

## IIMB GREENHOUSE GAS ASSESSMENT: 2023~24

### 1. Introduction:

Indian Institute of Management Bangalore (IIMB) is a premier business school in India, located in a picturesque campus in Bengaluru, India's technology hub, which provides a vibrant and dynamic environment for learning. IIMB is committed to fostering sustainable development and environmental stewardship. It integrates sustainability into its curriculum, operations, and community engagement initiatives. Through a combination of innovative practices, strategic initiatives, and active community involvement, IIMB aims to minimize its environmental footprint and promote a culture of sustainability on campus and beyond. The Institute's sustainability efforts are aligned with its vision to lead in creating responsible and impactful leaders who can drive positive change in society.



#### A. Objective of The Study

The study titled "Institutional Greenhouse Gas Assessment: A Case Study of the Indian Institute of Management - Bangalore Campus," conducted by EcoMorphosys, aims to compile a comprehensive annual inventory of carbon emissions.

Achieving Net Zero at the IIMB campus requires balancing carbon emissions with carbon mitigation efforts and carbon sequestration, thereby quantifying these metrics helps define the gap.

This assessment provides a detailed analysis of carbon emissions across Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (other indirect emissions).

## B. The Sustainable Path



Progress in sustainability is evident in how well the Institute integrates and embeds efforts across different sectors. Here are a few steps taken towards making IIMB a sustainable campus:

1. IIMB's "waste not, want not" policy turns food waste into biogas and compost, and recycles dry waste, striving for zero-waste.



2. Roof-top solar plants meet 12% of power needs; energy-efficient equipment is used campus-wide.

3. Battery-operated electric vehicles and bicycles reduce campus CO<sub>2</sub> emissions.



4. 100% recycled water from STP sustains gardens; the runoff water is recharged & stored for annual use.

5. The IIMB community reduces waste, avoids plastic, plants, trees, uses green vehicles, and eco-friendly products.



6. IIMB is excelling towards a sustainable B-school.

## 2. Carbon Emission Methodology:

Emission factors (EFs) are essential for creating a comprehensive GHG Inventory. They act as conversion metrics to estimate CO<sub>2</sub> emissions from activity values. Accurate carbon emission assessments are made possible by applying the right EFs, which provide insights into the environmental impact of specific activities.

EFs consist of the oxidation ratio (the fraction of carbon oxidized and released as CO<sub>2</sub>) and the carbon content (amount of carbon in the fuel). Emissions are often converted to carbon dioxide equivalents (CO<sub>2</sub>e) to compare different GHGs, measured in kilograms and accounting for their global warming potentials (GWPs).

Emission factors can vary by time and country, such as with coal composition, but constant default values can be derived when expressed in mass of carbon per unit of energy. Valid emission factors are crucial for emission inventories and can be found in handbooks, government publications, and research papers.



In this assessment, we consider various global, national, and cross-sectoral references to determine the best-suited Emission Factors for each emission source. For instance, the Central Electricity Authority (CEA) provides specific Emission Factors for electricity consumption in India, while WRI India data is used for various vehicular emissions.

The studies are in line with guidelines set by Greenhouse Gas Protocol – Corporate Accounting & Reporting Standard; ISO 14064 1:2018 - Specification with guidance at the organizational level for quantification and reporting of greenhouse gas emissions and removals; complemented by Global Reporting Initiative (GRI) & World Business Council For Sustainable Development (WBCSD).

### 3. Greenhouse Gas Inventory

#### Scope 1: Direct GHG emissions

Direct GHG emissions occur from sources that are owned or controlled by the Institution, for example, emissions from combustion in owned or controlled activities like cooking and heating; and emissions from owned vehicles, air conditioners, etc.

#### Scope 2: Electricity indirect GHG emissions

Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the Institution. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the Institution. Scope 2 emissions physically occur at the facility where electricity is generated.

