



**Confederation of Indian Industry**

# **CARBON FOOTPRINT STUDY**

## **Management Development Institute (MDI), Gurgaon**

**Mehrauli Road, Sukhrali, Gurugram - 122007, INDIA**



**Submitted by**



**Confederation of Indian Industry  
CII – Sohrabji Godrej Green Business Centre**

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## Acknowledgement

CII-Godrej GBC expresses its appreciation to MDI Gurgaon for showing keen interest in conducting carbon footprint study, to understand their campus footprint and adopt sustainable practices to reduce their emissions.

We acknowledge with thanks the co-operation extended to the CII team during the GHG Inventorization study at MDI Gurgaon. We deeply appreciate the interest, enthusiasm, and commitment of MDI Gurgaon towards environmental conservation.

Through the establishment of a carbon footprint of the campus, MDI Gurgaon has displayed its capability towards environmental protection. At this juncture, CII - Godrej GBC would like to congratulate MDI Gurgaon for its initiatives towards environmentally low carbon and sustainable growth.

The interaction and deliberation with the MDI Gurgaon management team were exemplary and the whole exercise was thoroughly a rewarding experience for CII - Godrej GBC. A sincere thanks to all the departments for supporting the team throughout the study. We would also like to place our appreciation on record for all the administrators of MDI Gurgaon for their support and contribution to the study.

## Executive Summary

The Management Development Institute (MDI) was registered on May 17, 1972, under the Societies Registration Act of 1860 (Punjab Amendment Act, 1957), as applicable to the Union Territory of Delhi, with its registered office at 10th Floor, IFCI Tower, 61, Nehru Place, New Delhi (India) - 110019. Initially the institute was established to train executives and managers of development banks. On May 16, 1975, the Government of Haryana (India) allocated 36 acres of land, facilitating the establishment of the institute's campus in Gurgaon. With this, the institute expanded its operations, which became the primary hub for its academic and training activities.

MDI Gurgaon is one of the oldest management institutions in India with a unique parentage, an exceptional legacy with a beautiful campus, a large and very respected alumni base. Over the years, the Institution has grown to be counted amongst the top management institutions in India, with aspirations to grow further in academic excellence, whether in research and teaching, training and consulting, or policy advisory, with the goal of bringing rigour and relevance to the tasks that it undertakes.

MDI Gurgaon aspires to be an institution at the forefront of integrating theory and practice, with a strong focus on quality research and impactful research outcomes that promote excellence. The institute aims to incorporate sustainability into all aspects of its functioning, including the curriculum, campus operations, and stakeholder engagements. This commitment involves reducing its carbon footprint, minimizing waste generation, and ensuring that its operations and business practices remain ethical and responsible.

This report elaborates the findings of the study conducted to establish the carbon footprint of the MDI, Gurgaon and potential roadmap for the institution to reduce its GHG emissions. The carbon footprint of the MDI Gurgaon was estimated for the FY 2023-24. The GHG inventorization study was conducted based on the Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard, and the emissions were classified under Scope 1 and Scope 2.

Table 1: MDI Gurgaon Total Emissions for FY 2023-2024

S. No	Year	Scope 1 (tCO <sub>2</sub> eq)	Scope 2 (tCO <sub>2</sub> eq)	Absolute Emissions (tCO <sub>2</sub> eq)
1	2023-24	420.67	2799.08	3219.75

Based on the site visit and data assessment, Scope 1, Scope 2 and absolute emissions for MDI Gurgaon for the FY 2023-24 were found to be 420.67 tCO<sub>2</sub>eq, 2799.08 tCO<sub>2</sub>eq and 3219.75 tCO<sub>2</sub>eq, respectively.

Considering the overall emissions for FY 2023-24, Scope 1 emissions contribute 13%, while Scope 2 emissions account for 87% of the total emissions. The percentage contribution of different emission sources under Scope 1 emissions for FY 2023-24 includes high-speed diesel (14.52%), R22 (27.02%), R134A (8%), R410A (27.21%), R32 (8.25%), and R407A (15%). Overall, the GHG emission intensity for FY 2023-24 was 4.98 tCO<sub>2</sub> eq per student or 0.0021 tCO<sub>2</sub> eq per sq. ft of area.

The detailed methodology for calculating GHG Emissions, potential levers to reduce emissions, target setting with timelines and a roadmap to achieve the targets has been elaborated in the report. An institution specific GHG tool has been developed and will be submitted along with the report to facilitate the calculation of year-on-year emissions.

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## 1. GHG Inventory Development

### 1.1 Introduction to Global Warming

Climate Change is perhaps the most significant environmental threat the world is facing today, and its impact is now being felt around the globe with severe winters, extreme droughts, cyclones, etc. Greenhouse Gas (GHG) emission is one of the significant contributors to climate change and various countries around the globe are now concentrating their efforts on reducing the emissions in a collaborative manner with various stakeholders. Various sectors such as industries, infrastructures, service providers, airports, ports, energy are now assessing for estimating and developing their Greenhouse Gas Inventory.

#### 1.1.1 GHG Inventory

A greenhouse gas inventory is an accounting of greenhouse gases (GHGs) emitted to or removed from the atmosphere over a period. Policymakers use inventories to establish a baseline for tracking emission trends, developing mitigation strategies and policies, and assessing progress. An inventory is usually the first step taken by entities that want to reduce their GHG emissions<sup>1</sup>.

Today, many companies, academic institutions and corporate houses in India are measuring and reporting their GHG emissions on a public platform. There has been a paradigm shift that has been observed in organizations for reporting their GHG emissions.

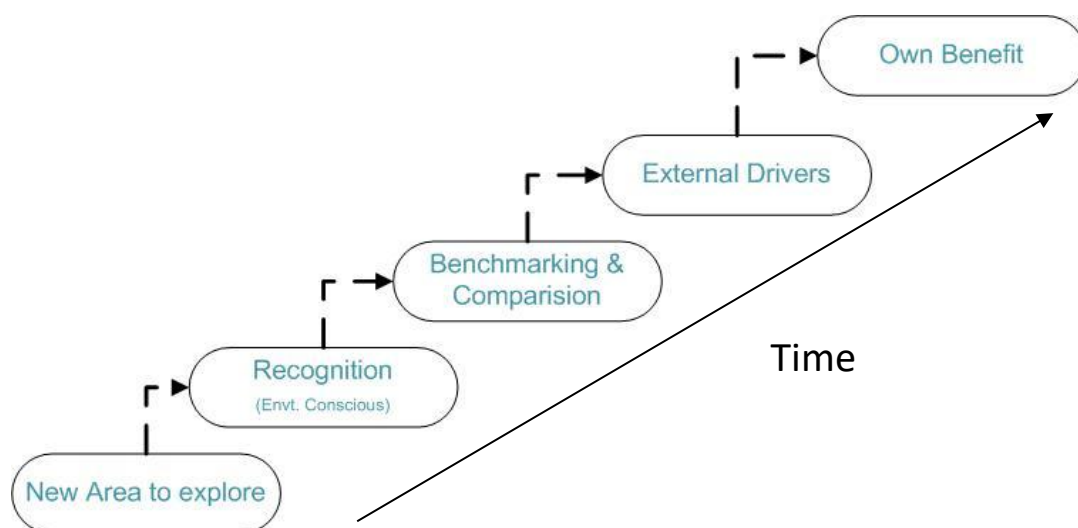


Figure 1: Paradigm Shift of Organizations

Before starting the actual inventory process, there exist several key questions to address. The answers to these questions will help frame the approach, determine what information is

<sup>1</sup> United States Environment Protection Agency

needed, define geographical boundaries, and establish the level of detail of the inventory. The objectives of undertaking a GHG Inventorization study can be several. Firstly, one of the objectives will be to understand and assess the GHG emissions resulting from campus operations. Secondly, the development of a structured inventory of energy uses and other activities that produce greenhouse gas emissions, can help identify areas of improvement such as energy efficiency or improved logistics operation and finally it can facilitate the development of emission reduction strategies that can provide a financial benefit as well as an environmental benefit i.e., the business case of doing GHG inventory.

