Annual Carbon Emission Report

for

Thapar Institute of Engineering & Technology, Patiala

Scope and Boundary:

The framework for estimating greenhouse gas (GHG) emissions at Thapar Institute of Engineering & Technology (TIET) is developed based on the following key considerations:

[1] Organizational Boundaries: The organizational boundaries of TIET encompass all departments, schools, faculties, campuses, and affiliated units that fall under the university's direct operational control.

[2] Operational Boundaries: These include all activities carried out within the defined organizational boundaries that contribute to GHG emissions. This covers direct emissions from on-campus sources such as energy consumption, transportation, heating and cooling systems, and waste management.

Scope of GHG Emissions: The GHG emissions can be classified into two scopes as per the Greenhouse Gas Protocol (GHGP) guidelines:

Scope 1: Direct GHG emission from sources owned or controlled by TIET, such as emissions from university-owned vehicles, on-site fuel combustion, and refrigerants.

Scope 2: Indirect GHG emission from the consumption of purchased electricity, heat, or steam. This includes emissions generated off-site but resulting from the university's energy consumption.

To ensure consistent and comparable data for analysis and decision-making, financial year (FY) is considered as the reporting period for GHG accounting. For example: GHG accounting for FY 2021-2022 denotes all the GHG emissions between April 2021 and March 2022. Moreover, FY 2020-2021 is considered as the baseline year for reporting of GHG emission in this report. The

GHG emission from various sources within organizational and operational boundaries are reported in tonnes of carbon dioxide equivalent (tCO_2e) for the FY 2020-2021, 2021-2022, 2022-2023, 2023-2024, 2024-25, and 2025-26. The details can be found in the following table:

Emission Source	**Reporting Year**					
	FY 2020-2021 (Baseline Year)	**FY 2021-2022**	**FY 2022-2023**	**FY 2023-2024**	**FY 2024-2025**	**FY 2025-2026**
Scope 1						
LPG used in Hostel/Canteens	43.83	221.08	528.57	721.04	890.60	1049.20
LPG used in Staff Residence	145.95	145.95	159.65	149.8	157.94	157.94
LPG used in Laboratory	0.34	0.38	0.34	0.31	0.38	0.38
Diesel used in DG sets	81.27	33.43	84.60	59.73	194.62	167.66
Diesel used by institute owned vehicles	1.04	1.69	4.21	4.06	0.64	1.29
Petrol used by institute owned vehicles	0.35	0.50	0.61	0.53	1.27	2.69
Refrigerant used in Laboratory	10.70	10.70	10.70	12.13	10.70	10.70
Scope 2						
Purchased electricity	4001.73	7294.94	14337.27	15313.52	18004.45	19515.39
Total Scope 1 and Scope 2 Emissions (tCO_2 eq.)	**4285.22**	**7708.69**	**15125.95**	**16261.14**	**19260.60**	**20905.21**

Limitation Disclosure:

To estimate total Scope 1 and Scope 2 emissions, data is gathered from multiple units across the institute, including departments, schools, the maintenance unit, and administrative offices.

However, refrigerant consumption in refrigeration and air conditioning systems is currently excluded from the calculation due to the absence of a reliable system for accurately tracking annual usage. It is important to note that refrigerants used within laboratories are accounted under Scope 1 emissions.

For this report, the emission factors are sourced from the United Nations Framework Convention on Climate Change. In cases where country-specific emission factors are not available, the emission factors recommended by the United States Environmental Protection Agency are utilized.

Future Considerations and Sustainable Action Plan:

To proactively reduce TIET's carbon footprint, the institute has implemented a comprehensive sustainability action plan. The administration aims to achieve a 25% reduction in GHG emissions by 2030, while progressing toward the long-term objective of carbon neutrality. In alignment with the Government of India's targets, the institute aspires to reach Net Zero emissions by 2070. This plan includes a range of initiatives and planned sustainability measures, including:

(a) EV charging stations
(b) Solar panels on roof top
(c) Solar water heating system
(d) Flaring of CH_4 at STP
(e) E-rikshaw for commuting inside campus
(f) LED lighting
(g) Sensor-based switches
(h) Smart electric meter
(i) Radiant cooling
(j) Ground water recharge well
(k) Tree plantation
(l) Waste reduction, reuse, and recycling
(m) Awareness campaign and Environmental education
(n) Installation of BLDC fans in new buildings
(o) 3 MW Solar plant

(p) No vehicle day on Wednesday
(q) Eco-friendly pedestrian walkway and cycling track

It is important to note that many of the aforementioned initiatives have already been implemented within the institute. These measures include the installation of solar water heating systems, EV charging infrastructure, and the use of e-rickshaws for transportation, adoption of LED lighting and BLDC fans in new buildings, introduction of a no-vehicle day on Wednesdays, deployment of smart electricity meters, construction of groundwater recharge wells, organization of plantation drives, and the launch of awareness campaigns and environmental education programs along with the adoption of radiant cooling systems. Collectively, these initiatives have significantly contributed to reducing the institute's carbon footprint.

Furthermore, the institute administration is actively working toward implementing additional sustainability initiatives in the near future. These planned efforts are intended to strengthen the institute's commitment to environmentally responsible operations. In addition, a 3 MW solar power plant in the campus is operational, which is significantly reducing the overall carbon footprint. The administration continues to remain dedicated to expanding and improving existing sustainability practices, with the goal of achieving even greater reductions in carbon emissions.