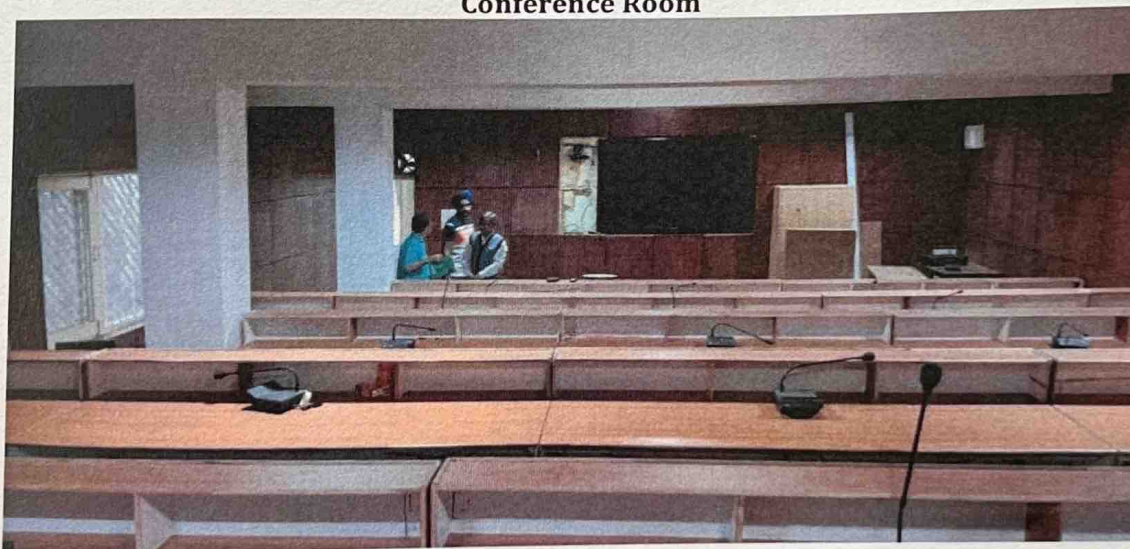


### Photographical view of Audit

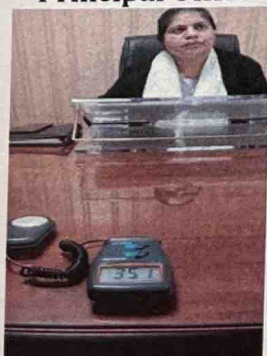
Auditorium



Conference Room



Principal Office



Computer Lab





**Chemistry Lab**



**Physics Lab**



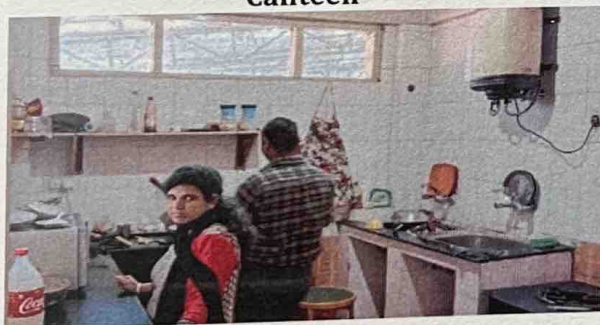
**Lab Equipment**



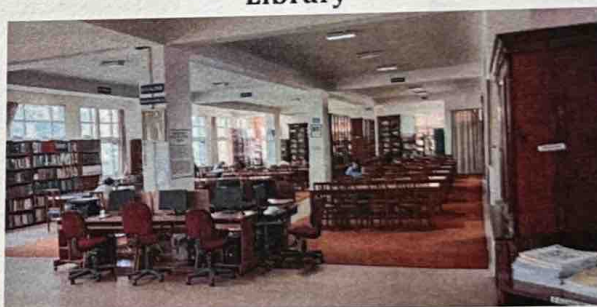
**Computers**



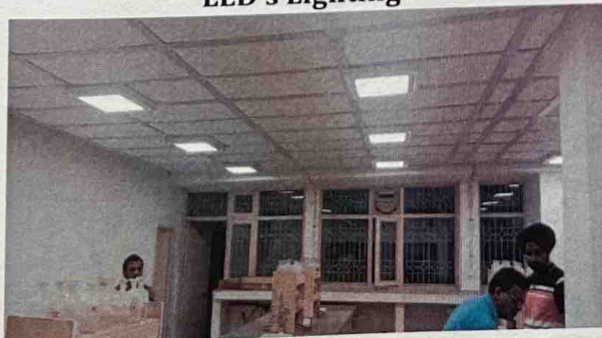
**Canteen**



**Library**



**Lighting Arrangement**  
**LED's Lighting**



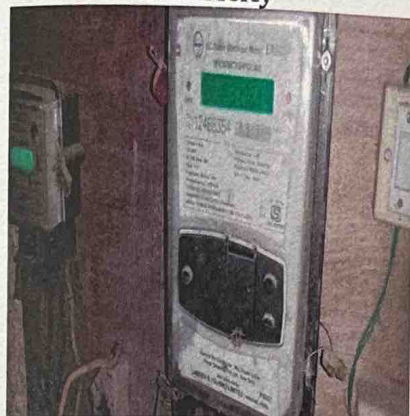
**Convictional Tube Lighting**





## Source of Energy

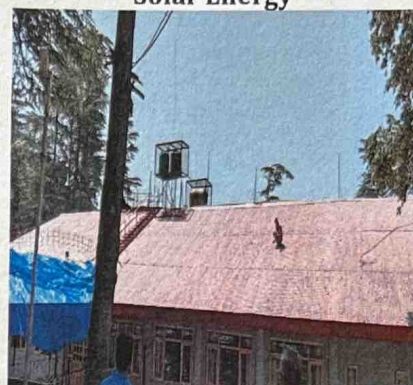
### Electricity



### DG Set



### Solar Energy

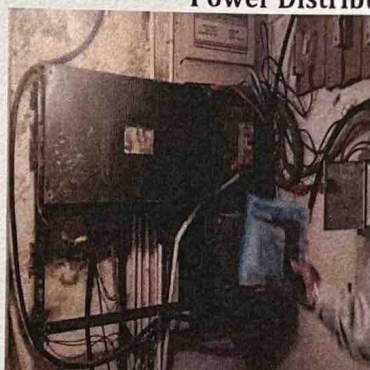


## Power System

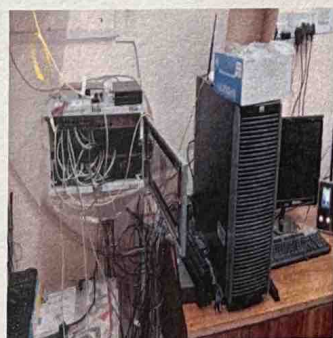
### Meter Box



### Power Distribution - Box & Panel



### Networking



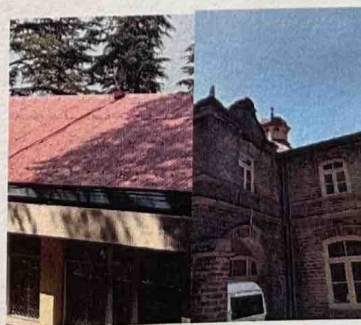
### Battery Bank for Networking



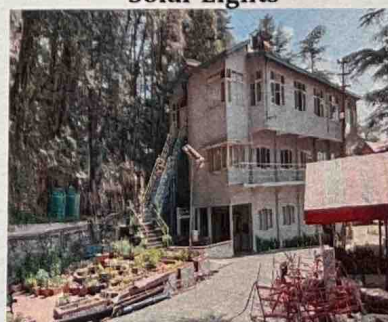
### Camera



### Light Arrestors



### Solar Lights







**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



## **Preparation of Action Plan**



### Preparation of Action Plan

There should be Committee formation for energy Audit, Green Audit and Environmental Audit involving Faculties and Students. Policies referring to institute's management and approach's towards the use of resources need to be considered. The institute should have a green policy/environmental policy for its sustainable development. The environmental policy formulated by the management of the institute should be implemented meticulously. The institute should have a policy on awareness raising or training programs (for ground staff or kitchen staff for example) and institute also should have a procurement policy (the Institute's policy for purchasing materials).

