SUSTAINABLE DEVELOPMENT GOAL

7

Affordable and Clean Energy

7.2.4 - Does your university as a body have an energy efficiency plan in place to reduce overall energy consumption?

Yes. Our university has a comprehensive, institution-wide **Energy Efficiency Plan** aimed at systematically reducing overall energy consumption across all campuses, fully aligned with **SDG7 expectations**. The plan outlines clear targets for lowering energy intensity, expanding renewable-energy use, and improving operational efficiency in academic, residential, and administrative buildings. It is grounded in **ISO 50001 energy-management principles**, ensuring a structured approach that includes regular energy audits, baseline assessments, performance monitoring, and continuous improvement cycles. Key strategies include optimizing HVAC operations, upgrading to LED lighting, implementing smart metering and building-management systems, enhancing insulation, and promoting responsible energy use among campus occupants. The plan also mandates energy-efficient procurement practices and encourages renewable-energy integration wherever feasible. Oversight is provided by a dedicated **Sustainability and Energy Committee**, which tracks progress, verifies reductions, and ensures accountability. This structured and proactive approach demonstrates the university's strong institutional commitment to **reducing total energy consumption.**

Policy:

St. PETER'S INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Deemed to be University U/S 3 of the UGC Act,1956)
AVADI, Chennai – 600 054. Tamil Nadu.
Phone: 044-26558080-84
E-mail: registrar@spiher.ac.in
Website: www.spiher.ac.in

Policy on High Energy Efficiency and Reduced Energy Consumption

Policy Created on:	**01/07/2020**	**Approved by:**
Revision 1	**10/02/2024**	**REGISTRAR**

Registrar
St. Peter's Institute of Higher Education and Research
(Deemed to be University U/S 3 of the UGC Act, 1956)
Avadi, Chennai - 600 054.

Directly supported SDGs

- **SDG 7 Affordable and Clean Energy**
- **SDG 13 Climate Action**

Indirectly supported SDGs

- **SDG 9 Industry, Innovation and Infrastructure**
- **SDG 11 Sustainable Cities and Communities**
- **SDG 12 Responsible Consumption and Production**

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Policy on High Energy Efficiency and Reduced Energy Consumption

Introduction

St. Peter's Institute of Higher Education and Research (SPIHER)affirms its long-standing commitment to sustainable infrastructure development through this Energy Efficiency Upgradation Policy. This policy integrates modern technologies, recent regulatory developments, and global best practices to ensure that SPIHER's existing buildings achieve optimal energy performance and environmental sustainability. The policy supports the Institute's broader goal of attaining carbon neutrality by 2035, in alignment with the United Nations Sustainable Development Goals (SDG 7 and SDG 13).

Purpose

This policy aims to strengthen SPIHER's initiatives for energy-efficient retrofitting, refurbishment, and modernization of all existing campus structures. It emphasizes measurable improvements in energy performance, resource optimization, and integration of renewable energy systems. The purpose is to ensure that every building upgrade contributes to a reduction in overall energy consumption, carbon footprint, and operational costs, while maintaining comfort, functionality, and academic excellence.

Scope

This policy applies to all existing buildings within SPIHER's academic, administrative, residential, and laboratory facilities. It covers renovation, retrofitting, maintenance, and modernization works undertaken directly by SPIHER or through partnerships with private contractors. The scope also includes smart energy management systems, renewable integration, and digital energy monitoring platforms.

Updated Policy Standards

- Energy Conservation Building Code (ECBC 2017, amended 2023) – Bureau of Energy Efficiency (BEE), Government of India.

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- ISO 50001:2018 – Energy Management Systems for continuous energy performance improvement.
- ASHRAE Standard 90.1-2022 for benchmarking building energy efficiency.
- National Building Code (NBC 2016) – Energy Efficiency and Sustainability Provisions.
- IGBC/GRIHA 4-Star Rating System for institutional retrofitting projects.

Implementation Framework

- Comprehensive Energy Audits: SPIHER will conduct third-party certified energy audits periodically to identify performance gaps and prioritize retrofit interventions.
- Retrofitting and Modernization: All existing structures will be upgraded using high-performance materials and low-embodied energy technologies, including advanced insulation, daylight harvesting systems, and automated building controls. Outdated electrical and HVAC systems will be replaced with equivalent energy-efficient units.
- Renewable Energy Integration: SPIHER will expand the installation of rooftop solar photovoltaic systems and hybrid energy storage systems to ensure at least 20% renewable energy contribution to the total electricity demand by 2025.
- Sustainable Construction and Material Management: Renovation works will emphasize eco-certified materials, rainwater harvesting integration, and construction waste recycling.