#### Scope 3: Other indirect GHG emissions

Scope 3 emissions are a consequence of the activities of the Institution, but occur from sources not owned or controlled by the Institution. Some examples of scope 3 activities are waste generated across the campus, procurements of electrical components for multiple purposes, transportation emission of stakeholders, etc.

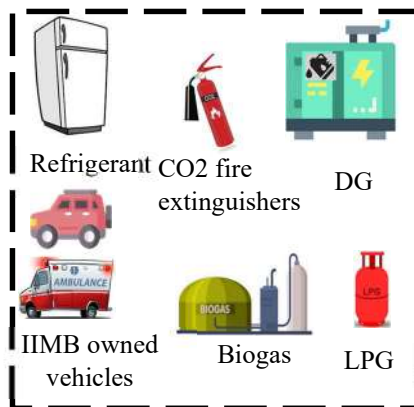
After our assessment these are the emission sources under each scope.

#### **SCOPE 2: Indirect Emissions**



Fossil fuel-based Electricity

#### **SCOPE 1: Direct Emissions**



#### **SCOPE 3: Value chain emissions**



Category 1 - Purchased Goods & Services



Category 4&7 - Transportation & distribution & Employee commutation in private vehicles



Category 5 - Waste generated in operations



Category 6 - Business travels

Fig. 1: IIMB'S Emission Sources Categorized as per GHG Protocol



## 4. Results

### 4.1 Greenhouse Gas Inventory Summary

Table 1: GHG Inventory Summary

IIM-B GREENHOUSE GAS INVENTORY - SUMMARY		2023-24	
<b>Energy Consumption</b>	Electricity	MWh	3,483
	Solar Power	MWh	466
	Gas for cooking - LPG & Biogas	Tonnes	69.2
	Diesel for DG	KL	15
<b>SCOPE WISE</b>		<b>Unit</b>	<b>2023-24</b>
<b>Inventory Emissions</b>	Scope 1: Direct Emissions	tCO <sub>2e</sub>	337
	Scope 2: Indirect Emissions - Owned	tCO <sub>2e</sub>	2,839
	Scope 3: Indirect Emissions - Not owned	tCO <sub>2e</sub>	678
	<b>Total</b>	<b>tCO<sub>2e</sub></b>	<b>3,853</b>
	<b>SOURCE WISE</b>		<b>Unit</b>
<b>Inventory Emissions</b>	Energy - electricity, gas,fuel	tCO <sub>2e</sub>	3,072
	Mobility	tCO <sub>2e</sub>	355
	Purchased & Capital Goods	tCO <sub>2e</sub>	323
	Fugitive emissions	tCO <sub>2e</sub>	73
	Waste generated	tCO <sub>2e</sub>	30
	<b>Total</b>	<b>tCO<sub>2e</sub></b>	<b>3,853</b>

The summary of the Greenhouse Gas Inventory and emissions can be seen in the table above. IIMB's annual energy usage includes 3,483 MWh of electricity, 466 MWh of solar energy, 69.2 tonnes of LPG and biogas for cooking, and 15 KL of diesel for generators.

Emissions are classified by scope, following the GHG Protocol, into Scope 1, 2 and 3. Scope 2 is the largest contributor due to high electricity consumption and is evidently a common trend among universities.

Emissions are also classified by source, with the main contributors in the order of high to low, as energy, mobility and, purchased & capital goods.

