Energy Policy

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IIT Gandhinagar (IITGN) had the benefit of building a new campus relatively recently and given widespread public awareness of the importance of sustainability and the need to mitigate the impacts of climate change, it incorporated sustainability practices into its master plan and campus design.

A fundamental guiding principle for the campus has been to build a sustainable, eco-friendly campus with minimal impact on the environment. The campus has been designed with low energy and resource consumption as one of the key considerations.

The original master plan of the institute states that for making the campus truly green, the institute would have a Sustainable Development Policy and inculcate sustainable practices through its action plans.

The master plan incorporated "environment and energy response" as one of its major components. The master plan complied with the National Building Code 2009 of India, including the 'Approach to Sustainability'. The buildings have been built to Green Rating for Integrated Habitat Assessment (GRIHA) for green buildings and large area developments and Energy Conservation Building Code (ECBC) standards. The guiding principles of the master plan included the following: a) complete and absolute respect for the environment at both micro and macro levels and b) respect, conserve and where possible, recycle resources.

Infrastructure details and guidelines meticulously ensure reducing, reusing and recycling of resources and reducing the ecological footprint of the institute (reducing the site dependency on city's resources). The institute has several features including low-energy sewage treatment, rooftop solar photovoltaic plants, solar water heaters, biogas plant, energy-efficient lights, motors and pumps, use of natural sunlight in corridors, passive cooling systems, a pedestrian-friendly campus and others that serve as evidence to the institute's aspiration to be sustainable. Energy efficiency and solar power generation are aligned with the National Missions on reducing carbon emissions and enhancing solar energy capacity.

All energy use is designed with and must conform to the following guidelines:

Infrastructure and building design

- Optimisation of building design to reduce energy consumption/ conventional energy demand without compromising on the visual and thermal comfort of the building occupants. All buildings comply with mandatory clauses of the Energy Conservation Building Code (ECBC), 2007.
- The master plan specifies that the built form of the campus would be mainly 'low-rise' with walkup (elevator free) buildings.
- Indoor comfort factors including visual, thermal and acoustic are addressed in all the buildings.
- Use of passive shading strategies: Shading devices are designed to permit the maximum winter sun and the minimum summer sun inside the structure, hence creating a comfortable internal environment, that is, cool in the summers and warm in the winters.
- Installation of window louvres to reduce heat gain, with studies indicating they provide more than 85% shading all year round.
- Solar shading analysis was undertaken for academic buildings during the initial stages of campus development, based on which the buildings are oriented with the longer sides facing towards the north and south.
- Use of innovative construction technologies and materials such as unfired fly ash-gypsum (fly ash from local sources) bricks to reduce the overall embodied energy of the buildings and cavity wall system (air cavities of 300-450 mm wide built between two skin walls) to reduce heat gain.
- Construction of housing and hostels involved the use of confined masonry technology (the first large scale application in India), which is earthquake resistant while being more economical than the conventional reinforced concrete frame construction. It reduces the amount of concrete being used thereby reducing the embodied energy of the buildings.
- Low environmental impact materials such as Armstrong (for false ceiling tiles), marine-grade plywood (for built-in furniture), natural stones and vitrified tiles (for flooring), and wood polymer composite and uPVC (for internal door frames, shutters and window panels) are used in the building interiors.
- Cross ventilation is provided in all the housing apartments, with two balconies, and two windows in each bedroom; jali screens have been provided to reduce glare.
- All fans are Bureau of Energy Efficiency (BEE) star rated. Centralised cooling systems and solar power generation to reduce carbon footprint and contribute to climate change mitigation.
- Installation of Passive Downdraft Evaporative Cooling (PDEC) technique, using a mist pump, in student dining halls. It has been adopted very effectively and helps reduce the indoor temperature with minimal energy consumption.
- All new installation of air conditioners should be brought to notice and approved by the Estate Office.
- Incorporation of site design strategies that assist in reduction of Urban Heat Island Effect (UHIE): High Solar Reflectance Index (SRI) tiles are used in the building roofs and balconies; plantation is done on the periphery of the roads to provide natural shading.
- Install all the insulation, fire-fighting systems, HVAC systems and refrigerant systems that are free from hydrochlorofluorocarbons (HCFC), CFC and halon gases, thus, having zero Ozone Depleting Potential (ODP) value.

- Roof insulation: Use of brickbat Coba insulation along with high SRI finish.
- Fire fighting system: Installation of dry powder type and compressed carbon dioxide fire suppression systems that are free from halon.
- HVAC system: Two types of HVAC systems (Variable Refrigerant Volume systems using the refrigerants R-410a and R-134a and water-cooled chiller-based system) have zero ODP.
- Use of Class 0 Armaflex as the nitrile rubber insulation in the HVAC system, which is dust-free, fibre-free and CFC free with zero ODP and reduces energy losses by 87%.
- Use of Twiga which is CFC and HCFC free for glass wool insulation.

