INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

Carbon Footprint 2024-2025

Indian Institute of Technology Jodhpur

Scope 1, 2, and Scope 3 Emissions, 2024-2025

Our approach towards Sustainability

The Indian Institute of Technology (IIT) Jodhpur is a global pioneer in sustainability, being one of the very few institutions in the world intentionally conceived, designed, and built as a fully integrated sustainable campus (link). The unique master plan of IIT Jodhpur conceptualizes the workings of all parts of the campus as an interlocking, integral network of complex dynamic systems, like the metabolism of a living organism. This meta-system shall be actively studied and monitored (partly to generate intelligent control instructions and partly to mine data) and as settlement evolving through trials and tests, in a "Living Laboratory". The ideas for this "Smart Intelligent Eco-Campus" encompass the ideals of social, economic and environmental sustainability, and integrate aspects of landscape and biodiversity, food, water and waste, solid waste, mobility, energy and ICT to create an intricate life-like system of campus metabolism. The Berms structures in IIT Jodhpur act as signature bounding elements containing compact desert settlements. They mitigate noise, dust, heat, and are part of the de-desertification strategy along with green buffer zones, green infrastructure, compact settlement pattern, and east-west streets. The IIT Jodhpur campus is a sustainable oasis in a challenging desert context, providing a protected habitat for flora and fauna (including humans). Our campus rejuvenating the site by providing biodiversity corridors to allow native species to have contiguous habitat and passage across the site and within the region than be isolated in island sanctuaries in a human settlement. The landscape plan aims at minimizing its water requirements by using recycled water. The campus uses hardy native species of plants, conserving water and improving soil moisture, while requiring little upkeep and easy disease management. The landscape is designed to absorb storm water even during extreme rainfall incidents and prevent erosion or flooding. The landscape provides open space for interaction between students, faculty, local communities, artists, etc. and for art installations and public spaces, and also suitable green cover for parked vehicles.

Sustainable Development Efforts by IIT Jodhpur through Use of Emerging Technologies. Overarching Goal: Mobilize academics, research and laboratory capabilities, skilled students, capacity building and social scientific responsibility capacities of IIT Jodhpur to advance emerging technologies for knowledge preservation of adapted communities, to adopt sustainable climate resilient systems,

water conservation measures, natural resource management, and achieve net-zero greenhouse gas emissions by 2050.

IIT Jodhpur students and administration have unique understanding of their relationship with the environment they live in. Here on the eastern edge of the Thar Desert, they know intimately the importance of co-existing communities and their adaptations while living with resilience to extreme heat, water management, soils and the flora and fauna. While IIT Jodhpur is young, we look with a bold vision toward the sustainability.

Evolution of the Sustainability Center since 2019: IIT Jodhpur declared its commitment to become the most sustainable desert institution in India by setting up the Center for Emerging Technologies for Sustainable Development (CETSD). In the meantime, IIT Jodhpur outlines its climate action plan and also role of CETSD to affirm its resolve to put climate resilient technologies in the service of the location.

CETSD Action Strategy: The Climate Action Plan outlined here, puts forward the necessary steps to achieve this vision, charting the path to preserving adaptation knowledge of societies, its related technologies, carbon neutrality, climate resilient agriculture, zero waste, water and soil conservation to preserve Thar desert ecosystem. It is a data-driven strategy which follows a “DECLARE model” proposed by CETSD towards achieving the objectives of the plan, which are as following:

- Develop a network with industries and NGOs for knowledge sharing and working in partnerships for applying emerging technologies to achieve SDGs.
- Enable a strong internal structure to facilitate sustainability related studies (technology, policy, social aspects, management, legal, and financial) having an expertise base within the center.
- Facilitate close connections with other entities at IITJ, for actualizing the emerging technology work, along with strong capacity building to undertake projects.
- Link with the government to enable applying emerging technologies to help the government carry out its activities.
- Actionable focus on partnership viable funding with industry and NGO to put technologies on the ground within minimal time to put CETSD on the global map
- Work with scientific social responsibility aspects.
- Engage students take concerted action for generating awareness amongst themselves through campus sustainability projects and academic projects.

Carbon Emission

IIT Jodhpur adheres to the globally recognized Greenhouse Gas (GHG) Protocol, jointly developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), to quantify and report its greenhouse gas emissions. The methodology adopted for emissions calculation aligns with standard practices and is detailed in the institute's previous sustainability reports.