Green Audits are exercises which generate considerable quantities of valuable management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organization and that action plans and implementation programs result from the findings. Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organizational priorities and the passing of time.

### Exit Meeting

The exit meeting was conducted jointly by experts of Eco Laboratories and team members of College. It was a mechanism to provide the management and staff a broad feedback on the preliminary findings of the audit team before completing the audited report. The exit meeting was held in the College on 5<sup>th</sup> May 2022. Clarification on certain information gathered was sought by the audit team from the management and staff of the College.



**Fig. 20: Team of Experts during Energy Audit of College Campus**





### **Draft Audit Report**

The information gathered by the audit team was consolidated as a draft audit report. This draft report was then circulated to the audit team and those directly concerned with the audit to check the report for accuracy. The draft green audit report was also discussed in the exit meeting.

### **Final Audit Report**

The final audit report is the corrected final document which contains the findings and recommendations of the audit. It will also form one of the bases of future audits because the information it contains informs some of the tests and analyses that need to be performed in the future. Final Audit Report was submitted to the Principal/ Director of the institute.

### **Follow Up and Action Plans**

Energy audits form a part of an on-going process. Innovative green initiatives have to be designed and implemented every year to make the institute energy efficient and environmentally sustainable. Follow up programs of green auditing recommendations should be done meticulously before next audit.

### **Next Audit**

In order to promote continuous improvement, it is recommended to conduct the next audit including green auditing during the year 2024.

### **Transparency of Audit Report**

The energy audit report is one of the useful means of demonstrating an organization's commitment to openness and transparency to save energy and environment. If an organization believes it has nothing to hide from its stakeholders, then it should feel confident enough to make its green audit reports freely available to those who request them. It has been recommend that next time the institute should go for a comprehensive "Green audit" for energy and environmental conservation with sustainable development and reports should be made available to all stakeholders.





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### About Eco Group (Consultant)





## ABOUT ECO GROUP

Eco Group is North India's reputed environmental organization Headquartered in Mohali (Chandigarh) that offers consultancy and environmental-related turnkey solutions for overall pollution abatement and sustainable development. We are a professional engineering firm with National level consultancy approved by QCI/ NABET and Environmental and Mechanical testing laboratory approved by MoEF&CC, NABL(ISO/IEC 17025:2017) and state boards.

Eco Group, established in 1998 has designed, engineered and executed more than 1,000 installations of Water, Domestic Sewage and Industrial Effluent Treatment Plants. With the help of our state-of-the-art technologies and apt infrastructure, we are proud to maintain an impeccable quality record, owing to our customer satisfaction levels. These treatment plants operate with the help of trained staff, including Sewage Treatment Plants (STPs), Effluent Treatment Plants (ETPs), Reverse Osmosis Plants (ROs), etc. In the last 20 years, we have undertaken several projects successfully and have created sustainable solutions to environmental issues.

Eco Group has two major business divisions as Eco Paryavaran Engineers & Consultants Pvt. Ltd. and Eco Laboratories & Consultants Pvt. Ltd. The former caters to consultancy and providing engineering solutions for environmental pollution whereas the latter pertains to the analytical and consultancy services in the field of lab studies. Eco Paryavaran is North India's leading supplier of pollution control equipment with world-class infrastructure.

Eco Laboratories is NABL (National Accreditation Board for Testing and Calibration Laboratories) accredited for ISO/IEC 17025:2017, approved by Ministry of Environment, Forest and Climate Change (MoEF&CC) & State Pollution Control Board (SPCBs) in the field of air, noise, wastes, water/wastewater testing including microbiological testing. Eco Laboratories & Consultants Pvt. Ltd. is also Government approved for ISO 9001:2015, ISO 14001 and OHSAS-18001:2007 and Environment Management Services (EMS) accredited by National Accreditation Board for Education and Training (NABET).