### 1.1.2 Global Warming Potential of Greenhouse gases

Responding to the consensus that human activities are widely responsible for global warming, the Kyoto protocol, a protocol to United Nations Framework Convention on Climate Change, was developed to address climate change. The protocol identified six major greenhouse gases, namely CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFC, PFC and SF<sub>6</sub>, based on their concentration in the atmosphere and their environmental deterioration potential.

The Kyoto Protocol represents seven GHGs collectively as CO<sub>2</sub> eq. emissions, wherein CO<sub>2</sub> eq. emission is the sum of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFC, PFC, SF<sub>6</sub> and NF<sub>3</sub> in terms of their global warming potential over the time horizon of 100 years. The Table 2 below shows the global warming potential of major GHGs.

Table 2: Global Warming Potential of major GHGs

S. No.	GHG	Unit	2007	2014	2019	GWP
1	CO <sub>2</sub>	PPM	384	395.4	410	1
2	CH <sub>4</sub>	PPB	1857	1893	1866	28
3	N <sub>2</sub> O	PPB	321	324	332	265
4	CFC 12 (series)	PPT	541	527	517*	10,200
5	HFC 134a (Series)	PPT	49	64	74*	1,300
6	SF <sub>6</sub>	PPT	6.4	8	9.4*	23,500
7	NF <sub>3</sub>		-	-	-	16,100

Source: [Intergovernmental Panel on Climate Change \(IPCC\) report.](#), \* calculated

### 1.1.3 Standards for Inventorization

Today, several standards like Greenhouse Gas Protocol (GHG Protocol) (adopted by ISO 14064), Life Cycle Assessment (in line with 14044) and Environment Product Declaration (In line with ISO 14025) are in place to determine the 'Greenhouse Gas Emissions'/environmental information of a facility or product. GHG Protocol was jointly developed by World Resource Institute (WRI), World Business Council for Sustainable Development (WBSCD). This is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions in a systematic way.

ISO 14064 Standard/Corporate GHG Accounting and Reporting Standard –

<i>To quantify the greenhouse gas emissions generated at the facility level</i>
ISO 14044 Standard (Life Cycle Impact Assessment) –
<i>To quantify the environmental impacts associated with a product throughout its life cycle</i>
ISO 14025 (Environmental Product declaration) –
<i>To display the environmental information of a product</i>

#### 1.1.4 GHG Protocol

The Greenhouse Gas Protocol Initiative is a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments, and others convened by the World Resources Institute (WRI), a U.S. based environmental non-governmental organization, and the World Business Council for Sustainable Development (WBCSD), a Geneva-based coalition of 170 international companies. Launched in 1998, the Initiative's mission is to develop internationally accepted GHG accounting and reporting standards for business and to promote their broad adoption.

The GHG Protocol Initiative comprises the GHG Protocol Corporate Accounting and Reporting Standard, which provides a step-by-step guide for organizations to use in quantifying and reporting their GHG emissions. This GHG Protocol Corporate Standard provides standards and guidance for companies and other types of organizations preparing a GHG emissions inventory. It covers the accounting and reporting of the six greenhouse gases covered by the Kyoto Protocol - carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulphur hexafluoride (SF<sub>6</sub>). The standard and guidance are designed with the following objectives:

- To help companies prepare a GHG inventory that represents a true and fair account of their emissions, using standardized approaches and principles.
- To simplify and reduce the costs of compiling a GHG inventory.
- To provide businesses with information that can be used to build an effective strategy to manage and reduce GHG emissions.
- To provide information that facilitates participation in voluntary and mandatory GHG programs.
- To increase consistency and transparency in GHG accounting and reporting among various companies and GHG programs.

GHG Protocol categorizes the emissions from an organization into three Scopes, namely Scope 1, Scope 2 and Scope 3.

Scope 1 – Direct GHG emissions occurring from sources that are owned or controlled by the organization. Emissions can be controlled at source and consumption. For eg.

- Coal/Coke Consumption in furnace
- LDO Consumption in burner
- Diesel used in DG sets

- Coal/HSD consumption for own power generation in CPP
- Fuel used in company own vehicles (Diesel/Petrol/CNG)
- R & AC
- Fire Extinguisher
- LPG consumption in Canteen & Factory

Scope 2 – Indirect GHG Emissions, an account of GHG emissions from the generation of purchased electricity consumed by the organization. Emission cannot be controlled at the source; it can be only controlled at consumption. For eg.

- Electricity consumption from Grid

Scope 3 – Indirect GHG Emissions, an account of GHG emissions from the upstream and downstream operations of the supply chain related activities. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. For eg.

- Transportation of purchased raw materials, fuels etc.
- Transportation/dispatch of product
- Employee commute
- Business Travel etc.

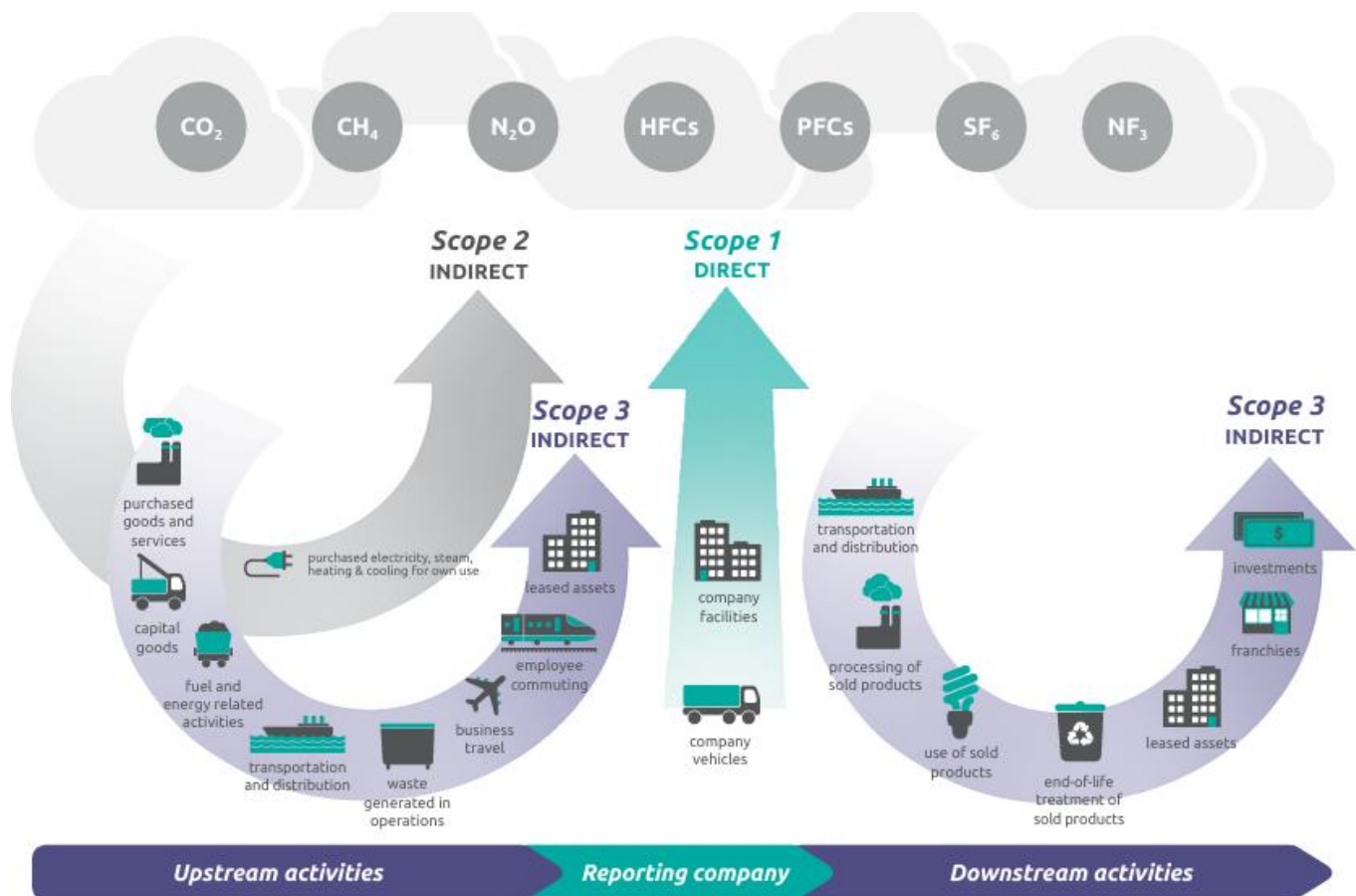


Figure 2: Classification of Scope 1, 2 & 3 GHG emissions.

