JAGDISH SHETH SCHOOL OF MANAGEMENT (JAGSoM)

- **CARBON FOOT PRINT MITIGATION PLAN**
- **AUDIT REPORTS - 2025 TO 2020**

CARBON FOOTPRINT MITIGATION PLAN: JAGSoM

(updated January 2025)

The net-zero carbon emission achievement plan for 2028 across all three scopes was reviewed in January 2025 along with the revision of the Strategic Plan of JAGSoM. JAGSoM endeavours to adhere to high targets of carbon emission and has consciously put in place a carbon audit and mitigation. Our conscious effort to do an annual audit is a testimony to this.

The analysis and mitigation plan that follows is embedded in the mission component of the school's socially responsible and holistic mission.

Exhibit 1: Audited Data of the Emission (Tables refer to the tables in the Carbon audit report)

	2020-21		2021-22		2022-23		2023-24		2024-25	
	Emission Factor (kgCO2e/Liter)	Emission (kgCO2e)	Emission Factor (kgCO2e/Liter)	Emission (kgCO2e)	Emission Factor (kgCO2e/Liter)	Emission (kgCO2e)	Emission Factor (kgCO2e/Liter)	Emission (kgCO2e)	Emission Factor (kgCO2e/Liter)	Emission (kgCO2e)
SCOPE 1										
Table 4 DG	2.68	1018.4	2.68	1286.4	2.68	2840.8	2.68	2669.3	2.68	2519.2
Table 5 Diesel vehicles	2.65	318	2.65	397.5	2.65	901	2.65	848	2.65	795
Table 6: Petrol vehicles	2.296	574	2.296	1285.8	2.296	2870	2.296	2663.4	2.296	2525.6
Table 7: Refrigerant leakage	675	121.5	675	121.5	675	270	675	270	675	270
SCOPE 2										
Table 8: Purchased Electricity	0.82	23780	0.82	29848	0.82	66420	0.82	62582	0.82	59040
SCOPE 3										
Table 9: Emission from commutation	0.15	6804	0.15	10395	0.15	156114	0.15	148176	0.15	134316
Table 10: Emissions from Air Travel	0.2	1392	0.2	696	0.2	3480	0.2	2784	0.2	2088
Table 11 Emission from waste generation	0.12	16.2	0.12	28.8	0.12	214.5	0.12	198	0.12	124.8
Table 12: Emissions from purchased Goods	0.05	0.24	0.05	0.3	0.05	0.675	0.05	0.6	0.05	0.55

Exhibit 2 : Carbon Usage in Percentage

	Carbon usage in percentage				
	2020-21	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Direct emission	6	7	3	3	3
Purchased electricity	70	68	28	28	29
Indirect emission	24	25	69	69	68

Time Series Analysis – Absolute emission (2020 to date)

Tine series analysis of all 3 scopes are represented graphically using absolute emission.

Figure 1: Scope 1 Absolute Emissions (Details below the graph)

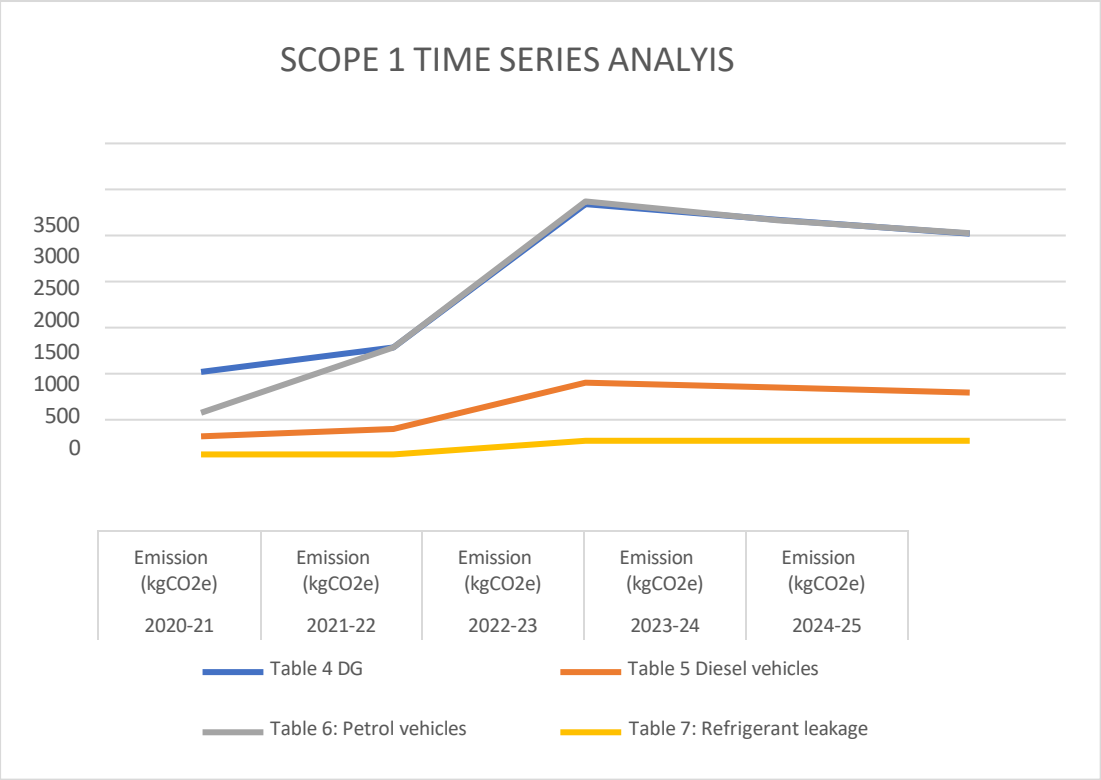


Figure 2: Scope 2 - Purchased Electricity

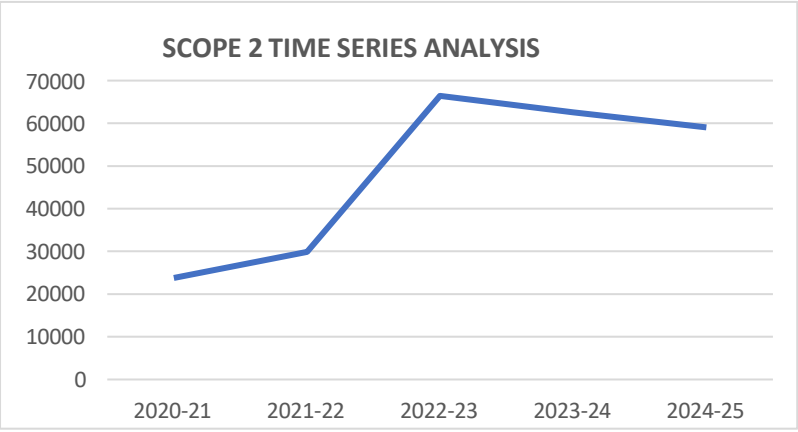
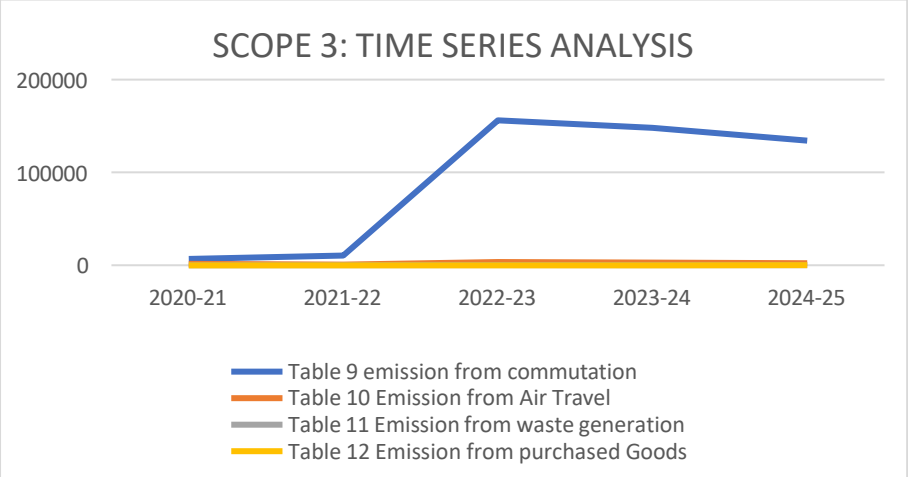


Figure 3: Scope 3 (Details below the graph)



Inference. The time series analysis is skewed and misleading because it includes the data of COVID years suggesting that there was a sudden increase in carbon emission in 2022-23. Hence the data given below is more appropriate.

Time Series Analysis – Post COVID (2022 to 20225)

Figure 4 : Scope 1 – Direct Emissions (Post Covid)

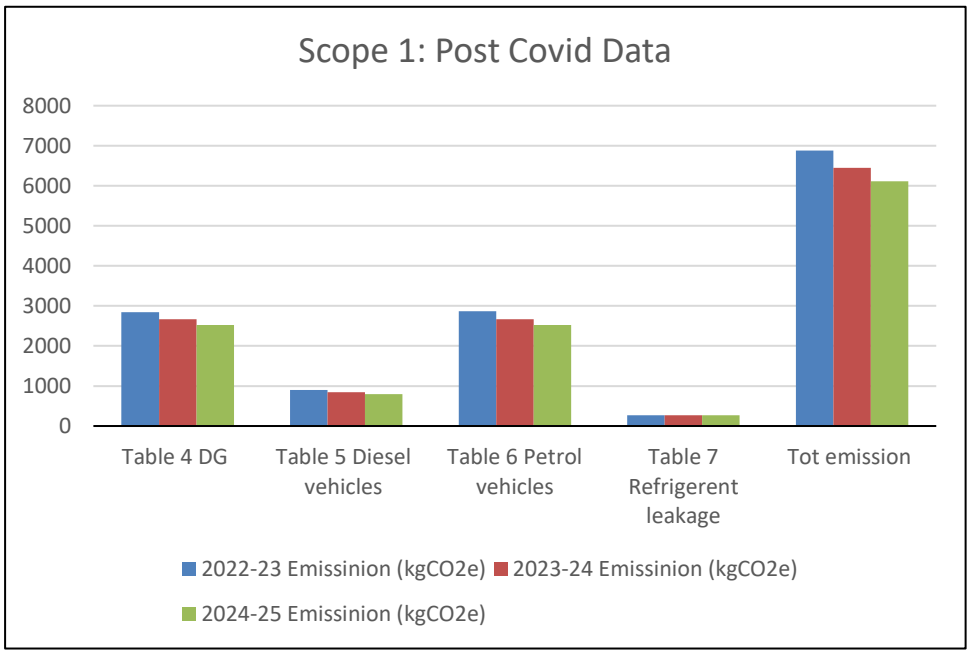


Figure 5: Scope 2 – Purchased Electricity (Post Covid)

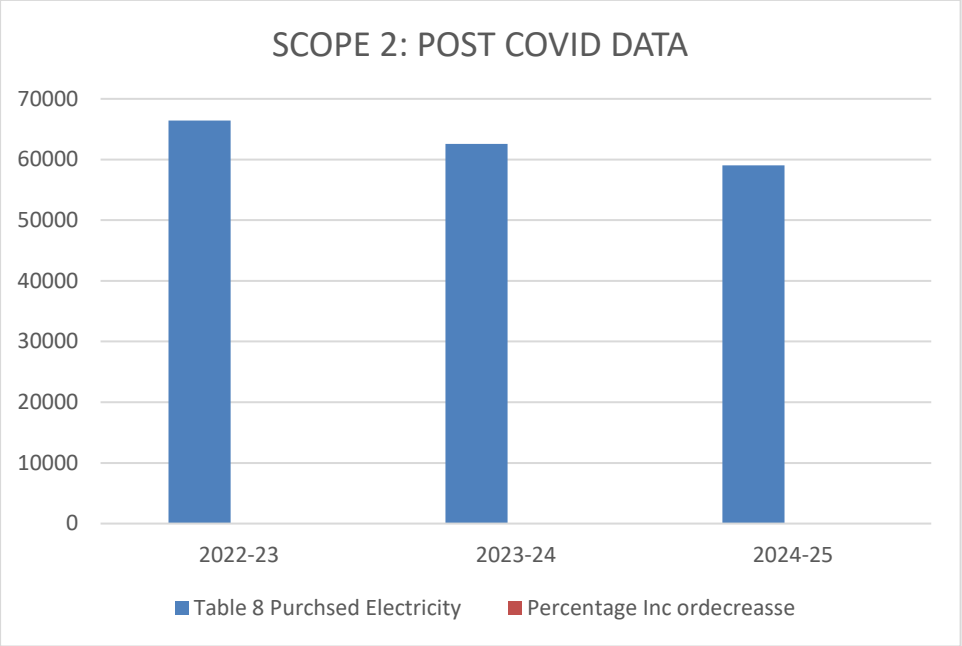


Figure 6: Scope 3-bOther Emissions (Post Covid)

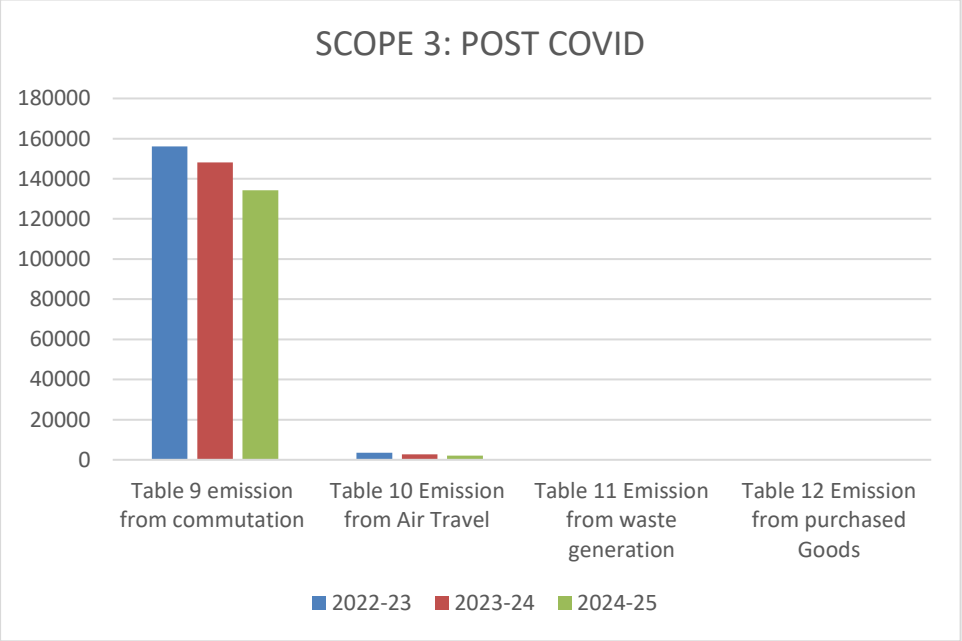


Figure 7 : SCOPE 1 - TOTAL EMISSIONS (POST COVID)

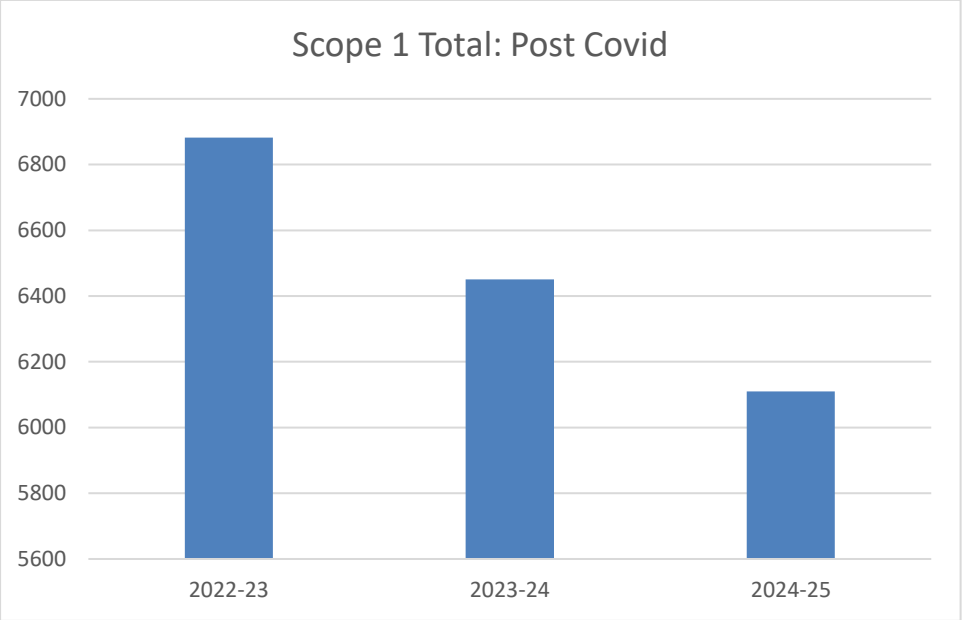


Figure 8 : SCOPE 2 TOTALELECTRICITY PURCHASED (POST COVID)

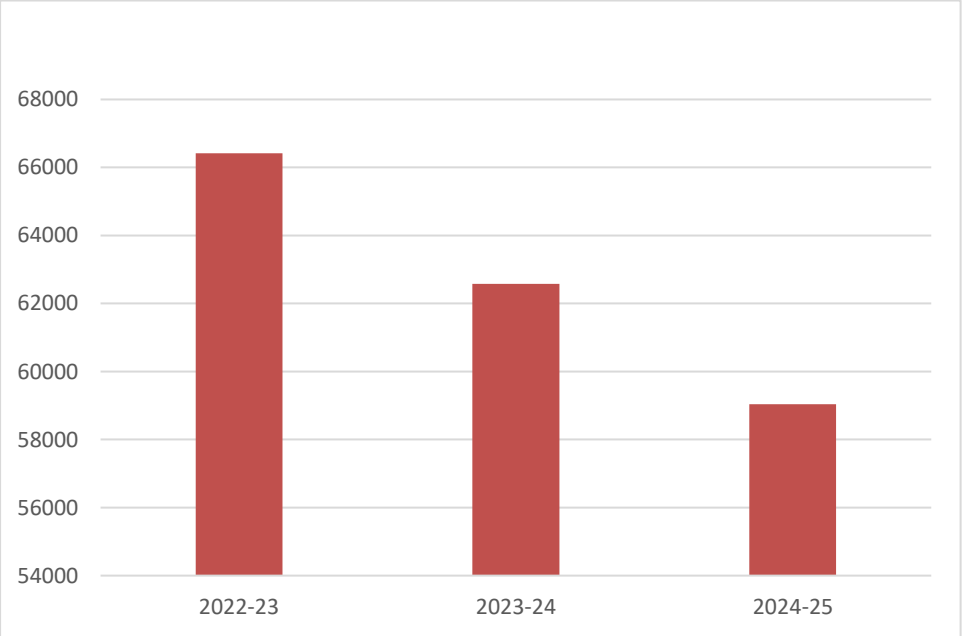


Figure 9 : SCOPE 3 TOTAL INDIRECT EMISSIONS (POST COVID)

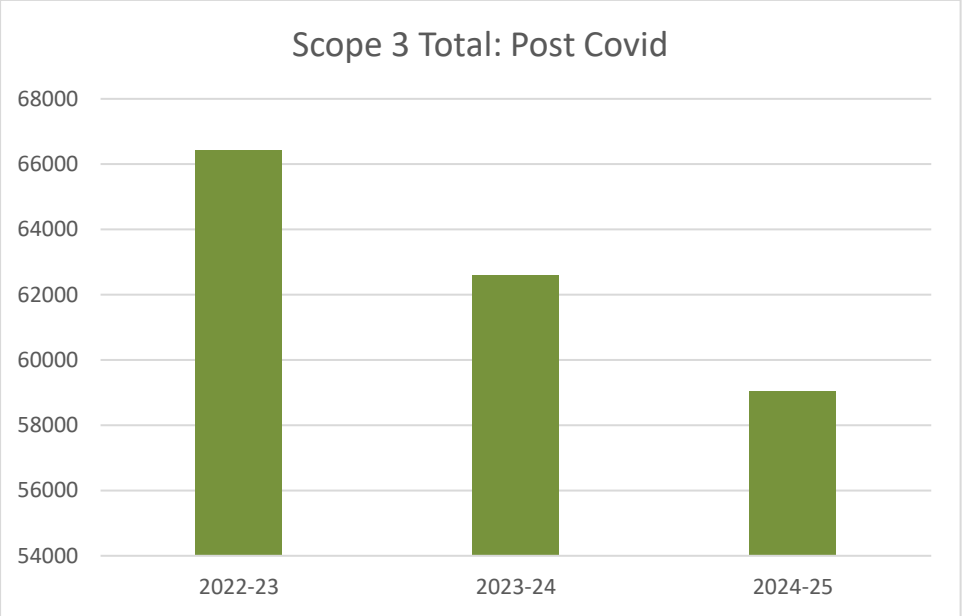


Exhibit 3: Post Covid Total Absolute Emission and Percentage Decrease

Post Covid Total	2022-23	2023-24	2024-25	Percentage decrease Y on Y
Scope 1	6881.8	6450.6	6109.8	5.775
Scope 2	66420	62582	59040	5.710
Scope 3	66420	62582	59040	7.546

Net Zero Goals

Till now the effort was to achieve net zero by passive measures or reducing the usage. This has led to reduction in emission (see Table above). In 2025, evaluation, a decision was taken to move to active methods to achieve net zero.