Governance and Accountability

The construction section will coordinate the implementation of this policy, supported by the Energy Efficiency Monitoring Cell under the SPIHER Sustainability Committee.

Performance will be evaluated through key indicators such as Energy Use Intensity (EUI), renewable energy share, and carbon emission reduction per square meter.

Monitoring, Reporting, and Review

SPIHER will conduct periodic reviews to assess progress and identify emerging technologies for adoption. Findings from the reviews will feed into

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the institution's Green and Energy audit Sustainability Report and the Green Campus 2035 Plan. The policy will undergo a major review every two years, incorporating new amendments in ECBC and ISO standards, or as mandated by national energy authorities.

Through this policy, SPIHER continues to demonstrate leadership among Higher Education Institutions in India in promoting energy-efficient modernization and climate-resilient infrastructure. The Institute's systematic approach ensures that every upgrade not only enhances energy efficiency but also contributes meaningfully to a greener, more sustainable future for the SPIHER community.

REGISTRAR

Registrar
St. Peter's Institute of Higher Education and Research
(Deemed to be University U/S 3 of the UGC Act, 1956)
Avadi, Chennai-600 054.

SPIHER received Energy Audit Certificate from third party certification body

NATURE SCIENCE FOUNDATION

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(ISO 9001:2015, 14001:2015, 45001:2018 & 50001:2018 Certified Organization
& Ministry of MSME Registered Organisation)
Coimbatore - 641 004, Tamil Nadu, India. [www.nsfonline.org.in]

Regd. No. 114 / 2017

Ministry of MSME, Govt. of India

ROHS

Certificate of Energy Audit

NSF/ENERGY AUDIT/SPIHER/2022/25

This is to certify that St. Peter's Institute of Higher Education and Research, Avadi, Chennai - 600 054, Tamil Nadu has successfully undergone 'Energy Audit' on 10th March 2022 and assessed the electrical energy conservation, energy saving measures and sustainability in compliance with the applicable regulations, policies and standards in the campus were found to be excellent.

This Certificate is valid till 11th March 2025.
Ref. No: ISO/NSF/SER/R/07

(Dr. S. RAJALAKSHMI JAYASEELAN)
Chairman of NSF
Certified ISO QMS, EMS, EnMS, OHSMS

(Mr. BSC. NAVEEN KUMAR)
Faculty, Mahatma Gandhi National Council for Rural Education Ministry of Higher Education, New Delhi.

(Dr. B. MYTHILI GNANAMANGAI)
Certified Auditor IGBC AP & ASSOCHAM
Indian Green Building Council

