

# Carbon Footprint Report For MMCOE & IMERT College Campus



## *About Climekare Sustainability Pvt. Ltd. –*

At ClimeKare Sustainability Pvt. Ltd., we are committed to helping organizations achieve their sustainability goals. We provide comprehensive services related to climate change mitigation, including carbon footprint accounting, carbon neutral advisory, ESG reporting, and CSR for climate change mitigation. Our experts understand the complex regulations and policies related to carbon Emissions and will help you develop a plan to meet your emissions targets.

Our mission is to help organizations reduce their carbon footprint and achieve their sustainability goals. We strive to provide comprehensive services to enable our clients to develop a comprehensive strategy for climate change mitigation.

Our vision is to create a future where organizations are able to reduce their environmental impact and contribute to the global effort to mitigate climate change. We believe that companies should be held accountable for their carbon emissions and have a responsibility to develop sustainable solutions. We are committed to helping our clients reduce their carbon footprint and create a more sustainable future.

## ***About this Report -***

This report provides a detailed greenhouse gas emissions arising in June 2022 to May 2023 at MMCOE & IMERT College Campus. The report content brief Information about Scope I, Scope II & Scope III calculation of emission & Mitigation to MMCOE & IMERT College Campus.

It has been prepared following a review of internal and external documentation, questionnaires with coordinator and interrogation of source data and data collection systems. All data collected and analysed within this report follow the World Resources Institute GHG Protocol principles of relevance, completeness, consistency, transparency and accuracy.

## **Objective of this Report –**

**Calculate the Carbon footprint emission of Institute and suggest the mitigation to make carbon neutral.**

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## *Abbreviations –*

**MMCOE** - MARATHWADA MITRA MANDAL'S COLLEGE OF ENGINEERING

**IMERT** - INSTITUTE OF MANAGEMENT EDUCATION RESEARCH AND TRAININ

**GHG** – GREENHOUSE GAS

**RCP** - REPRESENTATIVE CONCENTRATION PATHWAY

**LPG** - LIQUEFIED PETROLEUM GAS

**Kwh** – KILOWATT HOUR

**IPCC** - INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

**CO<sub>2e</sub>** – CARBON DIOXIDE EQUIVALENT

**FMCI<sup>III</sup>** - FOUNDATION FOR MAKE IT HAPPEN CENTER FOR INVENTION  
INNOVATION INCUBATION

## *Introduction ...*

We have eight planets in our solar system, each one circling the sun at a different distance. Earth is the third planet and we are in what is called the ‘Goldilocks Zone’. That means we aren’t too hot and we aren’t too cold; we are just right. This has allowed life to thrive on earth because the temperature is perfect enough to allow liquid water, which is believed to be one of the key elements to have life on a planet. Venus has what is called a runaway greenhouse effect. It’s a never ending cycle of heat being trapped inside due to the rising carbon dioxide levels. This is what happens when an atmosphere absorbs too much carbon dioxide: the heat has nowhere to go. As the temperature rises it effects the entire planet, creeping deep into the depths of the core.

Greenhouse gases (GHGs) are gases that increase the temperature of the Earth due to their absorption of infrared radiation. Although some emissions are natural, the rate of which they are being produced has increased because of humans. These gases are emitted from fossil fuel usage in electricity, in heat and transportation, as well as being emitted as by product of manufacturing. The most common GHGs are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and many fluorinated gases. A greenhouse gas footprint is the numerical quantity of these gases that a single entity emits. The calculations can be computed ranging from a single person to the entire world. The latest climate science is published in the IPCC Sixth Assessment Report. The report presents key scientific findings linking the increase in anthropogenic GHGs emissions in current climate change. According to the report, it is only possible to avoid warming of 1.5 °C or 2 °C if massive and immediate cuts in greenhouse gas emissions are made. Intergovernmental Panel on Climate Change (IPCC) – Assessment Report 6

- In next 20 years, global temperature is expected to reach or exceed 1.5°C of warming
  - Strong and sustained efforts are required.
  - To achieve “Net Zero” by mid of the century - To avoid catastrophic effects
- 
- ❑ UNFCCC global target to achieve Zero Emission by 2050
  - ❑ Globally, Businesses have set 2050 as target year for Net-Zero

Global warming is currently one of the most important concerns confronting the international community at the local, national, and global levels. The most immediate and visible effect of global warming is an increase in global temperatures. The global averaged combined land and ocean surface temperature has risen by 0.85 °C over the last 130 years (1880-2012) and is expected to climb further. The increase in global mean surface temperature is expected to be 0.3°C to 1.7°C under RCP 2.6, 1.1°C to 2.6°C under RCP4.5, 1.4°C to 3.1°C under RCP 6.0 and 2.6°C to 4.8°C under RCP 8.5 by the end of the 21st century as compared to 1986-2005. Increasing greenhouse gas emissions is one of the primary causes of global warming. According to the different climate models, it was projected that earth surface temperatures will increase in the range of 1.6 up to 5.8°C by end of this century in line with current rates of population growth and GHG emissions .