Exhibit 4: Plan for Net zero target (Net zero year given in green) (Tables refer to the tables in the Carbon audit report)

	2024-25		Percentage reduction per year					
	Emission Factor	Emission	2026	2027	2028	2029	2030	
SCOPE 1								
Table 4 DG	2.68	2519.2	10	20	20	20	30	Since the land and building area is extremely restricted, the generation of adequate electricity to reach net zero is not practical. However, solar facility is to be put in other locations of JAGSoM to offset the use in the city campus.
Table 5 Diesel vehicles	2.65	795	10	20	30	20		By contracting electric vehicles. Net emission of Diesel and Petrol is 3.3 tons. Tree plantation has begun in locations other than the city campus. 500 growing trees have been planted in Karjat, which will offset 8.3 tons and as it matures, will offset 11 tons (at the rate of 45 trees to offset 1 ton of carbon emission).
Table 6: Petrol vehicles	2.296	2525.6	20	20	30	30		The school started using electric hailing cabs. However, their availability is erratic. This emission is proposed to be offset by a dual strategy of focusing on electric vehicles and tree plantation as mentioned above.
Table 7: Refrigerant leakage	675	270	30	30	40			The leak is insignificant, and regular maintenance is being done to bring the leak to zero
SCOPE 2								
Table 8: Purchased Electricity	0.82	59040	10	10	20	20	30	59 tons of emissions would be offset using solar power in current and alternative locations.
SCOPE 3								
Table 9: Emission from commutation	0.15	134316	20	20	20	20	20	This accounts for 134 tons. It is practical to offset it through carbon credit purchase, which is being considered under the overall budget of the school.
Table 10: Emissions from Air Travel	0.2	2088	10	40	50			This amounts to 2 tons and will be automatically offset from the tree plantation effort.
Table 11 Emission from waste generation	0.12	124.8	30	30	40			Amounts to 0.12 tons and will be offset from the tree plantation intervention.
Table 12: Emission from purchased Goods	0.05	0.55	20	20	20	20	20	Amounts to 0.05 tons and will be offset from the tree plantation intervention.

Conclusion

JAGSoM endeavors to adhere to high targets of carbon emission and has consciously put in place a carbon audit and mitigation. The slight increase shown post 2022 is the result of covid inactivity and post-COVID resumption of activities to the normal level and should not be a cause for alarm. However, the school recognizes its location in the heart of the city and limited area to operationalize solar energy and has thus begun to embrace tree plantation and possibly carbon credit purchase, is absolutely necessary.

GHG Audit Report-2024-25 Jagdish Seth School of Management (JAGSoM) Bangalore Campus

Reporting Period- 1st June 2024 to 31st May 2025

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ABBREVIATIONS

AC - Air Conditioning
AR- Assessment Report
BEE- Bureau of Energy Efficiency
CH_4- Methane
CDM- Clean Development Mechanism
EF- Emission Factor
GHG- Greenhouse Gas
GJ- Gigajoule
GRI- Global Reporting Initiative
GWP- Global Warming Potential
HFCs- Hydrofluorocarbons
IPCC- Intergovernmental Panel on Climate Change
Kg- Kilogram
KPI- Key Performance Indicator
LCA- Life Cycle Assessment
m^2 - Square Metre
m^3 - Cubic Metre
MWh- Megawatt Hour
N_2O- Nitrous Oxide
PFCs- Perfluorocarbons
SF_6- Sulphur Hexafluoride
t- Tonne
tCO_2e- Tonne of Carbon Dioxide Equivalent

ACKNOWLEDGEMENT

Navy Blue Energy GHG audit team would like to extend its sincere appreciation to the management and staff of **Jagdish Seth School of Management (JAGSoM), Bangalore Campus** for their unwavering cooperation and support throughout the audit process. The commitment to transparency and openness demonstrated by the management team facilitated a thorough examination of records, internal controls, and operational processes.

We are grateful for the prompt provision of requested information and the willingness of Jagdish Seth School of Management (JAGSoM) personnel to address queries and provide clarification as needed.

Furthermore, we would like to express our gratitude to all employees involved in the audit for their professionalism and dedication. Their cooperation greatly contributed to the efficiency and effectiveness of the audit engagement. Additionally, we acknowledge the assistance received from other relevant stakeholders who played a role in the successful completion of this audit.

AUDIT TEAM

From Navy Blue Energy Following team members Conducted the GHG Audit.

Table 1 Audit Team

Team Member	Designation
Pravin J Awatade M.Tech Energy | BEE-CEM/CEA | AEE-CEM Certified Carbon Footprint Professional	Team Leader
Tushar Harer M Tech Energy BEE- CEM/CEA	Certified Energy Auditor
Dr. Amol Mande PhD | Energy Technology	Certified Energy Auditor

EXECUTIVE SUMMARY

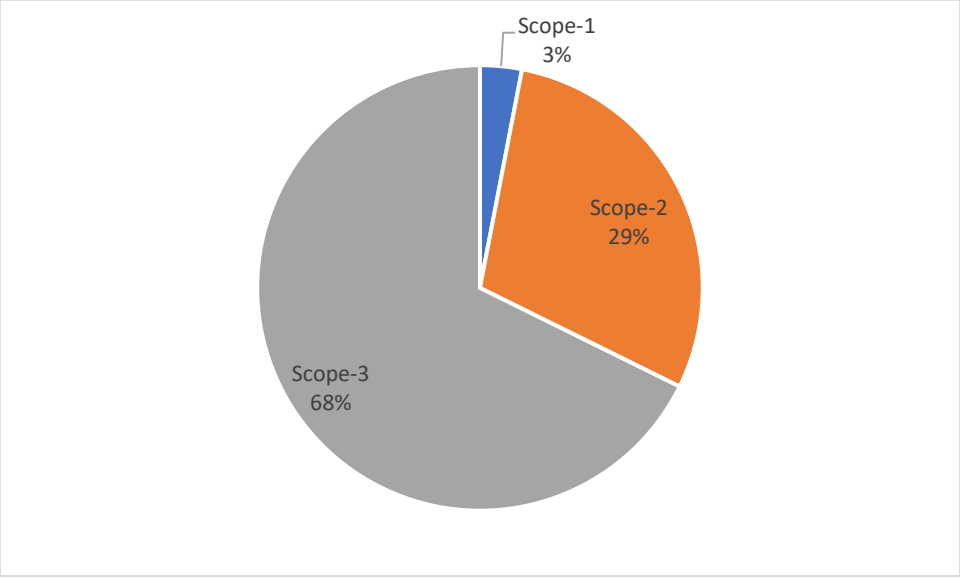
GHG EMISSION ACCOUNTING

The objective of this report is to outline the greenhouse gas (GHG) accounting of facility for the Period of 1st June 2024 to 31st May 2025. The total GHG footprint of Jagdish Seth School of Management (JAGSoM), Bangalore facility is 201.7 tCO_2e (Metric Tonnes of Carbon Dioxide equivalent).
Following Table gives an overview of the Scope-wise GHG emissions.

Table 2 Emission Summery

Scope	Emissions Due to	UoM	Value	Sub Total	Share
Scope-1	Due to Onsite Diesel Consumption by DG Sets	$kgCO_2e$	2519	6110	3%
	Due to Diesel Consumption by Facility's Own Vehicles	$kgCO_2e$	795		
	Due to Petrol Consumption by Facility's Own Vehicles	$kgCO_2e$	2526		
	Due to Refrigerant Leakages from Air-Conditioners	$kgCO_2e$	270		
Scope-2	Due to Purchased Electricity	$kgCO_2e$	59040	59040	29%
Scope-3	Due to Daily Commutation	$kgCO_2e$	134316	136529	68%
	Due to Air Travel	$kgCO_2e$	2088		
	Due to Solid Waste Disposal	$kgCO_2e$	125		
	Due to Goods Purchase	$kgCO_2e$	0.55		
	Total	$kgCO_2e$	201679	201679	100%
		tCO_2e	201.7	201.7	

Graph 1 Scope Wise Emission



OBJECTIVE OF GHG AUDIT

The objective of a Greenhouse Gas (GHG) Audit report is to assess and report on an organization's greenhouse gas emissions and their management strategies. The primary goals of a GHG Audit report include:

Emission Assessment: Identify and quantify the organization's greenhouse gas emissions across various scopes (Scope 1, 2 & 3), including direct and indirect emissions associated with its operations, energy consumption, and supply chain.

The goal is to measure, analyse, and verify the amount of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), emitted directly and indirectly by the organization's activities. GHG audits are integral to understanding an organization's environmental impact and implementing strategies for emission reduction.

Here are the key steps involved in a typical GHG audit:

1. **Establish the Scope and Boundaries:**
    - Define the organizational and operational boundaries of the audit, including the scope of emissions to be considered.
2. **Define the Reporting Period:**
    - Determine the time period for which emissions will be measured and reported (e.g., annual reporting).
3. **Identify Emission Sources:**
    - Identify and categorize sources of greenhouse gas emissions, distinguishing between direct (Scope-1) and indirect (Scope-2 & Scope-3) emissions.
4. **Data Collection:**
    - Gather relevant data on energy consumption, fuel usage, and other activities contributing to emissions.
    - Collect data on purchased electricity and heat.
5. **Select Emission Factors:**
    - Choose appropriate emission factors to convert activity data into greenhouse gas emissions.
    - Emission factors are specific to the type of activity and the greenhouse gas in question.
6. **Calculate Emissions:**
    - Use the collected data and emission factors to calculate the total greenhouse gas emissions for each category (Scope 1, 2 & 3)
7. **Quality Assurance and Quality Control (QA/QC):**
    - Implement QA/QC procedures to ensure data accuracy, completeness, and reliability.
    - Verify calculations and resolve any discrepancies.
8. **Documentation and Reporting:**
    - Document the methodology, data sources, emission factors, and calculations used in the audit.
    - Prepare a comprehensive GHG audit report, including a summary of findings, emission trends, and recommendations.

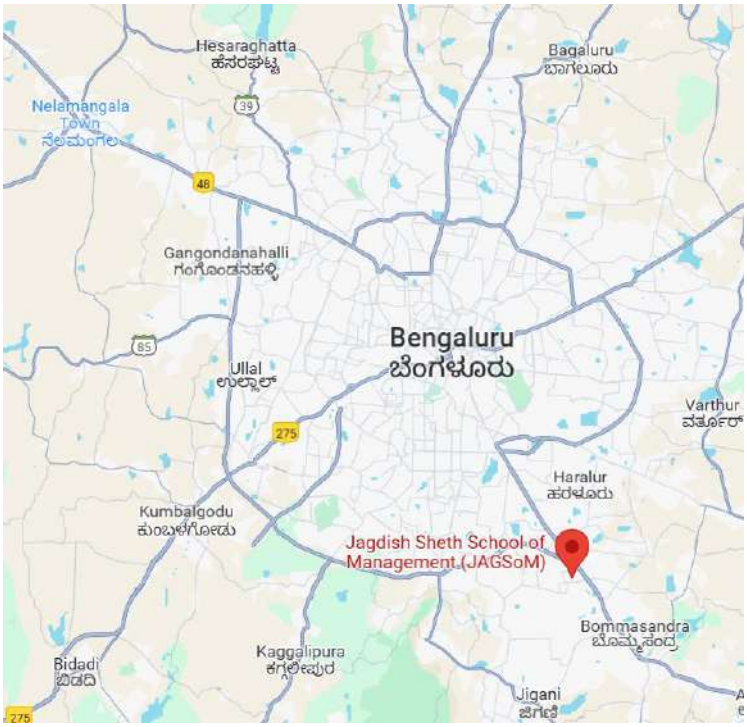
FACILITY INTRODUCTION

The **Jagdish Sheth School of Management (JAGSoM)**, formerly known as IFIM Business School, is a distinguished management institute located in **Electronic City, Bangalore, India**. The institute is named in honour of **Dr. Jagdish N. Sheth**, a globally renowned scholar and Padma Bhushan awardee, known for his contributions to marketing and public policy.

JAGSoM is one of the few Indian business schools to be accredited by the **Association to Advance Collegiate Schools of Business (AACSB)**, placing it among the top 5% of business schools globally. It is also accredited by **SAQS** and recognized by **AICTE**. The institution is committed to delivering globally benchmarked management education with a strong emphasis on **ethics, sustainability, and social responsibility**.

As part of its ongoing efforts toward environmental stewardship and regulatory compliance, JAGSoM has undertaken the preparation of its **Greenhouse Gas (GHG) Inventory Report**, in line with internationally accepted standards such as the **GHG Protocol**. This initiative reflects the institute's commitment to tracking, reducing, and managing its environmental footprint across Scope 1, Scope 2, and relevant Scope 3 emission categories.

Geo Location of the Facility 1



METHODOLOGY

WHAT IS GLOBAL WARMING

Global warming refers to the long-term increase in Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases into the atmosphere. While Earth's climate has naturally varied over geological time scales, the current trend of global warming is largely attributed to human activities that release large amounts of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases.

The main contributors to human-induced global warming include:

1. **Burning of Fossil Fuels:** The combustion of fossil fuels (coal, oil, and natural gas) for energy production releases large amounts of CO_2 into the atmosphere. This is a significant source of greenhouse gas emissions.
2. **Deforestation:** The clearing of forests for agriculture, logging, or other purposes reduces the number of trees that can absorb CO_2 from the atmosphere. Trees act as carbon sinks, and their removal contributes to increased greenhouse gas concentrations.
3. **Industrial Processes:** Certain industrial activities release greenhouse gases as byproducts. For example, cement production releases CO_2 during the chemical transformation of limestone into clinker.
4. **Agricultural Practices:** Agricultural activities, such as rice cultivation and livestock farming, produce methane and nitrous oxide, both potent greenhouse gases.
5. **Waste Management:** Improper waste disposal and waste treatment processes can lead to the release of methane, a potent greenhouse gas, from landfills.

The enhanced greenhouse effect resulting from these activities traps more heat in the Earth's atmosphere, leading to a rise in global temperatures. The consequences of global warming include:

- **Rising Sea Levels:** The melting of glaciers and polar ice caps contributes to rising sea levels, which can lead to coastal erosion and increased flooding.
- **Extreme Weather Events:** Changes in temperature patterns can lead to more frequent and severe weather events, such as heatwaves, droughts, hurricanes, and heavy precipitation.
- **Shifts in Ecosystems:** Changes in temperature and precipitation patterns can affect ecosystems, leading to shifts in the distribution of plant and animal species.
- **Ocean Acidification:** Increased CO_2 levels in the atmosphere also contribute to higher levels of carbon dioxide being absorbed by the oceans, leading to ocean acidification, which can harm marine life, particularly organisms with calcium carbonate shells or skeletons.

Efforts to mitigate global warming include international agreements such as the Paris Agreement, which aims to limit the global temperature increase to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit the increase to 1.5 degrees Celsius. This requires substantial reductions in greenhouse gas emissions and the transition to more sustainable and low-carbon energy sources.

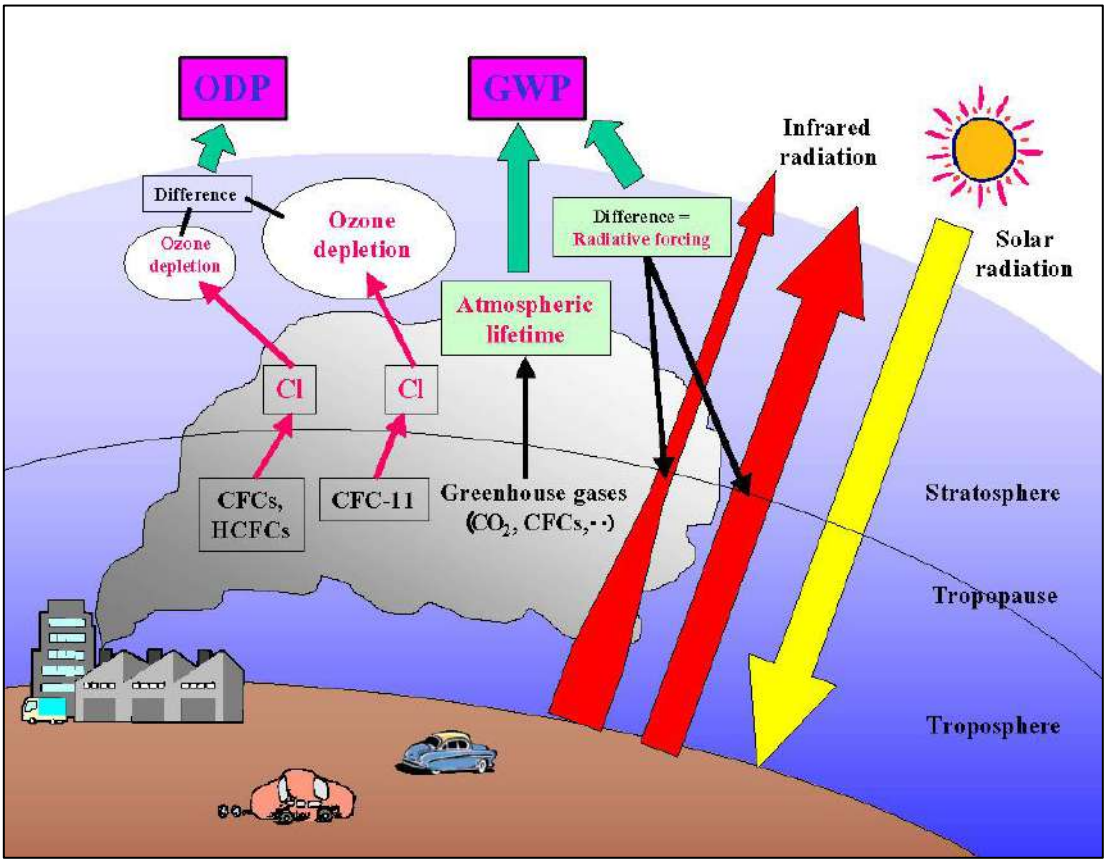
GLOBAL WARMING POTENTIAL (GWP)

Global Warming Potential (GWP) is a measure used to assess the relative impact of different greenhouse gases on global warming over a specific period, usually 100 years. It is expressed as a factor relative to carbon dioxide (CO_2), which is assigned a GWP of 1. The concept of GWP is important for comparing the warming potential of different greenhouse gases and developing strategies to mitigate climate change.