## 4.2 Greenhouse Gas Analysis

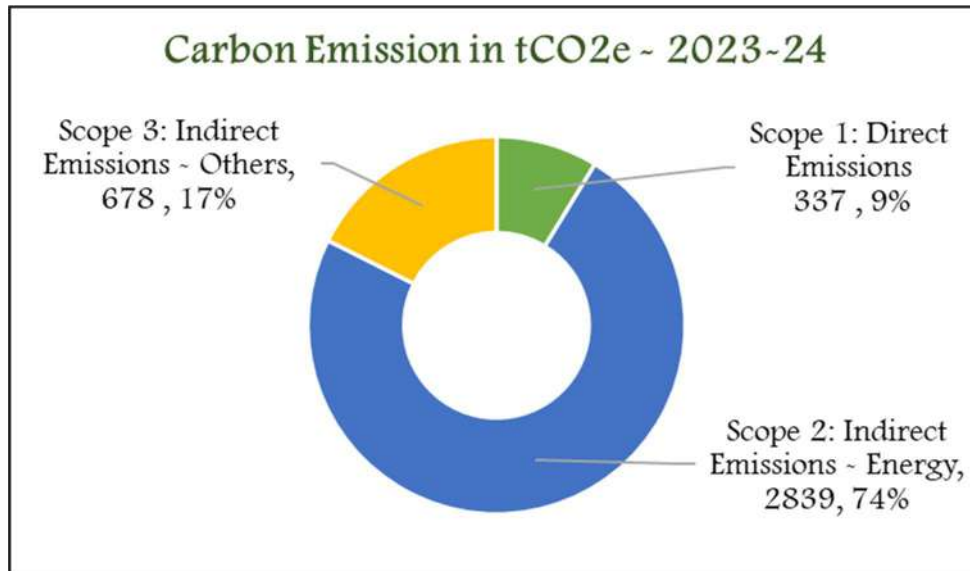


Fig. 2: Total Carbon Emissions across Scopes 1, 2 & 3

The charts above show emissions by scope (Scope 1, Scope 2, and Scope 3) for the 2023-24 reporting period, totaling **3,853 metric tons of CO<sub>2</sub> equivalent annually**, or about **1.40 metric tons per capita**. The largest emitter at IIMB is Scope 2, contributing 74% of total emissions, primarily due to electricity consumption in various buildings.

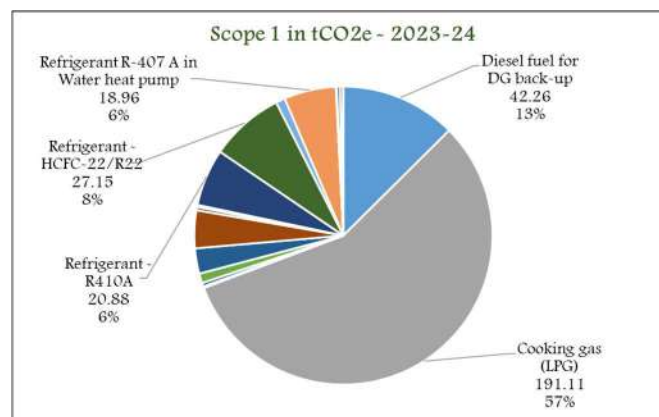


Fig. 3: Details of Scope 1 Emissions

Within Scope 1, the largest emissions come from cooking gas, contributing 57% with 191.11 tCO<sub>2</sub>e, mainly from its use in the hostel mess, MDC, and staff canteen for cooking meals for students, faculty, staff, visitors, and delegates. The second-largest contributor is Fugitive emissions Predominantly from refrigerant account for 20% of Scope 1 emissions, totalling to 73 tCO<sub>2</sub>e. Followed by diesel consumed by generators, emitting 42.26 tCO<sub>2</sub>e (13%). Fuel

consumption by IIMB-owned vehicles accounts for 7% of Scope 1 emissions, totaling 29.74 tCO<sub>2</sub>e.

While biogas flaring has a negligible carbon impact, its quantity is significant as it matches consumption levels. Emission sources such as oil, DG lube oil, STP lube oil, transformer oil, and coolant contribute minimally, less than 5%.