Carbon footprint has become a widely used concept in general public on responsibility and abatement action against global warming over the last few years. It can be defined as a measurement of the total GHG emissions caused directly and indirectly by an individual, an organization, event or product and is expressed as a carbon dioxide equivalent (CO<sub>2</sub>e).

An organizational carbon footprint measures the GHG emissions from all the activities across the organization, including energy used in buildings, LPG use in kitchen and student and staff commuting etc. calculating an organization's carbon footprint can be an effective tool for ongoing energy and environmental management.

## *Methodology for Calculations...*

**The carbon footprint measures the impact on the planet in terms of how many greenhouse gas emissions we emit directly or indirectly in our daily activities as an organisation.**

### **Study Area –**

Area - MMCOE & IMERT College Campus.

Geographical Coordinates - 18°29'25"N Logitude, 73°48'33"E latitude

Address - Sr.No.18, Plot No.5/3, CTS No.205,

Behind Vandevi Temple, Karve Nagar, Pune,

Maharashtra 411052

**Table 2.1 Name of the Departments**

Computer Engineering	Mechanical Engineering
E & TC Engineering	Electrical Engineering
Information Technology	Engineering Science
Artificial Intelligence & data Science	IMERT - MBA
FMCIII	

### **Assessment of Carbon Footprint –**

Carbon Footprint of an MMCOE & IMERT college Campus has been assessed using four basic steps, by setting the organizational boundary, setting operational boundary and collection of data and finally calculation of emissions using appropriate emissions factors.

The emissions inventory includes emissions generated by the activity at the organisational level, such as emissions generated directly and indirectly by the use of the offices. In terms of the activities carried out for the implementation of projects, only the emissions generated by



associated work-related travel are included, both through vehicles managed by the organisation and other means of transport.

In the following table the GHG emissions identified to calculate the carbon footprint are presented, which are classified in three scopes,

**Table 2.2 Emission Activities**

Emission Activities			
Scope	Category	Emission Activities	Activity data
Scope I	Direct Emission	LPG use In canteen & mess	Gas in Kg
Scope II	Indirect Emission	Electricity consumption	kWh of electricity purchase
Scope III	Other Indirect Emission	goods and services used by the organisation ,	Origin and destination of the travel and type of transport used
		Student and staff Commuting	Survey Regarding Travelling
		Waste Generation in Organization	Transport Details
		Business Travel	Transport Details

**Data Collections –**

Two types of data were collected namely activity data and Emission Factors. Since sampling is not carried out for this kind of study, activity data were collected from all activities within the defined boundaries for one-year period (June 2022- May 2023). Specially, commuting data were collected from all employees of the office as well. Parameters and relevant sources of the activity data related to each and every operations.

**Table 2.3 Data Collection**

Aspects	Parameters of Activity Data	Sources
LPG - on site	LPG consumption Annually (kg)	Invoices
Electricity – on site	Electricity consumption Annually (kWh)	Electricity Bills

Commuting	Distance traveled annually (km) -Average fuel efficiency of Vehicles -Type of vehicle -No of days per week traveled -No of weeks per year worked in the office -Type of fuel -Average No. of persons	questionnaire
Waste Disposal	Amount of food waste generation annually Amount of waste generation in daily routine	questionnaire
Purchase goods & Services Transportation	Distance traveled	Purchase Book
Business Travel	Distance traveled	questionnaire

Emission Factors have been developed with the use of **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, which can be used to the derivation of Emission Factors for any activity at any place in the world.