Table 3 Global Warming Potential

GHG	GWP (100 Years)
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298
Hydrofluorocarbons (HFCs)	See IPCC AR4 – Table 2.14
Perfluorocarbons (PFCs)	See IPCC AR4 – Table 2.14
Sulphur hexafluoride (SF_6)	22,800

Figure 1 GHG Emission Concept



SCOPE AND BOUNDARIES

SCOPE

As per Navy Blue's Contract the assessment scope is limited to Scope 1, Scope 2 and Scope-3. GHG Accounting Team identified following scope for GHG Emission in mentioned boundary.

SCOPE-1 (DIRECT)

GHG Accounting team identified following Scope-1 Emissions in the defined boundary.

1. Emission due to Diesel used in DG.
2. Emission by Diesel Consumption by owned vehicles
3. Emission by Petrol Consumption by owned vehicles
4. Emission due to Refrigerant leakage from AC.

SCOPE-2 (INDIRECT)

1. Indirect Emissions due to Grid Electricity used in the boundary.

SCOPE-3 (INDIRECT)

1. Employee Commute
2. Air Travel
3. Solid Waste Disposal
4. Purchasing Goods/Stationary

BOUNDARIES

This GHG Accounting limited to Jagdish Seth School of Management-Bangalore Campus including its operational activities, Electricity and fuel used and GHG Emissions. etc.

SCOPE-1

GHG EMISSION DUE TO DIESEL COMBUSTION IN DIESEL GENERATOR

Facility has DG set, which is used as a back-up energy source in case of Grid Failure. As per data received, GHG Emissions from DG set is as follow.

Table 4 DG Emissions

Parameter	UoM	Value
Diesel Consumption by DG Set in Reporting Period	Litres	940
Emission Factor	$kgCO_2e$/Litre	2.68
Emission due to DG Set in Reporting Period	$kgCO_2e$	2519.2
Ref. for Emission Factor: IPCC 2006 Guidelines, India GHG Program		

GHG EMISSIONS BY OWN DIESEL VEHICLES

Facility has some owned Diesel Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 5 Emissions due to Diesel Vehicles

Parameter	UoM	Value
Diesel Consumption by Vehicles in Reporting Period	Litres	300
Emission Factor	$kgCO_2e$/Litre	2.65
Emission by Owned Diesel Vehicles Reporting Period	$kgCO_2e$	795
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS BY OWN PETROL VEHICLES

Facility has some owned Petrol Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 6 Emissions due to Petrol Vehicles

Parameter	UoM	Value
Petrol Consumption by Vehicles in Reporting Period	Litres	1100
Emission Factor	$kgCO_2e$/Litre	2.296
Emission by Owned Petrol Vehicles Reporting Period	$kgCO_2e$	2525.6
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS DUE TO REFRIGERANT LEAKAGES

Facility has large capacity of Air-Conditioning system for premises. Facility uses R-32 as refrigerant in Air-Conditioning System. As per data available of Refrigerant Refilling, GHG emissions due to R-32 leakages is as follow.

Table 7 Emissions due to Refrigerant Leakage

Parameter	UoM	Value
Refrigerant Name	-	R-32
Refrigerant Refilled in Reporting Period	kg	0.4
Emission Factor	$kgCO_2e$/kg	675
Emission due to Refrigerant Leakage in Reporting Period	$kgCO_2e$	270
Ref. for Emission Factor: IPCC Fifth Assessment Report (AR5)		

SCOPE-2 (INDIRECT EMISSIONS)

Scope 2 emissions refer to indirect greenhouse gas (GHG) emissions associated with the generation of purchased electricity, heat, or steam consumed by a company. These emissions occur outside of a company's organizational boundaries but are a consequence of its activities.
For Jagdish Seth School of Management-Bangalore Campus Purchased Electricity can be defined as a source of indirect emissions. As per available Energy Billing Data, Scope-2 Emissions will be as following.

Table 8 Emissions from Purchased Electricity

Parameter	UoM	Value
Electricity Consumption in Reporting Period	kWh	72000
Emission Factor	$kgCO_2e$/Litre	0.82
Emission due to Purchased Electricity in Reporting Period	$kgCO_2e$	59040
Ref. for Emission Factor: CEA Baseline Carbon Emission Database, Version 19, 2023		

SCOPE-3 (INDIRECT EMISSIONS)

EMISSIONS DUE TO COMMUTATION

As Facility is the school of Management, all the Staff and Students commute daily from Home/Hostel to School. Audit team accounted the emissions due to this commutation as follows.

Table 9 Emissions due to Commutation

Parameter	UoM	Value
No. of Occupants	Nos.	520
Average Daily Travelling Distance	km	7
Working Days in Reporting period	Days	246
Total Travelling Distance	km	895440
Emission Factor	$kgCO_2e$/km	0.15
Emissions due to commutation	$kgCO_2e$	134316
Ref. for Emission Factor: UK DEFRA GHG Conversion Factors 2023, adjusted for India		

EMISSIONS DUE TO AIR TRAVEL

As an institute, some key persons travels by Air for the business purposes. Audit team accounted the emissions due to the Air travelled by Institute's key persons.

Table 10 Emissions due to Air Travel

Parameter	UoM	Value
No. of Air Travellers	Nos.	6
Average distance travelled by each Traveller in Reporting period	km	1740
Total Air Travel Distance in Reporting Period	km	10440
Emission Factor	$kgCO_2e$/km	0.2
Emissions due to Air Travel	$kgCO_2e$	2088
Ref. for Emission Factor: ICAO Carbon Emissions Calculator		

EMISSIONS DUE TO SOLID WASTE GENERATION

This facility generates some solid waste on daily basis. Audit team accounted the GHG emissions due to solid waste disposal.

Table 11 Emissions due to Waste generation

Parameter	UoM	Value
Solid Waste Generated	kg/Day	4
Applicable Days in Reporting period	Days	260
Total Solid Waste generated in Reporting Period	kg	1040
Emission Factor	$kgCO_2e$/Litre	0.12
Emission due to Solid Waste Disposal	$kgCO_2e$	124.8
Ref. for Emission Factor: IPCC Guidelines and India GHG Program		

EMISSIONS DUE TO PURCHASED GOODS

As facility is institute, it purchases goods like stationary and all. Audit Team accounted the emissions due to purchased goods.

Table 12 Emissions due to Purchased Goods

Parameter	UoM	Value
Total cost of Goods purchase in reporting Period	Rs.	11000
Emission Factor	$kgCO_2e$/Rs.1000	0.05
Emission due to Goods Purchase	$kgCO_2e$	0.55
Ref. for Emission Factor: USEPA EEIO Database, adjusted for local economic intensity (India proxy)		

RECOMMENDATIONS TO MITIGATE GHG EMISSIONS

SCOPE 1: DIRECT EMISSIONS (3%)

Table 13 Mitigation Plan for Scope-1 Emissions

Source	Recommendation
Diesel (DG Sets)	Upgrade to fuel-efficient or hybrid DG sets.
Facility Vehicles (Diesel & Petrol)	Shift to electric or hybrid vehicles. Promote carpooling and optimize travelling routes.
Refrigerant Leakage	Implement a refrigerant management and leak detection system.

SCOPE 2: PURCHASED ELECTRICITY (29%)

Table 14 Mitigation Plan for Scope-2 Emissions

Source	Recommendation
Electricity	• Adopt energy-efficient lighting (LED), HVAC, and office equipment. • Conduct regular energy audits. • Install Energy Monitoring System. • Transition to renewable energy via Green Power Purchase Agreements or Open Access Solar/Wind.

SCOPE 3: INDIRECT EMISSIONS (68%)

Table 15 Mitigation Plan for Scope-3 Emissions

Source	Recommendation
Daily Commutation	Encourage public transport, cycling, or electric shuttle services. Implement remote or hybrid work policies.
Air Travel	Replace physical meetings with virtual platforms. Offset emissions through Certified Carbon Credits.
Solid Waste Disposal	Improve waste segregation and composting. Partner with recyclers or EPR vendors.
Goods Purchase	Source from local, low-carbon, and Certified Green Suppliers. Apply green procurement policies.

STRATEGIC MEASURES

• GHG Policy: Create an internal sustainability/GHG reduction policy with targets.
• ISO 14064 Implementation: Use ISO-compliant systems for emission tracking.
• Employee Engagement: Run awareness drives and reward low-carbon practices.
• Offsetting: Consider verified carbon offsetting (e.g., forestry, renewable credits) for hard-to-abate emissions.

OFFSET MECHANISM

A carbon emission offset mechanism is a way for organizations to compensate for their greenhouse gas (GHG) emissions by investing in projects that reduce or remove an equivalent amount of emissions elsewhere. This mechanism is often used as part of a broader strategy to achieve carbon neutrality or to meet sustainability goals. The concept is based on the principle of balancing emissions by investing in activities that either prevent emissions from occurring or remove existing emissions from the atmosphere.

Here's an overview of how carbon emission offset mechanisms typically work:

1. **Identification of Carbon Offset Projects:**
    - Organizations can invest in various types of projects that result in emissions reductions or removals. Common project types include renewable energy projects (e.g., Wind, Solar), afforestation and reforestation, methane capture from landfills, and energy efficiency initiatives.
2. **Quantification of Emissions Reductions:**
    - Each project undergoes a rigorous process to quantify the emissions reductions or removals it achieves. This involves establishing a baseline for emissions that would have occurred without the project and comparing it to the actual emissions with the project in place.
3. **Verification and Certification:**
    - Carbon offset projects are often subject to third-party verification to ensure the accuracy and legitimacy of the claimed emissions reductions. Certification standards, such as the Verified Carbon Standard (VCS) or the Gold Standard, are used to verify and certify the emission reductions.
4. **Issuance of Carbon Credits:**
    - Once a project is verified, it is issued a certain number of carbon credits or offsets. One carbon credit typically represents the reduction or removal of one metric tonne of CO_2 equivalent.
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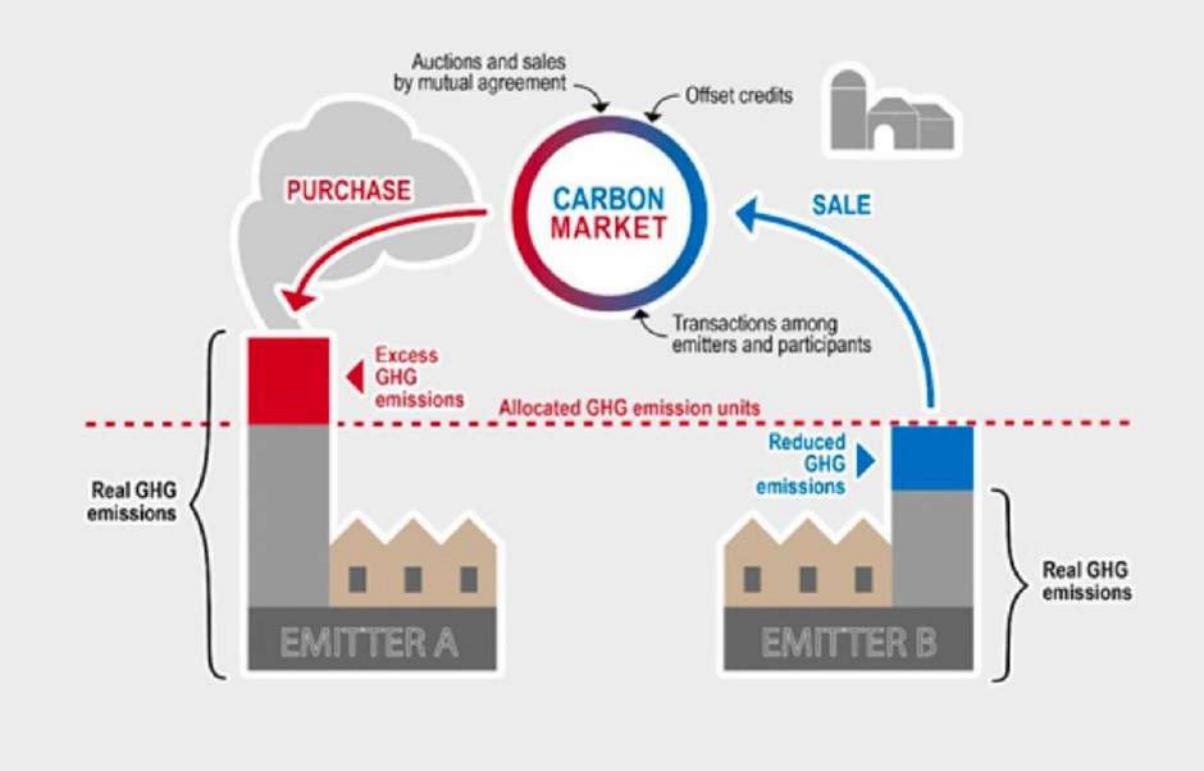

Figure 2 Carbon Market Mechanism

Audit Report prepared by/-
Navy Blue Energy | GHG Audit Team.

(M/s. NavyBlue Resources Integration & Solutions Pvt Ltd)
www.nbri.in | sales@nbri.in | +91-9619419288

GHG Audit Report-2023-24 Jagdish Seth School of Management (JAGSoM) Bangalore Campus

Reporting Period- 1st June 2023 to 31st May 2024

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ABBREVIATIONS

AC - Air Conditioning
AR- Assessment Report
BEE- Bureau of Energy Efficiency
CH_4- Methane
CDM- Clean Development Mechanism
EF- Emission Factor
GHG- Greenhouse Gas
GJ- Gigajoule
GRI- Global Reporting Initiative
GWP- Global Warming Potential
HFCs- Hydrofluorocarbons
IPCC- Intergovernmental Panel on Climate Change
Kg- Kilogram
KPI- Key Performance Indicator
LCA- Life Cycle Assessment
m^2 - Square Metre
m^3 - Cubic Metre
MWh- Megawatt Hour
N_2O- Nitrous Oxide
PFCs- Perfluorocarbons
SF_6- Sulphur Hexafluoride
t- Tonne
tCO_2e- Tonne of Carbon Dioxide Equivalent

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Navy Blue Energy GHG audit team would like to extend its sincere appreciation to the management and staff of **Jagdish Seth School of Management (JAGSoM), Bangalore Campus** for their unwavering cooperation and support throughout the audit process. The commitment to transparency and openness demonstrated by the management team facilitated a thorough examination of records, internal controls, and operational processes.

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AUDIT TEAM

From Navy Blue Energy Following team members Conducted the GHG Audit.

Table 1 Audit Team

Team Member	Designation
Pravin J Awatade M.Tech Energy | BEE-CEM/CEA | AEE-CEM Certified Carbon Footprint Professional	Team Leader
Tushar Harer M Tech Energy BEE- CEM/CEA	Certified Energy Auditor
Dr. Amol Mande PhD | Energy Technology	Certified Energy Auditor

EXECUTIVE SUMMARY

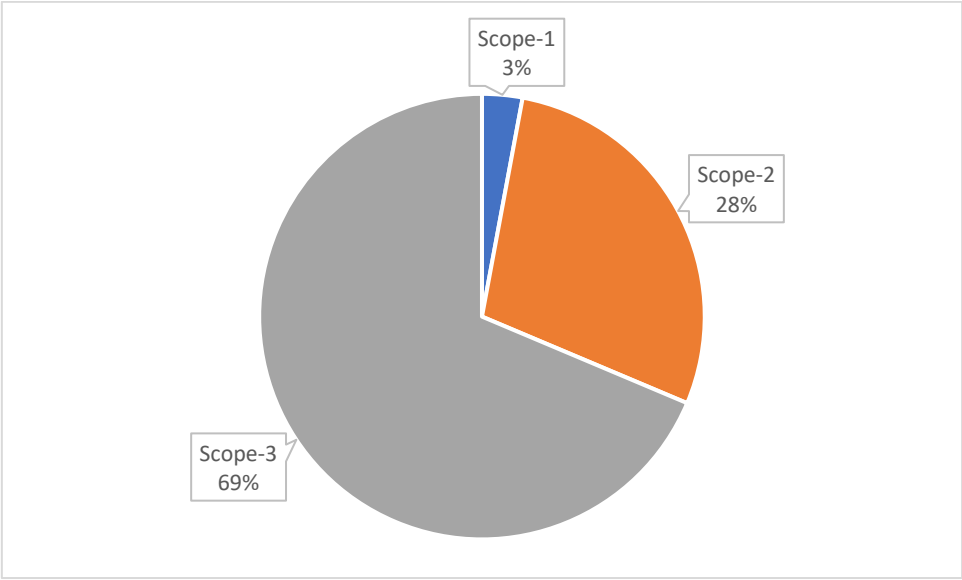
GHG EMISSION ACCOUNTING

The objective of this report is to outline the greenhouse gas (GHG) accounting of facility for the Period of 1st June 2023 to 31st May 2024. The total GHG footprint of Jagdish Seth School of Management (JAGSoM), Bangalore facility is 220.2 tCO_2e (Metric Tonnes of Carbon Dioxide equivalent).
Following Table gives an overview of the Scope-wise GHG emissions.