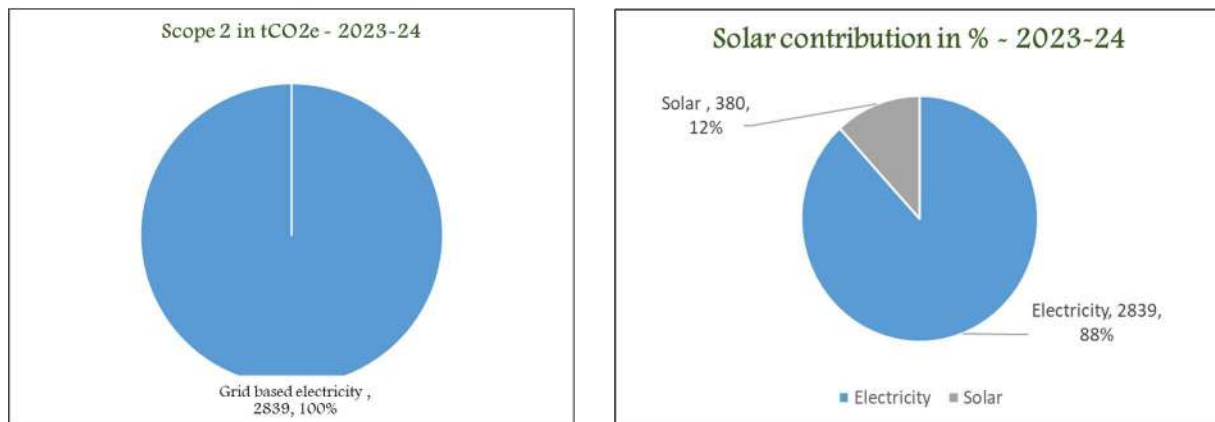


Fig. 4: Details of Scope 2 Emissions & solar contributions

Scope 2 illustrates the electricity consumption of IIMB, 12% of the total electricity demand is met by solar generated within the Institute.

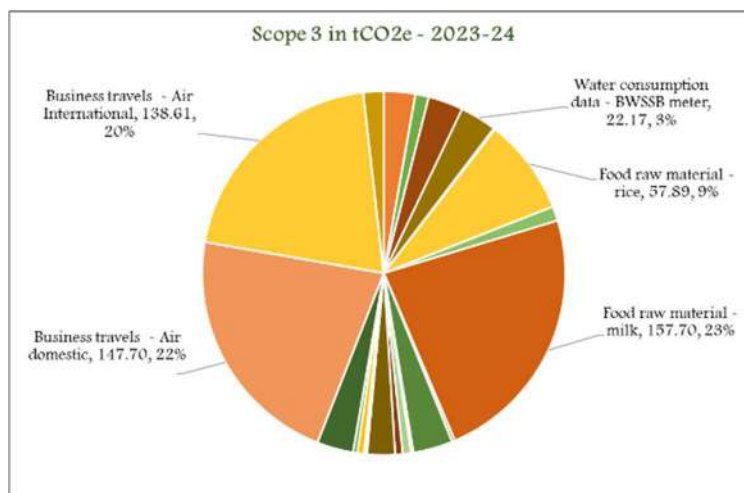




Fig. 5: Details of Scope 3 Emissions

Scope 3 shows the highest emissions from food raw material, particularly milk 157.70 tCO<sub>2</sub>e (23%). The next highest emitter is business air travel, 147.70 tCO<sub>2</sub>e (22%). Conversely, purchased goods and wastewater generation have the lowest emissions.