**Table 2.4 Emission Factors**

Activity	Emission Factors
LPG	2.98 kg/kg
Electricity	0.79 kg/kWh
Petrol	2.27 kg/lit
Diesel	2.64 kg/lit

**Formula For Calculation –**

Carbon Footprint of each emission sources and activities were calculated in kg CO<sub>2</sub>e/year by multiplying activity data with Emission Factor.

$$\text{Carbon Footprint ( CO}_2\text{e)} = \text{Activity Data} * \text{Emission Factor}$$

## Result & Analysis...

### Results of the June 2022 to June 2023 Carbon Footprint –

The results of the carbon footprint calculation for June 2022 to May 2023 by scope are detailed below:

**Table 3.1 Carbon Emission by Scope I for June 2022 to May 2023**

SCOPE I CARBON EMISSION - MMCOE & IMERT							
MONTH	YEAR	FMCIII Canteen		Carbon Emission (2.98 kg/kg)	MMCOE Canteen & mess		Emission (2.98 kg/kg)
		No of Cylinder	19 kg gas/cylinder		No. of Cylinder	19 Kg gas/Cylinder	
JUNE	2022	3	57	169.86	85	1615	4812.7
JULY	2022	3	57	169.86	90	1710	5095.8
AUGUST	2022	3	57	169.86	88	1672	4982.56
SEPTEMBER	2022	3	57	169.86	90	1710	5095.8
OCTOBER	2022	2	38	113.24	70	1330	3963.4
NOVEMBER	2022	2	38	113.24	70	1330	3963.4
DECEMBER	2022	3	57	169.86	90	1710	5095.8
JANUARY	2023	3	57	169.86	95	1805	5378.9
FEBRUARY	2023	3	57	169.86	90	1710	5095.8
MARCH	2023	3	57	169.86	90	1710	5095.8
APRIL	2023	3	57	169.86	95	1805	5378.9
MAY	2023	3	57	169.86	95	1805	5378.9
Total (kg)		34	646	1925.08	1048	19912	59337.76
Total (ton)				1.92508			59.33776
Total Co2 emission ( ton)				61.26284			

Scope I is related to fuel which is use under the campus premises. It included FMCIII canteen & MMCOE canteen or mess. By **FMCIII canteen** carbon emission is **1.92508 ton** & by **MMCOE canteen or Mess** is **59.33776 ton**. The total carbon emission of **scope I** is **61.26284 ton**.

**Table 3.2 Carbon Emission by Scope II for June 2022 to May 2023**

<b>SCOPE II CARBON EMISSION - MMCOE &amp; IMERT</b>				
MONTH	YEAR	UNITS	CARBON EMISSION (0.79kg/kWh)	Carbon Avoided by Solar Water Heater (kg)
JUNE	2022	30421	24032.59	13272
JULY	2022	25674	20282.46	
AUGUST	2022	20683	16339.57	
SEPTEMBER	2022	26344	20811.76	
OCTOBER	2022	21382	16891.78	
NOVEMBER	2022	27745	21918.55	
DECEMBER	2022	30034	23726.86	
JANUARY	2023	28703	22675.37	
FEBRUARY	2023	29018	22924.22	
MARCH	2023	35792	28275.68	
APRIL	2023	37781	29846.99	
MAY	2023	49843	39375.97	
Total (kg)		363420	287101.8	13272
Total (ton)			287.1018	13.272
Total CO2 emission			273.8298	
Total CO2 Avoided in %			4.418494556	

Scope II is related to indirect emission which emit by purchase electricity. The carbon emission by electricity is **287.1018 ton**. There is a solar water heater for heating water for the hostel, which help to reduce the use of electricity. It help to reduced **13.272** ton which is about **4.41%** reduction.