## 1.2 Methodology, Activity Data and GHG Inventory

### 1.2.1 Methodology

CII - Godrej GBC has carried out the carbon footprint study at MDI Gurgaon based on GHG Protocol standard- A Corporate Accounting and Reporting Standard. Execution of the carbon footprint study was carried out in the following method.

#### 1. Training Program: Building a Knowledge Foundation

- a) Importance of Training: Before diving deep into any scientific or technical endeavor, establishing a foundation of knowledge is crucial. This premise is what drove the training program, aimed at grounding the team in the basic principles and methodologies associated with a carbon footprint study.
- b) The Curriculum: The training not only underscored the imperative of understanding carbon footprints in today's environmentally conscious age but also delved into the nitty-gritty of the study. It introduced the participants to the diverse scopes of emissions, the methodology for compiling an inventory, and the techniques to execute the study effectively.
- c) The Outcome: Such a holistic training module ensured that each member was not just aware of the broader context of their work but also equipped with the technical know-how to execute their tasks efficiently.
- d) The session was conducted where officials from all relevant departments participated in the program.

#### 2. Development of the GHG Data Collection Questionnaire

- a) The Tool: The GHG data collection questionnaire emerged as an instrumental tool, laying the groundwork for accurate data compilation. Crafted with precision, this questionnaire was designed to capture all the relevant information, simplifying the inventorization process.
- b) Circulation and Discussion: Sharing the questionnaire with various units and holding discussions with the team ensured that everyone was on the same page. Such interactions facilitated clarifications, enhanced understanding, and fine-tuned the data collection process.

#### 3. The Primacy of Data Collection

- a) Quality and Completeness: The effectiveness of any GHG Inventorization study is inextricably linked with the quality of data collated. It's not just about quantity but about the precision, relevance, and exhaustiveness of the data.
- b) A Comprehensive Questionnaire: Recognizing the importance, a detailed questionnaire was developed. Encompassing all potential emission sources, it provided a structured format for data accumulation.

#### 4. Data Authentication: Ensuring Integrity and Accuracy

**Why Authenticate:** In scientific studies, verifying the veracity of the data is as essential as the data collection itself. Data authentication is the process that ensures that the data being utilized is genuine, accurate, and can stand up to scrutiny.

### 1.2.2 Activity Data Collection & Analysis

The activity data has been collected from MDI Gurgaon. The questionnaire has been shared which accounts for data collection of Scope 1 and Scope 2 emissions. Following is the summary of emission sources and activities data considered under the GHG study at MDI Gurgaon.

Table 3: Scope 1 emission sources.

S. No	Scope I Emission Source	Fuel type
1	Fuel Consumption in DG Sets	High Speed Diesel
2	Refrigerant used	R22, R32, R410A, R 134A, R407 A

Table 4: Scope 2 emission sources.

S. No	Scope II Emission Source	Fuel type
1	Electricity Purchased	Electricity

### 1.2.3 Boundaries for Assessment

The following table showcases the boundaries considered for assessment for MDI Gurgaon.

Table 5: GHG accounting boundaries and options considered.

S. No	Particulars	Considered for MDI Gurgaon
1	Organizational Boundary	Operational Control
2	Operational Boundary	MDI Gurgaon
3	Year & Scope category	2023-24 (Scope 1 and 2)
4	Emissions Considered	All related emissions
5	Data Collection	Primary /Secondary Data collection for all major activities

### 1.2.4 GHG Estimation

GHG data was quantified using GHG emission metrics; data quality was ensured before proceeding to carbon footprint calculations. The calculations include emissions from various sources under the three scopes. The breakup of each scope based on the emission sources and their corresponding contribution have also been indicated in this report. The emission intensity for MDI Gurgaon has been calculated as a function of “tCO<sub>2</sub>eq/number of students”. The emission intensity is defined as the level of emissions per student.

GHG Inventorization carried out for MDI Gurgaon indicates that 3219.75 tCO<sub>2</sub>eq GHG

emissions were emitted into the atmosphere because of varied operational activities within the campus in the year FY 2023-24.

During the FY 2023-24, 420.67 tCO<sub>2</sub>eq. emissions were emitted under the Scope 1 category, contributing 13% to the overall emissions. The contribution of scope 2 to the overall Net emissions was 2799.08 tCO<sub>2</sub>eq. from the purchased electricity which accounts to 87% of overall emissions. The following graph depicts the summary of overall absolute emissions for MDI Gurgaon.

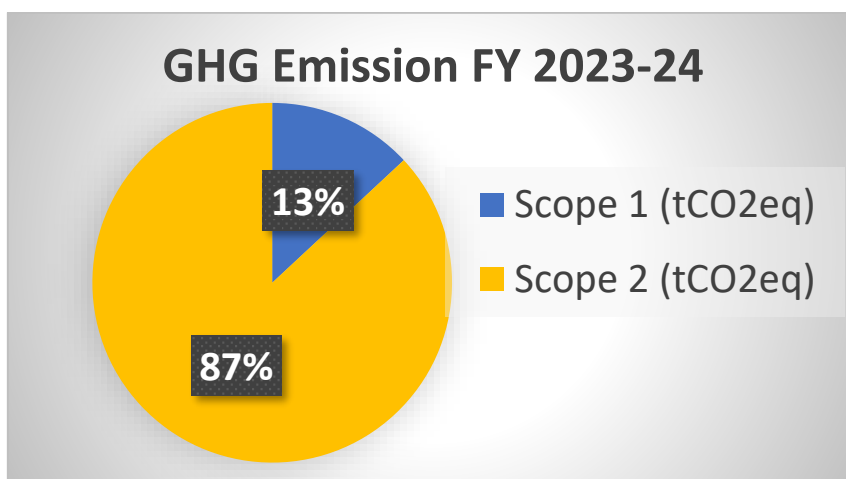


Figure 3: Overall emissions summary of MDI Gurgaon

The emission intensity in the year 2023-24 was 4.98 tCO<sub>2</sub>eq/ number of students.

The summary of emission intensity for MDI Gurgaon is indicated in the below table.

Table 6: Emission Intensity for MDI Gurgaon

S. No	Particular	Unit	FY 2023-24	India*	World*
1	Emission Intensity (in terms of total number of students)	TCO <sub>2</sub> eq/per capita	4.98	2.5	6.5

\*Reference: <https://www.wri.org/insights/charts-explain-per-capita-greenhouse-gas-emissions>

### 1.3 Scope wise emissions & sources

Emissions sources for scopes 1, and 2 were identified and listed in the below tables.

Scope 1 – Direct GHG emissions occurring from sources that are owned or controlled by the organization. Emission can be controlled at source and consumption.

Scope 2 – Indirect GHG Emissions, an account of GHG emissions from the generation of purchased electricity consumed by the organization. Emission cannot be controlled at the source; it can be only controlled at consumption.

