IEM
श्रद्धावान लभते ज्ञानम्
INSTITUTE OF ENGINEERING & MANAGEMENT
Good Education, Good Jobs

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# Sustainability Development Report

## 2024-25

## SDG 12

## *Responsible Consumption and Production*


## *Executive Summary*

The Institute of Engineering Management (IEM), Kolkata, advances SDG 12 through responsible consumption and production in its 2024-25 report. Key efforts include a 40 kW solar PV system generating 320 kWh daily, 1278203 kWh annual energy use with 894.74 tonnes $CO_2e$ footprint, e-waste recycling over 2169.90 kg, rainwater harvesting, EV infrastructure, and plastic bans. Goals target 10% energy reduction, 50% waste diversion, and biogas plants by 2025-26, supported by audits, education, and partnerships.

# *Contents*

# *Preamble*

The Institute of Engineering Management (IEM) Kolkata prioritizes responsible consumption and production patterns among its core sustainability commitments, aligning with Sustainable Development Goal 12 (SDG 12). The institute fosters sustainable resource management across campus operations, academics, research, and community outreach to minimize environmental impact and promote a circular economy. Through integrated energy efficiency, waste management, water conservation, and sustainable transportation initiatives, IEM Kolkata demonstrates comprehensive commitment to responsible resource stewardship.

# *Vision and Mission*

- **Vision:** To develop IEM Kolkata as a benchmark institution for sustainable consumption and production practices within higher education, advancing circular economy principles and resource efficiency.
- **Mission:** To implement waste reduction, energy and water efficiency, sustainable procurement, and awareness initiatives while integrating sustainability into education and research, supported by data-driven monitoring and continuous improvement.

# *Programs and Initiatives*

**Energy Efficiency and Renewable Energy**

- **Solar Power System:** IEM has implemented a 40 kW grid-connected rooftop solar photovoltaic (PV) system generating approximately 320 kWh of clean energy daily, monitored via smart meters, contributing to responsible energy consumption patterns.

- **Energy Conservation Technologies:**

    - Installation of timer circuits and Light Dependent Resistor (LDR)-based automation systems to prevent unnecessary electricity usage across campus buildings.

    - Energy-efficient LED lighting and sensor-based smart lighting systems installed across campus to optimize electricity use.

    - Electric appliance timers and smart automation further conserve electricity, especially in classrooms and air-conditioned spaces.

- **Energy Consumption Data:** Campus annual energy consumption amounted to 1278203kWh, reflecting the impact of energy-saving automation measures and conservation initiatives in place.

- **Renewable Energy Expansion:** Plans for a biogas plant featuring a 1000-liter digester and 1000-liter gas storage are underway to generate renewable energy from organic waste, supporting waste-to-energy conversion aligned with SDG 12.

- **Ongoing Energy Audits:** Regular electricity audits cover load and consumption patterns to identify saving opportunities. Internal campus-wide energy audits have analyzed energy consumption of lighting, fans, ACs, and auxiliary electrical appliances across buildings and laboratories with detailed load measurements.

- **Green Audits:** Promotion and use of solar energy facilities and alternate energy sources like biogas plants, complemented by ongoing energy audits and green audits to monitor and improve energy utilization.

**Carbon Footprint and Environmental Impact**

- **Total Annual Carbon Footprint:** Campus operations generate approximately 917.89 tonnes $CO_2$-equivalent annually, comprising:
    - Scope 1 Emissions (Campus Vehicles): 23.15 tonnes $CO_2$-equivalent/year
    - Scope 2 Emissions (Electricity Use): 894.74 tonnes $CO_2$-equivalent/year
- **Campus Green & Plantation Area:** Approximately 3,173 $m^2$ of campus green and plantation area contribute to ecological balance and biodiversity promotion.

- **Carbon Footprint Assessment:** Comprehensive carbon footprint assessment supports informed strategies for reducing consumption-related emissions and aligns with SDG 12's focus on minimizing environmental impact.

**Waste Management and Recycling**

- **Waste Segregation:** Campus practices include separate collection and responsible disposal of organic and inorganic waste, supporting circular economy principles.

- **E-Waste Management:** Scheduled and documented disposal of e-waste with records showing increasing quantities recycled annually (e.g., 4,201.90 kg in 2024–2025).
    - Repair and reuse of defective electronic devices to extend lifespan and promote circular consumption patterns.

    - Environmentally safe disposal in partnership with certified e-waste recyclers ensures responsible end-of-life management.

- **Organic Waste Conversion:** Waste segregation including organic, inorganic, and e-waste disposal supports sustainability goals and feeds into biogas production for renewable energy generation.

- **Circular Economy Awareness:** Awareness programs on circular economy and zero waste conducted through initiatives like the "Train the Trainers Program" involving 70 teachers from 65 schools, disseminating zero waste and sustainable consumption principles in surrounding communities.

