Commercial Syn Bags Ltd.

Commercial House, 3- 4, Jaora Compound, M. Y. H. Road,
Indore, Madhya Pradesh, India- 452001.

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CHAPTER 1 INTRODUCTION

The Carbon Footprint (CF) is a parameter that represents the total emissions of CO_2 and other greenhouse gases (GHG), expressed in mass of CO_2 equivalent, caused directly or indirectly by a product, organization, service or event. The carbon footprint is important to try to quantify the main emission sources and to have a complete picture of the impact of an organization on climate change. It is also the first step to carry out a plan to reduce GHG emissions. The carbon footprint of an organization intends to quantify the GHG emissions implied by the activity flows of an interconnected entity or group of entities.

1.1 Intended user

The client is intended user of this report. This report is solely intended for internal use. The first step towards managing GHG emissions is to measure them. This report provides essential quantitative information on GHG emissions of Comsyn Industries Ltd. This report helps organization to enhance the environmental impacts of GHG quantification/removal which further helps to reduce the GHG emissions as measurement leads to management.

1.2 Standards/ guidelines used

This report is prepared in accordance with the principles set out by ISO 14064 for the quantification and reporting of GHG emissions and removals. ISO 14064 standards and guidance enables companies to measure, manage and report greenhouse gas emissions from their operations and value chains.

This standard details the principles and requirements for the design, development and management of GHG inventories for companies and organizations, and for the reporting of these inventories. It also includes the requirements to determine the GHG emission limits, quantify the emissions and removals of the organization's gases and identify the activities or specific actions of the company in order to improve the management of these gases. ISO 14064 focuses mainly on the facilities and activities subject to the entire organization, conducting a study of GHG emissions associated with the processes carried out by the company, leaving open the possibility of including scope 3 sources. In the case of Comsyn Industries Ltd., the year 2024 has been established as the base or reference year.

1.3 Objectives of Carbon Footprint Study

- To identify the main GHG emission sources of an organization.
- To quantify the emissions in each stage of the process due to fuel consumption, electricity consumption, water consumption, waste water generation and solid waste generation, etc.
- To identify the hotspots of environmental emissions and suggest the reduction measures for the same.
- To find out carbon sequestration mitigations.

CHAPTER 2 DESCRIPTION OF THE ORGANIZATION/ COMPANY

Comsyn is a manufacturer of FIBC, Tarpaulin, Woven Sacks, and BOPP Bags, located in Indore, a city in Central India. It is a member of 50 years old Choudhary Group, which has a wide range of business interests. The company is socially responsible towards its 2000 employees, who are the pillars of the company. Their manufacturing capacity is 14400 M.T. per annum and produces 4-5 million big bags annually. The company is located in the AKVN of the state. The government has provided all infrastructures like electrical power, continuous water supply with purification system, internal road network, external approach road, etc.

2.1 Project Location

Sr. No.	Description	Details
1	**Name of the Project**	Commercial Syn Bags Limited
2	**Project type**	Manufacturer of FIBC, Tarpaulin, Woven Sacks, and BOPP Bags
3	**Location**	Indore, Madhya Pradesh
4	**Address of concerned executive (with address& contact)**	Amrit Pritam Commercial House, 3-4, Jaora Compound, M.Y.H. Road, Indore - 452 001 (M.P.), India. Phone:91-731-2704007 / 4279525 Email: vtp@comsyn.com
5	**Address**	Commercial House, 3-4, Jaora Compound, M.Y.H. Road, Indore - 452 001 (M.P.), India.
6	**Production capacity**	14400 M.T. per annum

Table 1 Project location details

2.2 Area Statement

Sr. No.	Description	Area in Sq. m.
1.	Total plot Area	28658.7
2.	Built Up Area	19498.67
3.	Green Belt Area	6736.5

Table 2 Project area details

(a)

(b)