- All street lighting has been designed to adhere to minimum energy efficiency norms as described in Guidelines and Benchmarks for Large Area Developments, Ministry of New and Renewable Energy (MNRE) and The Energy and Resources Institute (TERI), as well as to meet the minimum illumination levels and uniformity coefficient for different street categories. They have also been installed with astronomical switches that automatically switch the lights on and off based on pre-set times.

Solar energy

- On-site renewable energy system installation to offset a part of the annual energy consumption of internal artificial lighting and Heating, Ventilation and Air Conditioning (HVAC) systems.
- Solar photovoltaic panels have been installed on the rooftops and a solar carport has been built near the Academic Complex.
- A solar walkway (covered with solar PV panels) connecting the academic and hostel blocks harvests solar energy and contributes to improving the microclimate.
- All the residential and hostel buildings have solar water heaters/ units installed on their rooftops.
- Solar panel installation, use of louvres and skylights for maximum daylight utilisation is being considered for various buildings in the campus.
- Currently, the installed solar PV capacity is 500 kWp which provides for about 10% of the total energy demand of the campus.

Pedestrianisation, universal access and public transport

- The master plan envisioned a campus on the Sabarmati river, that is planned as a green campus with pedestrianized movement, largely free of vehicular traffic.
- Modal shift from motorized vehicles to non-motorized vehicles like bicycles or walking is encouraged.
- Segregated cycle tracks are provided along pedestrian paths and vehicular roads. Ample shaded cycle parking facilities are provided throughout the campus to encourage cycling.
- Visitors to the campus are requested to park their cars near the administration building and walk from there.
- The entire campus has been designed as a barrier-free place with universal access.
- The institute has been designed to be pedestrian-friendly and offers public transportation modes for the transportation of IITGN community members both on the campus and outside (covering areas up to a distance of approximately 20 km toward the nearest towns of Ahmedabad and Gandhinagar). CNG EECO cars operate on campus from 8.30 AM to 7.30 PM for internal

transport and their use is free for everyone (service has temporarily stopped since March 2021 due to COVID-19). The Institute bus service which runs regularly between the Campus and Gandhinagar - Ahmedabad is available for the IITGN community. These services aim for carbon management and reducing carbon dioxide emissions.

- Bicycle sharing project which was run as a pilot project till 2018 may be resumed after the identification of suitable service providers and assessing the potential challenges.
- Student vehicles - cars or motorcycles are discouraged on the campus.

Energy Management

- Calculation of the Energy Performance Index (EPI) for all the built areas on the campus on an annual basis contributes to assessing the energy utilisation.
- Ensure regular monitoring of the site's energy consumption by installing digital meters at the following point sources: Utility grid and each building level.
- Sub-meters for water pumping, outdoor lighting and common areas are installed.
- Performance monitoring and validation are conducted through the implementation of operation and maintenance protocol.
- Integration of Air Handling Units (AHUs) to Building Monitoring System (BMS) for efficient energy management, operations and maintenance.
- Light Emitting Diode (LED) lights are used in many locations throughout campus. All the road and pathway lights are LED and about three-fourths of the parcel lights are LED. All internal light fixtures in the Academic Complex are LED, except for some special lighting in the auditoriums and some common areas.
- Use of materials with lower embodied energy and low Volatile Organic Compounds (VOC) or free of VOC are to be considered.
- Use of Wood Plastic Composite (WPC) doors which are urea formaldehyde-free.
- Energy optimization has been achieved through the use of occupancy sensors in corridors and classrooms in academic blocks, energy-efficient lighting fixtures in the campus, astronomical time switches, motion sensors, etc. for lighting, ventilation fans, etc. in all the indoor and selected outdoor areas.
- Necessary steps are taken to reduce the wastage of energy required for water pumping through efficient design and the use of energy-efficient pumping systems.
- Competitions related to energy have been introduced in student hostels to raise awareness regarding energy conservation. (documents required to elaborate)

Public Advocacy, Communication, and Campaigns

- Organise activities and take initiatives to promote energy efficiency among the IITGN community
- Conduct safe driving drives for the campus and the neighbourhood, along with monitoring implementation of the road traffic safety on the campus
- Promote green commute on campus, by encouraging the community members for walking and cycling
- Define the structure and rules for keeping the campus noise-free

- Inculcate behavioural changes and contribute to increased awareness amongst the community members of IITGN and nearby villages. Constant appeals to switch to energy-efficient CFLs/ LED bulbs and switching off all electrical appliances when not in use.
- Encourage the community to avoid lift and use stairs, with a dual advantage for human health and energy savings.
- Rely on smart technology/ smart campus infrastructure (FTTx deployment in campus) to support classroom learning, provide robust research, engage students, enable professional development and improve campus business processes
- Circulate communications through Green Office for efficient energy management among the IITGN community members
- Invest suitably in solar and biomass to gradually move towards greater self-reliance in power requirements

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