



# CARBON FOOTPRINT REPORT OF MAITREYI COLLEGE

*Reporting Year April 2019 – March 2020  
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## ACKNOWLEDGEMENT

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## ABBREVIATIONS

<b>Abbreviations</b>	<b>Full Form</b>
GHG	Greenhouse Gases
CF	Carbon Footprint
FY	Financial Year
LPG	Liquefied Petroleum gas
Kg	Kilograms
Yr.	Year
IPCC	Intergovernmental Panel on Climate Change
KWh	Kilowatt hour
CNG	Compressed Natural Gas
e	equivalent
CO <sub>2</sub>	Carbon dioxide
CH <sub>4</sub>	Methane
N <sub>2</sub> O	Nitrous oxide
BEE	Bureau of Energy Efficiency

## **1. INTRODUCTION**

**Global warming**, an issue of past, current and future, has devastating impacts over countries. India has faced killer heat waves, severe flooding, melting Himalayas and much more because of Global Warming. There is an urgent call to reduce the alarming impacts of global warming by cutting down the carbon footprints in every sector to avert the risks to India's population economy and ecosystem.

Universities and colleges have been regarded as institutions with significant responsibilities to help resolve issues of sustainability as well as to serve as a role model to society by implementing sustainable plans that entail monitoring the negative consequences of campus operations.

Maitreyi College under Delhi University, a STAR College annually tracks & report its carbon footprint (Scope 1, 2 & 3) for its beautiful campus at Chanakyapuri, New Delhi. The report indicates Carbon Footprint assessed for **Maitreyi College** for the **Financial Year 2019-20**. The report highlights the current key emission sources of the college and sets a background for setting up emission reduction targets for next Financial Years (FY). Several recognized national and international standards have been referred for the computation of the footprint of the college.

The activity was carried out in following phases: Collection of data, Estimation of CO<sub>2</sub> followed by suggestive measures for mitigation. The Carbon Footprinting team comprising representatives from teaching staff, non-teaching staff & students collected & compiled the required data. The data was used to assess the GHG emissions for Scope 1, 2 & 3 using Agile CF Toolkit© (Copyright to Agile Group) for Reporting Year 2019-20. The report highlights the key emission sources of the College.

### **1.1. OBJECTIVES OF THE PROJECT**

The objective of computing the Scope 1, Scope 2 & Scope 3 emissions by Maitreyi College is to predict the trajectory of its emissions and identify & mitigate the stressors. This recent green initiative of Maitreyi College is a step towards being carbon neutral and sustainable not only financially but environmentally.

### **1.2 RELEVANCE**

In today's challenging world where survival of the fittest has become imperative, there is a need to educate students on sustainable development & sustainable practices. Maitreyi College recognizes the importance of following greener practices within its campus, with the

intent to engage not only Faculty & Non-Faculty members but also its students in a constructive environmental dialogue.

Maitreyi through its carbon footprinting activity promotes environment friendly & low emission practices in areas of water, energy, waste etc. Computing Carbon Footprint of Maitreyi College has allowed them to position themselves favourably in tackling the future challenges associated with a changing climate.

Such activities will help students develop knowledge on key emission areas and help invite career opportunities for them in the field of climate change. The activity will empower them to suggest new innovative ideas on how emissions can be reduced across the operations carried out at campus.

## **2. STUDY AREA**

### **2.1. ABOUT REPORTING ENTITY:** Maitreyi College, University of Delhi.

Carbon Footprint was carried out at the campus of Maitreyi College in Chanakyapuri spread over 10 acres of land in lush green surroundings with extensive play grounds and open spaces.

### **2.2.REPORTING PERIOD: 1 April 2019 to 31 March 2020**

The emissions reported for FY 18-19 will be considered as baseline to set emission reduction targets for upcoming FYs.

### **2.3.SCOPE OF PROJECT:**

#### a) Physical boundary

- *Location of the building:* Maitreyi College, Bapudham Complex, Chanakyapuri, New Delhi-110021
- *Description of areas excluded from GHG accounting:* The new Science block (non-operational) and the Girls Hostel (under construction) are not in the scope.