For estimation of GHG emissions from various sources, the following emission factors are considered:

Table 7: Activity Data and Emission Factors for various sources

S. No	Category	Emission Source	Activity	Value of Emission Factor	Unit of Emission Factor	Source
1.	Scope 1	HSD	22959 L	2.66	Kg CO <sub>2</sub> eq/L	DEFRA
2.		R22	58 Kg	1,960	Kg CO <sub>2</sub> eq/Kg	IPCC AR 6
3.		R134A	22 Kg	1,530	Kg CO <sub>2</sub> eq/Kg	IPCC AR 6
4.		R410A	59.5 Kg	1,924	Kg CO <sub>2</sub> eq/Kg	DEFRA
5.		R32	45 Kg	771	Kg CO <sub>2</sub> eq/Kg	IPCC AR 6
6.		R407A	16 Kg	3,943	Kg CO <sub>2</sub> eq/Kg	IPCC AR 6
1.	Scope 2	Grid Electricity	3887610 kWh	0.72	kg CO <sub>2</sub> eq/kWh	Central Electricity Authority

### 1.3.1 Emissions Breakup – MDI Gurgaon

The calculated Scope wise emissions (tCO<sub>2</sub>eq) are represented in Table 8 as shown below.

Table 8: GHG Emissions in FY 2023-24

Year	Scope 1 (tCO <sub>2</sub> eq)	Scope 2 (tCO <sub>2</sub> eq)	Absolute Emissions (tCO <sub>2</sub> eq)
<b>2023-24</b>	420.67	2,799.08	3,219.75

Based on the analysis, the % contribution of different emissions sources such as high speed diesel (HSD), R22, R134A, R410A, R32 and R407A in overall Scope 1 emission were found to be 14.52%, 27.02%, 8%, 27.21%, 8.25% and 15%, respectively (Refer Fig.4).

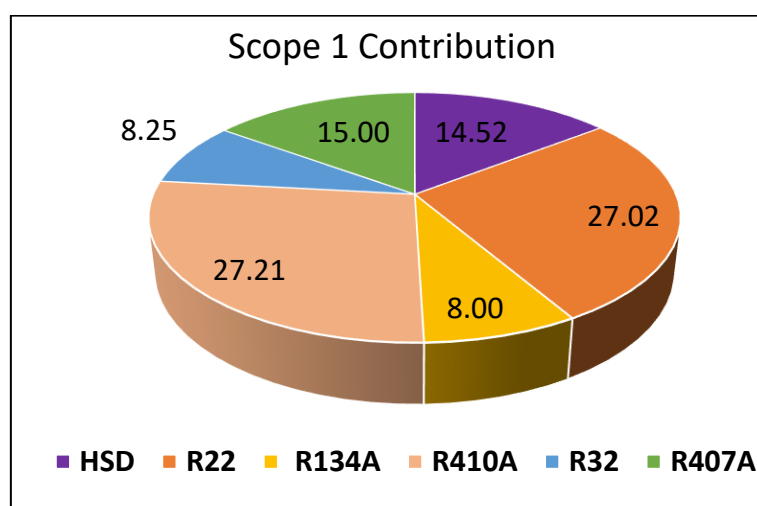


Figure 4: Emissions contribution of different sources in overall Scope 1 emissions

### 1.3.2. GHG Emission Inventory

The GHG Emission Inventory for MDI Gurgaon is customised based on the operations performed by the organisation. Utmost effort and care are taken in considering most of the

emission sources in the inventory. The tool is developed based on World Resources Institute and World Business Council for Sustainable Development - GHG Protocol.

### 1.3.3. GHG Emissions Tool

GHG emission accounting of MDI Gurgaon is carried out in accordance with the GHG protocol. The overview of the tool is as follows:

1. Setting the boundaries based on operations performed by the organisation.
2. Identify the sources of emissions as per Scope 1 and Scope 2.
3. Quantification Methods - Direct measurement of activity is the most accurate method. However, in case of unavailability of data use a calculation method based on the next accurate measure.
4. Calculation of emissions by using the emission factors.
5. Establishing a base year for purpose of benchmarking.
6. Develop strategies for emission reduction.
7. Maintain track of emission trends.
8. Manage the inventory quality.

The formulae for the calculation of emissions are incorporated in the tool providing input data would produce results. The GHG emissions are represented in the form of CO<sub>2</sub> equivalent measured in tonnes.

The MS excel sheet including roadmap for decarbonisation was discussed and presented along with the final emission numbers to officials of MDI Gurgaon.

## 2. GHG Emission Target Setting and Mitigation Measures

CII recommends MDI Gurgaon, to take GHG reduction targets. Specific GHG emission targets should be made along with Energy and Environmental targets. Targets are suggested to be made public or at least for internal purposes.

The main drivers for committing to GHG reduction targets are,

- To improve cost efficiency - cost savings can be made by identifying opportunities to increase resources and energy efficiency. This may help to improve your competitive advantage.
- To demonstrate sectoral leadership - by setting ambitious targets, measuring, managing, reporting, and reducing GHG emissions.
- To improve brand recognition in an increasingly environmentally conscious marketplace - if the targets are made public.
- It will also facilitate the organization's ability to conduct internal as well as external benchmarking.

- It will help in raising awareness among management and employees on what role they can play in reducing the impact of GHG emissions and thus, expect businesses to take a leadership role in the management of GHG emissions.
- a. The specific numeric target for reducing emissions intensity depends on the present level of the organization's operating efficiency and technology adoption. The target set by should be:
  - In line with corporate targets.
  - The target set should be realistic and challenging. It should be aggressive compared to the business-as-usual scenario considering both sector-specific and onground realities (When needed, CII will guide organizations seeking to establish aggressive targets).
- b. MDI Gurgaon, should continually analyze the GHG reduction potential opportunities identified, prioritize, and implement them to achieve GHG emission reduction target as well as associated cost benefits.

The Confederation of Indian Industry (CII) recommends and encourages MDI Gurgaon to engage in this target-setting exercise and aspire to become a role model or trendsetter in the country by successfully achieving the reduction targets they have undertaken.

## 2.1 GHG Emission Targets

Targets based on Type, Boundary, Approach, Timeline, Decision on Offsets, Track & Report Progress.

Type: These can be classified into two types of targets – Absolute & Intensity Targets.

Absolute Targets reduce absolute emissions over time whereas Intensity Targets reduce the ratio of emissions relative to business metrics over time.

The target boundary is based on Scope, geographic operations, sources, and activities covered by the target. The approach for target setting could be based on baseline & target year or a year-on-year basis.

The timeline for the target could be either short term or long term. However, opting for the long term would give better results.

Any one of the following approaches can be adopted by MDI Gurgaon for target setting on GHG emission reduction.

## 2.2 Science Based Targets Initiative (SBTi)



In addition to the above-mentioned targets, the organization should also explore undertaking a Science-Based Target (SBT) for GHG Reduction which is based on Sectoral Decarbonization Approach (SDA). Science-

based targets provide organizations with a clearly defined path to reduce GHG emissions in line with the Paris Agreement goals.

SBTi promotes science-based targets for businesses, an initiative CDP, UN Global Impact, WRI & WWF. SBTi operates & promotes best practices in emissions reductions and NET-ZERO targets in line with climate science, provides technical assistance and expert resources to companies who set science-based targets in line with the latest climate science, brings together a team of experts to provide companies with independent assessment and validation of targets. It has 844 companies applied and 344 companies have their target approved worldwide. In India, around 40 companies have applied.

To increase corporate ambition on climate action by changing the conversation on GHG emissions reduction target setting and creating an expectation that companies will set targets consistent with the level of decarbonization required by science to limit global warming to less than 2°C compared to pre-industrial temperatures. MDI Gurgaon shall set their GHG reduction targets based on the Science Based Targets initiatives (SBTi).

The benefits an organization will incur in committing to the science-based targets are:

1. Drive Innovation
2. Increased Competitiveness
3. Increased Credibility and innovation
4. Preparedness for Regulation/policy
5. Recognized as a climate change leader

### 2.3 Voluntary Initiatives

Voluntary environmental initiatives are private or public efforts to improve corporate environmental performance beyond existing legal requirements. For example, adopting ISO 14001 EMS System.

**Role of Voluntary Initiatives:** The role of voluntary initiatives along with regulatory scenarios would help the organization to achieve better results in a reduction of GHG emissions. This helps organizations to set more ambitious targets.