- **Wastewater Treatment:** Wastewater and sewage treated via aerobic sewage treatment methods, with treated water reused for gardening and other purposes, exemplifying water and resource efficiency.

**Water Conservation and Sustainable Water Management**

- **Rainwater Harvesting:** Rainwater harvesting systems and artificial groundwater recharge implemented on campus to augment water resources sustainably.

- **Water Infrastructure:** Use of bore wells and open wells with recharge facilities supports sustainable groundwater management. Separate piping systems for rainwater distribution reduce costs and improve efficiency.

- **Water Recycling:** Wastewater recycling and maintenance of water bodies for sustainable water management within the campus, reducing freshwater demand.

- **Water Conservation Structures:** Construction of tanks and bunds aid in water conservation efforts and provide infrastructure for water reuse across campus operations.

- **Sustainable Water Use:** Integration of water-efficient technologies and responsible consumption practices reduce campus water footprint and support SDG 12 goals.

**Sustainable Transportation**

- **Vehicle Restrictions and Clean Mobility:** Promotion of restricted entry for automobiles on campus, encouraging use of bicycles and battery-powered vehicles reduces transportation-related emissions and promotes responsible consumption patterns.

- **Electric Vehicle Infrastructure:** EV charging stations established on campus to support electric and hybrid vehicle adoption, reducing fossil fuel dependence.

- **Bicycle-Sharing Schemes:** Sustainable mobility is encouraged via bicycle-sharing programs, providing emission-free transportation alternatives.
- **Sustainable Transport Innovation:** Development and innovation in sustainable transportation with student projects such as solar-electric hybrid motorcycles that utilize solar power for charging, demonstrating responsible resource utilization.
- **Pedestrian-Friendly Infrastructure:** Implementation of pedestrian-friendly pathways enhances environmentally friendly mobility options on campus.
- **Emissions Reduction:** Awareness campaigns reduce pollution and dependence on fossil fuels within the campus community, promoting behavioral change toward responsible consumption.
- **Research & Development:** Research and development collaborations focusing on advancing electric vehicle technologies and sustainable transportation solutions support innovation in responsible consumption.

**Food, Green Buildings, and Smart Technologies**

- **Smart Resource Management:** Integration of smart resource management technologies such as automation for energy efficiency and waste management optimizes resource consumption.
- **Greening Initiatives:** Landscaping and greening initiatives on campus promote biodiversity, enhance aesthetic value, and support ecological balance, reducing environmental impact.
- **Plastic Ban:** Ban on the use of plastic at campus to promote a cleaner, more sustainable environment and eliminate single-use consumption patterns.
- **Smart Technologies:** Incorporation of smart technologies in resource-efficient facilities optimizes water, energy, and waste management through automated monitoring and control systems.
- **Awareness and Engagement:** Regular environmental and sustainability-related events and programs build awareness and cultivate eco-friendly practices among students and staff, fostering responsible consumption behaviors.

# *Research and Education*

- **International Conferences:** Organized and hosted multiple international conferences including IEEE UEMCON 2024, IEMCON 2024, and European Conference on Interdisciplinary Research in Technology Management (EIRTM)

2025, promoting research discourse in technology, energy, and sustainability aligned with responsible consumption principles.

- **Curriculum Integration:** Mandatory course "Sustainability, Climate Action, and Environmental Science" for 4th semester B.Tech students embeds sustainability concepts, including responsible consumption and production practices.
- **Train the Trainers Program:** Conducted awareness and training programs with 70 teachers from 65 schools to disseminate knowledge on responsible consumption, circular economy, and zero waste principles.
- **Student Engagement:** Established active student chapters such as IEEE and ISHRAE, which engage students in research, workshops, competitions, and sustainability-focused projects including national hackathons and design competitions aligned with SDG 12.
- **Global Partnerships:** Implemented study abroad programs and numerous academic collaborations with top global institutions including Harvard Business School, University of Melbourne, and universities in Japan, France, USA, and Canada, broadening academic and cultural exposure related to sustainability and responsible consumption.
- **Innovation and Entrepreneurship:** Supported innovation and entrepreneurship through incubation cells and start-up support, fostering student-led projects such as sustainable waste recycling technologies and solar-powered mobility solutions, embodying applied research toward sustainable consumption and production.
- **Research Focus Areas:** Collaborative research projects with academic and government institutions explore new-age energy technologies, resource efficiency, and circular economy solutions. Office of Sustainability spearheads energy sustainability research including microgrid systems, GHG monitoring, and energy footprint analysis.