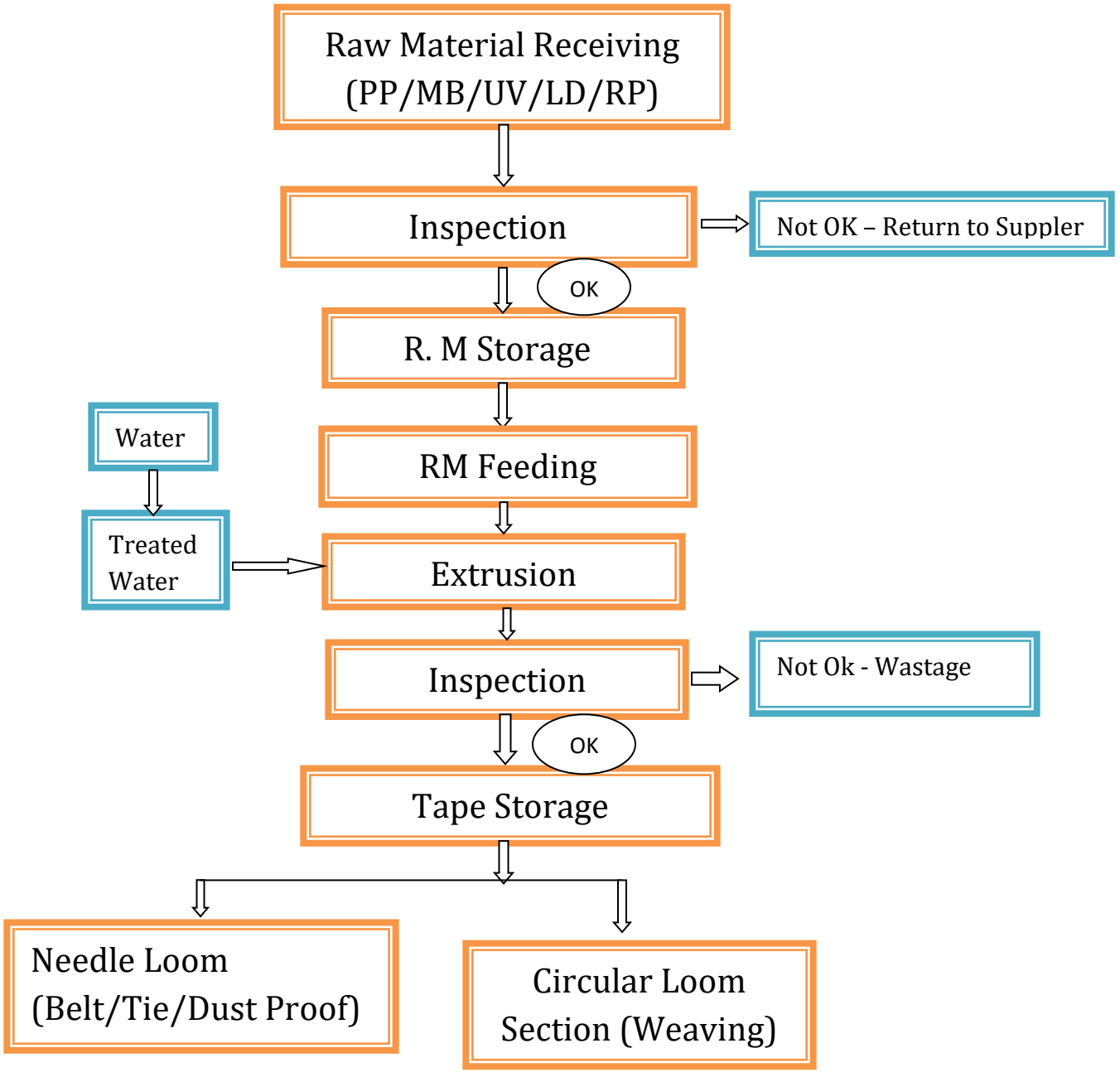
Figure 1 Images of project site

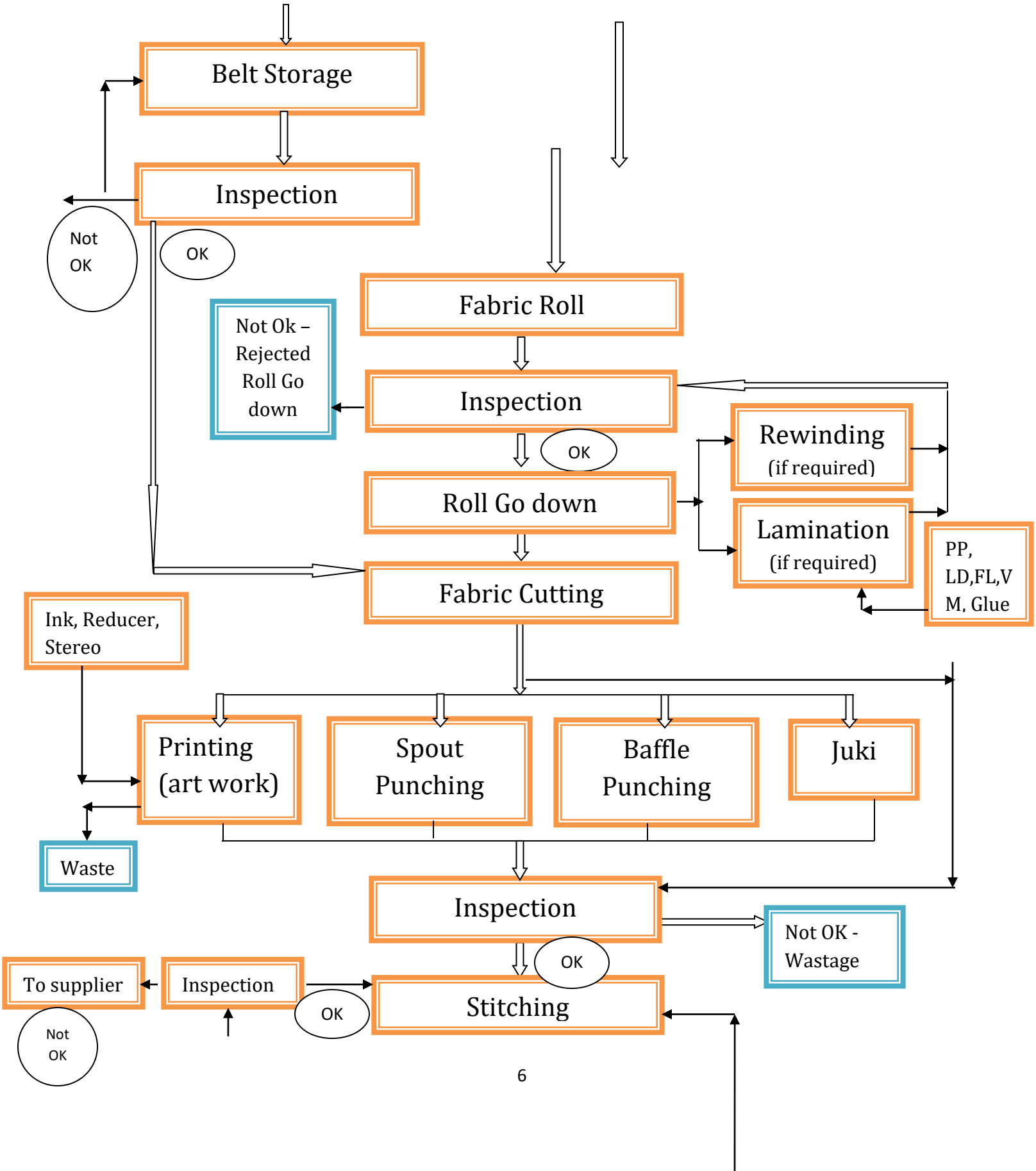
2.3 Raw material details

Sr. No.	Raw Material	Quantity (MT/ month)
1	Polypropylene (PP)	770
2	Low Density Poly Ethylene (LDPE)	98
3	Linear Low Density Poly Ethylene (LLDPE)	24
4	Recycled Plastic (RP)	82
5	Master Batch (MB)	103

Table 3 Raw material details

PROCESS FLOW CHART




Belt Storage
Inspection
Not OK
OK
Fabric Roll
Not Ok – Rejected Roll Go down
Inspection
OK
Rewinding (if required)
Roll Go down
Lamination (if required)
PP, LD,FL,VM, Glue
Fabric Cutting
Ink, Reducer, Stereo
Printing (art work)
Spout Punching
Baffle Punching
Juki
Waste
Inspection
Not OK - Wastage
OK
To supplier
Inspection
OK
Not OK
Stitching