(Er. D. DINESH KUMAR)
BEE Certified Energy Auditor
Bureau of Energy Efficiency

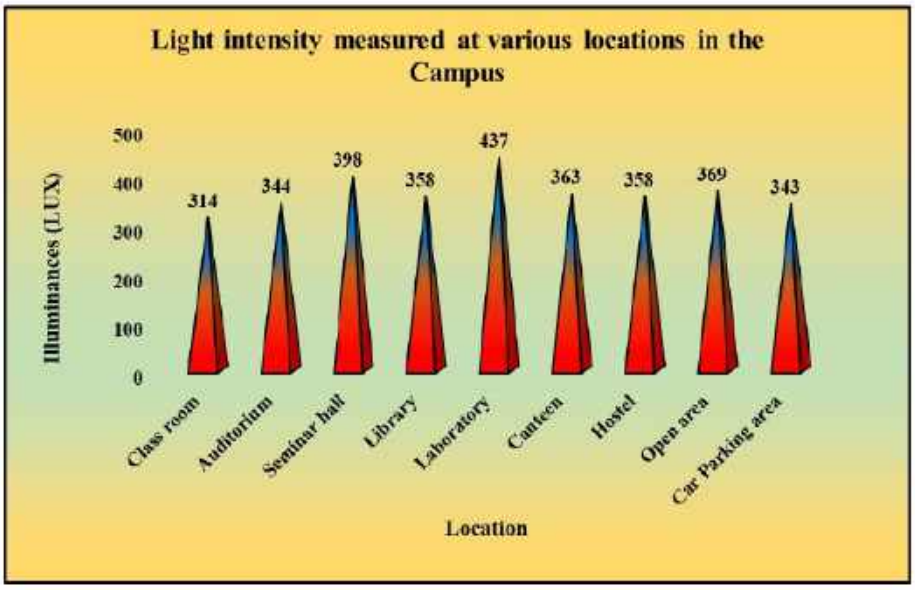


Figure 4. Light intensity Measured at the campus

4.2.8.2. Voltage Measurement at the Campus

Voltage measurement in AC & DC at different places in the campus is measured using the clamp (voltage) meter to reduce the energy consumption.

Table 7. Voltage measured at various locations in the Campus

S.No	Name of the Place	AC & DC Voltage Measurement [Volt (v)]
1.	Class Room (AC)	236
2.	Auditorium (AC)	239
3.	Seminar Hall (AC)	241
4.	Library (AC)	240
5.	Laboratory (AC)	218
6.	Canteen (AC)	240
7.	Power Room (AC)	239
8.	Generator Area (AC)	238
9.	Battery (DC)	240
10.	Solar panel (DC)	238
SD±		1.17

Source: BEE, 2015, Bureau of Energy Efficiency

4.2.8.1. Light intensity measurement at the campus

Light intensity or light output is used to measure whether a particular light source provides enough light for an application needed. There is a well-established light level recommendation for a wide range of applications in lighting industry and also for the type of space. Light intensity is measured in terms of lumens per square foot (foot-candles) or lumens per square meter (lux). A light meter (lux meter) is used to measure the amount of light in a space/on a particular work surface. The light meter consists of a sensor that measures the light falling on it and provides the user with a measurable illuminance reading. Light meters are an especially useful tool for measuring light for safety or over-illumination.

Table 6. Light intensity measured at various locations in the Campus

S. No	Type of Spaces	Illuminances (LUX)
1.	Class room	314
2.	Auditorium	344
3.	Seminar hall	398
4.	Library	358
5.	Laboratory	437
6.	Canteen	363
7.	Hostel	358
8.	Open area	369
9.	Car Parking area	343
	Mean	364.96%
	SE	7.38
	CD	13.16