#### b) Operational boundary

- *Scope 1 Direct GHG emissions from:*
  - Combustion of fuels in stationary sources-diesel used in electricity generators
  - Combustion of fuels in stationary sources – LPG consumption in canteen and Chemistry laboratories
  - Combustion of fuels in mobile sources- CNG used in owned vehicle (College Bus)
  - Fugitive emissions from Refrigeration/air-conditioning equipment
- *Scope 2 Indirect emissions from:*
  - Purchased electricity

- *Scope 3 Other Indirect GHG emissions from:*
  - GHG emissions due to daily commuting of Teaching Staff, Non-Teaching Staff and Students to and from college
  - GHG emissions due to paper consumption
  - GHG emissions from garden waste generation across the campus

### 3. METHODOLOGY FOR GHG QUANTIFICATION

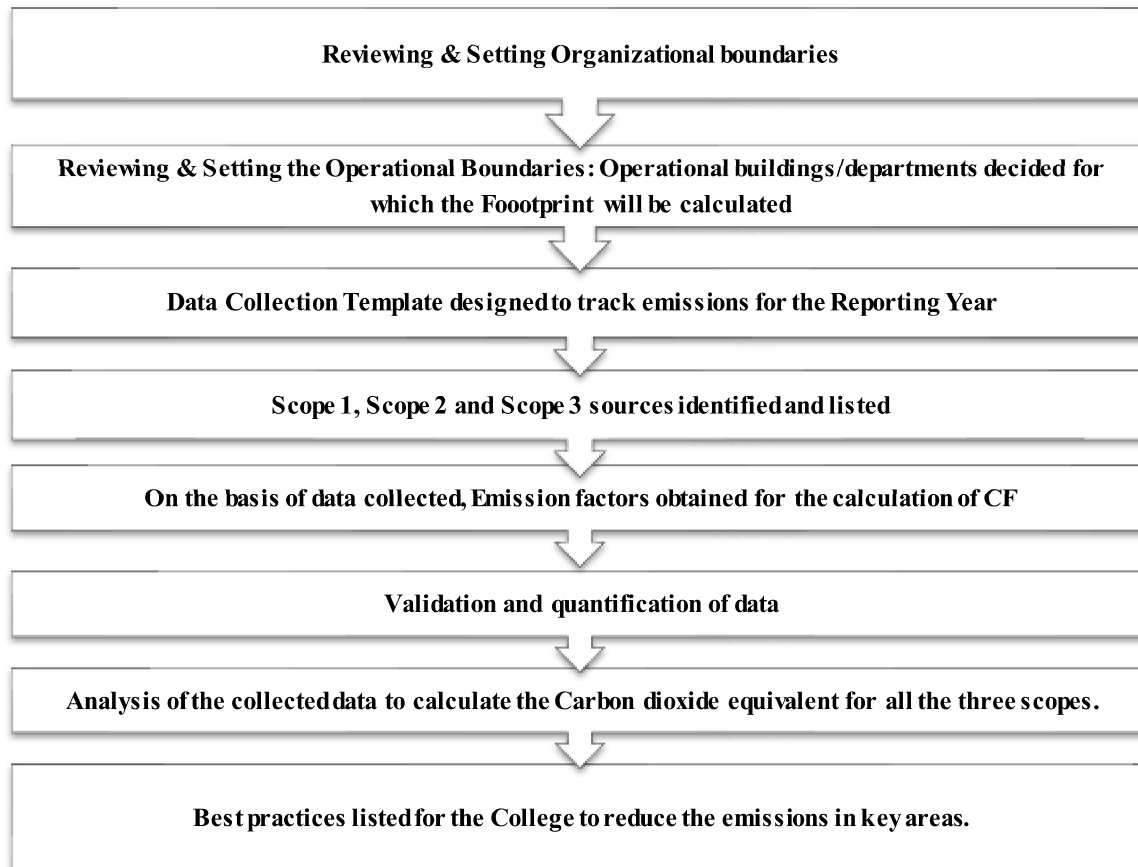


Figure 1: Flowchart showing adopted methodology for estimation of Carbon Footprint

Both qualitative and quantitative data was collected for the project:

