

IIT Gandhinagar has undertaken several sustainable campus initiatives. The conceptual process during the campus planning emphasized sustainability, which in turn informed the development of the master plan and campus development. Key sustainability features integrated in the IITGN campus development include water conservation, purification and recycling, solar energy generation, comprehensive waste management, and compost production. Moreover, the campus infrastructure supports passive cooling and energy conservation in all the aspects of construction, operations and management.

Low energy and resource consumption, as well as minimal upkeep and low maintenance costs, are among the guiding principles of campus development. Sustainable design elements have been widely incorporated across the IITGN campus. For example, the design of the campus layout encourages walking/cycling and harvested water retaining structures on the campus have been leveraged. Cavity wall systems, night purge systems, solar water heaters and passive shading devices are some of the elements incorporated in building design. The masterplan paid particular attention to preserving natural water bodies, natural landscape and drainage channels as far as possible, and incorporated landscaping strategies and weather-responsive design.

Vital statistics (year 2019-20):

Volume of water used at the Institute:

Inbound (treated/extracted water): 264000 cum

Volume of wastewater recycled using STP: 74895 cum

Percentage of recycled water: 28.4%

Amount of waste generated: 1126 MT

Amount of waste recycled: 1053 MT

Amount of waste sent to landfill: 73 MT

Percentage of waste recycled: 93.5%

Total energy used: 27855 GJ

Total energy used from low-carbon sources: 2374 GJ

Percentage of energy used from low-carbon sources: 8.5%

Institute floor space: 81143 sqm

Energy Performance Index: 95.4

### **Water:**

The Masterplan laid an emphasis on sustainability in campus water management and several innovative features were incorporated to achieve that end. A separate pipeline was installed from the Narmada Canal to bring fresh water across the Sabarmati River. On a semi-arid, undeveloped site, the campus has developed an environmentally responsible water collection and distribution system that includes piping in and using fresh water and capturing rooftop rainwater and once used, recycling all this water for irrigation purposes.

The campus treats all its sewage in an environmentally friendly sewage treatment plant that uses anaerobic reactors to digest sewage solids and a root zone treatment system, which treats the effluent to be later used for horticultural operations. The rooftop rainwater is captured in four underground Jal Mandaps of 50 lakh litres storage capacity, placed strategically across the campus.



### **Pollution and Waste Management:**

The waste generated at the institute is segregated into organic, recyclable, medical and chemical waste and waste that is to be sent to landfill. The organic waste is composted, and other types of waste are sent to the respective agencies for further processing. All new residents are informed of waste segregation guidelines, which are strictly adhered to.

There is zero use of plastic cups or cutlery at meetings, public events or canteens and very restricted use of packaged water bottles at the Institute.

Mess and canteen contractors are directed against the use of plastic disposable items and to minimize other disposable items.

IITGN actively promotes good sustainability practices amongst campus residents and the local community. It has constituted a Green Office Committee to coordinate and encourage clean and green practices on campus. Awareness drives have been conducted in nearby village Basan to promote solid waste management, including minimizing the use of plastic, waste segregation and waste disposal.

The Foundation Program, a flagship induction program of IITGN, started in 2011 promotes the practice and education of sanitation amongst students. All first year undergraduate students are required to undergo this five-week program during which they undertake cleanliness drives in such areas as the Ahmedabad railway station and nearby villages.



### **Climate Change:**

The IITGN community is actively engaged in promoting sustainability in all its operations. IITGN is developing a plan to measure water and carbon footprints by real-time monitoring on a day-to-day basis. This initiative will have considerable impact on reducing energy usage and making the entire campus more energy efficient.

Keeping climate change in mind, the masterplan of the campus development has considered passive cooling systems and harvesting solar energy (500kW capacity solar photovoltaic installed on the campus is integrated into its electric system). A biogas plant of 1 MT waste capacity is installed on the campus, in collaboration with Bhabha

Atomic Research Centre (BARC), which is rated to generate 90-120 kW of electric power through a gas generator.



### **Energy:**

As a relatively new institution (established in 2008), all the buildings are newly built and energy efficient. Energy optimisation has been achieved through the use of occupancy sensors in corridors and classrooms in academic blocks, use of energy efficient lighting fixtures in the campus, integration of air handling units to adoption of a Building Management System for efficient management, operations and maintenance, use of astronomical time switches for lighting, ventilation fans and electric heaters, etc. Additional alterations to existing buildings are planned to improve energy efficiency. Solar panel installation, use of louvres and skylights for maximum daylight utilization is under consideration, in buildings which do not have these features currently.

All residential buildings have solar water heaters installed on their rooftops. The housing area has 90 solar hot water units (three per building), each with a capacity of 500 litres per day. The hostel area has 44 solar hot water units. The hostel units each have electrical backup, set on timers, to provide additional heating for three hours in the morning and three hours in the evenings. LED lights are used in many locations throughout campus. All the road and pathway lights are LED and 74% 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.

The institute has taken several initiatives to minimize energy consumption. Under government guidelines, the maximum rooftop solar photovoltaic system capacity installed at a consumer premises shall be upto a maximum of 50% of consumer's sanctioned load/contract demand. During the first phase of construction, the institute

installed solar panels for renewable energy accordingly and is currently planning to install more solar panels as the load grows.

The institute is designed to be pedestrian and cycling friendly and offers public transportation modes for the transportation of IITGN community members both in the campus and outside (covering areas up to a distance of approximately 20 km toward the nearest town of Gandhinagar).



#### **Natural Resources, Wildlife and Ecosystems:**

The institute has both natural and manicured open spaces. The natural vegetation of the ravines at the site serve as habitat for native flora and fauna, with high ecological value and the manicured open spaces serve as active and passive recreational spaces along with fulfilling an aesthetic function. Seasonal ponds have been retained and used as landscape assets, helping in reducing the urban heat island effect and improving the micro climate.

The northern parcel of the site is used only in part leaving a substantial portion as habitat for 'nilgai antelope' and other existing fauna. Many sections of the ravines lie below the highest flood level of the Sabarmati River, and the Masterplan calls for the river bank to be protected from erosion during floods.

Emphasis has been placed on using native species of trees and plants in the campus landscaping, retaining around ninety percent of the existing trees through careful siting of buildings and tree transplantation for some existing trees.



Various sustainable interventions at the IITGN campus are explained through placards, which are installed at suitable locations on the campus, to generate better understanding and awareness amongst community members and visitors of the various sustainability measures that have been adopted.

For the master plan design and Phase-I constructions, IITGN fulfilled the mandatory requirements for green campus and became the first campus in India to be awarded a 5-star rating by Green Rating for Integrated Habitat Assessment for Large Developments (GRIHA LD) in 2016. The GRIHA ratings encompass several components, such as tree transplantation, use of fly ash bricks, and topsoil preservation.