# SUSTAINABILITY REPORT 2024


## Harcourt Butler Technical University, Kanpur
## KANPUR

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## Preamble

In our commitment to environmental safeguard and a sustainable future, the Harcourt Butler Technical university presents this Sustainability Report for the year 2024. Realizing the adverse impact of greenhouse gas emissions, wastewater generation, use of plastic, water leakage and over exploitation of water and energy usage, we at HBTU Kanpur endeavor to chalk out strategies and pave the way for a greener and more sustainable resilient tomorrow. This report highlights HBTU's efforts to assess and manage waste, energy conservation, afforestation and many more.

Recognizing the critical role of higher education in shaping a sustainable future, HBTU Kanpur is committed to embedding sustainability into its core academic, research, and administrative functions. The university acknowledges the global challenges of climate change, resource depletion, and environmental degradation and strives to address them through proactive initiatives in energy conservation, waste management, water conservation, and sustainable infrastructure development. This report showcases our wide range of educational programs and research initiatives focusing on renewable energy, climate solutions, environmental engineering, and more. Through this report, we reaffirm our dedication to continuous improvement and accountability in our sustainability journey.

(Dipteek Parmar)
Chairman, Sustainability Committee &
Pro Vice Chancellor

## 1. INTRODUCTION

With this Report, HBTU Kanpur reaffirms its dedication to:

- Implementing energy-efficient and renewable energy solutions.
- Establishing comprehensive waste management and recycling systems.
- Advancing research and academic programs in environmental sciences and sustainable technologies.
- Promoting water conservation through rainwater harvesting and efficient wastewater management.
- Ensuring a green and eco-friendly campus with responsible land use and biodiversity conservation.
- Strengthening institutional governance for sustainability through periodic audits, regulatory compliance, and stakeholder engagement.

By integrating sustainability into its academic and operational framework, HBTU Kanpur aspires to be a leader in green campus initiatives, aligning with global best practices and Sustainable Development Goals (SDGs).

## 2. KEY COMMITMENTS AND TARGETS

**By the year -2030**

| Energy | Water | Waste | Transportation |
|---|---|---|---|
| Install solar panels on all hostels and major buildings, targeting 50% of campus energy from renewable sources. | Achieve 100% rainwater harvesting coverage across both campuses, utilizing Recharge pits, open wells and low-lying areas. | Eliminate single-use plastics and treat 100% of solid and liquid waste, with 50% composting or energy generation. | Fully transition to e-rickshaws and bicycles for inter-campus commuting. |

**By the year- 2035**

| | | |
|---|---|---|
| Reduce greenhouse gas emissions by 30% from baseline levels through energy audits and conservation measures. | Increase green cover by 50% through regular plantation drives. | Establish a sustainability research centre to innovate eco-friendly technologies.<br>Zero usage of motorized transport |

## 3. STRATEGIES AND IMPLEMENTATION

As a step towards effective execution and implementation of sustainability policy for achieving the SDGs, the university has made several initiatives in different aspects. These aspects are:

a) Energy Management
b) Water and Wastewater Management
c) Solid Waste Management
d) Biodiversity and Green Campus
e) Sustainable Transportation
f) Education and Research
g) Infrastructure

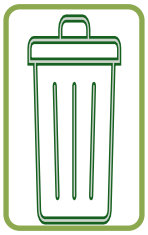
Various initiatives taken up and adopted by the university under the above aspects are presented in the Block diagram given below:

**Energy Management**

- **Renewable Energy:** Expand solar panels for electricity and solar water heaters in hostels
- **Efficiency:** Replace all conventional lighting with LED systems (90% achieved) and procure energy-efficient equipment (star-rated appliances).
- **Audits:** Conduct annual energy audits to monitor and optimize consumption.