Reinforcing its commitment to environmental stewardship, IIT Jodhpur continues to rigorously monitor and minimize its carbon footprint. By integrating sustainable practices across campus operations, the institute exemplifies how academic institutions can serve as drivers of measurable climate action. For the reporting cycle of 2024–2025, IIT Jodhpur's carbon emissions were quantified at 461 tonnes of CO_2 equivalent (tCO_2e) under Scope 1 and 13,248 tCO_2e under Scope 2, as illustrated in Figure 1.

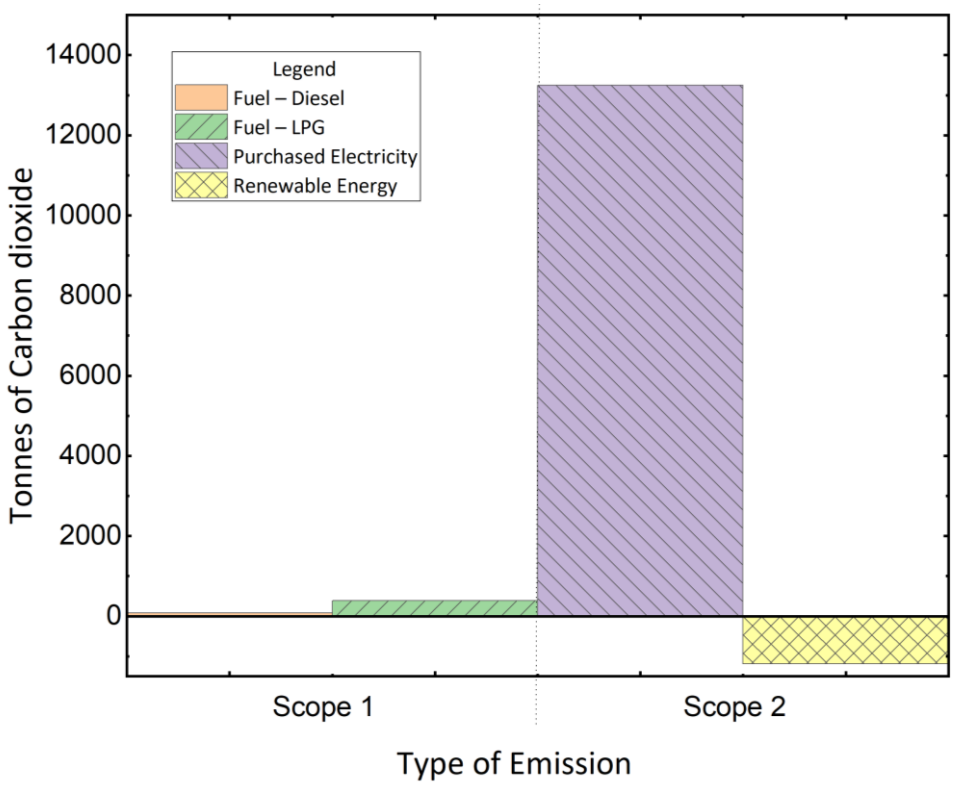

Figure 1. Scope 1 and Scope 2 emissions of 2024-2025 cycle of Indian Institute of Technology Jodhpur.

Scope 1 Emissions:

The Institute achieved a **3% reduction in Scope 1 emissions** from FY 2023–24 to FY 2024–25, as depicted in *Figure 2*. This measurable decline reflects the impact of targeted sustainability interventions, including the promotion of on-campus residency for faculty, staff, and students; the cultivation of a bicycle-centric mobility culture; and a substantial decrease in reliance on diesel-based generators through enhanced energy efficiency and operational management.