#### **Examples of Voluntary Initiatives:**

The examples of voluntary initiatives as shown in Fig. 5 are categorized into targets, disclosures & reporting, systems & tools, and framework/ratings/roadmap etc. which can be followed by organizations to come up with voluntary initiatives that would suit them in achieving a reduction of GHG emissions.



Figure 4: Examples of voluntary initiatives

## 2.4 GHG Mitigation Opportunities

To further accelerate the existing initiatives, MDI Gurgaon, could look at the following activities for GHG Mitigation.

1. Operational improvement - Energy benchmarking
2. Resource Efficiency
3. Cleantech\Fuel Switch
4. Offsite & onsite renewable energy
5. Working with Supply Chain

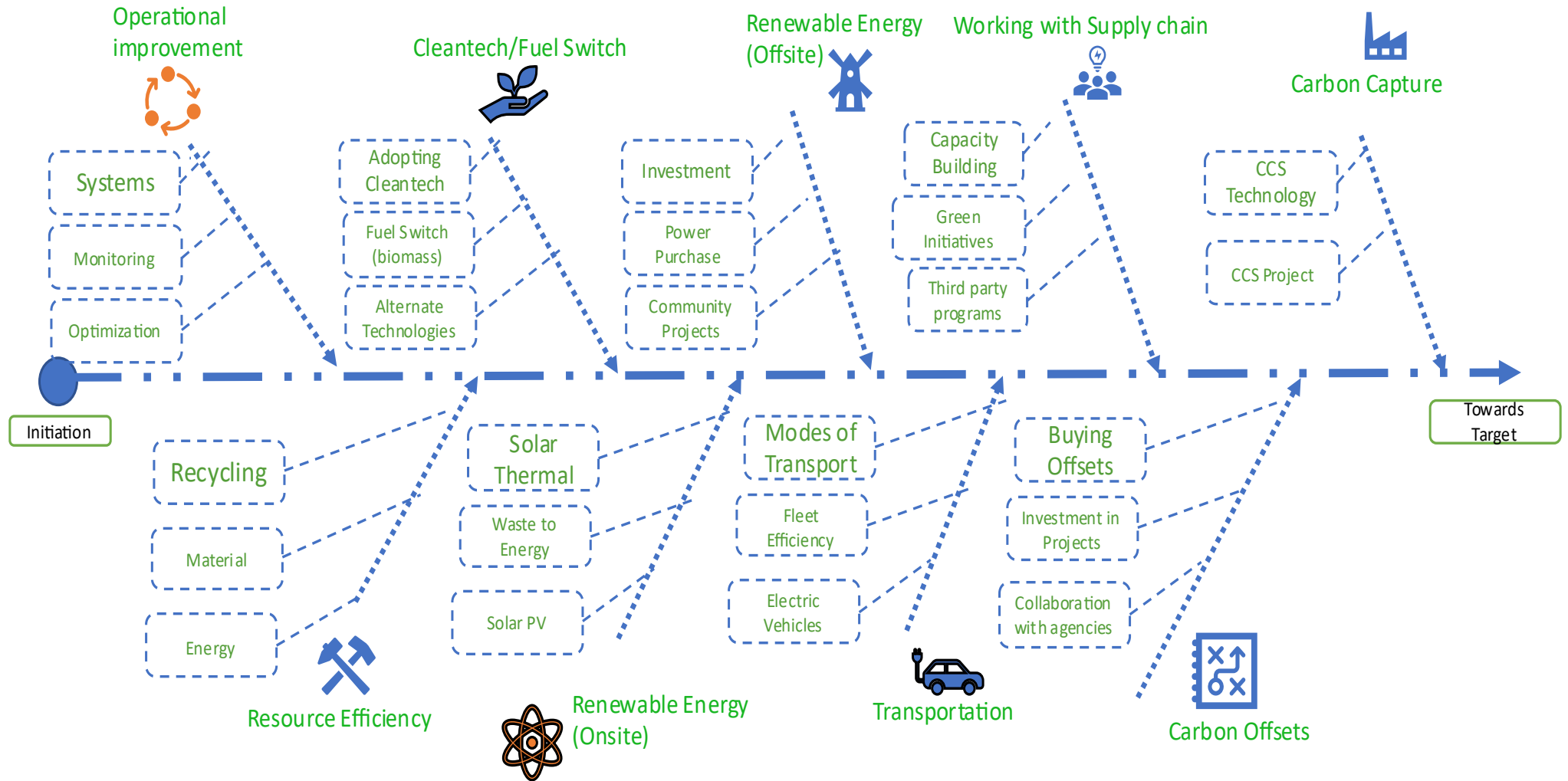


Figure 5: GHG Mitigation Opportunities.

### 3. Mitigation Measures for Decarbonization

#### 3.1 Substitution of diesel generator (DG) sets with solar energy integrated with battery storage

The emissions arising from diesel consumption in diesel generators (DGs) can be offset by implementing solar energy integrated with battery storage, assuming an annual 10% reduction in diesel consumption due to the technology shift. The assessment demonstrated that the substitution of DG sets with solar energy integrated with battery storage will reduce diesel consumption from **22,959 litres** in the baseline year (FY 2023-24) to **1,483.40 litres** by FY 2049-50. This will lead to a corresponding decline in diesel derived emissions from **61.07 tCO<sub>2</sub>eq** in FY 2023-24 to **3.95 tCO<sub>2</sub>eq** in FY 2049-50, resulting in an emission reduction of 93.54% by FY 2049-50. Table 10 presents the reduction in high-speed diesel (HSD) consumption of DG sets and the associated emissions at MDI Gurgaon resulting from the substitution with solar energy integrated with battery storage technology.

Table 9: Reduction in GHG emissions (Mitigation Measure 1)

Year	DG Set HSD (litres)	GHG Emission (TCO <sub>2</sub> e)	% Reduction in GHG Emission Compared to FY 2023 - 2024 as baseline
2023-2024	22959.00	61.07	-
2024-2025	20663.10	54.96	10
2025-2026	18596.79	49.47	19.00
2026-2027	16737.11	44.52	27.10
2027-2028	15063.40	40.07	34.39
2028-2029	13557.06	36.06	40.95
2029-2030	12201.35	32.46	46.86
2030-2031	10981.22	29.21	52.17
2031-2032	9883.10	26.29	56.95
2032-2033	8894.79	23.66	61.26
2033-2034	8005.31	21.29	65.13
2034-2035	7204.78	19.16	68.62
2035-2036	6484.30	17.25	71.76
2036-2037	5835.87	15.52	74.58
2037-2038	5252.28	13.97	77.12
2038-2039	4727.05	12.57	79.41
2039-2040	4254.35	11.32	81.47
2040-2041	3828.91	10.18	83.32
2041-2042	3446.02	9.17	84.99
2042-2043	3101.42	8.25	86.49
2043-2044	2791.28	7.42	87.84
2044-2045	2512.15	6.68	89.06
2045-2046	2260.94	6.01	90.15
2046-2047	2034.84	5.41	91.14

<b>2047-2048</b>	1831.36	4.87	92.02
<b>2048-2049</b>	1648.22	4.38	92.82
<b>2049-2050</b>	1483.40	3.95	93.54

### 3.2 Improving electrical energy efficiency

The pursuit of energy efficiency is not just an economic objective but an environmental imperative. By optimizing the consumption of both thermal and electrical energy, organization can reduce operational costs and decrease greenhouse gas (GHG) emissions.

By reducing the grid electricity consumption by 1% each year, MDI Gurgaon can reduce the grid electricity consumption from **38,87,610 kWh** from baseline year 2023-24 to **2993627 kWh** by the year 2049-50. Subsequently the GHG Emissions from grid electricity consumption (Scope 2) will reduce from **2799.08 tCO<sub>2</sub>e** (FY 2023-24) to **2155.41 tCO<sub>2</sub>e** (FY 2049-50). The below table and figure show the reduction of Grid Electricity consumption and GHG emissions of MDI Gurgaon.