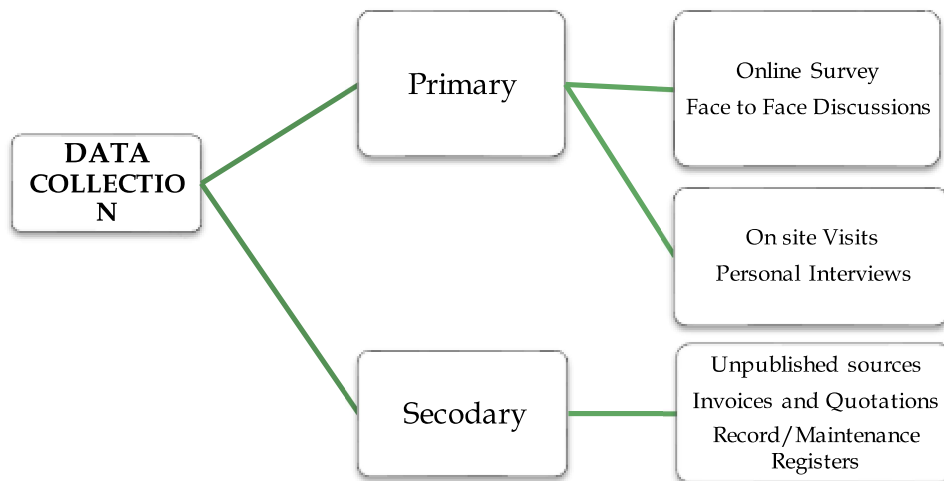


Figure 2: Types & methods of data collection

### 3.1.ABOUT THE AGILE CF TOOLKIT ©

Agile CF Toolkit© is the software used for calculating the CO<sub>2</sub> equivalent. The software uses latest applicable emission factors sourced from published reliable databases for specific country of computation.

### 3.2.LIMITATIONS DISCLOSURES

- In the absence of exact quantity of refrigerant load on installed air conditioners, refrigerators and water coolers, industry recommended values for capacity and type of equipment were considered.
- The data used for computation of carbon footprint was as provided by the Maitreyi College. In case the data did not include travel related information for few employees and students, the same have been ignored.
- The electricity units were taken from the actual electricity meter bills and the same is considered to be accurate.
- There could always be a calibration error in the system while the computation was made.



## 4. DATA COLLECTION

### 4.1.SCOPE 1 DIRECT GHG EMISSIONS

Direct GHG emissions occur from sources that are owned or controlled by Maitreyi College, for example, emissions from combustion in owned or controlled emissions from combustion of fuels in vehicles, fugitive emissions etc.

### 4.2.SCOPE 2 ELECTRICITY INDIRECT GHG EMISSIONS

Scope 2 accounts for the GHG emissions from the generation of purchased electricity consumed by Maitreyi College.

### 4.3.SCOPE 3 OTHER INDIRECT GHG EMISSIONS

It includes emissions from outsourced activities i.e., from the activities of members of the organization but occurred at sources owned/controlled by another organization. (E.g., commuting activities, waste generation etc.)

Table 1: Types of Data Collected and their source and units

<b>GHG ACCOUNTING ACTIVITY</b>	<b>ACTIVITY SUBSET</b>	<b>DATA COLLECTION SOURCES</b>	<b>UNITS</b>
<b>Stationary Combustion</b>	LPG Consumption in Canteen & Chemistry Lab	Record Registers from the respective department	Kg of LPG/ yr.
<b>Stationary Combustion</b>	Diesel used in DG	Purchase Record Books	Liters of Diesel/ yr.
<b>Mobile Combustion</b>	CNG used in College Bus/Distance Travelled by Bus in FY 19-20	Transport Record Books	Amount of Fuel or total distance covered/yr.
<b>Fugitive Emissions</b>	Refrigerant used in Refrigerators & Air Conditioners	Invoices, Quotations, Equipment Photographs, On site Visits	Kg of Refrigerant/ year
<b>Purchased Electricity</b>	Units of electricity used during the FY 19-20	Monthly Electricity Bills	KWh / yr.
<b>Employee Commuting</b>	Distance travelled; Mode of Transport used	Online Survey	Distance travelled/yr.
<b>Students Commuting</b>	Distance travelled; Mode of Transport used	Online Survey	Distance travelled/yr.
<b>Paper Consumption</b>	Amount of paper (fresh & recycled) used	Data Shared by College Administration	Kg of Paper Consumption/ yr.
<b>Garden Waste</b>	Amount of garden waste generated	Data shared by college Gardner	Kg of waste/yr.

## 5. DATA ANALYSIS: CALCULATIONS AND RESULTS

With reference to the data provided by the college, the number of students, teaching staff and non-teaching staff considered for the project is:

- **Students:** 3064
- **Teaching Staff:** 148
- **Non-teaching staff:** 83

A decrease in the number of students, teaching staff and non-teaching staff has been observed.

