Master Plan compliance with the environmental Norms - IIT Mandi

A.) Environmental Monitoring & Compliance

- Regular assessment of soil quality, including temperature, moisture, pH, and heavy metal content.
- Monitoring of river water, groundwater, drinking water, and treated wastewater quality.
- Conducting field surveys, environmental assessments, and ecological studies for sustainable campus planning.
- Campus development is carried out in accordance with the approved Master Plan and applicable environmental regulations.
- Continuous emphasis on resource conservation, pollution control, sustainable infrastructure development, and ecological protection.
- Environmental management practices are regularly reviewed to support IIT Mandi vision of a Green and Sustainable Campus

B.) Waste Management

- Source segregation of waste into biodegradable, non-biodegradable, recyclable, laboratory, and e-waste.
- Separate collection and disposal of paper, plastic, glass, and metal waste through authorized recyclers.
- Processing of biodegradable waste through composting and vermicomposting for use in campus horticulture.
- Promotion of sustainable landscaping using organic manure generated within the campus.
- Planned development of biogas and biofuel facilities for resource recovery.
- Development of a centralized recycling facility for efficient waste processing and recycling.
- Safe disposal of hazardous laboratory waste through CPCB/SPCB-authorized agencies.
- Operation of Sewage Treatment Plants (STPs) for treatment and reuse of wastewater for horticulture and landscaping.
- Treated effluent is discharged only after complying with prescribed environmental standards.

C.) Energy Efficiency Initiatives

The management and conservation of energy is an urgent necessity at this time. The following are some of the energy efficiency initiatives being implemented at IIT Mandi:

- **Green Energy technologies :** IIT Mandi is focused on the advancement of Green Energy technologies. A 0.5 MW on-grid solar plant has been established at the newly built hostel facility on the North campus and rooftop solar installation of around 3.5 MW is being planned through SECI, which is aimed to be completed till 2028.
- **Energy monitoring**: IIT Mandi has deployed smart energy metering systems in its buildings to assess and regulate electricity usage, showcasing a dedication to the judicious use of energy. Users are being made aware of energy conservation strategies through insights derived from electricity usage reports and trends.
- **Usage of the Solar street lights**: Around 30% of the street lights on campus are solar-powered, contributing to the utilization of renewable energy sources.
- **Use of LED lights:** IIT Mandi has fully transitioned to the use of LED light fixtures, replacing the traditional fluorescent backlit LCD lighting systems. LEDs offer an efficiency improvement of 50-70% compared to conventional lighting solutions. This initiative contributes to sustainability objectives and aids in the reduction of greenhouse gas emissions.
- **HVAC systems:** The HVAC infrastructure at IIT Mandi has been designed and operated with a focus on energy efficiency and optimized performance.

  The key features are as follows:

- **Centralized chiller system** : Centralized chiller system of 225 TR capacity is installed with Variable Frequency Drives (VFDs), enabling modulation of compressor and pump speeds based on actual cooling demand. This significantly reduces power consumption during part-load conditions.
- **Air Handling Units** (AHU) and Fan Coil Units (FCU) are equipped with VFD-based starters, allowing dynamic control of airflow as per occupancy and load requirements, thereby minimizing unnecessary energy usage.
- **Hot Water Generator System** comprising 2 Nos. units of 600 kW capacity each is installed for efficient thermal energy generation, ensuring optimized fuel/electricity utilization.
- **VRV (Variable Refrigerant Volume)** System with a total capacity of 834 HP is installed, which inherently operates on inverter technology and provides zone-wise cooling control, resulting in substantial energy savings compared to conventional systems.

- **VFD** : Overall, the integration of VFDs and variable load-based systems ensures reduced energy consumption, improved system efficiency, and extended equipment life.
- **Heat pumps:** Efficient heat pumps are being employed to satisfy the hot water needs of hostels. Given that IIT Mandi is located in the Himalayan area and requiring hot water all year round, the use of heat pumps can lower energy requirements by roughly 40 to 50%.
- **Fuel efficient DG backups :** Energy-efficient DG sets are operated only during grid outages, with regular maintenance and optimized fuel management to reduce emissions and improve operational efficiency.
- **Use of Electrical Vehicles**: IIT Mandi is prioritizing the use of electric vehicles on campus and has established an EV charging station at the North campus. This station is capable of fast charging one four-wheeler and two two-wheelers simultaneously. This initiative aims to promote a clean, green, and pollution-free environment on campus.
- **Efficient Distribution transformers**:
  - IIT Mandi campus has installed At RSS (33/11 kV), 2 Nos. transformers of 5 MVA capacity each are installed to cater to the campus load.
  - Proper load distribution and operation within optimal loading range contribute to reduction in technical losses and improved overall energy efficiency of the electrical network.
- **Sustainable Infrastructure Development:** New infrastructure upgrades for the expansion of the campus are being planned with a focus on energy efficiency and environmental considerations.

D.) Horticulture and Green Landscaping – IIT Mandi

IIT Mandi, located in the ecologically rich Kamand Valley of Himachal Pradesh, is committed to developing and maintaining a sustainable Green Campus through scientific landscaping, biodiversity conservation, and environmental stewardship.

Key Highlights

- Developed over 503 acres with extensive green landscapes, native forest cover, and landscaped gardens.
- Conservation of rich Himalayan flora, including native, ornamental, medicinal, aromatic, and fruit-bearing plant species.
- More than 25,000 trees and plants planted across North and South Campuses during 2024–26.
- Development of the Vrindavan Botanical Garden showcasing medicinal, aromatic, forest, and fruit tree species.
- Establishment of Navagraha Garden and Nakshatra Garden for conservation of culturally and ecologically significant plant species.

- Development of a Butterfly Garden with host and nectar plants to promote pollinator conservation and campus biodiversity.
- Well-maintained nurseries in both campuses for propagation of ornamental, flowering, medicinal, and indigenous plant species.
- Regular plantation drives under the national campaign "Ek Ped Maa Ke Naam", with active participation of students, faculty, staff, and campus community.
- Continuous horticulture maintenance covering lawns, gardens, avenue plantations, irrigation systems, potted plants, seasonal flowers, pruning, landscaping, and organic manure application.
- Promotion of sustainable horticulture through composting, organic manure utilization, and environmentally friendly landscape management.
- Botanical Garden developed as an educational and research resource for biodiversity conservation and environmental awareness.

Through these initiatives, IIT Mandi continues to enhance campus biodiversity, ecological sustainability, environmental awareness, and aesthetic development, in alignment with its Green Campus Policy and sustainable infrastructure goals.