**Table 14: Special Facility of Eco Group for Environmental Testing & Management**

**Onsite Environmental Testing**

Mobile Testing Laboratory



**Flue Gas Emissions from Stack/ Source/ Duct**

Flue Gas Analyzer – MRU, Optima 7



**Aerosol Dust in Ambient/ Indoor/ Work zone Environment**

(TSI Side Pak™ AM520i Real Time Aerosol Sampler for PM<sub>10</sub>, PM<sub>5.0</sub>, PM<sub>2.5</sub>, PM<sub>1.0</sub> and PM<sub>0.8</sub>- DPM), Intrinsically Safe



**VOCs & Toxic Gases in Ambient/ Indoor/ Work zone Environment**

Real Time VOC/Toxic Gas Meter (PID) - TIGER PhoCheck, Ion Science, UK, Intrinsically Safe



**Validation of Indoor Environment in Hospitals/ Operation Theaters**

As per ISO 14664 standard, services are delivered as Air Change/ Ventilation Rate, Air Velocity at filtration unit, Pressure Differential, Validation of HEPA Filters by DOP /POA testing, Temp. and Humidity



**Noise & Vibration Monitoring**

Sound level meters and octave brands



**Noise Dose Monitoring in Work Zone Environment**

Noise Dosimeter – SVANTEK SV104IS, Intrinsically Safe



**Calibration of Online CEMS (Emission/ Effluent)**

Calibration for Particulate Matter (Emissions) & pH, BOD, COD, TSS (Effluents)



**Milk Powder Emission Loss Monitoring in Dairy Industry**

Quantification of Milk Powder Emission Loss form Milk Dryers/ Fugitive Emissions/ General Leakage



**Carbon Monoxide (CO) in Ambient/ Indoor/ Work zone Environment**

Real Time NDIR CO Monitor - Horiba APMA-370



**Industrial Hygiene & Occupational Health and Safety Study in Work zone Environment**

Industrial Hygiene, Ventilation Rate, Heat Stress, Health and Safety Study as per OSHA/ NIOSH/ Indian Factories Act, 1948







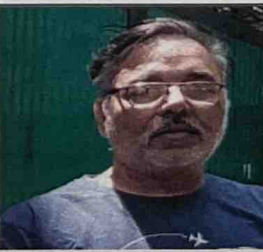
**Biohazard Testing**

Air Quality Testing for Bacteria. Yeast & Mould Count





**Table 15: Team of Experts for the Study**

S. No.	Name of Expert	Role of Expert	ID of Expert
1.	<b>Dr. Sandeep Garg</b> (Ph. D. & ME in Env. Sc., BE in Civil)	<b>Managing Director</b> <ul style="list-style-type: none"> <li>▪ NABL approved authorized signatory</li> <li>▪ MoEF&amp;CC approved govt. analyst</li> <li>▪ NABET approved EIA Coordinator &amp; Functional Area Expert</li> <li>▪ Chairman IWE &amp; Ex-Advisor, GMADA</li> </ul>	
2.	<b>Dr. Rai Singh</b> (Ph. D. & M. Sc. Env. Sc. P.G. Diploma in Industrial Safety, Health & Env.)	<b>Dy. General Manager (Technical &amp; Environment)</b> <ul style="list-style-type: none"> <li>▪ MoEF&amp;CC approved Govt. Analyst;</li> <li>▪ NABL approved authorized signatory</li> <li>▪ NABET approved Environmental Expert</li> <li>▪ Worked in CPCB (2001-12) as Research Scientist</li> </ul>	
3.	<b>Dr. Ajay Kumar</b>	<b>Chief Technical Officer Quality Manager</b> <ul style="list-style-type: none"> <li>▪ NABL approved authorized signatory</li> </ul>	
4.	<b>Ms. Simranjit Kaur</b> (M.Sc. & M.Phil.; Ph.D. in Solid Waste Management)	<b>Deputy General Manager – EMS &amp; Biological Lab Quality Manager – Analytical Division</b> <ul style="list-style-type: none"> <li>▪ NABL Technical Assessor,</li> <li>▪ NABL approved authorized signatory</li> <li>▪ MoEF&amp;CC approved govt. analyst</li> <li>▪ NABET approved EIA Coordinator &amp; Functional Area Expert</li> </ul>	
5.	<b>Mr. Maninder Preet Singh</b> (Diploma in Electrical & Electronics)	<b>Manager (Projects)</b>	