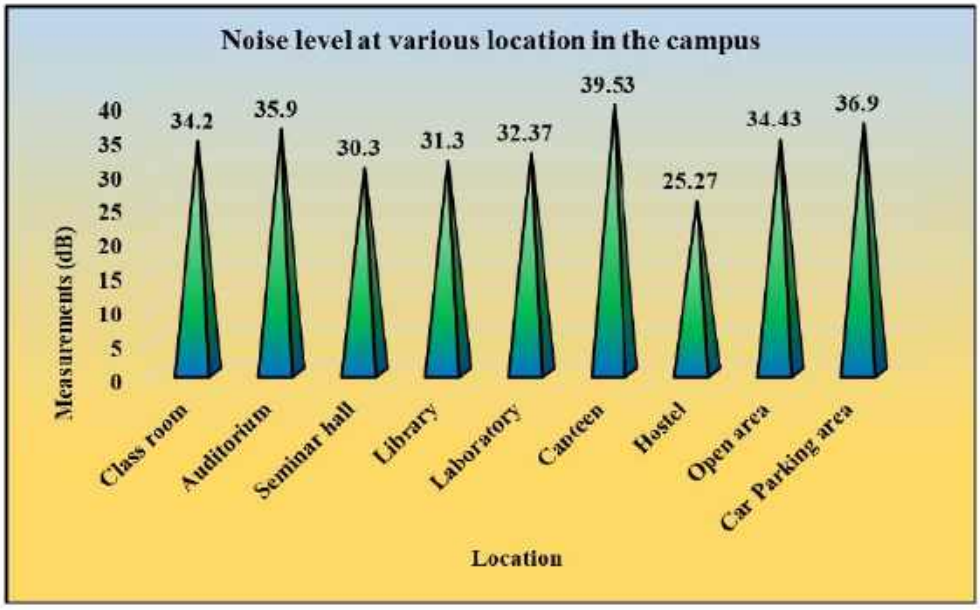
Source: IS: 6665-1972

Light intensity analysis in the Campus

Table 5. Noise level at various location in the campus

S. No	Locations	Measurements (dB)	Major noise sources	Remarks
1.	Class room	34.20	Students and Staff	No Noise Pollution
2.	Auditorium	35.90	Students	No Noise Pollution
3.	Seminar hall	30.30	Students	No Noise Pollution
4.	Library	31.3	Staff members	No Noise Pollution
5.	Laboratory	32.37	Students	No Noise Pollution
6.	Canteen	39.53	Students and Staff	No Noise Pollution
7.	Hostel	25.27	Students	No Noise Pollution
8.	Open area	34.43	Students and staff	No Noise Pollution
9.	Car Parking area	36.90	Vehicles	No Noise Pollution
	Mean	33.36%		
	SE	0.45		
	CD	0.80		

Figure 3. Noise level at various location in the campus



Noise level measured in various locations at the Campus

= 4.38 metric tons

365 is the number of days per year
0.01 is the coefficient to calculate the emission in metric tons per 100 km for bus

a. Transportation per year (Car)

= (Number of cars entering the campus x 2 x approximate travel distance of a vehicle each day inside campus only (in kilometers) x 365/100) x 0.02
= ((5 x 20 x 1 x 365)/100)) x 0.02
= 7.3 metric tons

365 is the number of days per year
0.02 is the coefficient to calculate the emission in metric tons per 100 km car

b. Transportation per year (Motorcycles)

= (Number of motorcycles entering the campus x 2 x approximate travel distance of avehicle each day inside campus only (in kilometers) x 365/100) x 0.01
= ((110 x 20 x 1 x 365)/100)) x 0.01
= 80.3 metric tons

365 is the number of days per year
0.01 is the coefficient to calculate the emission in metric tons per 100 km for motorcycles.

c. Total Carbon emission per year

= total emission from electricity usage + transportation (bus, car, motorcycle)
= (357.28 + 4.38 + 7.3 + 80.3)
= 449.26 metric tons

4.2.8. Noise level measurements (NBC Checkpoint 12.4.4.)

Noise is all unwanted sound or set of sounds that causes annoyance or can have a health impact and noise level is measured in decibels (dB). The body can also respond to lower noise levels. Level of noise are expected tobe within 55 dB in residential areas, including institutions. Class room noise levels aresupposed to be around 50 db. Sound Level Meter / Noise Thermometer are used to measure the noise level in the surroundings which converts the sound signal to an equivalent electrical signal and the resulting sound pressure level in decibels (dB) referenced to 20 µPa. Noise level prescribed by Central Pollution Control Board was presented in the Table 4.

Table 4. Noise level standard prescribed by Central Pollution Control Board, Government of India

Area Code	Zone	Limits in dB (A) Leq	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

Source: IS : 12065 - 1987

Table 3. Annual Energy Consumption of Fuels in the Campus

S. No	Month	Diesel consumption (Liters)	Petrol consumption (Liters)	LPG consumption (kg)
1	September 2024	3368	162	56
2	October 2024	3097	145	56
3	November 2024	2867	152	56
4	December 2024	2463	140	56
5	January 2025	3230	150	51
6	February 2025	2917	156	50
7	March 2025	3298	170	56
8	April 2025	3310	148	56
9	May 2025	3488	145	22
10	June 2025	3023	150	18
11	July 2025	2444	150	56
12	August 2025	2585	151	56

4.2.6. Carbon footprint

The carbon footprint per year is calculated (www.carbonfootprint.com) based on electricity usage per year in which CO_2 emission from electricity and the sum of transportation per year in terms of number of the shuttle buses service operated by the Organization and number of cars, motorcycles and trucks entering in the Organization campus. These factors are multiplied with total number of trips in each day and approximate travel distance of vehicles covered in each day with a coefficient (0.01) to calculate the emission of CO_2 in metric tons per year. Humans contribute to a massive increase of carbon dioxide emissions by burning fossil fuels, deforestation, and other industrial activities.

4.2.7. Calculation of carbon footprint

The carbon footprint analysis can be calculated based on the earlier reports as stated in www.carbonfootprint.com which is the sum of electricity usage per year. According to the data provided by the Management, carbon emission due to electricity consumption and fossil fuels are presented hereunder.