**Table 3.3 Carbon Emission by Scope III for June 2022 to May 2023**

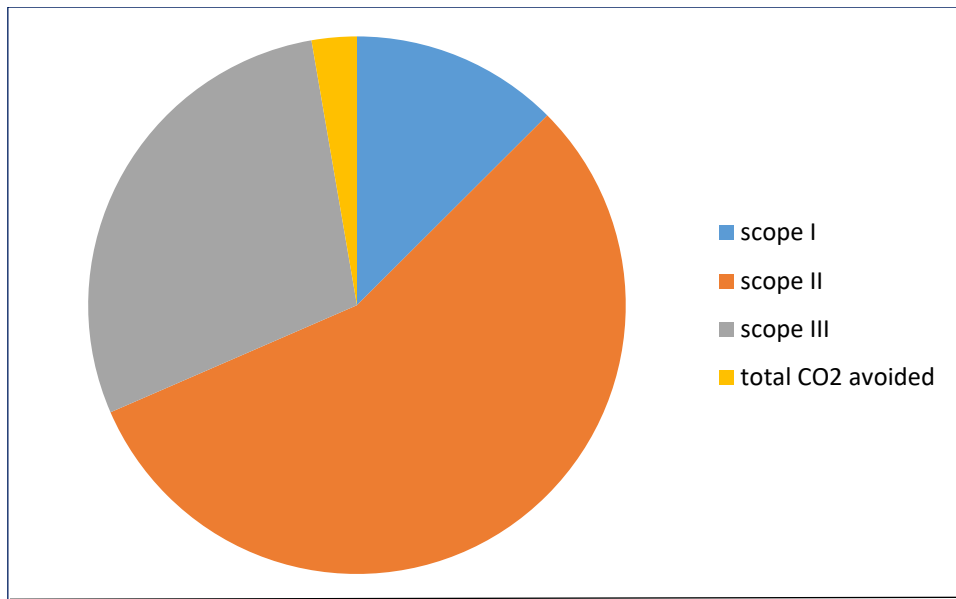
<b>Scope III CARBON EMISSION - MMCOE &amp; IMERT From June 2022 to May 2023</b>	
Category	Carbon Emission (ton CO <sub>2</sub> e/yr)
Category 1 - Purchased Goods & Services	0.31152
Category 5 - Waste Generation	3.37656
Category 6 - Business travelled	0.1598307
Category 7 - Student, staff & FMCIII employee Commuting	137.12334
<b>Total ( ton CO<sub>2</sub>e /yr)</b>	<b>140.9712507</b>

Scope III is related to other indirect emissions which included the different 15 categories but as a discussion four categories are applicable to this campus which are mention as above. The total Scope III carbon emission is 140.971 ton.

**Table 3.3 Total Carbon Emission**

<b>TOTAL CARBON EMISSION FOR MMCOE &amp; IMERT FROM JUNE 2022 TO MAY 2023</b>	
Scope I	61.26284
Scope II	273.8298
Scope III	140.9712
<b>Total CO<sub>2</sub>e in ton</b>	<b>476.06384</b>

Total Carbon Footprint of the campus is 476.06384 t CO<sub>2</sub>-e for the June 2022 – May 2023. Electricity is the main factor that most affected to carbon footprint. It accounts 57.51% of the total. Indirect GHG emissions show the highest value, than direct emissions. The Direct emission is only 12.61 % & other indirect carbon emission is about 29.61%.



**Image - Pie Chart for Carbon emission**

## **METHODS USED TO REDUCE AND OFFSET CARBON FOOTPRINT IN THE CAMPUS –**

### **INSTALLATION OF ROOF TOP SOLAR –**

By using rooftop solar energy systems, users can significantly reduce their carbon emissions. Solar power does not produce greenhouse gases or other pollutants after installation.

**Suggestion – As per the MMCOE can undergo solar power plant as per the load sanction capacity of 170 kw (reference – electricity bill June 2023 meter no- 055-X1096527) this will offset about 300 CoU .**

### **USING BIO FUELS FOR TRANSPORTATION**

Bio diesel can be used in any diesel powered vehicle, it is biodegradable and non-toxic. Bio Diesel is a helps to reduce CFP as it only releases CO<sub>2</sub> that the plants absorbed whilst Growing; therefore there is no negative impact on the carbon cycle.

Bio diesel which is used in Faculty owned two wheel tractors, has produced from the plant oil Extracted from the Jatropha oil, palm oil and used scraped coconut with transesterification Process within the Faculty. It was found that, the emission of CO from engine exhaust is 45% less than mineral diesel. Therefore it contributes to reduce present and future total CFP in the Faculty. Some researchers are being conducted to produce bio fuels from Algae in the Faculty also.

## **PUBLIC AWARENESS**

The most suitable way to reduce Carbon Footprint is adapting of zero cost activities. People may be aware of those activities through posters. There are some posters used to make student and staff aware such as Turn light off when offices and meeting rooms are empty, ensure electric equipment is off When not in use, and dispose the waste separately in the Faculty.

## **PLANTATION –**

Carbon Sequestration by tree plantation (Silver Maple, Oak, Dogwood, Pine, Neem)

## **WASTE MANAGEMENT**

Students and all staff members are encouraged for segregating waste at the point of origin in the Faculty. Three containers have been established at every building to dispose the waste Separately. It helps to prevent of mixing of recyclable waste with biodegradable waste.

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