**Water and Wastewater Management**

- **Conservation:** Maintain and enhance existing rainwater harvesting systems, including four open wells and natural ponds.
- Rainwater harvesting in all buildings (80% achieved)
- **Minimize leakage**: Repair all leakages, compromise with the availabe pressure
- **Monitoring:** Install electromagnetic flow meters in pipes and OHTs to track water consumption
- Wastewater treatment: Install a sustainable natural wastewater treatment with minimum energy usage.
- **Recycling:** Reuse of treated effluent for horticulture
- **Smart sensors**: Installation of smart sensors in wash rooms
- Ensure to make the campus a **ZLD (Zero liquid discharge)**



**Solid Waste Management**

- **Segregation:** Enforce a three-bin system (green for biodegradable, blue for recyclable, red for hazardous) in both campuses.
- **Recycling:** Partner with Kanpur Nagar Nigam (KNN) and firms like Bharat Oil & Waste Management Ltd. for waste disposal and recycling
- **Composting:** Develop on-site composting and biogas facilities for organic.
- Treat the total waste generated on the campus

**Biodiversity and Green Campus**

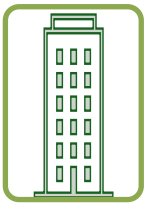
- **Plantation:** Conduct annual tree plantation drives with alumni and industry support (e.g., Green Day with Ruchi Soya Group).
- **Landscaping:** Maintain gardens with native and medicinal plants.

**Sustainable Transportation**

- **Emission-Free Mobility:** Provides bicycles and e-rickshaw to students.
- **Restricted Access:** Enforce automobile restrictions, with parking zones outside working areas.
- Use of low emission fuel.

**Education and Research**

- **Curriculum:** Integrate sustainability into academic programs and student projects. (B.Tech, M. Tech, M.Sc, PhD)
- Research in core areas of sustainability (Research projects, publications etc)
- **Outreach:** Expand NSS activities like cleanliness drives and cloth donation beyond campus.



**Infrastructure**

- **Eco-Friendly Design:** Incorporate green building materials and energy-efficient designs in new constructions (e.g., Shatabdi Bhawan).
- **Digitalization:** Reduce paper use through digital governance.

## 4. MONITORING AND REPORTING

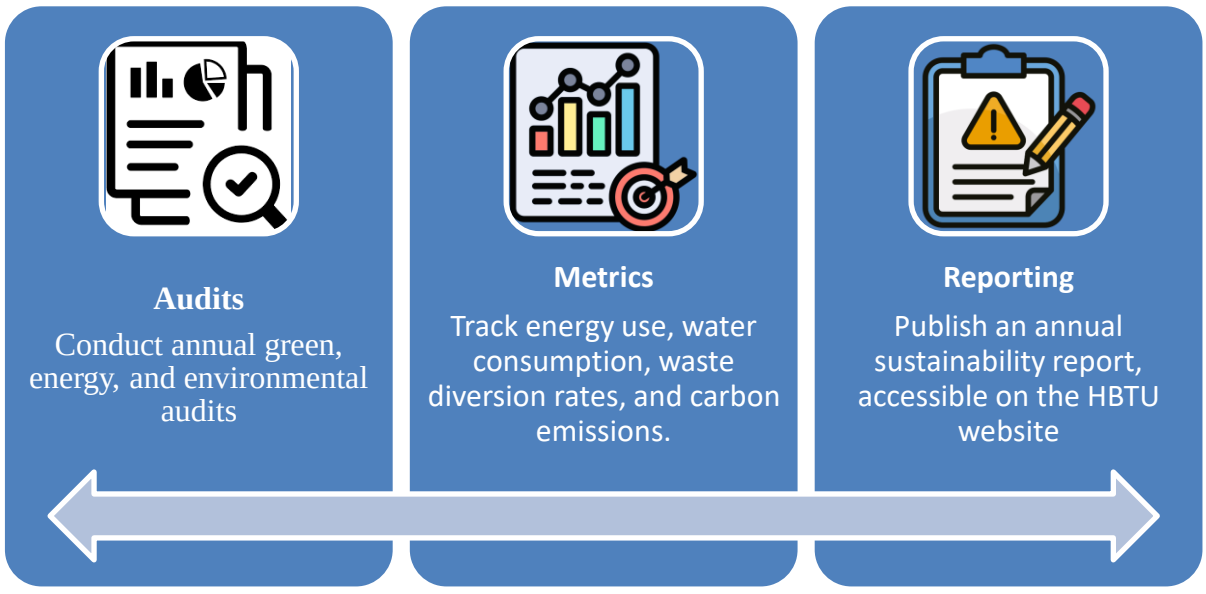
The university regularly monitors, ensures compliance and reports various aspects of sustainability through regular audits, metrices and reports.