The CO_2 emission from electricity

= (electricity usage per year in kWh/1000) x 0.84, where 0.84 is the coefficient to convert kWh to metric tons

= (425344 kWh/1000) x 0.84

= 357.28 metric tons

According to the above calculations, carbon emission due to electricity usage per year accounts for 357.28 metric tons.

Transportation per year (Shuttle)

= (Number of the shuttle vehicle in the campus x (2) x total trips for shuttle bus service each dayx approximate travel distance of a vehicle each day inside campus only (20 km)x 365/100) x 0.01

= ((6 x 20 x 1 x 365)/100)) x 0.01

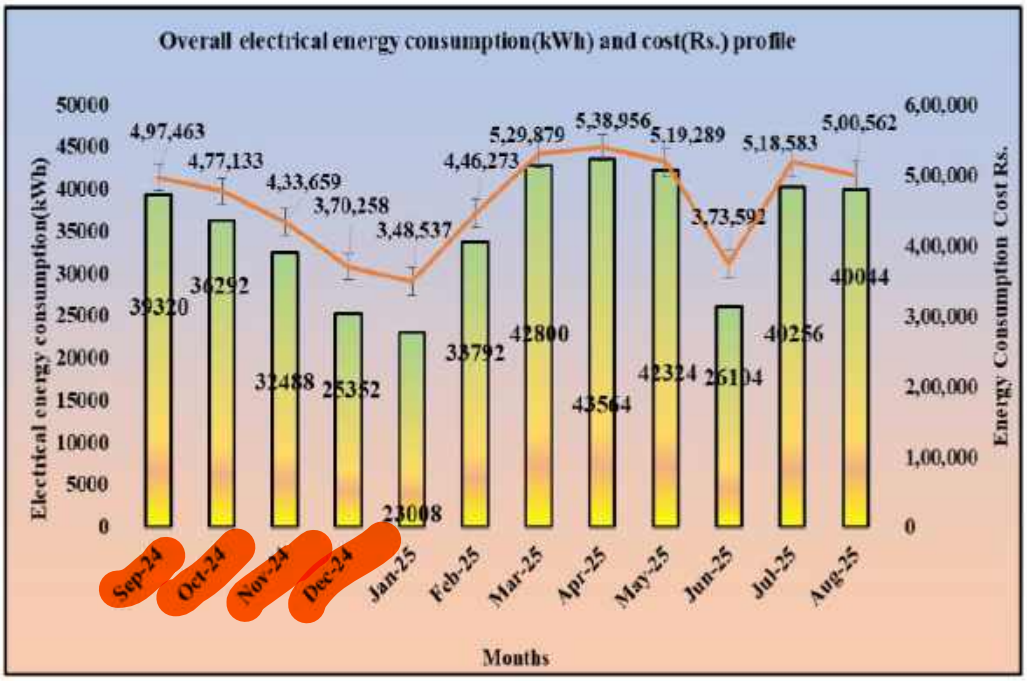


Figure 2. Overall electrical energy consumption and cost profile

Table 2. Electrical energy consumption and cost profile in the Institution

S. No	Months	Rating / Capacity units in kWh	Cost in Rs.
1.	September 2024	39320	4,97,463
2.	October 2024	36292	4,77,133
3.	November 2024	32488	4,33,659
4.	December 2024	25352	3,70258
5.	January 2025	23008	3,48,537
6.	February 2025	33792	4,46,273
7.	March 2025	42800	5,29,879
8.	April 2025	43564	5,38,956
9.	May 2025	42324	5,19,289
10	June 2025	26104	3,73,592
11.	July 2025	40256	5,18,583
12.	August 2025	40044	5,00,562

4.2.5. Power consuming equipment and electrical appliances

Other than electrical energy from grid, energy generated using fossil fuels for the year are presented in the Table 3.

Energy conservation facilities observed in the Campus

4.2.4. Energy consumption and cost profile (NBC Checkpoint 12.3.4.)

The following chart shows the profile of energy consumed and the cost for one year by the auditee (Figures 1 & 2; Table 2).