Table 2: A summary of the estimation of Maitreyi College for the Reporting Year 2019-20

GHG Emissions	Scope 1			Scope 2	Scope 3				Total
	MT of CO <sub>2</sub> equivalent	LPG Consumption	Diesel Consumption	HVAC & other	Purchased Electricity	Commuting	LPG Consumption	Paper Consumption	
<b>2019-20</b>	1.23	3.65	4.30	272.56	1468.154	21.79	2.09	0.001	<b>1773.775</b>

Scope 1: 9.18 MT CO<sub>2</sub> eq (reduced from previous year i.e., 12.6 MT)

Scope 2: 272.56 MT CO<sub>2</sub> eq (increased from previous year i.e., 266.91)

Scope 3: 1584 MT CO<sub>2</sub> eq (increased from previous year i.e., 200.82357)

Carbon Footprint of Maitreyi College for financial year 2019-20 is computed to be **1773.775 MT of CO<sub>2</sub> equivalent** for the identified GHG emission sources. The major source of emissions came from **Scope 3 emissions i.e., 1584 MTCO<sub>2</sub>e** followed by **Scope 2 which is 272.56 MTCO<sub>2</sub>e**. The minimum contribution is by **Scope 1** which was computed to be **9.18 MTCO<sub>2</sub>e**.

The total GHG emissions have increased comparative to the last FY year of 2018-19 (i.e., 480.32264 MT of CO<sub>2</sub>eq). The increase in the total GHG emissions is due to the Scope 3 i.e., the emissions from outsourced activities i.e., from the activities of members of the organization but occurred at sources owned/controlled by another organization or person. The increase may also be due to distribution and transmission activities besides the individual emission contribution from the mentioned sources.

### 5.1.SCOPE 1 GHG EMISSIONS

Scope 1 emissions i.e., the emissions occurring from sources that are owned or controlled by Maitreyi College, were estimated to be 9.18 MT CO<sub>2</sub> eq. This has reduced from previous year by 3.42 MT of CO<sub>2</sub> eq as several initiatives have been taken by college. Initiatives taken are as follows:

- Carbon Police of Maitreyi College

- Formulating Environmental Policy
- Green events - Decoration material is being reused, and no plastic decorations are allowed during offline events
- CF disclosure done
- Discontinuation of disposables in college canteen
- Installation of LEDs everywhere in the college

As indicated in Table 2, the maximum GHG emissions are contributed by **HVAC i.e., 4.3 MT of CO<sub>2</sub> eq.**

In the base year the number of LPG cylinders estimated in Scope 1 were found to be more as compared to the number of cylinders found in Scope 1 in FY 2019-20. Therefore, a reduction in the Scope 1 for LPG consumption is observed i.e., 1.23 MT CO<sub>2</sub> eq. The LPG cylinders used in chemistry department for research purposes are computed under Scope 1 whereas the LPG cylinders used in canteen for food preparation are computed under Scope 3, also contributing a rise in the Scope 3. In FY 2018-19 total 34 cylinders were used in the chemistry lab whereas, in FY 2019-20, 30 cylinders were used. Also, it was observed post discussions that the 97 cylinders of canteen considered in Scope 1 in FY 2018-19 should be considered under Scope 3 as the same is under the control of vendor.

Consumption of diesel to provide power backup to the College during power cuts to sustain the ongoing operations across campus was also reduced to 3.65 MT CO<sub>2</sub> eq. from 5.13 MT CO<sub>2</sub> eq. (2018-19).

## 6.2 SCOPE 2 GHG EMISSIONS

The second highest GHG emissions are the Scope 2 emissions. These are the emissions due to the electricity consumption by the college. The total emissions were estimated to be **272.56 MT CO<sub>2</sub>e** for the reporting year 2019-20. The emissions were higher as compared to previous FY of 2018-19 i.e., 266.91098 MT CO<sub>2</sub>e.

Electricity consumption reduction is an area where mitigation strategies need to be planned.

## 6.3 SCOPE 3 GHG EMISSIONS

Table 3: GHG emissions for different activities under Scope 3

SCOPE ACTIVITY	EMISSIONS (MTCO <sub>2</sub> e)
LPG Consumption (Canteen)	21.79
Commuting	1468.154
Paper Consumption	2.09
Garden Waste	0.001
Other	91.965

<b>TOTAL</b>	<b>1584 MT CO<sub>2</sub> eq.</b>
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The **Scope 3 emissions** for Maitreyi College were computed to be approximately 1584 MTCO<sub>2</sub>e against the previous score of 200. 823 MTCO<sub>2</sub>e. The maximum emissions are due to commuting of third party vendors, students, teaching and non-teaching staff.