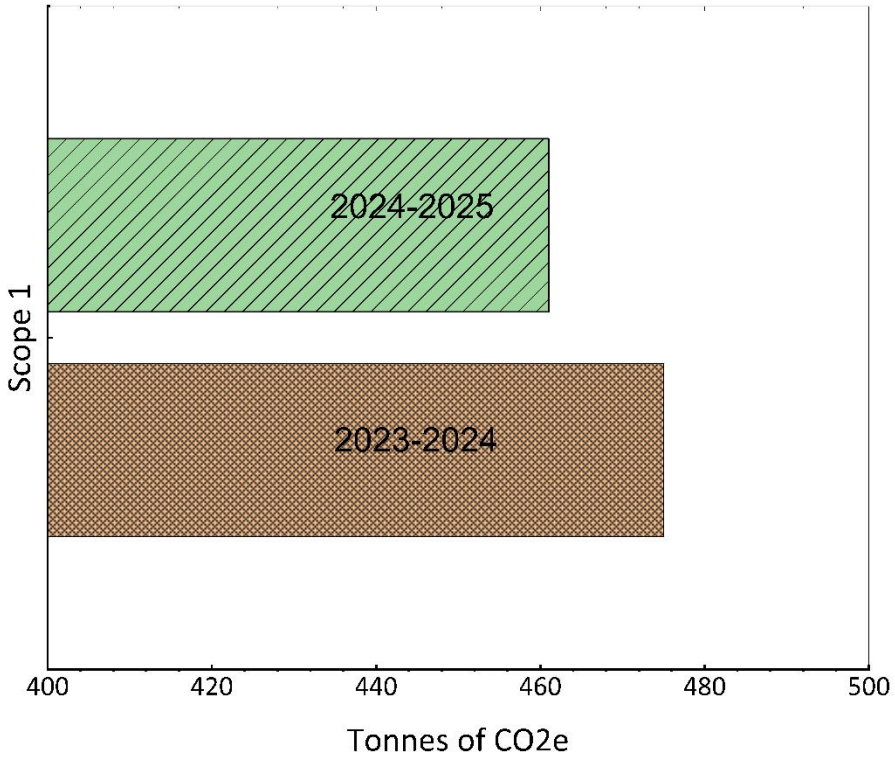

Figure 2. Scope 1 emissions reduction by the Indian Institute of Technology Jodhpur.

Scope 2 Emissions:

The Institute successfully achieved a **1% reduction in Scope 2 emissions** from FY 2023–24 to FY 2024–25, as illustrated in *Figure 3*. This notable decline is primarily attributed to the Institute's clean energy transition initiatives, particularly the deployment of on-site solar photovoltaic systems, which have reduced dependence on externally sourced electricity and strengthened energy sustainability on campus.

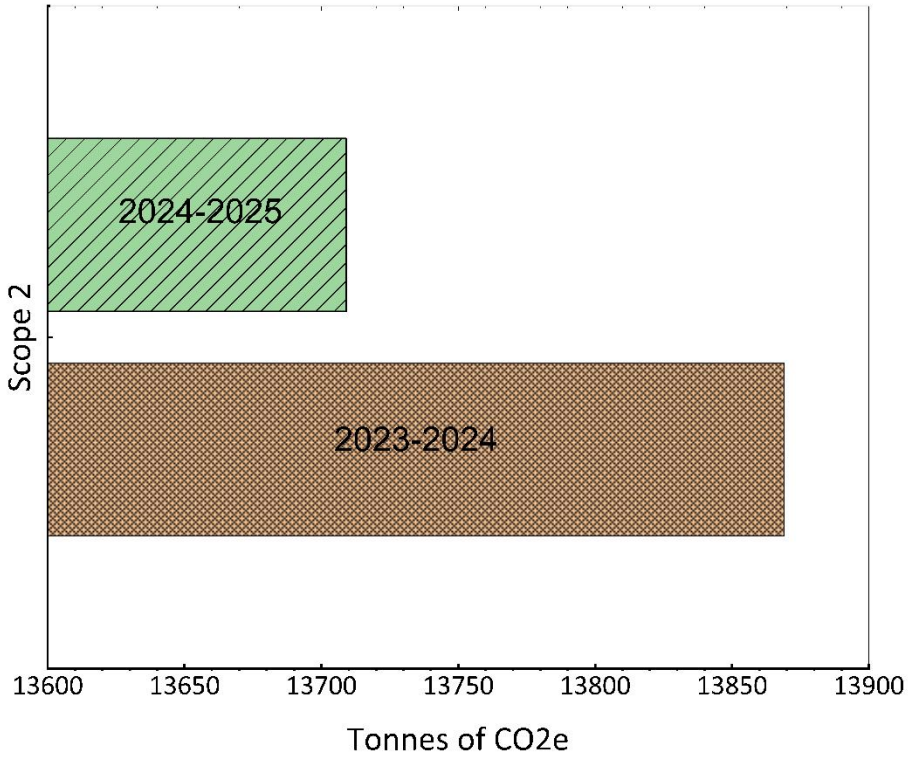

Figure 3. Scope 2 emissions reduction by the Indian Institute of Technology Jodhpur.

Scope 3 Emissions:

The Institute has successfully initiated the measurement of its Scope 3 emissions related to water and waste management. This includes emissions from waste disposal (landfilling, incineration, recycling processes), water treatment and supply, and end-of-life treatment of campus assets such as furniture, electronics, and laboratory equipment. As many of these activities now follow net-zero policies, the associated emissions are currently considered negligible or zero.