Table 2 Emission Summery

Scope	Emissions Due to	UoM	Value	Sub Total	Share
Scope-1	Due to Onsite Diesel Consumption by DG Sets	kgCO2e	2669	6451	3%
	Due to Diesel Consumption by Facility's Own Vehicles	kgCO2e	848		
	Due to Petrol Consumption by Facility's Own Vehicles	kgCO2e	2663		
	Due to Refrigerant Leakages from Air-Conditioners	kgCO2e	270		
Scope-2	Due to Purchased Electricity	kgCO2e	62582	62582	28%
Scope-3	Due to Daily Commutation	kgCO2e	148176	151159	69%
	Due to Air Travel	kgCO2e	2784		
	Due to Solid Waste Disposal	kgCO2e	198		
	Due to Goods Purchase	kgCO2e	0.60		
	Total	kgCO2e	220192	220192	100%
		tCO2e	220.2	220.2	

Graph 1 Scope Wise Emission



OBJECTIVE OF GHG AUDIT

The objective of a Greenhouse Gas (GHG) Audit report is to assess and report on an organization's greenhouse gas emissions and their management strategies. The primary goals of a GHG Audit report include:

Emission Assessment: Identify and quantify the organization's greenhouse gas emissions across various scopes (Scope 1, 2 & 3), including direct and indirect emissions associated with its operations, energy consumption, and supply chain.

The goal is to measure, analyse, and verify the amount of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), emitted directly and indirectly by the organization's activities. GHG audits are integral to understanding an organization's environmental impact and implementing strategies for emission reduction.

Here are the key steps involved in a typical GHG audit:

1. **Establish the Scope and Boundaries:**
    - Define the organizational and operational boundaries of the audit, including the scope of emissions to be considered.
2. **Define the Reporting Period:**
    - Determine the time period for which emissions will be measured and reported (e.g., annual reporting).
3. **Identify Emission Sources:**
    - Identify and categorize sources of greenhouse gas emissions, distinguishing between direct (Scope-1) and indirect (Scope-2 & Scope-3) emissions.
4. **Data Collection:**
    - Gather relevant data on energy consumption, fuel usage, and other activities contributing to emissions.
    - Collect data on purchased electricity and heat.
5. **Select Emission Factors:**
    - Choose appropriate emission factors to convert activity data into greenhouse gas emissions.
    - Emission factors are specific to the type of activity and the greenhouse gas in question.
6. **Calculate Emissions:**
    - Use the collected data and emission factors to calculate the total greenhouse gas emissions for each category (Scope 1, 2 & 3)
7. **Quality Assurance and Quality Control (QA/QC):**
    - Implement QA/QC procedures to ensure data accuracy, completeness, and reliability.
    - Verify calculations and resolve any discrepancies.
8. **Documentation and Reporting:**
    - Document the methodology, data sources, emission factors, and calculations used in the audit.
    - Prepare a comprehensive GHG audit report, including a summary of findings, emission trends, and recommendations.

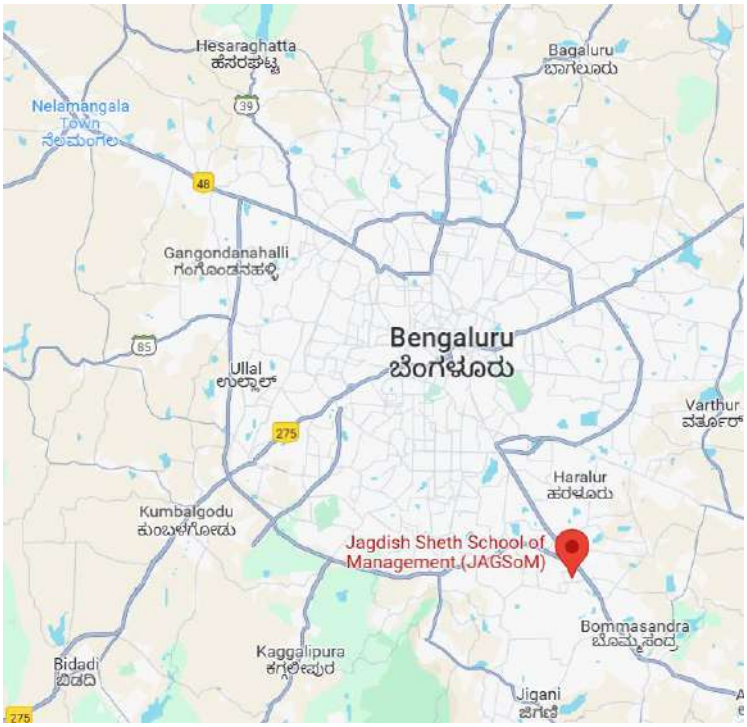
FACILITY INTRODUCTION

The **Jagdish Sheth School of Management (JAGSoM)**, formerly known as IFIM Business School, is a distinguished management institute located in **Electronic City, Bangalore, India**. The institute is named in honour of **Dr. Jagdish N. Sheth**, a globally renowned scholar and Padma Bhushan awardee, known for his contributions to marketing and public policy.

JAGSoM is one of the few Indian business schools to be accredited by the **Association to Advance Collegiate Schools of Business (AACSB)**, placing it among the top 5% of business schools globally. It is also accredited by **SAQS** and recognized by **AICTE**. The institution is committed to delivering globally benchmarked management education with a strong emphasis on **ethics, sustainability, and social responsibility**.

As part of its ongoing efforts toward environmental stewardship and regulatory compliance, JAGSoM has undertaken the preparation of its **Greenhouse Gas (GHG) Inventory Report**, in line with internationally accepted standards such as the **GHG Protocol**. This initiative reflects the institute's commitment to tracking, reducing, and managing its environmental footprint across Scope 1, Scope 2, and relevant Scope 3 emission categories.

Geo Location of the Facility 1



METHODOLOGY

WHAT IS GLOBAL WARMING

Global warming refers to the long-term increase in Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases into the atmosphere. While Earth's climate has naturally varied over geological time scales, the current trend of global warming is largely attributed to human activities that release large amounts of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases.

The main contributors to human-induced global warming include:

1. **Burning of Fossil Fuels:** The combustion of fossil fuels (coal, oil, and natural gas) for energy production releases large amounts of CO_2 into the atmosphere. This is a significant source of greenhouse gas emissions.
2. **Deforestation:** The clearing of forests for agriculture, logging, or other purposes reduces the number of trees that can absorb CO_2 from the atmosphere. Trees act as carbon sinks, and their removal contributes to increased greenhouse gas concentrations.
3. **Industrial Processes:** Certain industrial activities release greenhouse gases as byproducts. For example, cement production releases CO_2 during the chemical transformation of limestone into clinker.
4. **Agricultural Practices:** Agricultural activities, such as rice cultivation and livestock farming, produce methane and nitrous oxide, both potent greenhouse gases.
5. **Waste Management:** Improper waste disposal and waste treatment processes can lead to the release of methane, a potent greenhouse gas, from landfills.

The enhanced greenhouse effect resulting from these activities traps more heat in the Earth's atmosphere, leading to a rise in global temperatures. The consequences of global warming include:

- **Rising Sea Levels:** The melting of glaciers and polar ice caps contributes to rising sea levels, which can lead to coastal erosion and increased flooding.
- **Extreme Weather Events:** Changes in temperature patterns can lead to more frequent and severe weather events, such as heatwaves, droughts, hurricanes, and heavy precipitation.
- **Shifts in Ecosystems:** Changes in temperature and precipitation patterns can affect ecosystems, leading to shifts in the distribution of plant and animal species.
- **Ocean Acidification:** Increased CO_2 levels in the atmosphere also contribute to higher levels of carbon dioxide being absorbed by the oceans, leading to ocean acidification, which can harm marine life, particularly organisms with calcium carbonate shells or skeletons.

Efforts to mitigate global warming include international agreements such as the Paris Agreement, which aims to limit the global temperature increase to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit the increase to 1.5 degrees Celsius. This requires substantial reductions in greenhouse gas emissions and the transition to more sustainable and low-carbon energy sources.

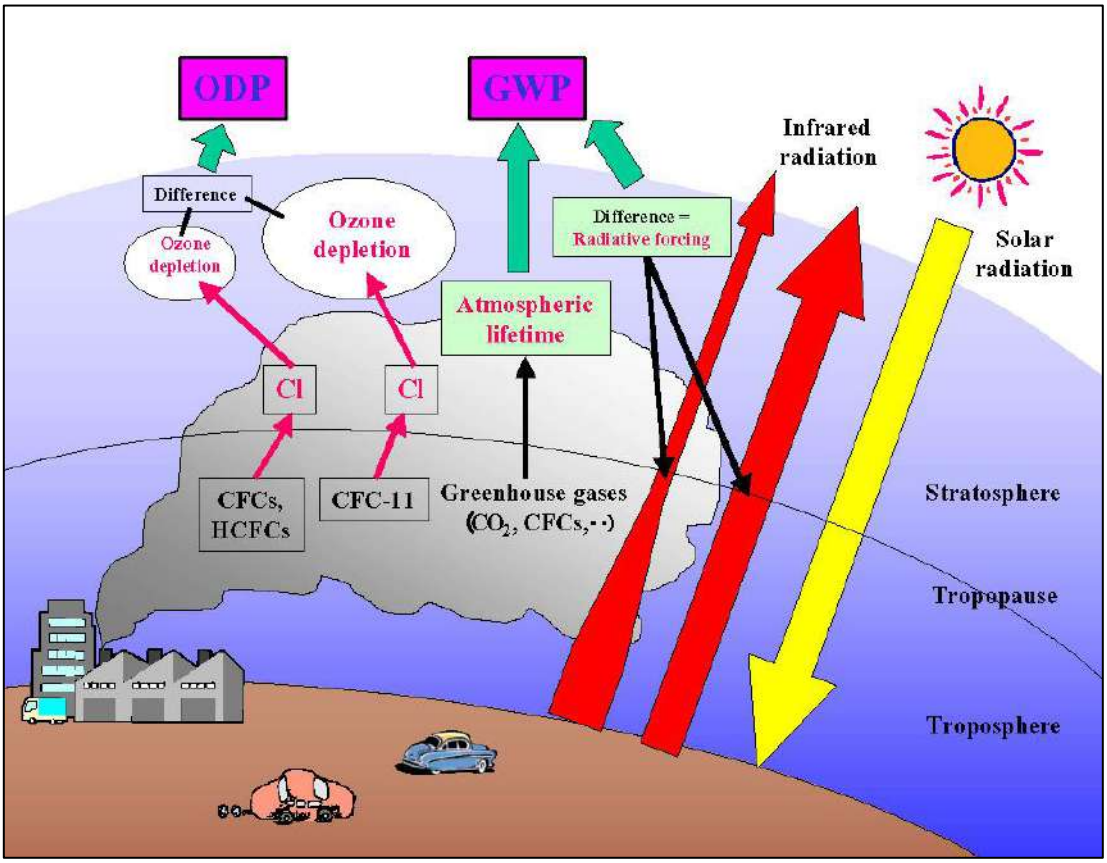
GLOBAL WARMING POTENTIAL (GWP)

Global Warming Potential (GWP) is a measure used to assess the relative impact of different greenhouse gases on global warming over a specific period, usually 100 years. It is expressed as a factor relative to carbon dioxide (CO_2), which is assigned a GWP of 1. The concept of GWP is important for comparing the warming potential of different greenhouse gases and developing strategies to mitigate climate change.

Table 3 Global Warming Potential

GHG	GWP (100 Years)
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298
Hydrofluorocarbons (HFCs)	See IPCC AR4 – Table 2.14
Perfluorocarbons (PFCs)	See IPCC AR4 – Table 2.14
Sulphur hexafluoride (SF_6)	22,800

Figure 1 GHG Emission Concept



SCOPE AND BOUNDARIES

SCOPE

As per Navy Blue's Contract the assessment scope is limited to scope 1, Scope 2 and Scope-3. GHG Accounting Team identified following scope for GHG Emission in mentioned boundary.

SCOPE-1 (DIRECT)

GHG Accounting team identified following Scope-1 Emissions in the defined boundary.

1. Emission due to Diesel used in DG.
2. Emission by Diesel Consumption by owned vehicles
3. Emission by Petrol Consumption by owned vehicles
4. Emission due to Refrigerant leakage from AC.

SCOPE-2 (INDIRECT)

1. Indirect Emissions due to Grid Electricity used in the boundary.

SCOPE-3 (INDIRECT)

1. Employee Commute
2. Air Travel
3. Solid Waste Disposal
4. Purchasing Goods/Stationary

BOUNDARIES

This GHG Accounting limited to Jagdish Seth School of Management-Bangalore Campus including its operational activities, Electricity and fuel used and GHG Emissions. etc.

SCOPE-1

GHG EMISSION DUE TO DIESEL COMBUSTION IN DIESEL GENERATOR

Facility has DG set, which is used as a back-up energy source in case of Grid Failure. As per data received, GHG Emissions from DG set is as follow.

Table 4 DG Emissions

Parameter	UoM	Value
Diesel Consumption by DG Set in Reporting Period	Litres	996
Emission Factor	$kgCO_2e$/Litre	2.68
Emission due to DG Set in Reporting Period	$kgCO_2e$	2669.28
Ref. for Emission Factor: IPCC 2006 Guidelines, India GHG Program		

GHG EMISSIONS BY OWN DIESEL VEHICLES

Facility has some owned Diesel Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 5 Emissions due to Diesel Vehicles

Parameter	UoM	Value
Diesel Consumption by Vehicles in Reporting Period	Litres	320
Emission Factor	$kgCO_2e$/Litre	2.65
Emission by Owned Diesel Vehicles Reporting Period	$kgCO_2e$	848
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS BY OWN PETROL VEHICLES

Facility has some owned Petrol Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 6 Emissions due to Petrol Vehicles

Parameter	UoM	Value
Petrol Consumption by Vehicles in Reporting Period	Litres	1160
Emission Factor	$kgCO_2e$/Litre	2.296
Emission by Owned Petrol Vehicles Reporting Period	$kgCO_2e$	2663.36
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS DUE TO REFRIGERANT LEAKAGES

Facility has large capacity of Air-Conditioning system for premises. Facility uses R-32 as refrigerant in Air-Conditioning System. As per data available of Refrigerant Refilling, GHG emissions due to R-32 leakages is as follow.

Table 7 Emissions due to Refrigerant Leakage

Parameter	UoM	Value
Refrigerant Name	-	R-32
Refrigerant Refilled in Reporting Period	kg	0.4
Emission Factor	$kgCO_2e$/kg	675
Emission due to Refrigerant Leakage in Reporting Period	$kgCO_2e$	270
Ref. for Emission Factor: IPCC Fifth Assessment Report (AR5)		

SCOPE-2 (INDIRECT EMISSIONS)

Scope 2 emissions refer to indirect greenhouse gas (GHG) emissions associated with the generation of purchased electricity, heat, or steam consumed by a company. These emissions occur outside of a company's organizational boundaries but are a consequence of its activities.
For Jagdish Seth School of Management-Bangalore Campus Purchased Electricity can be defined as a source of indirect emissions. As per available Energy Billing Data, Scope-2 Emissions will be as following.

Table 8 Emissions from Purchased Electricity

Parameter	UoM	Value
Electricity Consumption in Reporting Period	kWh	76320
Emission Factor	$kgCO_2e$/Litre	0.82
Emission due to Purchased Electricity in Reporting Period	$kgCO_2e$	62582.4
Ref. for Emission Factor: CEA Baseline Carbon Emission Database, Version 19, 2023		

SCOPE-3 (INDIRECT EMISSIONS)

EMISSIONS DUE TO COMMUTATION

As Facility is the school of Management, all the Staff and Students commute daily from Home/Hostel to School. Audit team accounted the emissions due to this commutation as follows.

Table 9 Emissions due to Commutation

Parameter	UoM	Value
No. of Occupants	Nos.	560
Average Daily Travelling Distance	km	7
Working Days in Reporting period	Days	252
Total Travelling Distance	km	987840
Emission Factor	$kgCO_2e$/km	0.15
Emissions due to commutation	$kgCO_2e$	148176
Ref. for Emission Factor: UK DEFRA GHG Conversion Factors 2023, adjusted for India		

EMISSIONS DUE TO AIR TRAVEL

As an institute, some key persons travels by Air for the business purposes. Audit team accounted the emissions due to the Air travelled by Institute's key persons.

Table 10 Emissions due to Air Travel

Parameter	UoM	Value
No. of Air Travellers	Nos.	8
Average distance travelled by each Traveller in Reporting period	km	1740
Total Air Travel Distance in Reporting Period	km	13920
Emission Factor	$kgCO_2e$/km	0.2
Emissions due to Air Travel	$kgCO_2e$	2784
Ref. for Emission Factor: ICAO Carbon Emissions Calculator		

EMISSIONS DUE TO SOLID WASTE GENERATION

This facility generates some solid waste on daily basis. Audit team accounted the GHG emissions due to solid waste disposal.

Table 11 Emissions due to Waste generation

Parameter	UoM	Value
Solid Waste Generated	kg/Day	6
Applicable Days in Reporting period	Days	275
Total Solid Waste generated in Reporting Period	kg	1650
Emission Factor	$kgCO_2e$/Litre	0.12
Emission due to Solid Waste Disposal	$kgCO_2e$	198
Ref. for Emission Factor: IPCC Guidelines and India GHG Program		

EMISSIONS DUE TO PURCHASED GOODS

As facility is institute, it purchases goods like stationary and all. Audit Team accounted the emissions due to purchased goods.

Table 12 Emissions due to Purchased Goods

Parameter	UoM	Value
Total cost of Goods purchase in reporting Period	Rs.	12000
Emission Factor	$kgCO_2e$/Rs.1000	0.05
Emission due to Goods Purchase	$kgCO_2e$	0.6
Ref. for Emission Factor: USEPA EEIO Database, adjusted for local economic intensity (India proxy)		

RECOMMENDATIONS TO MITIGATE GHG EMISSIONS

SCOPE 1: DIRECT EMISSIONS (3%)

Table 13 Mitigation Plan for Scope-1 Emissions

Source	Recommendation
Diesel (DG Sets)	Upgrade to fuel-efficient or hybrid DG sets.
Facility Vehicles (Diesel & Petrol)	Shift to electric or hybrid vehicles. Promote carpooling and optimize travelling routes.
Refrigerant Leakage	Implement a refrigerant management and leak detection system.

SCOPE 2: PURCHASED ELECTRICITY (28%)

Table 14 Mitigation Plan for Scope-2 Emissions

Source	Recommendation
Electricity	• Adopt energy-efficient lighting (LED), HVAC, and office equipment. • Conduct regular energy audits. • Install Energy Monitoring System. • Transition to renewable energy via Green Power Purchase Agreements or Open Access Solar/Wind.