**Energy Audit Report for St. Bede's College  
(Shimla, Himachal Pradesh)**



## **Approvals of Eco Laboratory**



## Approvals of Eco Laboratory

### NABET ACCREDITATION CERTIFICATE



Quality Council of India

National Accreditation Board for  
Education & Training



**Certificate of Accreditation**

Eco Laboratories and Consultants Pvt Ltd, Mohali

E 207, Phase VIII B, Sector 74, Industrial Area, SAS Nagar, Mohali

The organization is accredited as Category-A under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals- opencast only	1	1 (b)	A
2	Metallurgical industries	8	3 (a)	B
3	Cement plants	9	3 (b)	A
4	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	21	5 (f)	A
5	Distilleries	22	5 (g)	A
6	Sugar Industry	25	5 (j)	B
7	Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
8	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
9	Building and construction projects	38	8 (a)	B
10	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RA AC minutes dated July 02, 2021 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACD/21/1936 dated Sept 10, 2021. The accreditation needs to be renewed before the expiry date by Eco Laboratories and Consultants Pvt Ltd, Mohali following due process of assessment.

Sr. Director, NABET  
Dated: Sept 10, 2021

Certificate No.  
NABET/EIA/2023/RA 0211

Valid up to  
Dec 17, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.



**NABL ACCREDITATION CERTIFICATE**



NABL

National Accreditation Board for  
Testing and Calibration Laboratories

**CERTIFICATE OF ACCREDITATION**

**ECO LABORATORIES AND CONSULTANTS PVT. LTD.**

has been assessed and accredited in accordance with the standard

**ISO/IEC 17025:2017**

**"General Requirements for the Competence of Testing &  
Calibration Laboratories"**

for its facilities at

ECO GROUP, ECO BHAWAN, E-207, INDUSTRIAL AREA, PHASE VIII-B, (SECTOR 74) MOHALI, PUNJAB,  
INDIA

in the field of

**TESTING**

Certificate Number: TC-7477

Issue Date: 01/06/2021

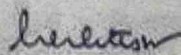
Valid Until:

31/05/2023

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.  
(To see the scope of accreditation of this laboratory, you may also visit NABL website [www.nabl-india.org](http://www.nabl-india.org))

Name of Legal Identity : ECO LABORATORIES AND CONSULTANTS PVT. LTD.

Signed for and on behalf of NABL



N. Venkateswaran  
Chief Executive Officer



**MOEF&CC ACCREDITATION CERTIFICATE**

रजिस्ट्रेशन नं. डी० एन०-33004/99

REGD. NO. D. L.-33004999

**भारत का राजपत्र**  
**The Gazette of India**

असाधारण  
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)  
PART II—Section 3—Sub-section (ii)

प्राधिकार से प्रकाशित  
PUBLISHED BY AUTHORITY

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नई दिल्ली, बुधवार, फरवरी 28, 2018/फाल्गुन 9, 1939

No. 258]

NEW DELHI, WEDNESDAY, FEBRUARY 28, 2018/PHALGUNA 9, 1939

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

वसिष्ठना

नई दिल्ली, 26 फरवरी, 2018

**NOTIFICATION**

New Delhi, the 26th February, 2018

S.O. 857(E).—In exercise of the powers conferred by clause (b) of sub-section (1) of section 12 and section 13 of the Environment (Protection) Act, 1986 (29 of 1986), read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the erstwhile Ministry of Environment and Forests, number S.O. 1174(E), dated the 18<sup>th</sup> July, 2007, namely: -

