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

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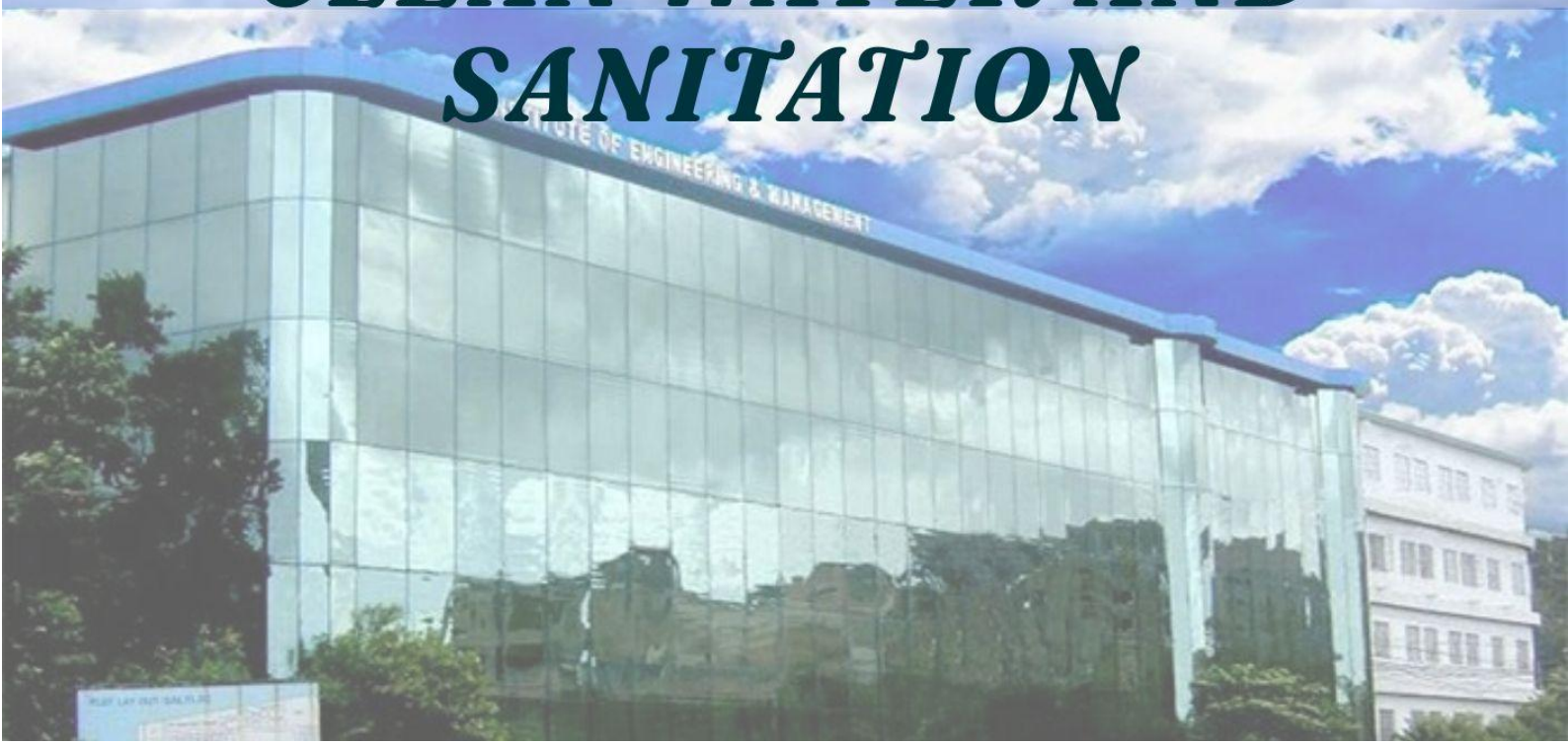
Sustainability Development Report