SCOPE 3: INDIRECT EMISSIONS (69%)

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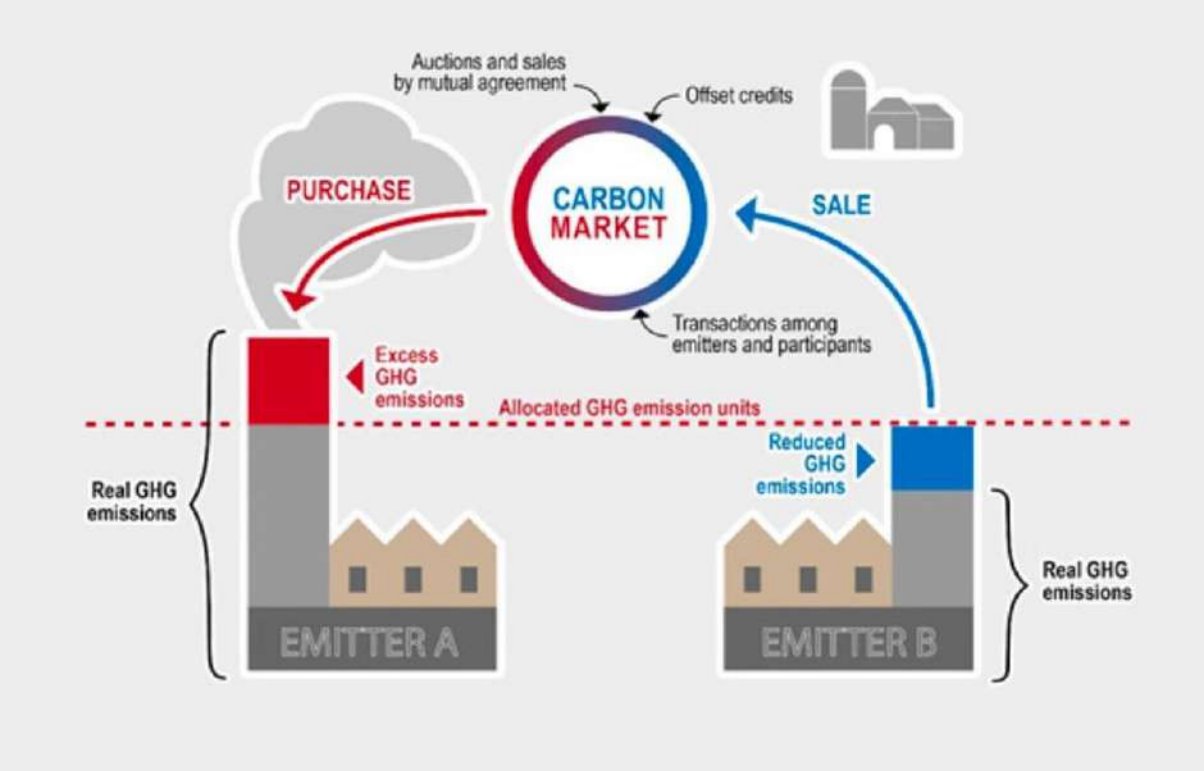

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(M/s. NavyBlue Resources Integration & Solutions Pvt Ltd)
www.nbri.in | sales@nbri.in | +91-9619419288

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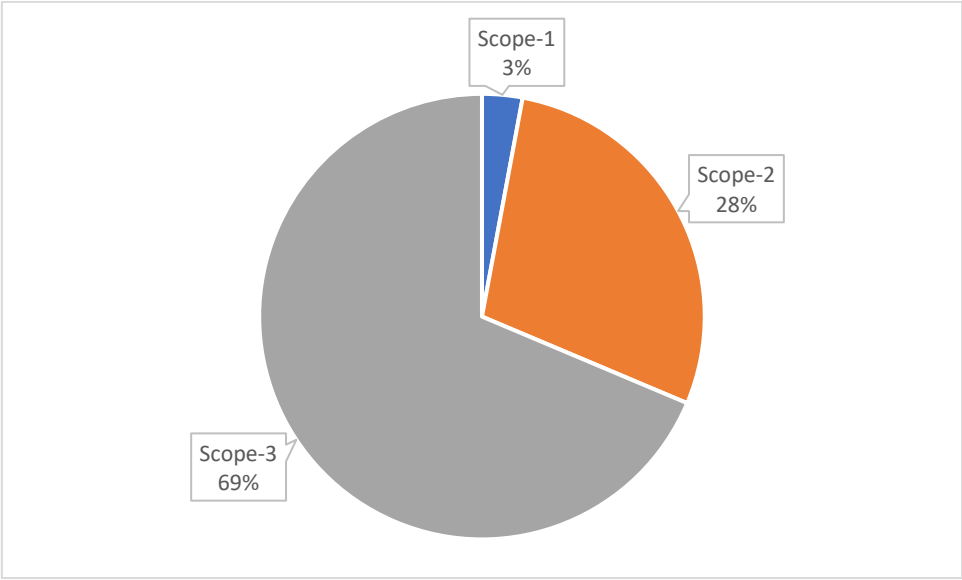
Following Table gives an overview of the Scope-wise GHG emissions.

Table 2 Emission Summery

Scope	Emissions Due to	UoM	Value	Sub Total	Share
Scope-1	Due to Onsite Diesel Consumption by DG Sets	$kgCO_2e$	2841	6882	3%
	Due to Diesel Consumption by Facility's Own Vehicles	$kgCO_2e$	901		
	Due to Petrol Consumption by Facility's Own Vehicles	$kgCO_2e$	2870		
	Due to Refrigerant Leakages from Air-Conditioners	$kgCO_2e$	270		
Scope-2	Due to Purchased Electricity	$kgCO_2e$	66420	66420	28%
Scope-3	Due to Daily Commutation	$kgCO_2e$	156114	159809	69%
	Due to Air Travel	$kgCO_2e$	3480		
	Due to Solid Waste Disposal	$kgCO_2e$	215		
	Due to Goods Purchase	$kgCO_2e$	0.68		
	Total	$kgCO_2e$	233111	233111	100%
		tCO_2e	233.1	233.1	

Graph 1 Scope Wise Emission



OBJECTIVE OF GHG AUDIT

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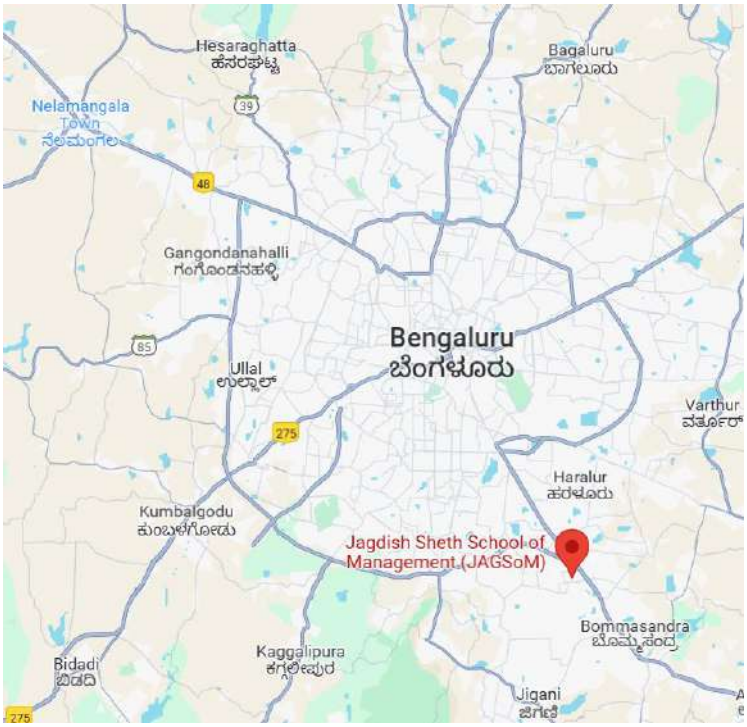

METHODOLOGY

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1. **Burning of Fossil Fuels:** The combustion of fossil fuels (coal, oil, and natural gas) for energy production releases large amounts of CO_2 into the atmosphere. This is a significant source of greenhouse gas emissions.
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Global Warming Potential (GWP) is a measure used to assess the relative impact of different greenhouse gases on global warming over a specific period, usually 100 years. It is expressed as a factor relative to carbon dioxide (CO_2), which is assigned a GWP of 1. The concept of GWP is important for comparing the warming potential of different greenhouse gases and developing strategies to mitigate climate change.

Table 3 Global Warming Potential

GHG	GWP (100 Years)
Carbon dioxide (CO_2)	1
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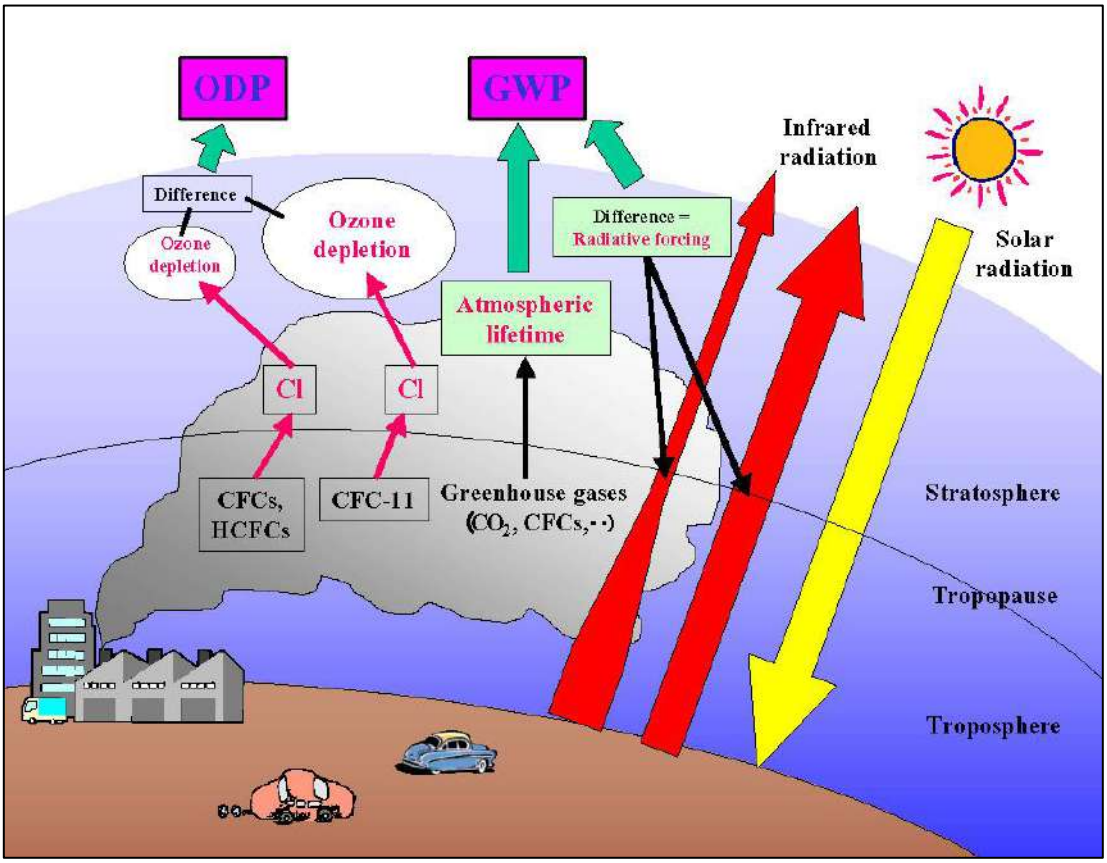

SCOPE AND BOUNDARIES

SCOPE

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SCOPE-1 (DIRECT)

GHG Accounting team identified following Scope-1 Emissions in the defined boundary.

1. Emission due to Diesel used in DG.
2. Emission by Diesel Consumption by owned vehicles
3. Emission by Petrol Consumption by owned vehicles
4. Emission due to Refrigerant leakage from AC.

SCOPE-2 (INDIRECT)

1. Indirect Emissions due to Grid Electricity used in the boundary.

SCOPE-3 (INDIRECT)

1. Employee Commute
2. Air Travel
3. Solid Waste Disposal
4. Purchasing Goods/Stationary

BOUNDARIES

This GHG Accounting limited to Jagdish Seth School of Management-Bangalore Campus including its operational activities, Electricity and fuel used and GHG Emissions. etc.

SCOPE-1

GHG EMISSION DUE TO DIESEL COMBUSTION IN DIESEL GENERATOR

Facility has DG set, which is used as a back-up energy source in case of Grid Failure. As per data received, GHG Emissions from DG set is as follow.

Table 4 DG Emissions

Parameter	UoM	Value
Diesel Consumption by DG Set in Reporting Period	Litres	1060
Emission Factor	$kgCO_2e$/Litre	2.68
Emission due to DG Set in Reporting Period	$kgCO_2e$	2840.8
Ref. for Emission Factor: IPCC 2006 Guidelines, India GHG Program		

GHG EMISSIONS BY OWN DIESEL VEHICLES

Facility has some owned Diesel Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 5 Emissions due to Diesel Vehicles

Parameter	UoM	Value
Diesel Consumption by Vehicles in Reporting Period	Litres	340
Emission Factor	$kgCO_2e$/Litre	2.65
Emission by Owned Diesel Vehicles Reporting Period	$kgCO_2e$	901
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS BY OWN PETROL VEHICLES

Facility has some owned Petrol Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 6 Emissions due to Petrol Vehicles

Parameter	UoM	Value
Petrol Consumption by Vehicles in Reporting Period	Litres	1250
Emission Factor	$kgCO_2e$/Litre	2.296
Emission by Owned Petrol Vehicles Reporting Period	$kgCO_2e$	2870
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS DUE TO REFRIGERANT LEAKAGES

Facility has large capacity of Air-Conditioning system for premises. Facility uses R-32 as refrigerant in Air-Conditioning System. As per data available of Refrigerant Refilling, GHG emissions due to R-32 leakages is as follow.

Table 7 Emissions due to Refrigerant Leakage

Parameter	UoM	Value
Refrigerant Name	-	R-32
Refrigerant Refilled in Reporting Period	kg	0.4
Emission Factor	$kgCO_2e$/kg	675
Emission due to Refrigerant Leakage in Reporting Period	$kgCO_2e$	270
Ref. for Emission Factor: IPCC Fifth Assessment Report (AR5)		

SCOPE-2 (INDIRECT EMISSIONS)

Scope 2 emissions refer to indirect greenhouse gas (GHG) emissions associated with the generation of purchased electricity, heat, or steam consumed by a company. These emissions occur outside of a company's organizational boundaries but are a consequence of its activities.
For Jagdish Seth School of Management-Bangalore Campus Purchased Electricity can be defined as a source of indirect emissions. As per available Energy Billing Data, Scope-2 Emissions will be as following.

Table 8 Emissions from Purchased Electricity

Parameter	UoM	Value
Electricity Consumption in Reporting Period	kWh	81000
Emission Factor	$kgCO_2e$/Litre	0.82
Emission due to Purchased Electricity in Reporting Period	$kgCO_2e$	66420
Ref. for Emission Factor: CEA Baseline Carbon Emission Database, Version 19, 2023		

SCOPE-3 (INDIRECT EMISSIONS)

EMISSIONS DUE TO COMMUTATION

As Facility is the school of Management, all the Staff and Students commute daily from Home/Hostel to School. Audit team accounted the emissions due to this commutation as follows.

Table 9 Emissions due to Commutation

Parameter	UoM	Value
No. of Occupants	Nos.	590
Average Daily Travelling Distance	km	7
Working Days in Reporting period	Days	252
Total Travelling Distance	km	1040760
Emission Factor	$kgCO_2e$/km	0.15
Emissions due to commutation	$kgCO_2e$	156114
Ref. for Emission Factor: UK DEFRA GHG Conversion Factors 2023, adjusted for India		

EMISSIONS DUE TO AIR TRAVEL

As an institute, some key persons travels by Air for the business purposes. Audit team accounted the emissions due to the Air travelled by Institute's key persons.

Table 10 Emissions due to Air Travel

Parameter	UoM	Value
No. of Air Travellers	Nos.	12
Average distance travelled by each Traveller in Reporting period	km	1450
Total Air Travel Distance in Reporting Period	km	17400
Emission Factor	$kgCO_2e$/km	0.2
Emissions due to Air Travel	$kgCO_2e$	3480
Ref. for Emission Factor: ICAO Carbon Emissions Calculator		

EMISSIONS DUE TO SOLID WASTE GENERATION

This facility generates some solid waste on daily basis. Audit team accounted the GHG emissions due to solid waste disposal.

Table 11 Emissions due to Waste generation

Parameter	UoM	Value
Solid Waste Generated	kg/Day	6.5
Applicable Days in Reporting period	Days	275
Total Solid Waste generated in Reporting Period	kg	1787.5
Emission Factor	$kgCO_2e$/Litre	0.12
Emission due to Solid Waste Disposal	$kgCO_2e$	214.5
Ref. for Emission Factor: IPCC Guidelines and India GHG Program		

EMISSIONS DUE TO PURCHASED GOODS

As facility is institute, it purchases goods like stationary and all. Audit Team accounted the emissions due to purchased goods.

Table 12 Emissions due to Purchased Goods

Parameter	UoM	Value
Total cost of Goods purchase in reporting Period	Rs.	13500
Emission Factor	$kgCO_2e$/Rs.1000	0.05
Emission due to Goods Purchase	$kgCO_2e$	0.675
Ref. for Emission Factor: USEPA EEIO Database, adjusted for local economic intensity (India proxy)		

RECOMMENDATIONS TO MITIGATE GHG EMISSIONS

SCOPE 1: DIRECT EMISSIONS (3%)

Table 13 Mitigation Plan for Scope-1 Emissions

Source	Recommendation
Diesel (DG Sets)	Upgrade to fuel-efficient or hybrid DG sets.
Facility Vehicles (Diesel & Petrol)	Shift to electric or hybrid vehicles. Promote carpooling and optimize travelling routes.
Refrigerant Leakage	Implement a refrigerant management and leak detection system.

SCOPE 2: PURCHASED ELECTRICITY (28%)

Table 14 Mitigation Plan for Scope-2 Emissions

Source	Recommendation
Electricity	• Adopt energy-efficient lighting (LED), HVAC, and office equipment. • Conduct regular energy audits. • Install Energy Monitoring System. • Transition to renewable energy via Green Power Purchase Agreements or Open Access Solar/Wind.

SCOPE 3: INDIRECT EMISSIONS (69%)

Table 15 Mitigation Plan for Scope-3 Emissions

Source	Recommendation
Daily Commutation	Encourage public transport, cycling, or electric shuttle services. Implement remote or hybrid work policies.
Air Travel	Replace physical meetings with virtual platforms. Offset emissions through Certified Carbon Credits.
Solid Waste Disposal	Improve waste segregation and composting. Partner with recyclers or EPR vendors.
Goods Purchase	Source from local, low-carbon, and Certified Green Suppliers. Apply green procurement policies.

STRATEGIC MEASURES

• GHG Policy: Create an internal sustainability/GHG reduction policy with targets.
• ISO 14064 Implementation: Use ISO-compliant systems for emission tracking.
• Employee Engagement: Run awareness drives and reward low-carbon practices.
• Offsetting: Consider verified carbon offsetting (e.g., forestry, renewable credits) for hard-to-abate emissions.

OFFSET MECHANISM

A carbon emission offset mechanism is a way for organizations to compensate for their greenhouse gas (GHG) emissions by investing in projects that reduce or remove an equivalent amount of emissions elsewhere. This mechanism is often used as part of a broader strategy to achieve carbon neutrality or to meet sustainability goals. The concept is based on the principle of balancing emissions by investing in activities that either prevent emissions from occurring or remove existing emissions from the atmosphere.