Table 10: Reduction in GHG emissions (Mitigation Measure 2)

Year	Grid Electricity Consumption (kWh)	GHG Emission (TCO <sub>2</sub> e)	% Reduction in GHG Emission Compared to FY 2023 -2024 as baseline
<b>2023-2024</b>	3887610	2799.08	
<b>2024-2025</b>	3848734	2771.09	1.00
<b>2025-2026</b>	3810247	2743.38	1.99
<b>2026-2027</b>	3772144	2715.94	2.97
<b>2027-2028</b>	3734423	2688.78	3.94
<b>2028-2029</b>	3697078	2661.90	4.90
<b>2029-2030</b>	3660108	2635.28	5.85
<b>2030-2031</b>	3623507	2608.92	6.79
<b>2031-2032</b>	3587272	2582.84	7.73
<b>2032-2033</b>	3551399	2557.01	8.65
<b>2033-2034</b>	3515885	2531.44	9.56
<b>2034-2035</b>	3480726	2506.12	10.47
<b>2035-2036</b>	3445919	2481.06	11.36
<b>2036-2037</b>	3411460	2456.25	12.25
<b>2037-2038</b>	3377345	2431.69	13.13
<b>2038-2039</b>	3343571	2407.37	13.99
<b>2039-2040</b>	3310136	2383.30	14.85
<b>2040-2041</b>	3277034	2359.46	15.71
<b>2041-2042</b>	3244264	2335.87	16.55
<b>2042-2043</b>	3211821	2312.51	17.38
<b>2043-2044</b>	3179703	2289.39	18.21
<b>2044-2045</b>	3147906	2266.49	19.03
<b>2045-2046</b>	3116427	2243.83	19.84

<b>2046-2047</b>	3085263	2221.39	20.64
<b>2047-2048</b>	3054410	2199.18	21.43
<b>2048-2049</b>	3023866	2177.18	22.22
<b>2049-2050</b>	2993627	2155.41	23.00

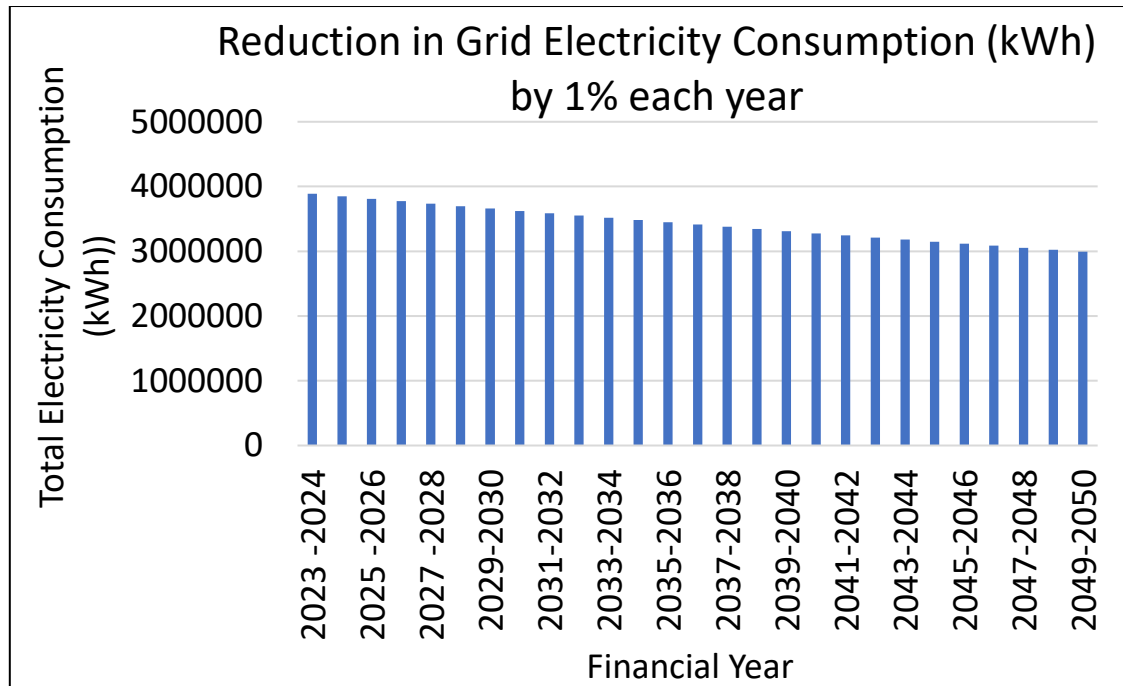


Figure 6: MDI Gurgaon Reduction in Grid Electricity Consumption

### Understanding Energy Benchmarking

At the core of energy efficiency enhancement lies the concept of energy benchmarking. It's a methodology that measures an entity's energy consumption against the best-performing entities or standard best practices. By comparing specific energy consumption of major equipment to those in the best performing institutions, significant gaps can be unearthed.

For MDI Gurgaon, this benchmarking exercise can yield valuable insights. By gauging where they stand in comparison to industry leaders, they can pinpoint areas of inefficiency.

### Tapping into Best Practices

Once the gaps are identified, the journey towards rectifying them begins. Best practices from industry leaders can be adopted, replicated, or even improved upon.

Some of these best practices might involve:

1. **Technological upgrades:** Using cutting-edge machinery and technologies that consume less energy for the same output.
2. **Maintenance routines:** Regular check-ups and servicing of equipment to ensure they run at optimal efficiency.

3. **Employee training:** Educating staff about the importance of energy efficiency and training them to operate machinery optimally.

### **Linking Energy Efficiency to GHG Reduction**

The equation here is simple yet profound: Improving energy efficiency leads to decreased energy consumption, which, in turn, leads to reduced GHG emissions. Especially in an energy-intensive operations, even small percentage improvements in energy efficiency can translate to substantial reductions in carbon emissions.

### **Embracing ISO 50001:2018 - Energy Management System (EnMS)**

ISO 50001:2018, a globally recognized standard, sets the framework for establishing and improving an organization's energy management system.

#### **Benefits of implementing ISO 50001:2018:**

1. **Holistic Approach:** The standard isn't restricted by organization size, type, or location. Whether a multinational corporation or a small local entity, all can benefit from its guidelines.
2. **Flexibility:** It focuses on the organization's-controlled activities affecting energy performance, allowing for customization according to the company's needs.
3. **Broad Applicability:** The standard remains relevant irrespective of the energy types consumed, ensuring its utility across sectors and geographies.
4. **Continuous Improvement:** While the standard mandates continual improvement in energy performance, it doesn't set rigid targets, allowing organizations to define their own benchmarks and growth trajectories.

### **3.3 Increasing Power Sourcing from Renewable Energy**

The transition from conventional energy sources to renewable ones is among the most impactful measures industries can take to combat climate change. As organizations seek to reduce their carbon footprint, the role of renewable energy becomes paramount. For MDI Gurgaon, the journey toward greener energy consumption provides both challenges and opportunities.

#### **Scope 2 Emissions**

In the realm of organization sustainability, emissions are typically categorized into three 'scopes'. Scope 2 emissions pertain to the GHGs released from electricity purchased and used by an organization. At present, Scope 2 emissions account for 87% of MDI Gurgaon's overall GHG emissions. Addressing this fraction can have profound environmental and economic benefits.

#### **Tapping into Onsite and Offsite Renewable Solutions**

**Onsite Installation:** Integrating renewable energy sources within the premises can drastically cut down on energy transportation losses and reliance on grid electricity. A Solar rooftop system is a prime example. These systems, installed on building rooftops, harness the sun's energy to produce electricity, reducing the need for external sources. The direct benefits include energy cost savings, energy self-sufficiency, and a tangible demonstration of the company's commitment to sustainable practices.