The emissions due to the paper consumption has reduced from **8 MTCO<sub>2</sub>e** to **2 MTCO<sub>2</sub>e** as the College has taken up several paper reduction strategies such as:

- Stopped printing of pay slips of employees on a monthly basis. They are printed only on demand.
- Stopped taking unnecessary printouts wherever computer-based practicals were performed.

Negligible emissions are due to the garden waste i.e., **0.001 MTCO<sub>2</sub>e**. The garden waste is used for the production of compost.

## **7. RECOMMENDATIONS AND SUGGESTIONS**

- It is very important for college to identify its areas of heavy electricity usage. That may be done through sub-metering system. Generally, unused lights, fans & equipment are major contributors for Scope 2. Thorough site rounds and awareness is another mechanism to check the unnecessary usage. Most classes happen during daytime. By avoiding artificial lighting on sunny days, college can save electricity.
- Concept of Eco monitor in each class can ensure that lights are switched off before leaving.
- Another reason for high electricity consumption may be use of old appliances. It should be ensured that while replacing / purchasing new appliances, energy efficiency should be checked (Eco powered).
- Periodic maintenance of all appliances should be ensured. Regular, routine maintenance is essential to keep HVAC system running efficiently. Regular HVAC filter changes also helps. When those filters are clogged, your HVAC systems use more energy to heat and cool.
- Additionally, check for any unsealed locations with the change of each season. Air leaks and unsealed windows can really increase the amount of energy used to heat and cool the college.
- Energy Audit for the College may also be conducted. Set the thermostat or temperatures of air conditioners to 24 degrees Celsius during summers. Even a difference of just a couple of degrees can save on energy consumption and costs.
- Occupancy sensors may be installed at reception areas, classrooms etc. such that energy might be saved. Solar panels may also be installed to consume renewable power and dependencies on the Grid power can be reduced.
- Insulation of the roof areas may be checked.
- Increased E-Mail awareness should be sent to the students, teachers and other staff members to save papers, switching off lights, safe & eco-friendly commuting etc.
- The waste from compost pit can be used to generate biogas and the same pipeline may be extended to cafeteria for cooking.
- Online workshops, activities & awareness sessions may be done on topics related to emission reduction, climate change & eco-friendly methods

- Both teachers and students should be encouraged to use e-notes as study material and submit soft copy of their internal assignments to avoid wastage of paper.
- College societies like dance society, drama society etc. should take initiatives to prepare their events/plays/performances with messages of conserving resources and saving environment.
- Online environmental quizzes, jingles, video making etc. can be done with students, faculty and non-faculty to raise the awareness on carbon reduction.

## 8. CONCLUSION AND DISCUSSION

Maitreyi College has been annually tracking their carbon footprint. The purpose of this study is to compute the carbon footprint of MAITREYI COLLEGE, University of Delhi for the Reporting Year 2019-20 and to illustrate the trajectory for determining carbon footprint to identify stressors. The study presents the Scope 1, Scope 2 & Scope 3 emissions of the Maitreyi College. It highlights, the top 3 areas of emissions within the campus i.e. Commuting (82.770%), Electricity Consumption (15.37%) and LPG Consumption in Canteen (1.22%).

The total emissions computed for the college is **1773.775 MT of CO<sub>2</sub>** equivalent, out of which the major contribution is of Scope 3 (89.30%) emissions, followed by Scope 2 (15.37%) and least by Scope 1 (0.517%).



As compared to the baseline set for the college, the emissions were found to be increased for the FY 2019-20. The contributors may be: (a) increased online activities leading to higher electricity usage (b) transportation increase due to delivering of the documents from college to necessary destinations. Increase in scope 3 is also due to proper identification and considering of the canteen cylinders in Scope 3 for FY 2019-20.

Maitreyi College, because of its tremendous efforts in the area of paper saving, garden waste and Diesel Consumption has shown significant reduction in these areas. Besides the computation of Carbon Footprint of Maitreyi, this activity has raised a reasonable awareness amongst faculty, non-faculty and students about carbon footprint and impacts of global warming which was lacking initially.

The study strongly suggested that transportation of students and faculty to and from the campus is one of the main stressors. Besides, the college needs to work on its reduction strategies for purchased electricity.

Carbon Footprinting has started gaining momentum in educational institutions and Maitreyi College is the pioneer in such disclosures. Assessing carbon emissions and reporting them acts as a reflection of due diligence, responsible global citizens and can serve several purposes including formulating efforts for financial, social and environmental sustainability.