Here's an overview of how carbon emission offset mechanisms typically work:

1. **Identification of Carbon Offset Projects:**
    - Organizations can invest in various types of projects that result in emissions reductions or removals. Common project types include renewable energy projects (e.g., Wind, Solar), afforestation and reforestation, methane capture from landfills, and energy efficiency initiatives.
2. **Quantification of Emissions Reductions:**
    - Each project undergoes a rigorous process to quantify the emissions reductions or removals it achieves. This involves establishing a baseline for emissions that would have occurred without the project and comparing it to the actual emissions with the project in place.
3. **Verification and Certification:**
    - Carbon offset projects are often subject to third-party verification to ensure the accuracy and legitimacy of the claimed emissions reductions. Certification standards, such as the Verified Carbon Standard (VCS) or the Gold Standard, are used to verify and certify the emission reductions.
4. **Issuance of Carbon Credits:**
    - Once a project is verified, it is issued a certain number of carbon credits or offsets. One carbon credit typically represents the reduction or removal of one metric tonne of CO_2 equivalent.
5. **Purchase of Carbon Credits:**
    - Organizations seeking to offset their emissions can purchase these carbon credits on the voluntary or compliance market. The funds from the sale of carbon credits help finance the ongoing operation and maintenance of the offset project.
6. **Retirement or Cancellation of Carbon Credits:**
    - To ensure that the emissions reductions are not double counted, the purchased carbon credits are typically retired or cancelled in a public registry. This step confirms that the emissions reduction is attributed to the organization that purchased the offsets.

By participating in carbon offset mechanisms, organizations can take responsibility for their unavoidable emissions while supporting projects that contribute to sustainable development and environmental protection. It's important for organizations to carefully select credible and verifiable offset projects and to view carbon offsetting as part of a broader strategy that includes efforts to reduce emissions directly.

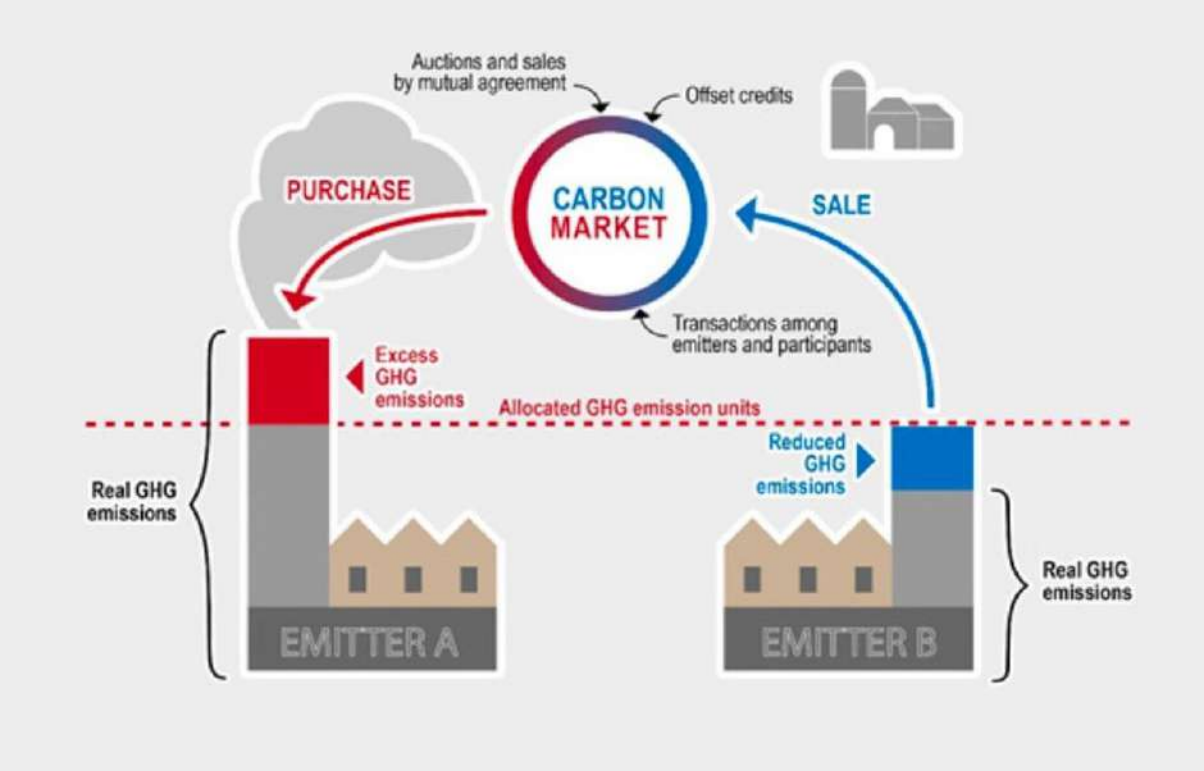

Figure 2 Carbon Market Mechanism

Audit Report prepared by/-
Navy Blue Energy | GHG Audit Team.

(M/s. NavyBlue Resources Integration & Solutions Pvt Ltd)
www.nbri.in | sales@nbri.in | +91-9619419288

GHG Audit Report-2021-22 Jagdish Seth School of Management (JAGSoM) Bangalore Campus

Reporting Period- 1st June 2021 to 31st May 2022

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LIST OF TABLES

LIST OF FIGURES

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ABBREVIATIONS

AC - Air Conditioning
AR- Assessment Report
BEE- Bureau of Energy Efficiency
CH_4- Methane
CDM- Clean Development Mechanism
EF- Emission Factor
GHG- Greenhouse Gas
GJ- Gigajoule
GRI- Global Reporting Initiative
GWP- Global Warming Potential
HFCs- Hydrofluorocarbons
IPCC- Intergovernmental Panel on Climate Change
Kg- Kilogram
KPI- Key Performance Indicator
LCA- Life Cycle Assessment
m^2 - Square Metre
m^3 - Cubic Metre
MWh- Megawatt Hour
N_2O- Nitrous Oxide
PFCs- Perfluorocarbons
SF_6- Sulphur Hexafluoride
t- Tonne
tCO_2e- Tonne of Carbon Dioxide Equivalent

ACKNOWLEDGEMENT

Navy Blue Energy GHG audit team would like to extend its sincere appreciation to the management and staff of **Jagdish Seth School of Management (JAGSoM), Bangalore Campus** for their unwavering cooperation and support throughout the audit process. The commitment to transparency and openness demonstrated by the management team facilitated a thorough examination of records, internal controls, and operational processes.

We are grateful for the prompt provision of requested information and the willingness of Jagdish Seth School of Management (JAGSoM) personnel to address queries and provide clarification as needed.

Furthermore, we would like to express our gratitude to all employees involved in the audit for their professionalism and dedication. Their cooperation greatly contributed to the efficiency and effectiveness of the audit engagement. Additionally, we acknowledge the assistance received from other relevant stakeholders who played a role in the successful completion of this audit.

AUDIT TEAM

From Navy Blue Energy Following team members Conducted the GHG Audit.

Table 1 Audit Team

Team Member	Designation
Pravin J Awatade M.Tech Energy | BEE-CEM/CEA | AEE-CEM Certified Carbon Footprint Professional	Team Leader
Tushar Harer M Tech Energy BEE- CEM/CEA	Certified Energy Auditor
Dr. Amol Mande PhD | Energy Technology	Certified Energy Auditor

EXECUTIVE SUMMARY

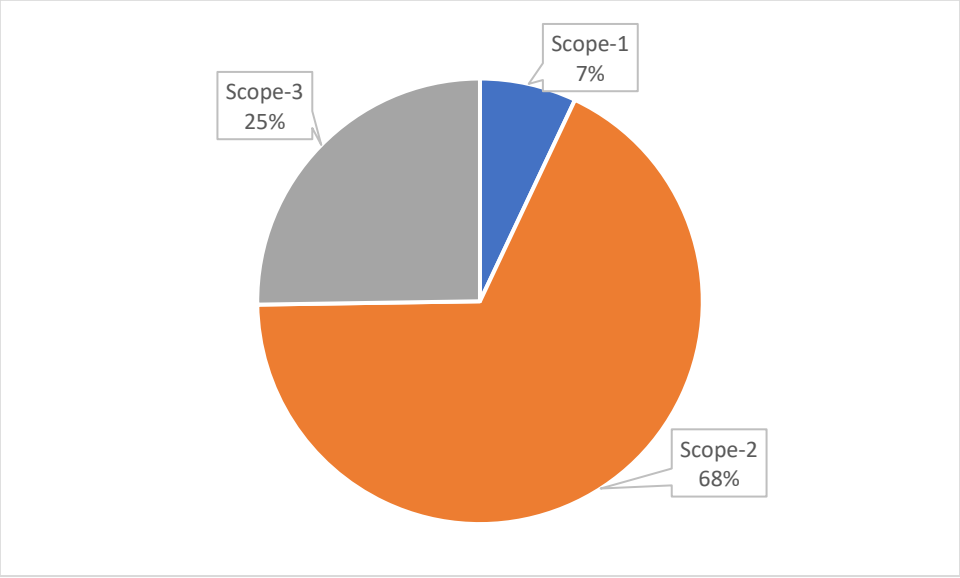
GHG EMISSION ACCOUNTING

The objective of this report is to outline the greenhouse gas (GHG) accounting of facility for the Period of 1st June 2021 to 31st May 2022. The total GHG footprint of Jagdish Seth School of Management (JAGSoM), Bangalore facility is 44.1 tCO_2e (Metric Tonnes of Carbon Dioxide equivalent).
Following Table gives an overview of the Scope-wise GHG emissions.

Table 2 Emission Summery

Scope	Emissions Due to	UoM	Value	Sub Total	Share
Scope-1	Due to Onsite Diesel Consumption by DG Sets	$kgCO_2e$	1286	3091	7%
	Due to Diesel Consumption by Facility's Own Vehicles	$kgCO_2e$	398		
	Due to Petrol Consumption by Facility's Own Vehicles	$kgCO_2e$	1286		
	Due to Refrigerant Leakages from Air-Conditioners	$kgCO_2e$	122		
Scope-2	Due to Purchased Electricity	$kgCO_2e$	29848	29848	68%
Scope-3	Due to Daily Commutation	$kgCO_2e$	10395	11120	25%
	Due to Air Travel	$kgCO_2e$	696		
	Due to Solid Waste Disposal	$kgCO_2e$	29		
	Due to Goods Purchase	$kgCO_2e$	0.30		
	Total	$kgCO_2e$	44059.3	44059.3	100%
		tCO_2e	44.1	44.1	

Graph 1 Scope Wise Emission



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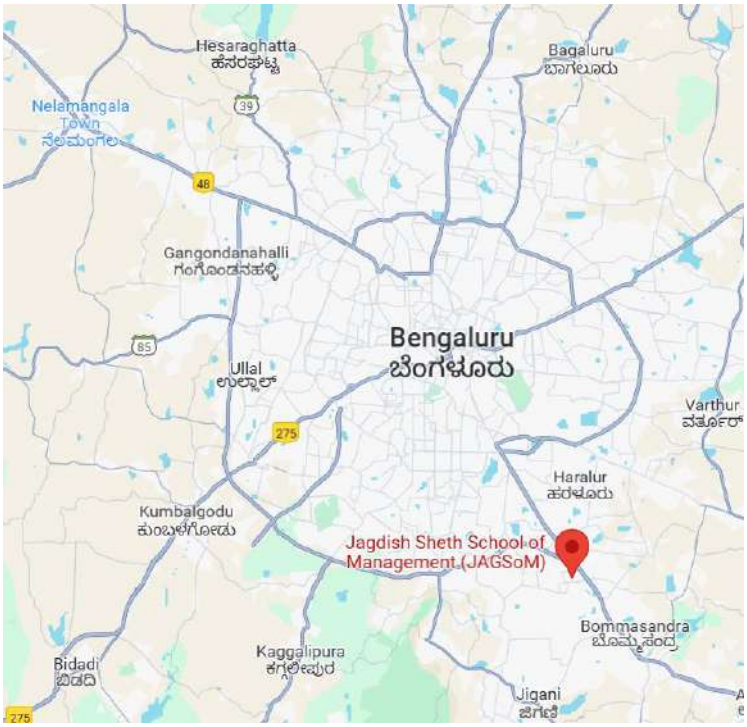

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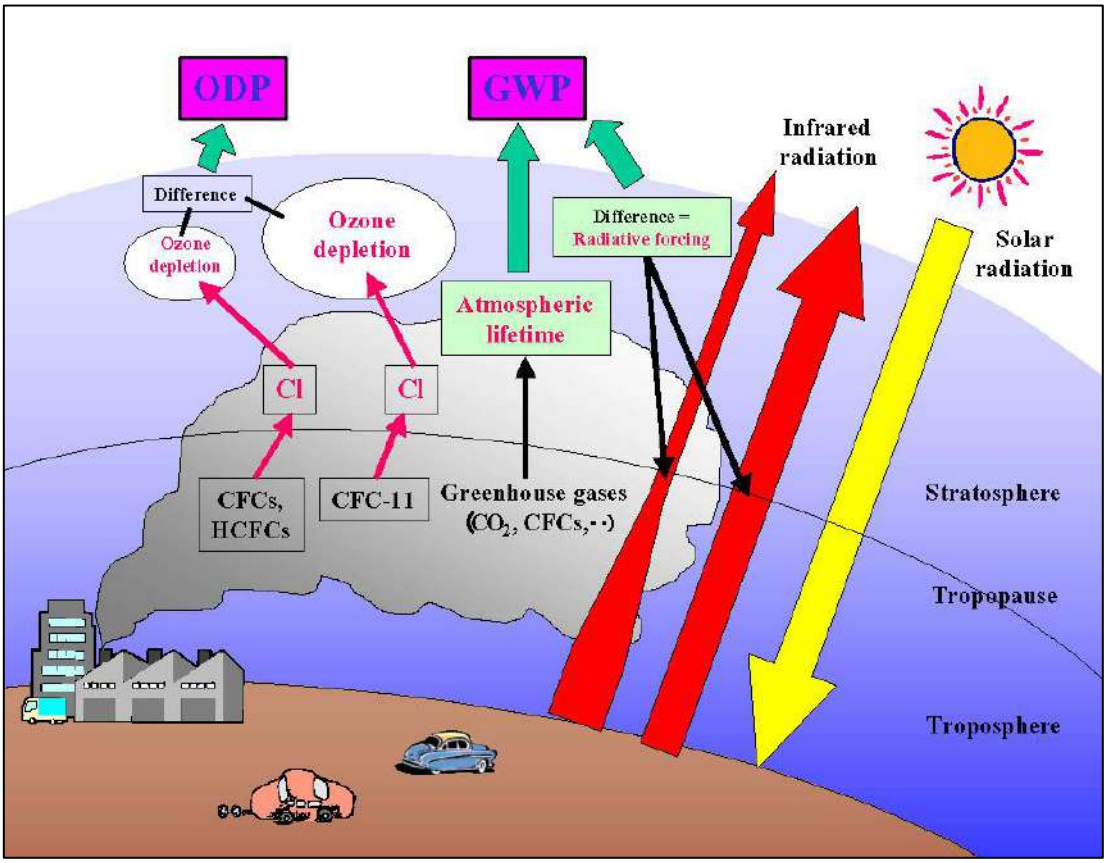

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4. Emission due to Refrigerant leakage from AC.

SCOPE-2 (INDIRECT)

1. Indirect Emissions due to Grid Electricity used in the boundary.

SCOPE-3 (INDIRECT)

1. Employee Commute
2. Air Travel
3. Solid Waste Disposal
4. Purchasing Goods/Stationary

BOUNDARIES

This GHG Accounting limited to Jagdish Seth School of Management-Bangalore Campus including its operational activities, Electricity and fuel used and GHG Emissions. etc.

SCOPE-1

GHG EMISSION DUE TO DIESEL COMBUSTION IN DIESEL GENERATOR

Facility has DG set, which is used as a back-up energy source in case of Grid Failure. As per data received, GHG Emissions from DG set is as follow.

Table 4 DG Emissions

Parameter	UoM	Value
Diesel Consumption by DG Set in Reporting Period	Litres	480
Emission Factor	$kgCO_2e$/Litre	2.68
Emission due to DG Set in Reporting Period	$kgCO_2e$	1286.4
Ref. for Emission Factor: IPCC 2006 Guidelines, India GHG Program		

GHG EMISSIONS BY OWN DIESEL VEHICLES

Facility has some owned Diesel Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 5 Emissions due to Diesel Vehicles

Parameter	UoM	Value
Diesel Consumption by Vehicles in Reporting Period	Litres	150
Emission Factor	$kgCO_2e$/Litre	2.65
Emission by Owned Diesel Vehicles Reporting Period	$kgCO_2e$	397.5
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS BY OWN PETROL VEHICLES

Facility has some owned Petrol Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 6 Emissions due to Petrol Vehicles

Parameter	UoM	Value
Petrol Consumption by Vehicles in Reporting Period	Litres	560
Emission Factor	$kgCO_2e$/Litre	2.296
Emission by Owned Petrol Vehicles Reporting Period	$kgCO_2e$	1285.8
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS DUE TO REFRIGERANT LEAKAGES

Facility has large capacity of Air-Conditioning system for premises. Facility uses R-32 as refrigerant in Air-Conditioning System. As per data available of Refrigerant Refilling, GHG emissions due to R-32 leakages is as follow.

Table 7 Emissions due to Refrigerant Leakage

Parameter	UoM	Value
Refrigerant Name	-	R-32
Refrigerant Refilled in Reporting Period	kg	0.18
Emission Factor	$kgCO_2e$/kg	675
Emission due to Refrigerant Leakage in Reporting Period	$kgCO_2e$	121.5
Ref. for Emission Factor: IPCC Fifth Assessment Report (AR5)		

SCOPE-2 (INDIRECT EMISSIONS)

Scope 2 emissions refer to indirect greenhouse gas (GHG) emissions associated with the generation of purchased electricity, heat, or steam consumed by a company. These emissions occur outside of a company's organizational boundaries but are a consequence of its activities.
For Jagdish Seth School of Management-Bangalore Campus Purchased Electricity can be defined as a source of indirect emissions. As per available Energy Billing Data, Scope-2 Emissions will be as following.

Table 8 Emissions from Purchased Electricity

Parameter	UoM	Value
Electricity Consumption in Reporting Period	kWh	36400
Emission Factor	$kgCO_2e$/Litre	0.82
Emission due to Purchased Electricity in Reporting Period	$kgCO_2e$	29848
Ref. for Emission Factor: CEA Baseline Carbon Emission Database, Version 19, 2023		

SCOPE-3 (INDIRECT EMISSIONS)

EMISSIONS DUE TO COMMUTATION

As Facility is the school of Management, all the Staff and Students commute daily from Home/Hostel to School. Audit team accounted the emissions due to this commutation as follows.

Table 9 Emissions due to Commutation

Parameter	UoM	Value
No. of Occupants	Nos.	90
Average Daily Travelling Distance	km	7
Working Days in Reporting period	Days	110
Total Travelling Distance	km	69300
Emission Factor	$kgCO_2e$/km	0.15
Emissions due to commutation	$kgCO_2e$	10395
Ref. for Emission Factor: UK DEFRA GHG Conversion Factors 2023, adjusted for India		

EMISSIONS DUE TO AIR TRAVEL

As an institute, some key persons travels by Air for the business purposes. Audit team accounted the emissions due to the Air travelled by Institute's key persons.