**Offsite Renewable Consumption:** For entities that might not have the infrastructure or geographical advantage for onsite installations, offsite solutions offer a viable path. Through mechanisms like Power Purchase Agreements (PPA) or Open Access, companies can source wind or other renewable energies. Essentially, these agreements allow organizations to buy renewable energy from an external provider, ensuring that the power they consume is green.

### 100% Renewable Energy

While integrating a percentage of renewable energy can bring significant benefits, the goal for MDI Gurgaon should be a complete transition. By aiming for 100% renewable energy procurement, the organization can entirely offset emissions from Grid electricity usage. This ambitious target is more than just an environmental commitment; it's a statement to stakeholders, customers, and competitors about MDI Gurgaon's vision for a sustainable future.

By increasing the renewable energy share in the overall Power mix by 10% each year, MDI Gurgaon can achieve 100% of their energy requirement from renewable energy by the year 2033-34. The below table shows how the overall energy requirement can be achieved by renewable energy.

Table 11: Reduction in GHG emissions (Mitigation Measure 3)

Year	Grid Electricity Consumption (kWh/year)	GHG Emission (tCO <sub>2</sub> eq)	% GHG Reduction Compared to FY 2023 -2024 as baseline
2023-2024	3887610	2799.08	-
2024-2025	3498849	2519.17	10.00
2025-2026	3148964	2267.25	19.00
2026-2027	2834068	2040.53	27.10
2027-2028	2550661	1836.48	34.39
2028-2029	2295595	1652.83	40.95
2029-2030	2066035	1487.55	46.86
2030-2031	1859432	1338.79	52.17

<b>2031-2032</b>	1673489	1204.91	56.95
<b>2032-2033</b>	1506140	1084.42	61.26
<b>2033-2034</b>	1355526	975.98	65.13
<b>2034-2035</b>	1219973	878.38	68.62
<b>2035-2036</b>	1097976	790.54	71.76
<b>2036-2037</b>	988178	711.49	74.58
<b>2037-2038</b>	889360	640.34	77.12
<b>2038-2039</b>	800424	576.31	79.41
<b>2039-2040</b>	720382	518.68	81.47
<b>2040-2041</b>	648344	466.81	83.32
<b>2041-2042</b>	583509	420.13	84.99
<b>2042-2043</b>	525158	378.11	86.49
<b>2043-2044</b>	472643	340.30	87.84
<b>2044-2045</b>	425378	306.27	89.06
<b>2045-2046</b>	382841	275.65	90.15
<b>2046-2047</b>	344556	248.08	91.14
<b>2047-2048</b>	310101	223.27	92.02
<b>2048-2049</b>	279091	200.95	92.82
<b>2049-2050</b>	251182	180.85	93.54

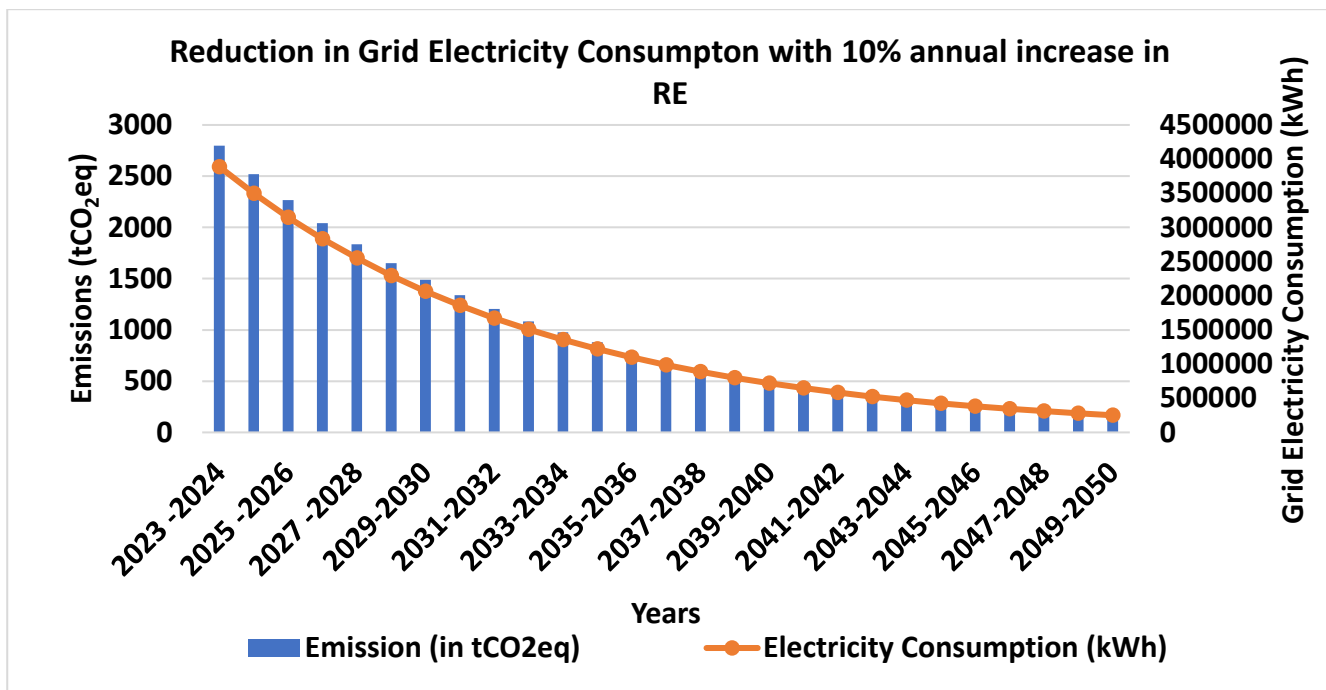


Figure 7: Projected reduction in grid electricity consumption with a 10% annual increase in renewable energy share at MDI Gurgaon

### Benefits of Renewable Energy Transition

- Environmental Impact:** The immediate and most pronounced benefit is the reduction in carbon emissions, contributing to global efforts against climate change.
- Economic Sense:** Renewable energy, especially solar, has seen a steady decline in costs. In the long run, these sources can prove to be more economical than conventional power, offering savings on energy bills.
- Energy Security:** With onsite installations, there's reduced dependence on external power providers, granting companies more control over their energy supplies.
- Stakeholder Engagement:** A commitment to green energy resonates with a growing segment of environmentally conscious stakeholders, enhancing brand value and trust.
- Regulatory Advantages:** As governments worldwide push for cleaner energy, organization using renewable sources might benefit from tax breaks, incentives, and preferential regulations.

## 4. Action Plan

In addressing the findings of the GHG Inventorization, CII-GBC proposes a comprehensive action plan for MDI Gurgaon, focusing on practical measures to reduce emissions across Scope 1, 2, and 3. Key components of this plan include:

- Advanced Energy Management:** Implement state-of-the-art energy management systems to enhance efficiency in energy use. This involves upgrading machinery,

optimizing process operations, and regular energy audits to identify and rectify inefficiencies.

2. **Adoption of Renewable Energy:** Increase the reliance on renewable energy sources like solar. The plan includes feasibility studies for on-site renewable energy installations and exploring power purchase agreements from renewable sources.
3. **Employee Training and Engagement:** Conduct comprehensive training programs for employees at all levels to foster a culture of sustainability. Encourage innovation and participation in identifying and implementing emission reduction strategies.
4. **Stakeholder Collaboration:** Engage with suppliers, industry partners, and regulatory bodies to align the supply chain and operational practices with sustainability goals. This includes adopting best practices and complying with emerging environmental regulations.
5. **Monitoring and Reporting:** Establish a robust mechanism for monitoring emission reductions and regularly report progress against set targets. This will ensure transparency, facilitate stakeholder engagement, and allow for timely adjustments to the strategy.

This action plan is designed to be dynamic and responsive to technological advancements and regulatory changes, ensuring that MDI Gurgaon remains at the forefront of environmental sustainability.