In the Table appended to the said notification, -

(i) for serial numbers 1,17,24,26,30,39,41,45,81,86,87,93,94,95,96 and 100 the entries relating thereto, the following serial numbers and entries shall be substituted, namely: -

S.No.	Name of the Laboratory	Name of the Govt. Analyst	Recognition with effect from and valid up to
(1)	(2)	(3)	(4)
1	M/s Mantec Consultants Pvt. Ltd. D-36, Sector-VI, Noida-201301, Uttar Pradesh	(i) Mr. Gaja Nand Mallick (ii) Dr. Vivek Dwivedi (iii) Mr. Sumit Verma	26.02.2018 to 25.02.2023
17	M/s Idma Laboratories Limited	(i) Mr. Ankush Aggarwal	26.02.2018



[भाग II-खण्ड 3(ii)]

भारत का राजपत्र : असाधारण

5

	391, Industrial Area, Phase-I, Paunchkula-160019, Haryana	(i) Mr. Niranjan Dev Behl (ii) Dr. Rajendra Kumar Jain	to 25.02.2023
24	M/s Newcon Consultants & Laboratories Pvt. Ltd. 8th K.M. Stone, Delhi Meerut Road, Merta (Opp. Manan Dham Mandir), Ghaziabad-201003, Uttar Pradesh	(i) Mr. Pankaj Gupta (ii) Mr. Amit Kumar Singh (iii) Mr. Intekhab Khan	26.02.2018 to 25.02.2023
26	M/s Klean Laboratories & Research Pvt. Ltd. 402, Parushottam Plaza, Opp. Baner Telephone Exchange, Baner Road, Pune-411045, Maharashtra	(i) Mr. Vishwas Waman Kale (ii) Mr. Sanjay Kamalakar Mardikar (iii) Ms. Manjusha Gaikwad	26.02.2018 to 25.02.2023
30	M/s Lawn Enviro Associates, "Lawn House" #184-C, Vengalrao Nagar, Hyderabad-500038, Telangana	(i) Mr. Devireddy Nagarajuna Reddy (ii) Ms. Chevula Anuradha (iii) Ms. Vangani Pallavi	26.02.2018 to 25.02.2023
39	M/s Team Test House, (A Unit of Team Institute of Science & Technology Pvt. Ltd.) G-1-584, RIICO Industrial Area, Sitapura, Jaipur-302022, Rajasthan	(i) Mrs. Kavita Mathur (ii) Mr. Kedar Nath Mukhopadhyay (iii) Mr. Rajesh Mabeshwari	26.02.2018 to 25.02.2023
41	M/s Envirochem Research & Test Labs Pvt. Ltd. HIG-79, Sector-E, Aliganj, Lucknow-226024, Uttar Pradesh	(i) Dr. Madan Mohan Agarwal (ii) Sh. Vivek Kumar Gupta (iii) Mrs. Saroj Singh	26.02.2018 to 25.02.2023
45	M/s Mineral Engineering Services 25/XXV, Club Road, Bellary-583103, Karnataka	(i) Mr. M. Sachin Raju (ii) Mr. M.R. Durga Prasad (iii) Mr. A.D. Yashwanth Arun Murthy	26.02.2018 to 25.02.2023
81	M/s Advanced Environmental Testing and Research Lab Pvt. Ltd. 63/1, Kailash Vihar, Near ITO, City Center-II, Gwalior-474011, Madhya Pradesh	(i) Mr. Rajesh Jain (ii) Dr. Dinesh Kumar Uchcharya (iii) Mr. Arvind Kumar Sharma	26.02.2018 to 25.02.2023
86	M/s Care Labs Plot No. 1, 3rd Floor, Sai Sadan Complex, Shiva Ganga Colony, L.B. Nagar, Hyderabad-500074, Telangana	(i) Mr. K. Srinivasa Rao (ii) Ms. Gouthami Gangula (iii) Ms. P. Mamatha	26.02.2018 to 25.02.2023
87	M/s Green Circle Inc. Green Empire, Anupushpan Habitat Centre, Nr. Yash Complex, Above Axis Bank Ltd., Gotri Main Road, Vadodra-390021, Gujarat	(i) Mr. Pradeep Joshi (ii) Mr. Ram Raghav (iii) Ms. Shital Jashvantsinh Pamar	26.02.2018 to 25.02.2023
93	M/s Eco Laboratories & Consultants Pvt. Ltd. E-207, Industrial Area, Phase- VIII B, Sector-74, Mohali-160071, Punjab	(i) Mr. Sandeep Garg (ii) Ms. Simranjit Kaur (iii) Dr. Deepika Thakur	26.02.2018 to 25.02.2023
94	M/s Hubert Enviro Care Systems Pvt. Ltd. No. 18, 92nd Street, Ashok Nagar, Chennai-600083, Tamil Nadu	(i) Dr. J.R. Moses (ii) Dr. Rajkumar Samuel (iii) Mr. A.K. Natarajan	26.02.2018 to 25.02.2023
95	M/s Nawal Analytical Laboratories Plot No. 100, New SIDCO Industrial Estate, Sri Nagar, Hosur-635109, Tamil Nadu	(i) Mr. D. Balakrishnan (ii) Ms. S. Elamathi (iii) Mr. K.B. Krishnamoorthy	26.02.2018 to 25.02.2023