The overview of the GHG Inventory is shared below wherein

Table 2: GHG Inventory Overview

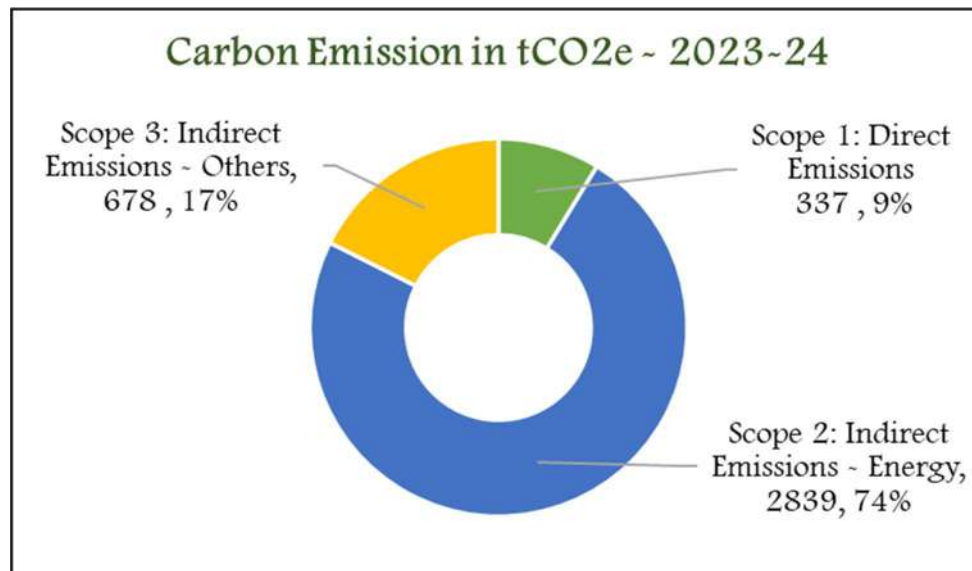
 <b>IIM-B GREENHOUSE GAS INVENTORY OVERVIEW</b> 		
<i>Population</i>	<i>Nos</i>	<i>2,751</i>
<i>Absolute Carbon Emissions</i>	<i>tCO<sub>2e</sub>/yr</i>	<i>3,853</i>
<i>Absolute Carbon Emission per capita</i>	<i>tCO<sub>2e</sub>/capita</i>	<i>1.40</i>
<i>Carbon mitigation through afforestation</i>	<i>tC/yr</i>	<i>165.45</i>
<i>Net Carbon Emissions</i>	<i>tCO<sub>2e</sub>/yr</i>	<i>3,688</i>
<i>Net Carbon Emission per capita</i>	<i>tCO<sub>2e</sub>/capita</i>	<i>1.34</i>
<i>Avoided emission through Solar</i>	<i>tCO<sub>2e</sub>/yr</i>	<i>380</i>

- **Population** – includes Students, Faculty, Residents, Employees including contract all permanent and contract employees.
- **Absolute Carbon emissions** - include the carbon emissions under Scope 1, 2 & 3 as per GHG Protocol.
- **Carbon mitigation through afforestation** – is the carbon stocked in the Institute across above ground (trees) and below ground biomass (soil and roots). The data is arrived based on the type of canopy cover & the area earmarked as greenbelt.
- **Net carbon emissions** – is the difference of absolute carbon emissions & mitigated emissions.
- **Net Carbon emission per capita** – is the annual carbon emission per capita of the campus. This is calculated to arrive at a common comparable quantity.
- **Avoided emission through solar** - refer to greenhouse gas emission reduced by replacing grid electricity with solar power.



## 5. Conclusion

EcoMorphosys' Greenhouse Gas assessment study evaluates annual carbon emissions at IIMB for the period of 2023-24. It examines emissions from fuel and electricity consumption, water usage, capital goods, employee commutes, business travel, and waste generated within the operational boundary of the Institute.



The total carbon emissions from various operations within IIMB campus is **3,853 tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>eq)** per annum, equivalent to about **1.40 metric tons of CO<sub>2</sub> equivalent** per capita. Among these, Scope 2 emissions, related to the Institute's electricity consumption, are the largest contributor to the carbon footprint.

**Dominance of Scope 2 Emissions:** The majority of the carbon emissions (74%) are from indirect energy-related activities, indicating significant electricity consumption.

**Scope 1 and Scope 3 Contributions:** Direct emissions (Scope 1) and other indirect emissions (Scope 3) together contribute 26% of the total carbon footprint, highlighting the importance of addressing both on-site activities and broader operational practices.

**Carbon stocks:** The carbon stocks were assessed in 2023, and we estimate that 165.45 MT are stored annually, contributing to carbon mitigation efforts.

The study emphasizes the need for IIMB to focus on reducing electricity consumption and exploring renewable energy sources to minimize its largest emission category. Additionally, strategies to reduce direct emissions and other indirect emissions could be considered to achieve a more comprehensive reduction in the overall carbon footprint.