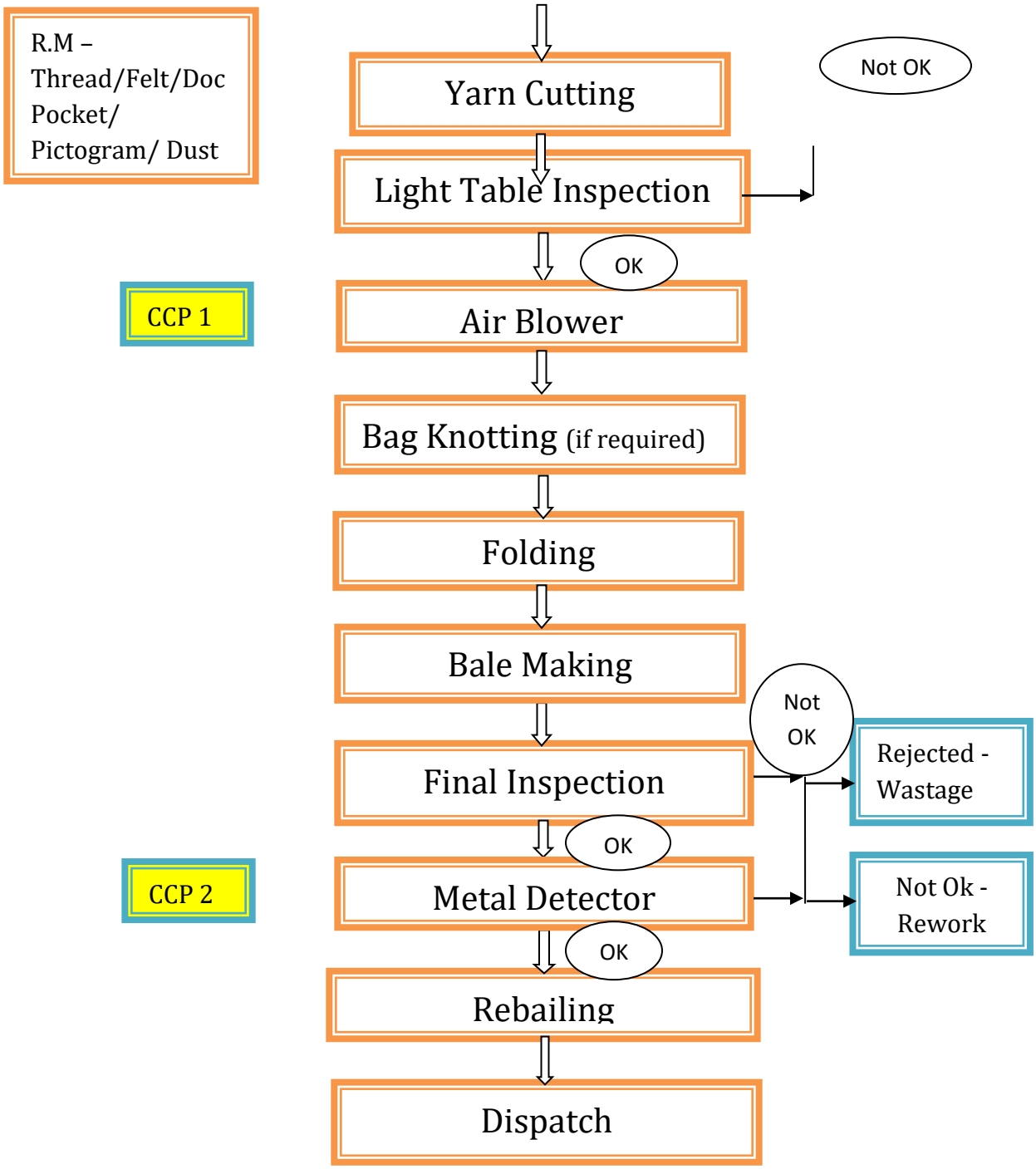


Figure 2 Process flow diagram

CHAPTER 3 METHODOLOGY AND REPORTING BOUNDARIES

3.1 Methodology

3.1.1 Definition of Calculation Boundaries

To start measuring GHG emissions, all the units and departments of the organization will be included in the assessment of emissions.