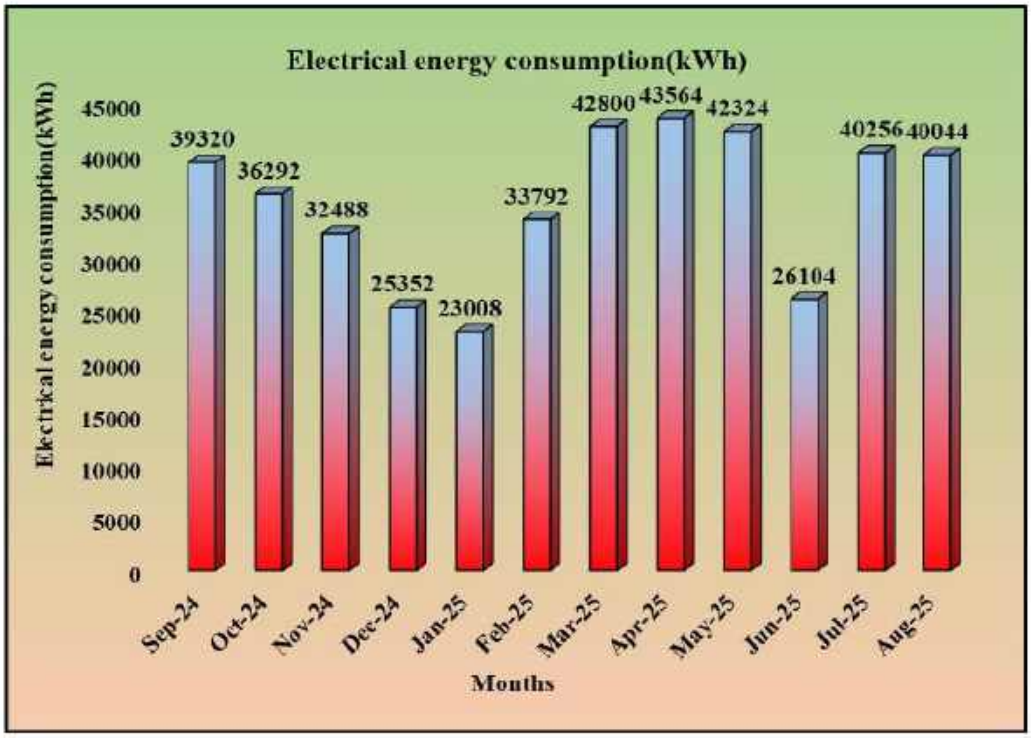


Figure 1. Electrical energy consumption profile

4.2.2. Lighting facilities (NBC Checkpoint 6.2.2 – 6.2.10, 7.1.1.2 and 7.5)

External shading facilities are made based on the sun path to reduce the energy consumption. Day light integration is implemented in the building by placing adequate number of windows. Electrical lighting facilities during day time increases the energy consumption, it is observed that sufficient day lighting facilities are available through windows which in turn reduce the energy consumption bill of the Organization. Artificial lighting facilities are regularly monitored and maintained. In some areas sensor lights are implemented to save energy. External and internal signage lifts are made up of recycled material with maximum light intensity. In the buildings windows head are higher to penetrate day light.

Natural Lighting facilities observed during day time

4.2.3. Building Service Optimization (NBC Checkpoint 11)

To save energy in the buildings there should be a proper plan for HVAC system. In the organization it is observed that adequate natural ventilation is implemented and practices. In some places exhaust fans are used for ventilation especially in the canteen and laboratories. To reduce the heat inside the building shading patterns are maintained by planting trees in and around the campus. Solar panels are implemented at the roof top to reduce the heat and to save energy. Air conditioning are provided at specific areas. Energy conservation plays an vital role in maintaining the sustainability. It is observed that the Organization has replaced all the tube light with CFL / LED lamps, has proper metering and submetering facilities, availability of BEE star rated appliances in Air cooler, lift, AC, generator, etc., Solar water heater and panels are implemented to conserve energy. Instruments and meters are properly maintained and calibrated at regular intervals or annual maintenance plan is observed as one of the energy saving opportunity. Adequate energy saving awareness programmes are conducted to the stakeholders. Emissions and leaks are monitored through operation and maintenance manual.