**Energy Audit**

Recently, the Energy audit, environment audit and Green audit were carried out for the university. Energy Solution Company (ESC), Ghaziabad was entrusted to carry out the Energy Audit of the Harcourt Butler Technical University (HBTU), Kanpur. The site Visits for the Energy Audit were conducted on December, 2024. Similarly, the Environmental audit and Greet audit were also carried out for the university. These audits were carried out by M/S Jupiter Consultancy Services private limited, Kanpur. The Management is highly conscious of its Energy Efficiency and cost and has initiated several measures to reduce energy consumption, all office lights and street lights are Energy Efficient LED Lights. Hence, it is recommended to use motion sensors to minimize energy consumption. A motion detector is a device that detects moving objects, particularly people. These devices are actively used for street lights or indoor lights in walkways such as lobbies, stairs, and also in offices.

**Green Audit and Environmental Audit**

The Green Audit and the Environmental for the university was carried out by M/S Jupiter Enviro-safe consultants, Kanpur in the month of January 2025 to assess the Green practices as well as execution of existing Environmental Management System implemented in the University Campus for Water Management ,Air Quality .Green Area Cover, Solid Waste Management and Knowledge of Environmental Legislation ,Energy Consumption, Student Welfare Facilities ,Housekeeping Practices ,Existence of Carbon Foot Print and Green Wealth, Green Credit etc.




The present metrices and future targets for various aspects of sustainability are presented below:

**a) Carbon emissions**

HBTU Kanpur is spready over two campuses in an area over 325 acres. The campus community consists of around 2500 residents which includes students, teaching and non-teaching staff and their family members. Carbon emissions due to our institute come from various sources. The emission details from our campus are given in the Table below:

| **Scope** | **Description of the Scope** | **Carbon Footprints (present)** | **Carbon Footprints (2050)** |
|---|---|---|---|
| Scope -I | (Direct Emissions): Includes the direct emissions from sources owned or controlled by the institute. These emissions result from burning fuels on-site, operating institute-owned vehicles, and refrigerant leakages | 135 | 00 (Zero) |
| Scope - II | Includes indirect emissions associated with the generation, transmission and distribution of the purchased electricity consumed by the institute | 1080 | 00 (Zero) |
| Scope - III | (Indirect): Includes all other indirect emissions due to the institute's activities not classified under Scope 1 or 2. These emissions can be attributed to activities such as the extraction, production, and transportation of purchased goods or services, business travel, employee commuting, construction and maintenance work undertaken on the campus, and waste disposal. | - | 00 (Zero) |

**b) Electricity Consumption and targets**

| Electricity consumed during October 2023 to November 2024 | Target (2030) |
|---|---|
| 17,18,896 KWh | 859448 KWh |

**Water and Wastewater**

| | Present requirement/generation | Target (2030) |
|---|---|---|
| Water requirement | 700 KL | 800 KL |
| Wastewater generated | 560 KL | 00 (Zero Liquid Discharge) |

**PNG Consumption**

| | Present usage September 2024 to February 2025 | Target (2030) |
|---|---|---|
| PNG Consumption | 30856 SCM | 26000 SCM |