In setting organizational boundaries, a company selects an approach for consolidating GHG emissions and then consistently applies the selected approach to define those businesses and operations that constitute the company for the purpose of accounting and reporting GHG emissions. For corporate reporting of GHG emissions, two distinct approaches can be taken: Equity Share Approach and Control Approach. The equity share approach accounts for emissions based on financial ownership or economic interest in an operation. The control approach accounts for emissions based on operational or financial control of an operation. The calculation boundaries are given in table 4.

3.1.2 Selection of Conversion Factors

Conversion factors facilitate the calculation of CO_2 emissions by multiplying activity data, expressed in their respective international units and converted into kilograms of carbon dioxide equivalent (Kg CO_2 eq.). CO_2 eq. is the universal unit of measurement to indicate the global warming potential (GWP) of GHGs, expressed in terms of the GWP of one unit of carbon dioxide. We consulted numerous reference sources to select the most appropriate conversion factors, considering certain selection criteria such as accessibility, consistency, and transparency in revisions and updates. Every year, during the first months of the year, conversion factors are reviewed and updated.

GHG (t CO_2 eq.) = aspect quantity data x conversion factor

3.1.3 Application of Conversion Factors/ Emission Factors

Most conversion factors were used directly as defined in the chosen source. In certain instances, suitable factors needed to be calculated specifically, e.g. using average values when slight differences exist among the sources (e.g. hotel stays, rail travel, car trips, and the like) or using ad HOC factors that can be calculated for specific aspects and crosschecked against calculators from relevant sources (e.g. air travel).

Emission Factor: An emission factor is a coefficient which allows converting activity data into GHG emissions. It is the average emission rate of a given source, relative to units of activity or process/processes.

3.2 Operational boundaries considered for the project

Category	Description		Applicability
1	DIRECT GHG EMISSIONS AND REMOVALS		✓
	1.1	Direct emissions from stationary combustion	
	1.2	Direct emissions from mobile combustion	
	1.3	Direct process emissions and removals arising from industrial processes	
	1.4	Direct fugitive emissions arising from the release of greenhouse gases in anthropogenic systems	
	1.5	Direct emissions and removals from land use, land use change and forestry	
2	INDIRECT GHG EMISSIONS FROM IMPORTED ENERGY		✓
	2.1	Indirect emissions from imported electricity	
	2.2	Indirect emissions from imported energy	
3	INDIRECT GHG EMISSIONS FROM TRANSPORTATION		✓
	3.1	Emissions from upstream transport and distribution for goods	
	3.2	Emissions from downstream transport and distribution for goods	
	3.3	Emissions from employee commuting	
	3.4	Emissions from client and visitor transport	
	3.5	Emissions from business travel	
4	INDIRECT GHG EMISSIONS FROM PRODUCTS USED BY ORGANIZATION		✓
	4.1	Emissions from purchased goods	
	4.2	Emissions from capital goods	
	4.3	Emissions from disposal of solid and liquid waste	
	4.4	Emissions from the use of assets	
	4.5	Emissions from the use of services that are not described in the above subcategories (consulting, cleaning, maintenance, mail delivery, bank, etc.)	
5	INDIRECT GHG EMISSIONS ASSOCIATED WITH THE USE OF PRODUCTS FROM THE ORGANIZATION		NA
	5.1	Emissions or removals from the use stage of the product	
	5.2	Emissions from downstream leased assets	
	5.3	Emissions from end of life stage of the product	

	5.4	Emissions from investments	
6	INDIRECT GHG EMISSIONS FROM OTHER SOURCES		NA

Table 4 Boundary conditions

CHAPTER 4 GHG INVENTORY AND EMISSION QUANTIFICATION

4.1 Unit 1

4.1.1 Category 1

Direct GHG emissions due to fuel consumption

Fuel type	Fuel consumption	Total emissions(kg CO_2 eq./year)	Total emissions (t CO_2 eq. /year)
Diesel	2400 lit/ year	6336	6.336
LPG	3969.504 lit/ year	6180.87	6.180
Total Category 1 emissions (t CO_2 eq. /year)			**12.516**