SDG 6
CLEAN WATER AND SANITATION



Executive summary

The Institute of Engineering and Management (IEM) is committed to advancing SDG 6 by promoting sustainable water and sanitation practices. The campus features a comprehensive water management system including an aerobic sewage treatment plant that recycles wastewater for gardening, significantly conserving freshwater. Rainwater harvesting systems store 64,750 liters to recharge borewells, reducing dependence on municipal supplies. With 124 registered Ph.D. scholars and over 11,000 citations in water sustainability research, IEM fosters strong academic contributions. Water-efficient fixtures and UV-RO purification systems ensure safe water quality, continually monitored through smart technologies. The institute's outreach programs engaged over 5,482 students in 48 community activities focused on water conservation and hygiene education. It maintains 27 active MoUs with universities, industries, and government bodies for collaborative water sustainability initiatives. Energy consumption was 1278203 kWh annually, producing 894.74 tonnes of CO_2-equivalent emissions, mitigated by 40 kW rooftop solar panels generating 320+ kWh per day. Challenges include rising water demand, variable availability, infrastructure maintenance, and stakeholder coordination. Opportunities lie in expanding sensor-based water management, smart monitoring, and community-led conservation efforts. Future plans involve enhancing wastewater reuse systems, deploying IoT-enabled water quality monitoring, integrating sustainability into curricula, and scaling community engagement. These initiatives position IEM as a leader in clean water access and sustainable sanitation aligned with global SDG 6 targets.

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Preamble

The Institute of Engineering and Management is committed to advancing sustainable water and sanitation practices. We recognize clean water and sanitation as vital to health, education, and environmental sustainability. Through research, education, community engagement, and infrastructure development, IEM strives to contribute meaningfully to achieving SDG 6 targets. Our efforts focus on innovation, conservation, and inclusive access to safe water for all.

Vision and Mission

- **Vision:** To be a leading institution advancing clean water access and sustainable sanitation through education, research, and community engagement.
- **Mission:** To equip students and researchers with knowledge and skills to develop innovative water management solutions that ensure safe, affordable, and sustainable water and sanitation for all.

Key Achievements

- IEM treats wastewater on campus and reuses it for gardening. This saves fresh water.
- Rainwater harvesting stores 64,750 liters underground. It recharges bore wells and wells to boost groundwater.
- IEM uses 1278203 kWh energy annually, emitting ~894.74 tonnes CO_2 from electricity. Rooftop solar panels generate 320+ kWh daily.
- IEM has 27 MoUs for joint water sustainability projects with universities and industries.

Water Management and Conservation Practices

- IEM has implemented comprehensive water management strategies focusing on wastewater treatment, rainwater harvesting, water-efficient technologies, and water quality assurance. The institute operates an aerobic sewage treatment plant that processes wastewater generated on campus. The treated wastewater is recycled and predominantly used for gardening and landscaping purposes, contributing significantly to water conservation efforts.
- Rainwater harvesting systems have been established, including underground storage tanks with a collective capacity of approximately 64,750 L to capture and utilize rainwater effectively. The harvested rainwater is channelled through specialized piping networks to recharge bore wells and open wells across the campus area, thereby reducing dependency on municipal water supplies.
- The campus is equipped with water-efficient fixtures and advanced technologies such as sensor-based water flow control, which help minimize wastage. In addition, the use

of UV-RO purification systems ensures that drinking water quality meets stringent safety standards.

- Continuous water quality monitoring and maintenance of water bodies and distribution infrastructure are carried out regularly, ensuring the health and safety of the campus community.

Research and Education on Water Sustainability

- IEM fosters a strong research culture with established Centers of Excellence that include sustainability-focused domains. In the academic year, 124 PhD candidates are registered under recognized guides, reflecting the institute's dedication to advanced research.
- The institute has integrated subjects such as 'Sustainability, Climate Action, and Environmental Science' into the core curriculum for all 4^{th} semester B.Tech. students. This integration enables practical understanding through living labs on campus, where students conduct pilot projects related to sustainable water use and environmental impact.
- Research projects supported by government bodies and university grants involve greenhouse gas emission monitoring, water resource management, and renewable energy integration.

Community Engagement and Outreach

IEM actively engages with the local community through various outreach programs designed to promote awareness of water conservation and sanitation. During the year, 5,482 students participated in approximately 48 extension activities, including campaigns under the Swachh Bharat mission and gender sensitization programs run in collaboration with NGOs and government organizations

Infrastructure and Policy Support

- Water conservation infrastructure at IEM includes rainwater harvesting, borewell and open well recharge facilities, construction of tanks and bunds, wastewater recycling systems, and systematic campus water body maintenance.
- The water supply involves purified water from Nabadiganta Water Management Ltd. stored in underground tanks with a capacity of 64,750 L to serve the academic and residential premises.
- In alignment with green campus initiatives, the institute has implemented policies restricting automobile entry, promoting pedestrian-friendly pathways, bicycle-sharing programs, and using electric vehicles on campus.

- Quality assurance is backed by regular water and energy audits. Environmental audits include annual assessment of carbon footprints, energy consumption (1278203 kWh annually), and water usage monitoring to identify conservation opportunities.