## *Community Engagement and Outreach*

- **Train the Trainers Program:** Conducted comprehensive "Train the Trainers" Program on circular economy awareness, training 70 teachers from 65 schools to spread zero waste and sustainable consumption practices in surrounding communities.
- **Social Welfare Initiatives:** Lions Club of Kolkata IEM actively organized multiple community service events:

    - Distribution of 300 food packets and sweets to underprivileged children on Children's Day (14 November 2024)
    - Humanitarian outreach programs supporting 103 specially-abled children, orphans, and 48 elderly people
    - Organized free health check-up camps attended by approximately 50 persons to promote health awareness
- **Vocational Empowerment:** Inaugurated vocational computer training centers for youth and women to empower them with digital literacy and employability skills, emphasizing sustainable livelihood generation and responsible resource use.
- **Philanthropy and Community Welfare:** Arranged philanthropy events including:
    - Donation of sewing machines and mosquito nets to old age homes (18 July 2025)
    - Mental health awareness rallies
    - Recognition events fostering social cohesion and community well-being
- **Community Education:** Student-led initiatives foster environmental education and community outreach aligned with SDG goals, promoting awareness of responsible consumption practices.

## *Partnerships and Collaborations*

- **Waste Management Partnership:** MoU with NKDA (Newtown Kolkata Development Authority) for waste management and recycling initiatives.
- **Academic Collaborations:** Signed multiple MoUs with renowned global academic institutions including:
    - Harvard Business School
    - University of Melbourne
    - Ryukoku University (Japan)
    - IBM
    - Fostering academic collaboration, joint research, and skill development in sustainability
- **Industry Partnerships:** Collaborative engagements with reputed industry partners including:

    - LTIMindtree
    - Capgemini
    - Pegasystems
    - IBM
    - For academic-integrated curriculum development, industry exposure, student placements, and sustainability research projects
- **Government and Research Organizations:** Partnership with government and research organizations such as CSIR-NEERI for environment and sustainability research focusing on regional and national impact, including emissions monitoring and waste-to-energy solutions.
- **International Conference Partnerships:** Hosted and organized international conferences in partnership with global organizations including:
    - IEEE
    - SMART Society USA
    - The Photovoltaic Institute of Île-de-France (IPVF)
    - Promoting interdisciplinary research and innovation in energy and sustainability
- **Startup Ecosystem:** Supported startup incubation and entrepreneurship development through Innovation and Entrepreneurship Development Centres in collaboration with industry mentors and government schemes, fostering sustainable products and circular economy initiatives.
- **E-Waste Management Partnership:** Certified e-waste recycler partnerships ensure environmentally safe disposal and responsible end-of-life management of electronic waste.

# *Data and Metrics*

| **Metric / Activity with Value** | **Notes / Events / Details** |
|---|---|
| Solar PV System Capacity | 40 kW |
| Daily Solar Energy Generation | 320 kWh/day |
| Biogas Digester Volume (Planned) | 1000 liters |
| Biogas Storage Capacity (Planned) | 1000 liters |

| | |
|---|---|
| Annual Campus Energy Consumption (Feb 2024–Jan 2025) | 1278203 kWh |
| Scope 1 Emissions (Campus Vehicles) | 23.15 tonnes $CO_2$-equivalent/year |
| Scope 2 Emissions (Electricity Use) | 894.74 tonnes $CO_2$-equivalent/year |
| Total Annual Carbon Footprint | 917.89 tonnes $CO_2$-equivalent/year |
| Campus Green & Plantation Area | Nearly 3,200 $m^2$ |
| E-waste Recycled (2024–2025) | 2169.90 kg |
| Smart Energy Systems Implementation Target | 75% of buildings |
| Proposed Additional Solar Capacity (Future) | 40 kW |
| Teachers Trained (Train the Trainers Program) | 70 teachers from 65 schools |
| Underprivileged Children Supported (Children's Day 2024) | 300+ |
| Special Individuals Supported (Community Programs) | 151 (103 children + 48 elderly) |

# *Challenges and Opportunities*

**Challenges**

- **External Funding Constraints:** More external funds from government bodies are needed to be obtained. However, internal funding schemes like grant-in-aid offering up to ₹10 lakhs per project provide alternative support, with 94 out of 144 proposals funded last year totaling ₹1.8 crores. Monitoring and managing this funding effectively remains critical.

- **Curriculum-Industry Alignment:** Keeping curriculum and teaching aligned with rapidly evolving industry demands is challenging and requires continuous faculty training, technology integration, and strong industry partnerships to ensure student employability and relevance to SDG 12 initiatives.

- **Resource Management Complexity:** Efficient management of energy, water, and waste resources is both a challenge and an opportunity. Smart systems and audits

(energy, environment, green audits) help optimize resource use and promote sustainability, but require ongoing investment and technical expertise.