Table 5 Emissions of Category 1 for unit 1

4.1.2 Category 2

Indirect GHG emissions due to purchased electricity

Category	Consumption (kWh/ year)	Total emissions (kg CO_2 eq./year)	Total emissions (t CO_2 eq. /year)
Electricity	4743240	4325834.88	4325.83
Total Category 2 emissions (t CO_2 eq. /year)			**4325.83**

Table 6 Emissions of Category 2 for unit 1

4.1.3 Category 3

Indirect GHG emissions due to transportation

(a) Employee Commuting

Types of vehicles	No. of vehicles	Distance (Km/day)	Total (Km/year)	Total emission (t CO_2 eq. /year)
Car	4	70	25550	18.019
2 wheeler	4	20	29200	1.218
Bus	1	70	102200	13.514
Total emissions due to employee commuting (t CO_2 eq./year)				**32.750**

(b) Raw material Transportation

Material type	Means of Transportation	Material transported (t-Km/year)	Total emissions(t CO_2 eq. /year)
Raw materials	By road	7314720	1233.262
Total emissions due to raw material distribution			**1233.262**

Total emissions due to employee commuting	32.750 t CO_2 eq./year
Emissions due to raw material transportation	1233.262 t CO_2 eq./year
Total Category 3 Emissions (t CO_2 eq. /year)	**1251.585 t CO_2 eq./year**

Table 7 Emissions of Category 3 for unit 1

4.1.4 Category 4

Indirect GHG emissions from purchased goods and disposal of solid and liquid waste

(a) Purchased goods

Sr. No.	Raw material	Quantity (MT/year)	Total embodied carbon (Kg CO2 eq./ year)	Total embodied carbon (t CO2 eq./ year)
1	PP	4800000	11424000	11424
2	LDPE	108000	277560	277.56
3	LLDPE	60000	139200	139.2
4	RP	600000	297000	297
5	MB	720000	4168800	4168.8
Emissions from purchased goods (t CO_2 eq./year)				**16308.553**

(b) Liquid waste

Category	Quantity (m^3/year)	Total emissions (t CO_2 eq. /year)
Water supply	7300	1.095
Waste water generation	3285	0.894

Emissions due to waste water generation and water supply (t CO_2 eq./year)	**1.989**

(c) Solid waste

Waste	**Quantity (ton/ year)**	**Total emissions (kg CO_2 eq. /year)**	**Total emissions (t CO_2 eq. /year)**
Solid waste	0.192	4.088	0.004
Emissions due to solid waste generation (t CO_2 eq./year)			**0.004**

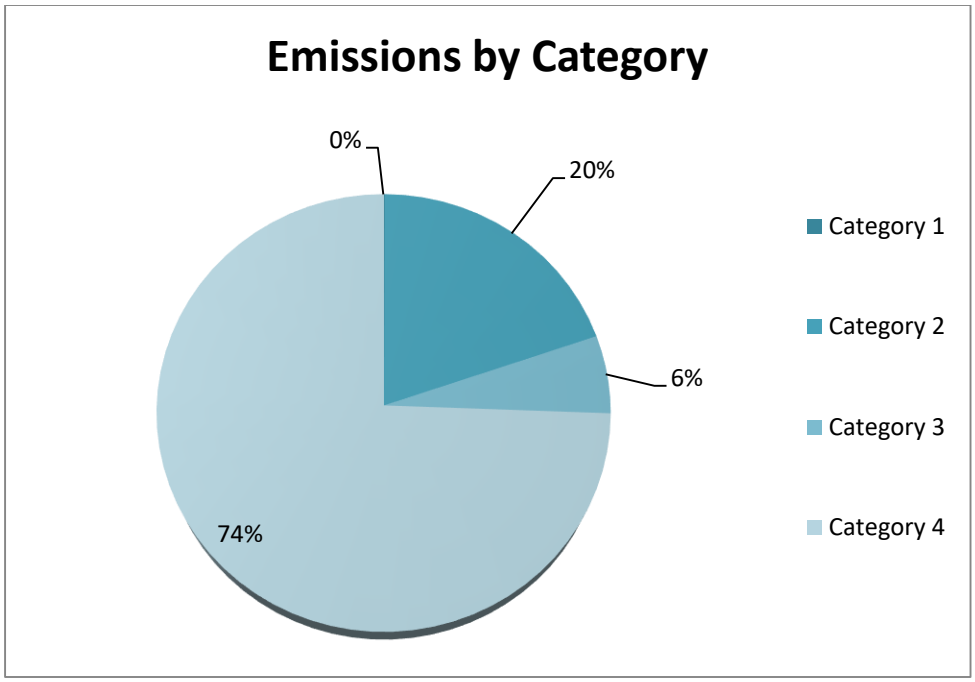
Total emissions from purchased goods	16306.56 t CO_2 eq./year
Emissions due to water supply and waste water generation	1.989 t CO_2 eq./year
Emissions due to solid waste generation	0.004 t CO_2 eq./year
Total Category 4 Emissions (t CO_2 eq. /year)	**16308.553 t CO_2 eq./year**