 **Approved**





**ISO 9001: 2015 CERTIFICATE**

# Certificate of Registration

This is to Certify that  
Quality Management System of

**ECO LABORATORIES AND CONSULTANTS PVT. LTD.**

E-207, INDUSTRIAL AREA, PHASE VIII B (SECTOR-74),  
MOHALI-160071, PUNJAB, INDIA

has been assessed and found to conform to the requirements of

## ISO 9001:2015

for the following scope :

TESTING SERVICES IN BIOLOGICAL, CHEMICAL AND  
MECHANICAL CATEGORIES & EIA CONSULTANTS FOR  
PREPARING EIA/ EMP REPORTS

Certificate No : 191QCX58  
Initial Registration Date : 06/05/2019  
Date of Expiry<sup>3</sup> : 05/05/2022  
1st Surve. Due : 06/04/2020

Issuance Date : 06/05/2019  
2nd Surve. Due : 06/04/2021

  
**Director**



ACCREDITED  
Management Systems  
Certification Body  
MSCB-119



**AQC MIDDLE EAST FZE.**

Head Office: E3-1401 E3 Andher Gas Tower, Sheikh Khalifa Bin Zayed Road, 2, Ajman, UAE. e-mail : [info@aqcme.com](mailto:info@aqcme.com)  
Key Location: 401, Middle East Building, 55, Nehru Place, New Delhi - 110029, India.

<sup>3</sup>Validity of the Certificate is subject to successful completion of surveillance audits on or before of due date. The first surveillance audit is not allowed to be conducted, this certificate shall be suspended immediately.

**Certificate Verification:** Please do check the validity of certificate at <http://www.aqcme.com> and follow up on website for details of terms and conditions. Certificate is the property of AQC Middle East FZE and shall be returned immediately when demanded.





**ISO 14001:2015 CERTIFICATE**

# Certificate of Registration

This is to Certify that  
Environmental Management System of

**ECO LABORATORIES AND CONSULTANTS PVT. LTD.**

E-207, INDUSTRIAL AREA, PHASE VIII B (SECTOR-74),  
MOHALI-160071, PUNJAB, INDIA

has been assessed and found to conform to the requirements of

**ISO 14001:2015**

for the following scope :