Partnerships and Collaborations

- IEM maintains 27 active MoUs with national and international universities, government agencies, and industry partners that foster collaborative research and knowledge exchange on sustainable water management.
- A notable collaboration with S.N. Bose National Centre for Basic Sciences focuses on green building technology and renewable energy projects aimed at reducing operational carbon footprints.
- IEM has been involved in government-funded projects such as those by ICSSR and the Ministry of Environment, Forest and Climate Change, supporting research in sustainability and environmental impact assessment.
- The institute also conducts capacity building through 'Train the Trainers' workshops on zero waste and circular economy models, expanding outreach to schools and community organizations.

Data and Metrics

Category and Metric/Indicator	**Value/Number**
Rainwater Harvesting Storage Capacity	64,750 liters
Sewage Treatment Plant Capacity	Aerobic system recycling water for gardening
Annual Energy Consumption	1278203 kWh
Annual CO_2-Equivalent Emissions from Electricity Use	894.74 tonnes
Rooftop Solar Panel Capacity	40 kW
Daily Solar Energy Generation	320 kWh
Water Quality Systems Implemented (UV-RO, Smart Monitoring)	Yes

Challenges and Opportunities

- Rising campus water demand due to institutional growth and changing consumption patterns.
- Variability in water availability, worsened by climate change, unpredictable rainfall, and periods of water scarcity.
- Aging and capacity-constrained water infrastructure that requires frequent maintenance and upgrades.

- Need for rigorous, ongoing testing and preventive measures to avoid contamination risks.
- Challenges in sustaining long-term community awareness and behaviour change for conservation and hygiene.

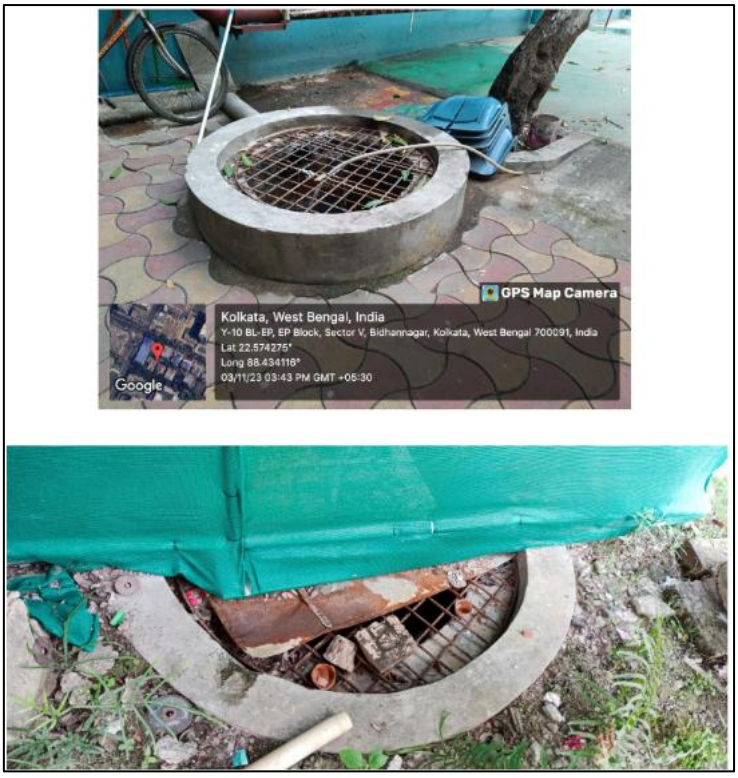
Annual Goals (2025-26)

- Expand and enhance wastewater-recycling systems to increase capacity and efficiency, reducing freshwater demand on campus.
- Install and upgrade water-efficient fixtures, along with greywater harvesting technologies, to promote conservation.
- Upgrade infrastructure with smart, real-time water quality monitoring systems using IoT devices and AI-driven analytics to pre-empt contamination and optimize usage.
- Promote green infrastructure such as expanded rainwater harvesting, wastewater reuse, and solar-powered water treatment in line with SDG 6.
- Integrate sustainability themes more deeply into curricula to make education application-oriented on water and environmental issues.
- Increase research projects and publications focused on sustainable water use and sanitation technologies.
- Deepen industry-academia collaborations for pilot testing innovative sustainable water technologies.
- Strengthen partnerships with government, industry, and international bodies for funding, innovation, and knowledge exchange in water sustainability.
- Scale up community awareness campaigns on water conservation and hygiene practices.
- Enhance training programs for local schools and residents on sustainable water management and sanitation.
- Implement more participatory water governance models to build resilient, inclusive local water systems.

Photo Gallery

Water efficient fixtures in bathrooms of Management House, IEM Campus

Drinking water purification system



Rainwater harvesting in open bore wells