Further to strengthen the GHG Inventorization, MDI Gurgaon can implement as below:

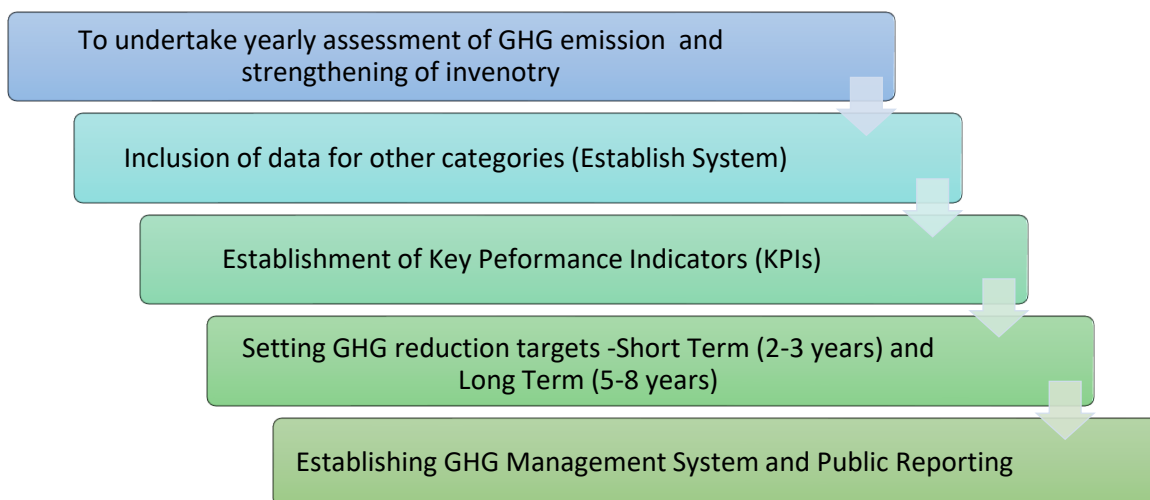


Figure 8: Brief Summary of Action Plan.

#### 4.1 Yearly Assessment of GHG Emissions and Strengthening of Inventory

It is recommended that MDI Gurgaon should undertake a yearly assessment of GHG emissions and include all the major sources of GHG emissions covering scope 1, scope 2 and scope 3.

- a. It is recommended to develop a management matrix for internal reporting of GHG emissions and monitoring reduction. A dedicated team or existing team from the EHS/ Operation & Maintenance team can be appointed to undertake this activity.

- b. CII strongly feels that the MDI Gurgaon team should form a GHG management committee that involves senior persons from all departments and the committee should continue the work and progress towards the lowest GHG emission level.
- c. CII recommends MDI Gurgaon undertake a yearly assessment of GHG emissions and apply continual improvement methods for reducing GHG emissions.
- d. CII also suggests that the MDI Gurgaon team evaluate the possibility of getting ISO 14064 certification for the GHG management system in future.

## 4.2 Inclusion of data for other categories

CII appreciates the efforts of the MDI Gurgaon team in collecting source data for all the Scope 1 and 2 emissions. However, a few suggestions have been shared to strengthen the data collection.

### 4.2.1 Strengthening of Scope 3

We suggest the following steps be considered to strengthen the data collection for Scope 3 emissions.

1. **Supplier Engagement for Procurement:** Engage with suppliers to collect detailed emissions data for goods and services procured by the institution, including office supplies, laboratory materials, equipment, and outsourced services.
2. **Students and Employee Commuting:** Collect and analyze data related to the transportation of students and employees between their homes and the campus, as well as travel undertaken for official organizational activities. This includes emissions from vehicles used for employee commuting, classified under Scope 3 (Category 7: Employee Commuting).
3. **Waste Management Data from Contractors:** Collect comprehensive data from waste management contractors, including emissions from the disposal and recycling of waste generated within the institution, as well as emissions associated with the end-of-life treatment of materials.
4. **Energy Consumption of Outsourced Activities:** If any part of the manufacturing process is outsourced, collect data on the energy consumption and associated emissions of these activities.

### 4.2.2 Establishment of Key Performance Indicators

It is recommended that the unit should establish Key Performance Indicators (KPIs) to monitor the progress and compare the emissions from the unit. KPIs for GHG emission can be in the form of GHG Emission Intensity.

The emission intensity would be used as a benchmark to compare with other organizations in the same sector.

## 4.3 Establishing GHG Management System and Reporting GHG Emissions

### 4.3.1 Establishing GHG Management System

Once the organization starts doing GHG Inventorization on a yearly basis, it is recommended that it implements a GHG management system. The unit should monitor the GHG emissions & GHG emission intensity and establish a robust data monitoring and recording system. Many organization have implemented corporate wide GHG Inventorization software and there is a separate module in ERP on GHG Accounting. Implementing this software will not only help in effective GHG management but also overall sustainability management. Following are the few software's which units have implemented to monitor and track their GHG emissions, (this software can also monitor other aspects of sustainability such as waste management, water management, etc.)

**enablon**



<http://enablon.com/>

<http://www.sofisoftware.com/india/index/>

### 4.3.2 Reporting GHG Emissions

It is recommended that once unit attains the maturity in terms of GHG accounting, the unit should evaluate the possibility of reporting their GHG emissions to the stakeholders. As of now in India, the reporting of GHG emissions is not mandated by the government and is still voluntary, but in countries like the United States and the United Kingdom the companies mandatorily report their emissions.

The Securities and Exchange Board of India (SEBI) introduced new requirements for sustainability reporting by listed entities. As per the notification, companies would be required to submit a new report on ESG parameters, namely the Business Responsibility and Sustainability Report (BRSR). The SEBI press release said the BRSR will apply to the top 1000 listed entities (by market capitalization), for reporting voluntarily for FY 2021-22 and on a mandatory basis from FY 2022-23.

Following are key drivers to voluntary report the GHG Emissions:

1. Facilitating informed decision making and prioritising actions
2. Brings commitment from the organisation to reduce and effectively manage GHG emissions as reporting adds transparency and accountability to the process of GHG Management
3. Improve and promote GHG management practice internally and externally.
4. Keeping key stakeholders informed about the progress made on GHG management and reduction.

5. Benchmark performance (internally and externally as well as overtime); and improve the effectiveness of processes.
6. In addition to the above there is significant interest from the investors in GHG emission data and investing decisions have also been taken considering Climate Change Risk and GHG management can be a good tool to adverse climate change risks

Many companies are reporting GHG emissions internally as well as external. Following are a few reporting platforms to report GHG emissions:



Figure 9: Reporting Platforms for GHG Emission.

## 5. Conclusion

The GHG inventorization conducted by CII-GBC at MDI Gurgaon provides a comprehensive overview of greenhouse gas (GHG) emissions. This report encapsulates significant findings and outlines critical pathways for future environmental strategies. It was observed that under Scope 1, refrigerants R22 and R410A are the major contributors to GHG emissions. In terms of total emissions, Scope 2 emissions, i.e., emissions due to purchased grid electricity consumption, account for 87% of the total emissions. This highlights the need for ongoing improvements in operational efficiency and further investment in sustainable technologies.

Furthermore, augmenting the use of renewable energy sources in operations will be crucial in further reducing the organization's carbon footprint. It is evident that MDI Gurgaon is on a promising path towards environmental sustainability. The journey towards significantly reduced GHG emissions is a continuous process that requires dedication, innovation, and strategic planning. CII-GBC emphasizes the importance of continuous monitoring and transparent reporting of GHG emissions. Such practices are vital for tracking progress, ensuring accountability, and fostering continuous improvement in environmental performance.

In conclusion, the collaboration between CII-GBC and MDI Gurgaon is a testament to their shared commitment to environmental stewardship. We anticipate continued partnership in driving sustainable practices and achieving the shared goal of reducing the institution's carbon footprint.

## 6. Annexures

The tool submitted along with this report has the collected activity data and calculations to estimate annual GHG inventory of MDI Gurgaon. The tool consists of the emission factor data for conversion of emissions into CO<sub>2</sub> eq. emissions for understanding.

The following calculation tools are included

- GHG Inventory calculation sheet - Scope 1 and Scope 2 emissions