Total emissions reduction by carbon sinks:

Furthermore, IIT Jodhpur has implemented large-scale plantation initiatives that significantly contribute to carbon reduction. The Institute follows a policy of maintaining over 50% of its campus as green cover. In the year 2024–2025 alone, more than 10,000 saplings were planted. Currently, the campus is home to over 30,000 trees and approximately 80,000 shrubs, herbs, and plants. This extensive vegetation acts as a substantial carbon sink and contributes to microclimate regulation by reducing ambient temperatures. When accounting solely for the **carbon sequestration potential of existing trees** on campus, IIT Jodhpur could offset approximately **13,049 tCO_2e** of its reported emissions. It is important to note that the campus also hosts **over 50,000 plants**, along with an expansive **green grass cover**, all of which contribute to additional carbon capture. While these elements were not included in the current offset calculations, the Institute plans to incorporate their sequestration potential in future assessments to more accurately reflect their ecological contribution.

Way Forward

Building on the progress made in reducing Scope 1 and Scope 2 emissions, IIT Jodhpur remains committed to achieve deeper decarbonization and foster a resilient and sustainable campus environment.

Key actions planned for the coming years include:

- Expansion of renewable energy infrastructure, with increased capacity from rooftop solar and potential integration of wind or hybrid systems.
- Transition of campus kitchens to solar-based cooking systems to reduce LPG consumption, which is currently the major contributor to Scope 1 emissions. This move will significantly curb direct emissions associated with energy usage in dining facilities.
- Comprehensive carbon sequestration assessment, including quantification of the carbon sink capacity of shrubs, herbs, and grass cover, which are currently not accounted for but have demonstrated potential for additional offsets.
- Adoption of low-carbon technologies across campus facilities, including energy-efficient HVAC systems and green building measures.
- Enhanced mobility planning, emphasizing non-motorized transport and further disincentivizing fossil fuel usage.
- Institutionalization of a Carbon Accounting Framework, updated annually to reflect changes in operations, land use, and energy sourcing.

These measures will not only accelerate the Institute’s progress toward carbon neutrality but also serve as a replicable model for academic campuses across India and beyond.

Analysis:

The tables below provide the carbon emissions of the Institute for 2024-2025.

Table 1. Carbon emissions of the Institute for 2024-2025.

Type of Emission	Category	Data	Amount	Unit	Total CO_2 (tCO_2)	Strategies Followed
Scope 1	Fuel – Diesel	Diesel	28,030	Litres	75	Minimization of diesel-based generator use and On-campus residency
	Fuel – LPG	LPG	129,589	kg	386	Effective LPG leak detection and control
Subtotal (Scope 1)					**461**	
Scope 2	Purchased Electricity	Grid Power	16,769,246	kWh	13,248	On-site solar generation Efficient energy usage policies
	Renewable Energy	Solar Generation	1,509,387	kWh	0	On-site solar panels (Net Zero transition)
Subtotal (Scope 2)					**13,248**	
Scope 3	Commuting	Personal Vehicles, Buses, Cycles	—	—	0	- Bicycle-dominant campus (3,751+ cycles) - Campus Transport Infrastructure
	Waste Disposal	—	—	—	0	- Sustainability Policy
	Water & Wastewater Management	—	—	—	0	Water Management Strategy- Our facility adopts a comprehensive water sustainability strategy that includes the reuse, recycling, and recharge of water resources
	End-of-Life Asset Disposal	—	—	—	0	- Sustainability Policy
Subtotal (Scope 3)					**0**	

When accounting solely for the carbon sequestration potential of existing trees on campus, IIT Jodhpur could offset approximately 13,049 tCO_2e of its reported emissions. It is important to note that the campus also hosts over 50,000 shrubs and herbs, along with an expansive green grass cover, all of which contribute to additional carbon capture. While these elements were not included in the current offset calculations, the Institute plans to incorporate their sequestration potential in future assessments to more accurately reflect their ecological contribution.

Table 2. Carbon emissions of the Institute for 2024-2025, along with carbon sinks.

Type of Emission	Category	Data	Amount	Unit	Total CO_2 (tCO_2)	Strategies Followed
Scope 1	Fuel – Diesel	Diesel	28,030	Litres	75	Minimization of diesel-based generator use and On-campus residency
	Fuel – LPG	LPG	1,29,589	kg	386	Effective LPG leak detection and control
Subtotal (Scope 1)					**461**	
Scope 2	Purchased Electricity	Grid Power	1,67,69,246	kWh	13,248	- On-site solar generation
						- Efficient energy usage policies
	Renewable Energy	Solar Generation	15,09,387	kWh	0	- On-site solar panels (Net Zero transition)
Subtotal (Scope 2)					**13,248**	
		Total emissions			**13,709**	
Carbon sinks	Trees		30000	num	-660	https://princetontreecare.com/so-how-much-carbon-does-one-tree-actually-absorb/ 22 kg co2 absorbed per year per tree planted
		Total emissions			**13049**	

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