TESTING SERVICES IN BIOLOGICAL, CHEMICAL AND  
MECHANICAL CATEGORIES & EIA CONSULTANTS FOR  
PREPARING EIA/ EMP REPORTS

Certificate No	: 19IECS58	Issuance Date	: 06/05/2019
Initial Registration Date	: 06/05/2019		
Date of Expiry*	: 05/05/2022		
1st Surve. Due	: 06/04/2020	2nd Surve. Due	: 06/04/2021

Director



ACCREDITED  
Management Systems  
Certification Body  
MSCB-119



**AQE MIDDLE EAST FZE.**

Head Office: E3-HOT E Amber Gem Tower, Sheikh Khalifa Bin Zayed Road, 2, Ajman, UAE. e-mail: [info@aqemiddleeast.com](mailto:info@aqemiddleeast.com),  
Key Location: 403, Madhuban Building, 35, Nehru Place, New Delhi-110019, India.

\*Validity of the Certificate is subject to successful completion of surveillance audits on or before the date of expiry. The first surveillance audit is due within 6 months of the date of expiry. If the organization fails to complete the audit, the certificate shall be suspended/withdrawn.

**Certificate Verification:** Please check the validity of certificate at [www.aqemiddleeast.com](http://www.aqemiddleeast.com) or contact us at [info@aqemiddleeast.com](mailto:info@aqemiddleeast.com) or at our office.  
Certificate is the property of AQE Middle East FZE and shall be returned immediately when demanded.





**ISO 45001: 2018 CERTIFICATE**

# Certificate of Registration

This is to Certify that  
Occupational Health & Safety Management System of

**ECO LABORATORIES AND CONSULTANTS PVT. LTD.**

E-207, INDUSTRIAL AREA, PHASE VIII B (SECTOR-74),  
MOHALI-160071, PUNJAB, INDIA

has been assessed and found to conform to the requirements of

## ISO 45001:2018

for the following scope :

TESTING SERVICES IN BIOLOGICAL, CHEMICAL AND  
MECHANICAL CATEGORIES & EIA CONSULTANTS FOR  
PREPARING EIA/ EMP REPORTS

Certificate No	: 1910CN74	Issuance Date	: 06/05/2019
Initial Registration Date	: 06/05/2019		
Date of Expiry*	: 05/05/2022		
1st Surve. Due	: 06/04/2020	2nd Surve. Due	: 06/04/2021

*[Signature]*

**Director**

**AQC MIDDLE EAST FZE.**



**ACCREDITED**  
Management Systems  
Certification Body  
MSCB-119

Head Office: E-1402 E Amber Court Tower Sheikh Khalifa Bin Zayed Road 3, Ajman, UAE.  
Key Location: 403, Madhusudan Building, 35, Nehru Place, New Delhi - 110019, India. e-mail: info@aqcmiddleeast.com  
Validity of the Certificate is subject to successful completion of surveillance audits on or before of due date. The company shall ensure that it is not allowed to be  
renewed, this certificate shall be suspended/withdrawn.

Certificate Verification: Please do check the validity of certificate at <http://www.aqc.com/verify/certificate.aspx> or <http://www.aqc.com/verify/certificate.aspx>  
Certificate is the property of AQC Middle East FZE and shall be returned immediately when demanded.





## Acknowledgement





## Energy Audit Report for St. Bede's College (Shimla, Himachal Pradesh)



### Acknowledgement

Eco Paryavaran Laboratories and Consultants are thankful to the Management and the Principal of St. Bede's College, Shimla for entrusting processes of energy auditing with us.

We are grateful to IQAC coordinator and the team members of IQAC for initiating the Energy Audit Process.

We thank all the participants of the auditing team especially faculty, students and non-teaching staff who participated with us to gather data through survey and provided all necessary information.

We also thank full to the office staff who helped us during the document verification.

**Prepared By**

*Dr. Rai Singh*  
04/04/2022

**Dr. Rai Singh**

**(DGM Environment)**

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**Approved By**

*Dr. Sandeep Garg*

**Dr. Sandeep Garg**

**(Managing Director)**

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Email: md@ecoparyavaran.org

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\*\*\*\*\* End of Report \*\*\*\*\*