**Air quality**

| Parameter | Values | Target (2030) |
|---|---|---|
| PM 2.5 | 30-38 microgram/$m^3$ | 20 |
| PM 10 | 72-90.20 microgram/$m^3$ | 50 |

## 5. ACADEMICS

### Academic Programs which lead to a degree in Sustainable Development

The university offers several academic programmes which leads to the award of formal degree. These are listed below:

1. Master of Technology (M.Tech.) in Environmental Science and Engineering.
2. Master of Technology (M.Tech.) in Energy and Environment.
3. M. Tech in Chemical Engineering
4. B.Tech in Civil Engineering
5. B. Tech in Electrical Engineering
6. B.Tech in Mechanical Engineering

### Major Academic Courses related to sustainable development offered by various departments of the university

| **Name of the Department** | **Name of courses and level** | |
|---|---|---|
| | **B.Tech (Undergraduate)** | **M.Tech/M.Sc (Post Graduate)** |
| Civil Engineering | Environmental Engineering-I | Environmental Quality and Pollution Management |
| | Environmental Engineering-II | Air Pollution and Control |
| | Environmental Pollution and Management | Environmental Impact Assessment |
| | Design of wastewater treatment systems | Environmental Chemistry and Microbiology |
| | Introduction to RS and GIS | Solid and Hazardous Waste Management |
| | Geo-Environmental Engineering | Groundwater flow and pollution modeling |
| | Disaster Management | Principles of Cleaner Production |
| | Sustainable Transport System | Industrial Waste Management and environmental Audit |
| | Municipal Solid Waste Management | Water Resources Management |
| Chemical Engineering | Energy Resource & Energy Conservation | Hydrogen Energy and Fuel Cell Technology |
| | Nano Technology | Waste to Energy |
| | Green Chemistry | |
| | Energy Management | |
| Mechanical Engineering | Solar Energy | Wind Energy and Hydro Power |
| | Renewable Energy Systems | Solar Energy Utilization |
| Electrical Engineering | Electric vehicles | Electric and hybrid vehicles |
| | Wind and solar energy systems | Non-conventional energy resources |
| | Non-conventional energy resources | - |
| OT | By-products Utilization and Waste Management | Bio Fuels |
| | Fuel & Green Lubricants | - |
| BE | - | Bio Energy |
| CHY | - | Waste management technology |
| | - | Energy and Environmental Sustainability |
| | - | Green Chemistry |

## 6. RESEARCH

In last few years, the university has made progress on research related to various aspects of sustainability. Its research publications on sustainability span diverse disciplines, addressing climate change, renewable energy, waste management, air pollution, water pollution, water conservation, waste management, use of nanotechnology in water purification and waste water treatment. These cutting-edge studies offer innovative solutions to global challenges, fostering a greener and more sustainable future. Some of the research at HBTU Kanpur focusses on the following aspects:

a) Air pollution
b) Water pollution
c) Water conservation
d) Climate change
e) Application of nano-technology in water purification, wastewater treatment, fuels etc.
f) Renewable energy resources
g) Bio-fuels
h) Hydropower
i) Nano-composites
j) Alternative fuels

In addition, several R&D projects related to sustainability issues are running in the university.

## 7. CONTINUING EDUCATION AND CAPACITY BUILDING

**Workshops/ conferences/ FDPs on topics related to sustainable development organized by the University**

Different departments of HBTU Kanpur organize various academic and professional events throughout the year, including **Conferences**, **Workshops**, and **Faculty Development Programs (FDPs)**. These events are thoughtfully designed around contemporary and critical themes, with **sustainability** being a recurring and significant focus. From promoting clean energy technologies and sustainable infrastructure practices to exploring advancements in AI for sustainable chemical processes, these initiatives reflect the institute's commitment to addressing global challenges through interdisciplinary engagement.