Table 10 Emissions due to Air Travel

Parameter	UoM	Value
No. of Air Travellers	Nos.	2
Average distance travelled by each Traveller in Reporting period	km	1740
Total Air Travel Distance in Reporting Period	km	3480
Emission Factor	$kgCO_2e$/km	0.2
Emissions due to Air Travel	$kgCO_2e$	696
Ref. for Emission Factor: ICAO Carbon Emissions Calculator		

EMISSIONS DUE TO SOLID WASTE GENERATION

This facility generates some solid waste on daily basis. Audit team accounted the GHG emissions due to solid waste disposal.

Table 11 Emissions due to Waste generation

Parameter	UoM	Value
Solid Waste Generated	kg/Day	2
Applicable Days in Reporting period	Days	120
Total Solid Waste generated in Reporting Period	kg	240
Emission Factor	$kgCO_2e$/Litre	0.12
Emission due to Solid Waste Disposal	$kgCO_2e$	28.8
Ref. for Emission Factor: IPCC Guidelines and India GHG Program		

EMISSIONS DUE TO PURCHASED GOODS

As facility is institute, it purchases goods like stationary and all. Audit Team accounted the emissions due to purchased goods.

Table 12 Emissions due to Purchased Goods

Parameter	UoM	Value
Total cost of Goods purchase in reporting Period	Rs.	6000
Emission Factor	$kgCO_2e$/Rs.1000	0.05
Emission due to Goods Purchase	$kgCO_2e$	0.3
Ref. for Emission Factor: USEPA EEIO Database, adjusted for local economic intensity (India proxy)		

RECOMMENDATIONS TO MITIGATE GHG EMISSIONS

SCOPE 1: DIRECT EMISSIONS (7%)

Table 13 Mitigation Plan for Scope-1 Emissions

Source	Recommendation
Diesel (DG Sets)	Upgrade to fuel-efficient or hybrid DG sets.
Facility Vehicles (Diesel & Petrol)	Shift to electric or hybrid vehicles. Promote carpooling and optimize travelling routes.
Refrigerant Leakage	Implement a refrigerant management and leak detection system.

SCOPE 2: PURCHASED ELECTRICITY (68%)

Table 14 Mitigation Plan for Scope-2 Emissions

Source	Recommendation
Electricity	• Adopt energy-efficient lighting (LED), HVAC, and office equipment. • Conduct regular energy audits. • Install Energy Monitoring System. • Transition to renewable energy via Green Power Purchase Agreements or Open Access Solar/Wind.

SCOPE 3: INDIRECT EMISSIONS (25%)

Table 15 Mitigation Plan for Scope-3 Emissions

Source	Recommendation
Daily Commutation	Encourage public transport, cycling, or electric shuttle services. Implement remote or hybrid work policies.
Air Travel	Replace physical meetings with virtual platforms. Offset emissions through Certified Carbon Credits.
Solid Waste Disposal	Improve waste segregation and composting. Partner with recyclers or EPR vendors.
Goods Purchase	Source from local, low-carbon, and Certified Green Suppliers. Apply green procurement policies.

STRATEGIC MEASURES

• GHG Policy: Create an internal sustainability/GHG reduction policy with targets.
• ISO 14064 Implementation: Use ISO-compliant systems for emission tracking.
• Employee Engagement: Run awareness drives and reward low-carbon practices.
• Offsetting: Consider verified carbon offsetting (e.g., forestry, renewable credits) for hard-to-abate emissions.

OFFSET MECHANISM

A carbon emission offset mechanism is a way for organizations to compensate for their greenhouse gas (GHG) emissions by investing in projects that reduce or remove an equivalent amount of emissions elsewhere. This mechanism is often used as part of a broader strategy to achieve carbon neutrality or to meet sustainability goals. The concept is based on the principle of balancing emissions by investing in activities that either prevent emissions from occurring or remove existing emissions from the atmosphere.

Here's an overview of how carbon emission offset mechanisms typically work:

1. **Identification of Carbon Offset Projects:**
    - Organizations can invest in various types of projects that result in emissions reductions or removals. Common project types include renewable energy projects (e.g., Wind, Solar), afforestation and reforestation, methane capture from landfills, and energy efficiency initiatives.
2. **Quantification of Emissions Reductions:**
    - Each project undergoes a rigorous process to quantify the emissions reductions or removals it achieves. This involves establishing a baseline for emissions that would have occurred without the project and comparing it to the actual emissions with the project in place.
3. **Verification and Certification:**
    - Carbon offset projects are often subject to third-party verification to ensure the accuracy and legitimacy of the claimed emissions reductions. Certification standards, such as the Verified Carbon Standard (VCS) or the Gold Standard, are used to verify and certify the emission reductions.
4. **Issuance of Carbon Credits:**
    - Once a project is verified, it is issued a certain number of carbon credits or offsets. One carbon credit typically represents the reduction or removal of one metric tonne of CO_2 equivalent.
5. **Purchase of Carbon Credits:**
    - Organizations seeking to offset their emissions can purchase these carbon credits on the voluntary or compliance market. The funds from the sale of carbon credits help finance the ongoing operation and maintenance of the offset project.
6. **Retirement or Cancellation of Carbon Credits:**
    - To ensure that the emissions reductions are not double counted, the purchased carbon credits are typically retired or cancelled in a public registry. This step confirms that the emissions reduction is attributed to the organization that purchased the offsets.

By participating in carbon offset mechanisms, organizations can take responsibility for their unavoidable emissions while supporting projects that contribute to sustainable development and environmental protection. It's important for organizations to carefully select credible and verifiable offset projects and to view carbon offsetting as part of a broader strategy that includes efforts to reduce emissions directly.

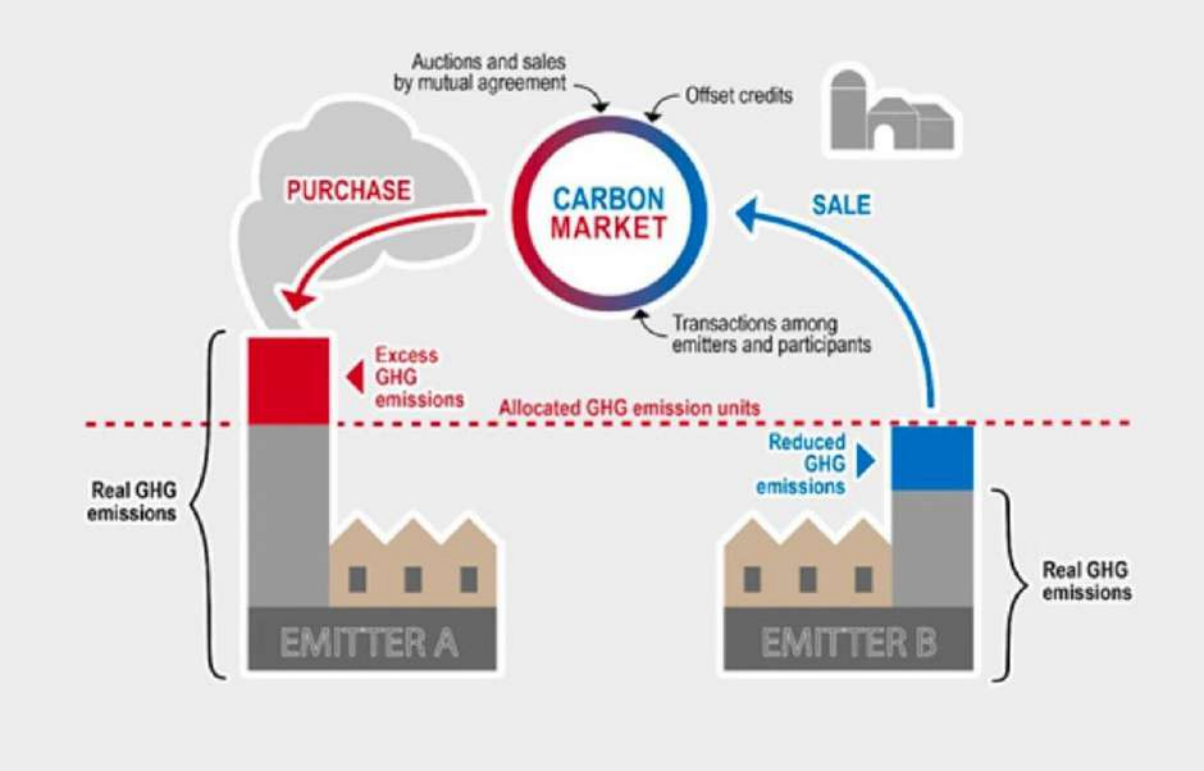

Figure 2 Carbon Market Mechanism

Audit Report prepared by/-
Navy Blue Energy | GHG Audit Team.

(M/s. NavyBlue Resources Integration & Solutions Pvt Ltd)
www.nbri.in | sales@nbri.in | +91-9619419288

GHG Audit Report-2020-21 Jagdish Seth School of Management (JAGSoM) Bangalore Campus

Reporting Period- 1st June 2020 to 31st May 2021

INDEX

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ABBREVIATIONS

AC - Air Conditioning
AR- Assessment Report
BEE- Bureau of Energy Efficiency
CH_4- Methane
CDM- Clean Development Mechanism
EF- Emission Factor
GHG- Greenhouse Gas
GJ- Gigajoule
GRI- Global Reporting Initiative
GWP- Global Warming Potential
HFCs- Hydrofluorocarbons
IPCC- Intergovernmental Panel on Climate Change
Kg- Kilogram
KPI- Key Performance Indicator
LCA- Life Cycle Assessment
m^2 - Square Metre
m^3 - Cubic Metre
MWh- Megawatt Hour
N_2O- Nitrous Oxide
PFCs- Perfluorocarbons
SF_6- Sulphur Hexafluoride
t- Tonne
tCO_2e- Tonne of Carbon Dioxide Equivalent

ACKNOWLEDGEMENT

Navy Blue Energy GHG audit team would like to extend its sincere appreciation to the management and staff of **Jagdish Seth School of Management (JAGSoM), Bangalore Campus** for their unwavering cooperation and support throughout the audit process. The commitment to transparency and openness demonstrated by the management team facilitated a thorough examination of records, internal controls, and operational processes.

We are grateful for the prompt provision of requested information and the willingness of Jagdish Seth School of Management (JAGSoM) personnel to address queries and provide clarification as needed.

Furthermore, we would like to express our gratitude to all employees involved in the audit for their professionalism and dedication. Their cooperation greatly contributed to the efficiency and effectiveness of the audit engagement. Additionally, we acknowledge the assistance received from other relevant stakeholders who played a role in the successful completion of this audit.

AUDIT TEAM

From Navy Blue Energy Following team members Conducted the GHG Audit.

Table 1 Audit Team

Team Member	Designation
Pravin J Awatade M.Tech Energy | BEE-CEM/CEA | AEE-CEM Certified Carbon Footprint Professional	Team Leader
Tushar Harer M Tech Energy BEE- CEM/CEA	Certified Energy Auditor
Dr. Amol Mande PhD | Energy Technology	Certified Energy Auditor

EXECUTIVE SUMMARY

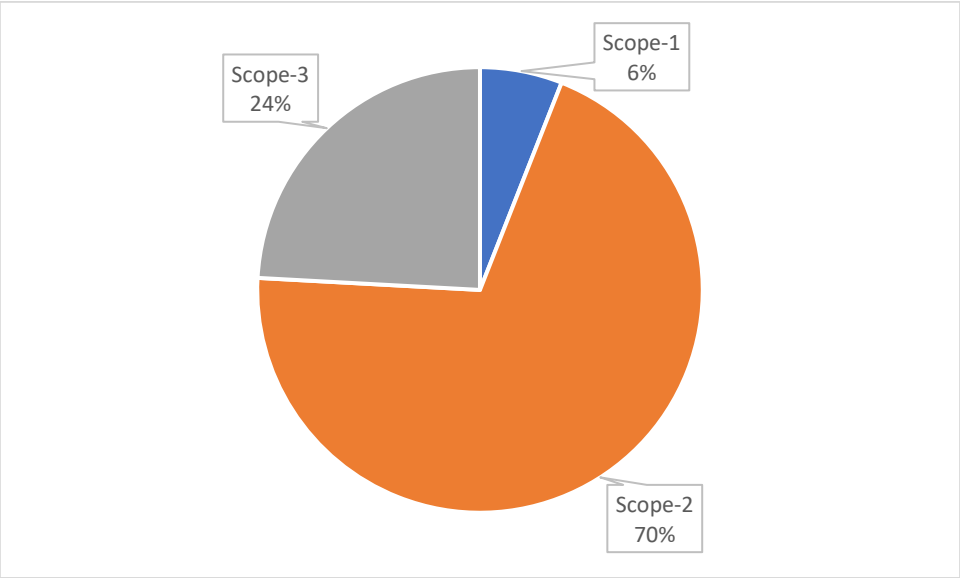
GHG EMISSION ACCOUNTING

The objective of this report is to outline the greenhouse gas (GHG) accounting of facility for the Period of 1st June 2020 to 31st May 2021. The total GHG footprint of Jagdish Seth School of Management (JAGSoM), Bangalore facility is 34.02 tCO_2e (Metric Tonnes of Carbon Dioxide equivalent).
Following Table gives an overview of the Scope-wise GHG emissions.

Table 2 Emission Summery

Scope	Emissions Due to	UoM	Value	Sub Total	Share
Scope-1	Due to Onsite Diesel Consumption by DG Sets	$kgCO_2e$	1018	2032	6%
	Due to Diesel Consumption by Facility's Own Vehicles	$kgCO_2e$	318		
	Due to Petrol Consumption by Facility's Own Vehicles	$kgCO_2e$	574		
	Due to Refrigerant Leakages from Air-Conditioners	$kgCO_2e$	122		
Scope-2	Due to Purchased Electricity	$kgCO_2e$	23780	23780	70%
Scope-3	Due to Daily Commutation	$kgCO_2e$	6804	8212	24%
	Due to Air Travel	$kgCO_2e$	1392		
	Due to Solid Waste Disposal	$kgCO_2e$	16		
	Due to Goods Purchase	$kgCO_2e$	0.24		
	Total	$kgCO_2e$	34024.3	34024.3	100%
		tCO_2e	34.02	34.02	

Graph 1 Scope Wise Emission



OBJECTIVE OF GHG AUDIT

The objective of a Greenhouse Gas (GHG) Audit report is to assess and report on an organization's greenhouse gas emissions and their management strategies. The primary goals of a GHG Audit report include:

Emission Assessment: Identify and quantify the organization's greenhouse gas emissions across various scopes (Scope 1, 2 & 3), including direct and indirect emissions associated with its operations, energy consumption, and supply chain.

The goal is to measure, analyse, and verify the amount of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), emitted directly and indirectly by the organization's activities. GHG audits are integral to understanding an organization's environmental impact and implementing strategies for emission reduction.

Here are the key steps involved in a typical GHG audit:

1. **Establish the Scope and Boundaries:**
    - Define the organizational and operational boundaries of the audit, including the scope of emissions to be considered.
2. **Define the Reporting Period:**
    - Determine the time period for which emissions will be measured and reported (e.g., annual reporting).
3. **Identify Emission Sources:**
    - Identify and categorize sources of greenhouse gas emissions, distinguishing between direct (Scope-1) and indirect (Scope-2 & Scope-3) emissions.
4. **Data Collection:**
    - Gather relevant data on energy consumption, fuel usage, and other activities contributing to emissions.
    - Collect data on purchased electricity and heat.
5. **Select Emission Factors:**
    - Choose appropriate emission factors to convert activity data into greenhouse gas emissions.
    - Emission factors are specific to the type of activity and the greenhouse gas in question.
6. **Calculate Emissions:**
    - Use the collected data and emission factors to calculate the total greenhouse gas emissions for each category (Scope 1, 2 & 3)
7. **Quality Assurance and Quality Control (QA/QC):**
    - Implement QA/QC procedures to ensure data accuracy, completeness, and reliability.
    - Verify calculations and resolve any discrepancies.
8. **Documentation and Reporting:**
    - Document the methodology, data sources, emission factors, and calculations used in the audit.
    - Prepare a comprehensive GHG audit report, including a summary of findings, emission trends, and recommendations.

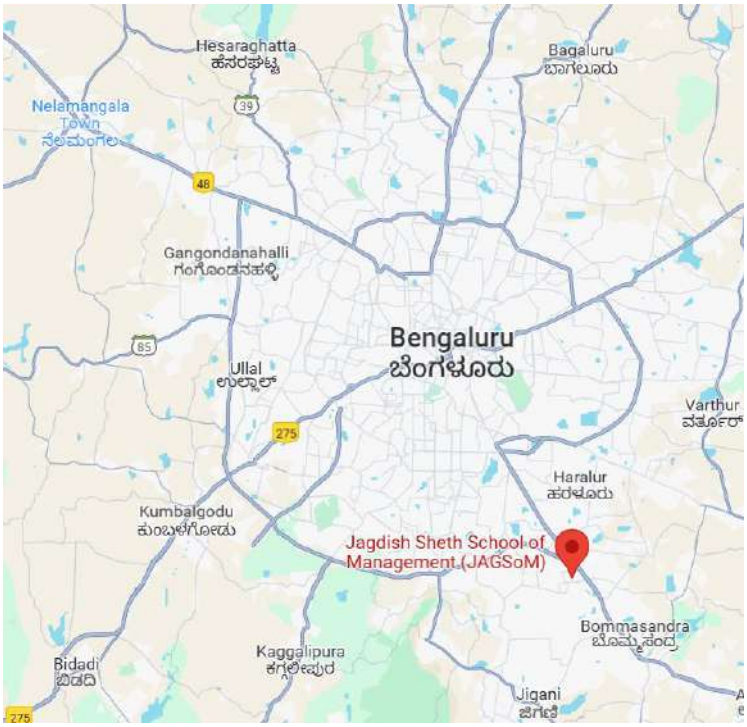
FACILITY INTRODUCTION

The **Jagdish Sheth School of Management (JAGSoM)**, formerly known as IFIM Business School, is a distinguished management institute located in **Electronic City, Bangalore, India**. The institute is named in honour of **Dr. Jagdish N. Sheth**, a globally renowned scholar and Padma Bhushan awardee, known for his contributions to marketing and public policy.

JAGSoM is one of the few Indian business schools to be accredited by the **Association to Advance Collegiate Schools of Business (AACSB)**, placing it among the top 5% of business schools globally. It is also accredited by **SAQS** and recognized by **AICTE**. The institution is committed to delivering globally benchmarked management education with a strong emphasis on **ethics, sustainability, and social responsibility**.

As part of its ongoing efforts toward environmental stewardship and regulatory compliance, JAGSoM has undertaken the preparation of its **Greenhouse Gas (GHG) Inventory Report**, in line with internationally accepted standards such as the **GHG Protocol**. This initiative reflects the institute's commitment to tracking, reducing, and managing its environmental footprint across Scope 1, Scope 2, and relevant Scope 3 emission categories.

Geo Location of the Facility 1



METHODOLOGY

WHAT IS GLOBAL WARMING

Global warming refers to the long-term increase in Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases into the atmosphere. While Earth's climate has naturally varied over geological time scales, the current trend of global warming is largely attributed to human activities that release large amounts of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases.