- Low emitting lights are fixed as per the LPD mentioned in National Building Code (NBC) Part -11(Approach to Sustainability) for safety and comfort.
- External and internal signage lifts are differentiated to conserve energy.
- 'Danger' and 'warning boards' are available near generator and UPS.
- Building Integrated Photovoltaic system like power storage system, backup power supplies, wiring and safety disconnects are available.
- Adequate HVAC and day lighting facilities are observed.
- Outside air is introduced through windows for ventilation in the conditioned spaces.
- Provision of sub meters to monitor energy consumption is not available need to be installed.
- Three star rated appliances (AC, Air cooler, Refrigerator, etc.,) are procured to conserve energy.
- Awareness posters like 'Turn off when not in use', 'Save Energy', etc., to be place to promote awareness for conserving energy in the campus.
- All the artificial lighting system are monitored and controlled through partial availability of sensors.
- No emissions and leaks are observed
- Operation and maintenance manual are observed in the on-site.
- Instruments and equipment are properly calibrated and maintained.
- Noise level observed in the different location resulted in normal range.
- Adequate training and awareness programmes are conducted to the stakeholders for energy conservation.
- To optimize the energy campus has implemented solar panel, operation and maintenance, etc.
- Standard Operating Procedure for electrical instruments are not available in the campus.

4.2.1. Energy Efficient Design and Process (NBC Checkpoint 3.5, 3.6 & 3.8.)

In the campus, it is observed that for lighting, cooling and ventilation renewable sources of energy like solar panel, water heater, etc., are used. Local resources are made available in post occupant stage as per the operation and maintenance plan. Standard Operating Procedures for UPS, AC are available to conserve energy and to avoid damages.

Solar panel observed in the campus

4. ENERGY AUDIT

4.1. Introduction

An energy audit is a survey in which the study of energy flows for the purpose of conservation is examined at an organization. It refers to a technique or system that seeks to reduce the amount of energy used in the Organization without impacting the output. The audit includes suggestions of alternative means and methods for achieving energy savings to a greater extend. Conventionally, electrical energy is generated by means of fossil fuels, hydraulic and wind energy. The availability of fossil fuels and their depletion rate, insist the need for alternate energy systems and conservation of conventional electricenergy. In general, the primary objective of an energy auditing and management of energy consumption is to offer goods or services at the lowest possible cost and with the least amount of environmental impact.

Energy Conservation Building Code (ECBC) is established in the year 2017, which provides minimum requirements for the energy-efficient design and construction of buildings across India. It also provides two additional sets of incremental requirements for buildings to achieve enhanced levels of energy efficiency that go beyond the minimum requirements. Bureau of Energy Efficiency (BEE) came into force in 2002 towards implementation of energy saving practices in an organization. Energy-efficiency labels are information affixed to manufactured products and usually communicate the product energy performance.

BEE Star Rating Scheme is based on actual performance of the building as well as equipment in terms of specific energy usage termed as 'Energy Performance Indicator' by means of star ratings labelled items used which will be useful for energy savings in a sustainable manner (Mishra and Patel, 2016). Energy audit programme provide aid in maintaining a focus on energy price variations, energy supply availability and efficiency, determining an appropriate energy mix, identifying energy-saving technology, retrofitting for energy-saving equipment and so on (Gnanamangai *et al.*, 2021). In general, an energy audit process dealt with the driving energy conservation concepts into reality by giving technically possible solutions within a specified time limit while considering the economic and other organizational issues. It also dealt with the uncover ways to cut operating expenses or reduce energy use per unit of production interms of savings. It serves as a "benchmark" for managing energy in the organization for planning more energy-efficient use across the board.