A List of the events conducted/planned in the **first six months** of 2025 is attached for reference. These include contributions from departments such as Chemistry, Civil Engineering, Oil Technology, Mechanical Engineering, and Chemical Engineering. For a complete list of past events related to sustainability, please visit the link: https://hbtu.ac.in/conference-events/

| Sr. No. | Event | Title | Themes related to sustainability | Department | Date |
|---|---|---|---|---|---|
| 1 | Indo-Israel Worksh op | Design and Implementation of Smart water supply systems | Water conservation | Civil Engineering | August 30-31st 2024 |
| 2 | FDP | Clean Energy and Manufacturing Technologies | 1. Clean energy technologies and their impact on manufacturing industries.<br>2. Renewable energy sources, energy efficiency and their integration into manufacturing systems.<br>3. Role of clean energy in reducing carbon footprints and enhancing sustainability in industrial practices. | HRD Cell | Dec. 30, 2024 to Jan. 04, 2025 |
| 3 | Short term course | "Emerging Trends in Environmental Engineering for Sustainable Development (ETESD 2025) | Environmental pollution and Control<br>Climate change<br>Groundwater remediation<br>Solid waste management and resource recovery<br>Environmental flow | Civil Engineering Department | January 20-24th 2025 |
| 4 | Internati onal Confere nce | InDACON - 2025 | Chemical Resilience & Sustainable Practices: Advanced materials in Water purification strategies for Desalination, Energy production & Environmental conservation | Chemical Engineering | 20 - 22 February, 2025 |
| 5 | Worksh op | Interdisciplinary Approaches in Geotechnical and Geo-environmental Engineering | Sustainable Practices in Geo-environmental Engineering | Civil Engineering | 17th – 21st February 2025 |
| 6 | Internati onal Confere nce | Recent Developments and Sustainability in Oleo Chemicals & Vegetable Oil Industry | Sustainability in oil processing industry. | Oil Technology | Feb 28th – March 1st, 2025 |
| 7 | Internati onal Confere nce | CHEM-TECHNOVA 2025 | Greening the Future: Innovations and Challenges in Sustainable Chemical Engineering | Chemical Engineering | 3 - 5 April, 2025 |
| 8 | Internati onal Confere nce | Advances In Materials, Manufacturing And Artificial Intelligence Applications | 1. Energy from waste, biomass Carbon capturing and utilization<br>2. Removal of greenhouse gases<br>3. Renewable energy usage | Mechanical Engineering | 4th – 5th April 2025 |

| | | | | | |
|---|---|---|---|---|---|
| 9 | National Conference | Frontiers In Functional Material For Sustainable Development Of Energy And Environment | Functional and Smart polymeric Materials for Green Energy & Sustainable Environment<br>Sustainability and Clean Energy<br>Functional and Smart polymeric Materials for Green Energy & Sustainable Environment | Department of Chemistry | 19-20 May 2025 |

## 8. EXTENSION ACTIVITIES

**a) Student bodies at HBTU Kanpur:** HBTU Kanpur has an active NSS working under the aegis of University Students Activity Council working for various issues including that of sustainability. The NSS organizes various programmes and awareness campaigns related to sustainability aspects for a greener future.

b) **Women Study Centre**: Sustainability Activities under Women Study Centre run by the University (such as cleanliness drives, plantation drives, save water day, save our planet etc).

c) **Outreach:** As part of outreach/extension, the faculty members of the university deliver invited lectures on topics related to Sustainability- such as climate change, environmental pollution etc.

## 9. CONCLUDING STATEMENT

In conclusion, the HBTU Kanpur Sustainability Report reflects our university's commitment towards a more sustainable future. We plan to chalk out strategies for addressing climate change, managing carbon emissions, conserving water resources, and promoting responsible waste management. Our dedication to academic excellence, research and continuing education will continue to drive positive change for a more resilient planet. By integrating sustainability across all aspects of our campus operations and academics, the university aims to foster a culture of environmental responsibility. We aim to stand at the forefront of sustainability and also inspire others to follow the same for creating a lasting positive impact on environment so that the earth is left for the coming generations too.