- **Grid Integration of Renewables:** Integrating renewable energy sources such as rooftop solar into the existing campus grid poses challenges in maintaining voltage stability, demand-supply balance, and system flexibility. This requires advanced grid management and smart energy solutions to prevent curtailment and ensure reliable power supply.

- **Renewable Energy Intermittency:** Renewable sources like solar and biogas suffer from intermittency and dependence on geographic and climatic conditions, leading to variability in power generation. Achieving sustained energy conservation requires continuous awareness and behavioral change among campus users; compliance with energy-saving practices is an ongoing challenge.

- **Carbon Footprint Quantification:** Accurate quantification of carbon footprints and emissions across direct and indirect sources requires technical expertise and sophisticated monitoring tools to ensure data accuracy and support informed decision-making.

- **Behavioral Change:** Ensuring campus-wide adoption of responsible consumption practices and sustained compliance with sustainability initiatives requires ongoing engagement and cultural transformation.

**Opportunities**

- **Resource Optimization:** Efficient management of energy, water, and waste resources through smart systems and comprehensive audits presents opportunities to significantly reduce consumption and operational costs while promoting sustainability on campus.

- **Student Skills Development:** Opportunity to enhance student skills through experiential learning, interdisciplinary projects, and global exposure via study abroad programs and international collaborations to prepare them for sustainable innovations and careers in circular economy sectors.

- **Sustainable Technology Innovation:** The rise of student-led startups and innovation cells (e.g., Waste Oil Recycler, solar-powered products) presents opportunities to develop sustainable technologies and products aligned with circular economy principles, supported by incubation and mentorship programs.

- **Green Building Expansion:** Opportunity to scale green building practices and smart technologies across more campus facilities, reducing resource consumption

and demonstrating best practices in responsible consumption to external stakeholders.

- **Community Multiplier Effect:** Train the Trainers programs and community engagement create multiplier effects, extending responsible consumption practices beyond campus to schools and communities, amplifying institutional impact.

- **Carbon Certification and Recognition:** Participation in international sustainability benchmarking such as AASHE STARS and Times Higher Education Impact Rankings provides opportunities to measure, improve, and gain recognition for institutional sustainability performance, attracting socially-conscious stakeholders.

## *Annual Goals (2025-2026)*

- **Renewable Energy Expansion:** Increase rooftop solar capacity by an additional 40 kW through installation of new solar panels to enhance renewable energy utilization and reduce grid dependence.

- **Biogas Commissioning:** Operationalize the planned biogas plant with 500-liter digester and 200-liter gas storage to convert campus organic waste into renewable energy, supporting waste-to-energy conversion and circular economy.

- **Smart Energy Systems:** Implement integrated smart energy management solutions for load balancing, scheduling, and demand response in 75% of campus buildings to enhance grid stability and reduce operational costs.

- **Electric Vehicle Infrastructure:** Expand EV charging infrastructure and incentivize electric and hybrid vehicle adoption to further reduce transportation emissions.

- **Water Resource Management:** Deploy rainwater harvesting expansion, greywater recycling systems, and comprehensive waste composting as part of campus-wide resource conservation efforts.

- **Sustainability Degree Program:** Launch a Master of Science (MS) program focused on Sustainability and Environment to cultivate advanced knowledge and skills in sustainable development and responsible consumption practices.

- **Internship Programs:** Start internship programs emphasizing sustainable technology innovations, providing students hands-on experience with green technologies and industry collaboration in circular economy sectors.

- **Community Outreach Expansion:** Increase outreach activities targeting local schools to educate and raise awareness about responsible consumption and sustainable living practices, amplifying community impact.
- **International Benchmarking:** Participate actively in international sustainability benchmarking such as AASHE STARS and Times Higher Education Impact Rankings to measure and improve institutional sustainability performance.
- **Energy Efficiency Enhancement:** Enhance energy efficiency further by deploying sensor-based energy control systems and expanding energy audits for continuous optimization of consumption patterns.
- **Circular Economy Promotion:** Promote circular economy principles through expanded zero waste outreach and resource efficiency programs across campus and in the community, supported by enhanced data collection and monitoring systems.
- **Carbon Footprint Reduction Targets:** Deploy improved techniques and tools for accurate carbon emission monitoring across Scope 1 and Scope 2 emissions, aiming for certified reduction targets aligned with climate action goals.

# *Photo Gallery*


*3-Phase timer circuits for the Classrooms and Single-Phase timer circuits for the ACs have been connected in the classrooms of IEM Newtown Campus so that the lights and ACs are not kept switched on even when there is no class going on and the electricity wastage is reduced thus saving electricity bills.*


*Joyful faces of children and faculties distributing gifts during the event*

*Club members distributing sewing machines and mosquito nets at the old age home.*


*Water efficient fixtures in bathrooms of Management House, IEM Campus*

*Drinking water purification system*