The main contributors to human-induced global warming include:

1. **Burning of Fossil Fuels:** The combustion of fossil fuels (coal, oil, and natural gas) for energy production releases large amounts of CO_2 into the atmosphere. This is a significant source of greenhouse gas emissions.
2. **Deforestation:** The clearing of forests for agriculture, logging, or other purposes reduces the number of trees that can absorb CO_2 from the atmosphere. Trees act as carbon sinks, and their removal contributes to increased greenhouse gas concentrations.
3. **Industrial Processes:** Certain industrial activities release greenhouse gases as byproducts. For example, cement production releases CO_2 during the chemical transformation of limestone into clinker.
4. **Agricultural Practices:** Agricultural activities, such as rice cultivation and livestock farming, produce methane and nitrous oxide, both potent greenhouse gases.
5. **Waste Management:** Improper waste disposal and waste treatment processes can lead to the release of methane, a potent greenhouse gas, from landfills.

The enhanced greenhouse effect resulting from these activities traps more heat in the Earth's atmosphere, leading to a rise in global temperatures. The consequences of global warming include:

- **Rising Sea Levels:** The melting of glaciers and polar ice caps contributes to rising sea levels, which can lead to coastal erosion and increased flooding.
- **Extreme Weather Events:** Changes in temperature patterns can lead to more frequent and severe weather events, such as heatwaves, droughts, hurricanes, and heavy precipitation.
- **Shifts in Ecosystems:** Changes in temperature and precipitation patterns can affect ecosystems, leading to shifts in the distribution of plant and animal species.
- **Ocean Acidification:** Increased CO_2 levels in the atmosphere also contribute to higher levels of carbon dioxide being absorbed by the oceans, leading to ocean acidification, which can harm marine life, particularly organisms with calcium carbonate shells or skeletons.

Efforts to mitigate global warming include international agreements such as the Paris Agreement, which aims to limit the global temperature increase to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit the increase to 1.5 degrees Celsius. This requires substantial reductions in greenhouse gas emissions and the transition to more sustainable and low-carbon energy sources.

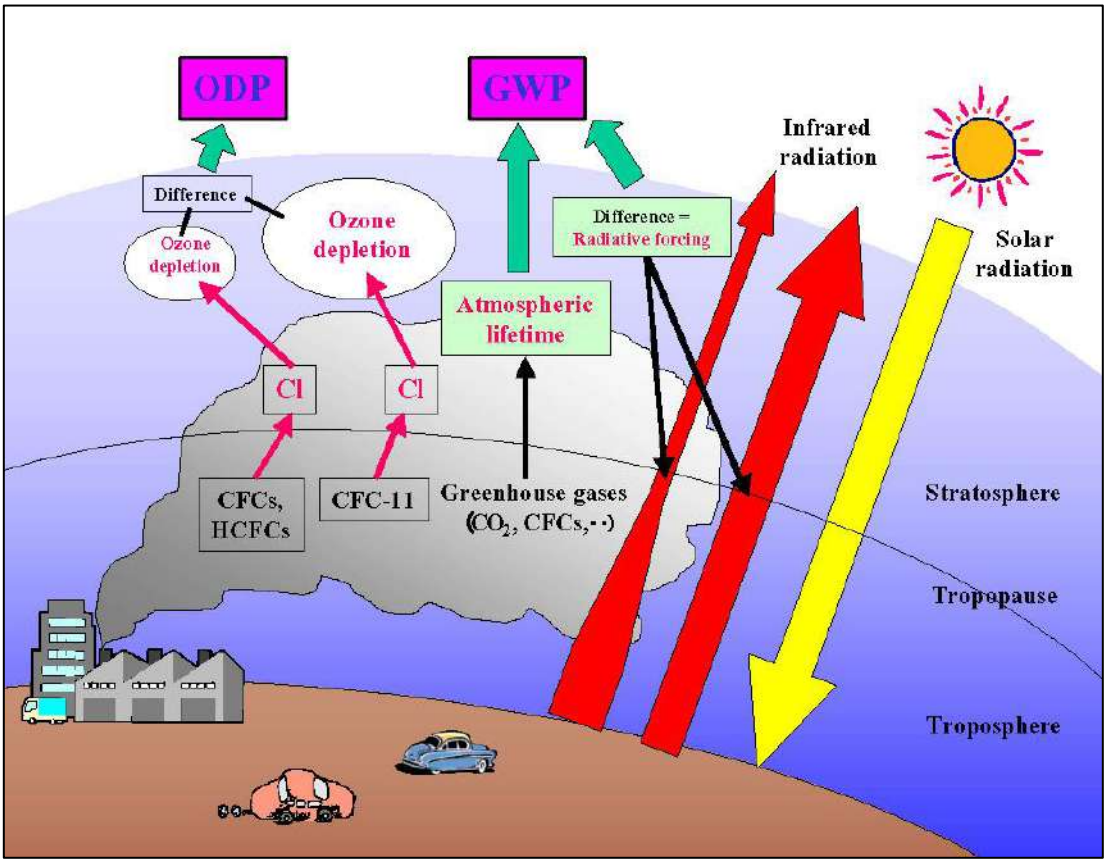
GLOBAL WARMING POTENTIAL (GWP)

Global Warming Potential (GWP) is a measure used to assess the relative impact of different greenhouse gases on global warming over a specific period, usually 100 years. It is expressed as a factor relative to carbon dioxide (CO_2), which is assigned a GWP of 1. The concept of GWP is important for comparing the warming potential of different greenhouse gases and developing strategies to mitigate climate change.

Table 3 Global Warming Potential

GHG	GWP (100 Years)
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298
Hydrofluorocarbons (HFCs)	See IPCC AR4 – Table 2.14
Perfluorocarbons (PFCs)	See IPCC AR4 – Table 2.14
Sulphur hexafluoride (SF_6)	22,800

Figure 1 GHG Emission Concept



SCOPE AND BOUNDARIES

SCOPE

As per Navy Blue's Contract the assessment scope is limited to scope 1, Scope 2 and Scope-3. GHG Accounting Team identified following scope for GHG Emission in mentioned boundary.

SCOPE-1 (DIRECT)

GHG Accounting team identified following Scope-1 Emissions in the defined boundary.

1. Emission due to Diesel used in DG.
2. Emission by Diesel Consumption by owned vehicles
3. Emission by Petrol Consumption by owned vehicles
4. Emission due to Refrigerant leakage from AC.

SCOPE-2 (INDIRECT)

1. Indirect Emissions due to Grid Electricity used in the boundary.

SCOPE-3 (INDIRECT)

1. Employee Commute
2. Air Travel
3. Solid Waste Disposal
4. Purchasing Goods/Stationary

BOUNDARIES

This GHG Accounting limited to Jagdish Seth School of Management-Bangalore Campus including its operational activities, Electricity and fuel used and GHG Emissions. etc.

SCOPE-1

GHG EMISSION DUE TO DIESEL COMBUSTION IN DIESEL GENERATOR

Facility has DG set, which is used as a back-up energy source in case of Grid Failure. As per data received, GHG Emissions from DG set is as follow.

Table 4 DG Emissions

Parameter	UoM	Value
Diesel Consumption by DG Set in Reporting Period	Litres	380
Emission Factor	$kgCO_2e$/Litre	2.68
Emission due to DG Set in Reporting Period	$kgCO_2e$	1018.4
Ref. for Emission Factor: IPCC 2006 Guidelines, India GHG Program		

GHG EMISSIONS BY OWN DIESEL VEHICLES

Facility has some owned Diesel Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 5 Emissions due to Diesel Vehicles

Parameter	UoM	Value
Diesel Consumption by Vehicles in Reporting Period	Litres	120
Emission Factor	$kgCO_2e$/Litre	2.65
Emission by Owned Diesel Vehicles Reporting Period	$kgCO_2e$	318
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS BY OWN PETROL VEHICLES

Facility has some owned Petrol Engine Vehicles. Audit Team checked the Diesel consumption records for these vehicles.

Table 6 Emissions due to Petrol Vehicles

Parameter	UoM	Value
Petrol Consumption by Vehicles in Reporting Period	Litres	250
Emission Factor	$kgCO_2e$/Litre	2.296
Emission by Owned Petrol Vehicles Reporting Period	$kgCO_2e$	574
Ref. for Emission Factor: GHG Protocol v2.6 / IPCC 2006		

GHG EMISSIONS DUE TO REFRIGERANT LEAKAGES

Facility has large capacity of Air-Conditioning system for premises. Facility uses R-32 as refrigerant in Air-Conditioning System. As per data available of Refrigerant Refilling, GHG emissions due to R-32 leakages is as follow.

Table 7 Emissions due to Refrigerant Leakage

Parameter	UoM	Value
Refrigerant Name	-	R-32
Refrigerant Refilled in Reporting Period	kg	0.18
Emission Factor	$kgCO_2e$/kg	675
Emission due to Refrigerant Leakage in Reporting Period	$kgCO_2e$	121.5
Ref. for Emission Factor: IPCC Fifth Assessment Report (AR5)		

SCOPE-2 (INDIRECT EMISSIONS)

Scope 2 emissions refer to indirect greenhouse gas (GHG) emissions associated with the generation of purchased electricity, heat, or steam consumed by a company. These emissions occur outside of a company's organizational boundaries but are a consequence of its activities.
For Jagdish Seth School of Management-Bangalore Campus Purchased Electricity can be defined as a source of indirect emissions. As per available Energy Billing Data, Scope-2 Emissions will be as following.

Table 8 Emissions from Purchased Electricity

Parameter	UoM	Value
Electricity Consumption in Reporting Period	kWh	29000
Emission Factor	$kgCO_2e$/Litre	0.82
Emission due to Purchased Electricity in Reporting Period	$kgCO_2e$	23780
Ref. for Emission Factor: CEA Baseline Carbon Emission Database, Version 19, 2023		

SCOPE-3 (INDIRECT EMISSIONS)

EMISSIONS DUE TO COMMUTATION

As Facility is the school of Management, all the Staff and Students commute daily from Home/Hostel to School. Audit team accounted the emissions due to this commutation as follows.

Table 9 Emissions due to Commutation

Parameter	UoM	Value
No. of Occupants	Nos.	72
Average Daily Travelling Distance	km	7
Working Days in Reporting period	Days	90
Total Travelling Distance	km	45360
Emission Factor	$kgCO_2e$/km	0.15
Emissions due to commutation	$kgCO_2e$	6804
Ref. for Emission Factor: UK DEFRA GHG Conversion Factors 2023, adjusted for India		

EMISSIONS DUE TO AIR TRAVEL

As an institute, some key persons travels by Air for the business purposes. Audit team accounted the emissions due to the Air travelled by Institute's key persons.

Table 10 Emissions due to Air Travel

Parameter	UoM	Value
No. of Air Travellers	Nos.	4
Average distance travelled by each Traveller in Reporting period	km	1740
Total Air Travel Distance in Reporting Period	km	6960
Emission Factor	$kgCO_2e$/km	0.2
Emissions due to Air Travel	$kgCO_2e$	1392
Ref. for Emission Factor: ICAO Carbon Emissions Calculator		

EMISSIONS DUE TO SOLID WASTE GENERATION

This facility generates some solid waste on daily basis. Audit team accounted the GHG emissions due to solid waste disposal.

Table 11 Emissions due to Waste generation

Parameter	UoM	Value
Solid Waste Generated	kg/Day	1.5
Applicable Days in Reporting period	Days	90
Total Solid Waste generated in Reporting Period	kg	240135
Emission Factor	$kgCO_2e$/Litre	0.12
Emission due to Solid Waste Disposal	$kgCO_2e$	16.2
Ref. for Emission Factor: IPCC Guidelines and India GHG Program		

EMISSIONS DUE TO PURCHASED GOODS

As facility is institute, it purchases goods like stationary and all. Audit Team accounted the emissions due to purchased goods.

Table 12 Emissions due to Purchased Goods

Parameter	UoM	Value
Total cost of Goods purchase in reporting Period	Rs.	4800
Emission Factor	$kgCO_2e$/Rs.1000	0.05
Emission due to Goods Purchase	$kgCO_2e$	0.24
Ref. for Emission Factor: USEPA EEIO Database, adjusted for local economic intensity (India proxy)		

RECOMMENDATIONS TO MITIGATE GHG EMISSIONS

SCOPE 1: DIRECT EMISSIONS (6%)

Table 13 Mitigation Plan for Scope-1 Emissions

Source	Recommendation
Diesel (DG Sets)	Upgrade to fuel-efficient or hybrid DG sets.
Facility Vehicles (Diesel & Petrol)	Shift to electric or hybrid vehicles. Promote carpooling and optimize travelling routes.
Refrigerant Leakage	Implement a refrigerant management and leak detection system.

SCOPE 2: PURCHASED ELECTRICITY (70%)

Table 14 Mitigation Plan for Scope-2 Emissions

Source	Recommendation
Electricity	• Adopt energy-efficient lighting (LED), HVAC, and office equipment. • Conduct regular energy audits. • Install Energy Monitoring System. • Transition to renewable energy via Green Power Purchase Agreements or Open Access Solar/Wind.

SCOPE 3: INDIRECT EMISSIONS (24%)

Table 15 Mitigation Plan for Scope-3 Emissions

Source	Recommendation
Daily Commutation	Encourage public transport, cycling, or electric shuttle services. Implement remote or hybrid work policies.
Air Travel	Replace physical meetings with virtual platforms. Offset emissions through Certified Carbon Credits.
Solid Waste Disposal	Improve waste segregation and composting. Partner with recyclers or EPR vendors.
Goods Purchase	Source from local, low-carbon, and Certified Green Suppliers. Apply green procurement policies.

STRATEGIC MEASURES

• GHG Policy: Create an internal sustainability/GHG reduction policy with targets.
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OFFSET MECHANISM

A carbon emission offset mechanism is a way for organizations to compensate for their greenhouse gas (GHG) emissions by investing in projects that reduce or remove an equivalent amount of emissions elsewhere. This mechanism is often used as part of a broader strategy to achieve carbon neutrality or to meet sustainability goals. The concept is based on the principle of balancing emissions by investing in activities that either prevent emissions from occurring or remove existing emissions from the atmosphere.

Here's an overview of how carbon emission offset mechanisms typically work:

1. **Identification of Carbon Offset Projects:**
    - Organizations can invest in various types of projects that result in emissions reductions or removals. Common project types include renewable energy projects (e.g., Wind, Solar), afforestation and reforestation, methane capture from landfills, and energy efficiency initiatives.
2. **Quantification of Emissions Reductions:**
    - Each project undergoes a rigorous process to quantify the emissions reductions or removals it achieves. This involves establishing a baseline for emissions that would have occurred without the project and comparing it to the actual emissions with the project in place.
3. **Verification and Certification:**
    - Carbon offset projects are often subject to third-party verification to ensure the accuracy and legitimacy of the claimed emissions reductions. Certification standards, such as the Verified Carbon Standard (VCS) or the Gold Standard, are used to verify and certify the emission reductions.
4. **Issuance of Carbon Credits:**
    - Once a project is verified, it is issued a certain number of carbon credits or offsets. One carbon credit typically represents the reduction or removal of one metric tonne of CO_2 equivalent.
5. **Purchase of Carbon Credits:**
    - Organizations seeking to offset their emissions can purchase these carbon credits on the voluntary or compliance market. The funds from the sale of carbon credits help finance the ongoing operation and maintenance of the offset project.
6. **Retirement or Cancellation of Carbon Credits:**
    - To ensure that the emissions reductions are not double counted, the purchased carbon credits are typically retired or cancelled in a public registry. This step confirms that the emissions reduction is attributed to the organization that purchased the offsets.

By participating in carbon offset mechanisms, organizations can take responsibility for their unavoidable emissions while supporting projects that contribute to sustainable development and environmental protection. It's important for organizations to carefully select credible and verifiable offset projects and to view carbon offsetting as part of a broader strategy that includes efforts to reduce emissions directly.

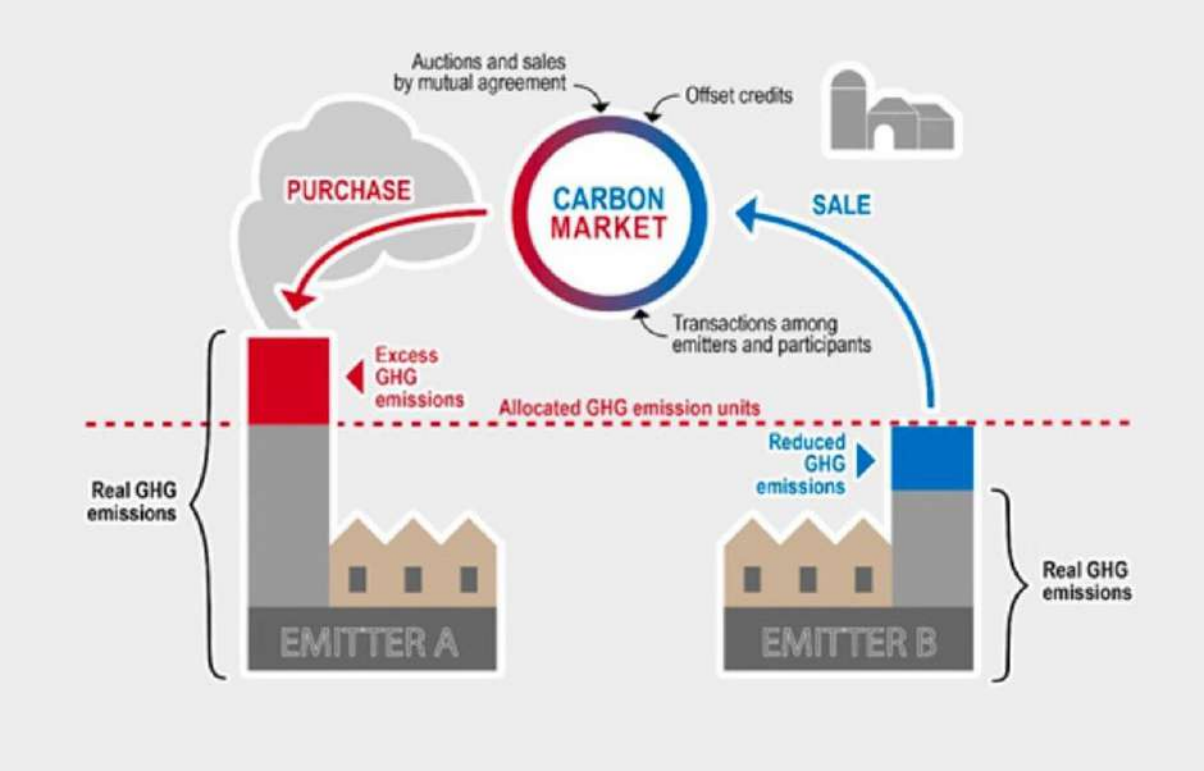

Figure 2 Carbon Market Mechanism

Audit Report prepared by/-
Navy Blue Energy | GHG Audit Team.

(M/s. NavyBlue Resources Integration & Solutions Pvt Ltd)
www.nbri.in | sales@nbri.in | +91-9619419288