4.2. Energy audit observations

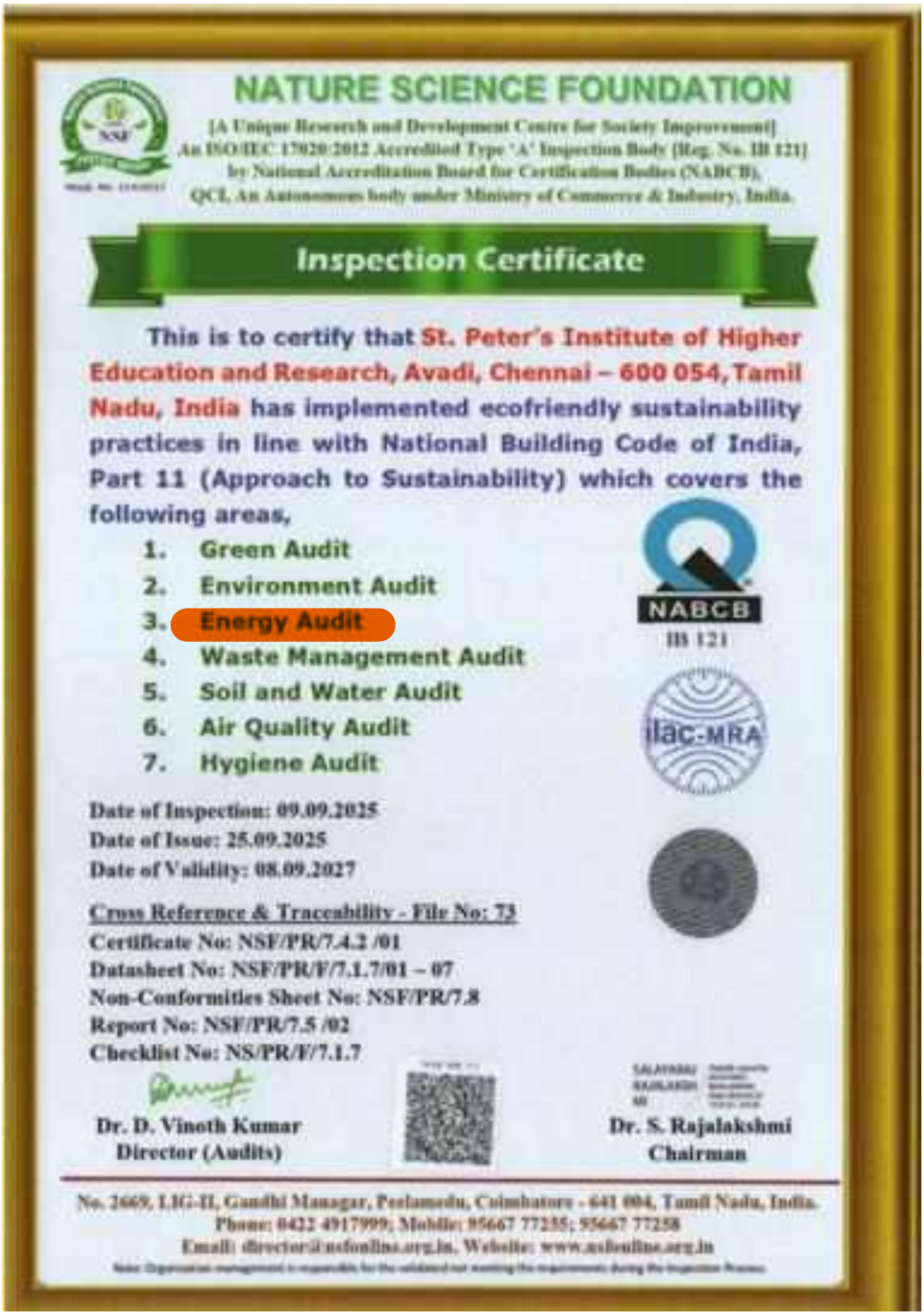
During onsite audit following departments were verified for physical facility availability.

- Adequate awareness programmes are organized and conducted to the stakeholders for the proper handling and maintenance of the appliances.
- Adequate external and vertical shading are provided to conserve energy.
- Natural ventilation through windows and shading is available adequately to reduce the energy consumption.
- It is observed that large foliage trees are planted inside the campus to reduce noise pollution.

Voltage intensity measured at the Campus

4.2.9. Operation and Maintenance (NBC Checkpoint 13)

During commissioning and handover, operation and maintenance plan is under process to implement.



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An ISO/IEC 17020:2012 Accredited Type 'A' Inspection Body [Reg. No. IB 121]
by National Accreditation Board for Certification Bodies (NABCB),
QCI, An Autonomous body under Ministry of Commerce & Industry, India.

Inspection Certificate

This is to certify that St. Peter's Institute of Higher Education and Research, Avadi, Chennai – 600 054, Tamil Nadu, India has implemented ecofriendly sustainability practices in line with National Building Code of India, Part 11 (Approach to Sustainability) which covers the following areas,

1. Green Audit
2. Environment Audit
3. Energy Audit
4. Waste Management Audit
5. Soil and Water Audit
6. Air Quality Audit
7. Hygiene Audit

NABCB
IB 121

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Report No: NSF/PR/7.5 /02
Checklist No: NS/PR/F/7.1.7

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