Table 8 Emissions of Category 4 for unit 1

4.1.5 Total emissions

Category	**Emissions (t CO_2 eq./year)**
1	12.517
2	4325.83
3	1266.012
4	16308.553
Total emissions (t CO_2 eq. /year)	**21912.912**

Table 9 Total emissions for unit 1



Graph 1 Representation of emissions by category for unit 1

4.2 Unit 2

4.2.1 Category 1

Direct GHG emissions due to fuel consumption

Fuel type	Fuel consumption	Total emissions(kg CO_2 eq./year)	Total emissions (t CO_2 eq. /year)
Diesel	2400 lit/ year	6336	6.336
LPG	921.492 lit/ year	1434.85	1.434
Petrol	1200 lit/ year	2724	2.724
Total Category 1 emissions (t CO_2 eq. /year)			**10.495**

Table 10 Emissions of Category 1 for unit 2

4.2.2 Category 2

Indirect GHG emissions due to purchased electricity

Category	Consumption (kWh/ year)	Total emissions (kg CO_2 eq./year)	Total emissions (t CO_2 eq. /year)
Electricity	2559816	2334552.192	2334.55
Total Category 2 emissions (t CO_2 eq. /year)			**2334.55**

Table 11 Emissions of Category 2 for unit 2

4.2.3 Category 3

Indirect GHG emissions due to transportation

(a) Employee Commuting

Types of vehicles	No. of vehicles	Distance (Km/day)	Total (Km/year)	Total emission (t CO_2 eq. /year)
Car	1	50	18250	3.218
2 wheeler	200	10	730000	30.441
Total emissions due to employee commuting (t CO_2 eq./year)				**33.659**

(b) Raw material Transportation

Material type	Means of Transportation	Material transported (t-Km/year)	Total emissions(t CO_2 eq. /year)
Raw materials	By road	2282616	384.849
Total emissions due to raw material distribution			**384.849**

Total emissions due to employee commuting	33.659 t CO_2 eq./year
Emissions due to raw material transportation	384.849 t CO_2 eq./year
Total Category 3 Emissions (t CO_2 eq. /year)	**1251.585 t CO_2 eq./year**

Table 12 Emissions of Category 3 for unit 2

4.2.4 Category 4

Indirect GHG emissions from purchased goods and disposal of solid and liquid waste

(a) Purchased goods

Sr. No.	Raw material	Quantity (MT/year)	Total embodied carbon (Kg CO2 eq./ year)	Total embodied carbon (t CO2 eq./ year)
1	PP	1200000	2856000	2856
2	LDPE	168000	431760	431.76
3	LLDPE	960000	2227200	2227.2
5	MB	36000	208440	208.44
Emissions from purchased goods (t CO_2 eq./year)				**5723.4**

(b) Liquid waste

Category	Quantity (m^3/year)	Total emissions (t CO_2 eq. /year)
Water supply	4380	0.657
Waste water generation	3285	0.894
Emissions due to waste water generation and water supply (t CO_2 eq./year)		**1.551**

(c) Solid waste

Waste	Quantity (ton/ year)	Total emissions (kg CO_2 eq. /year)	Total emissions (t CO_2 eq. /year)
Solid waste	0.168	3.577	0.0036
Emissions due to solid waste generation (t CO_2 eq./year)			**0.0036**

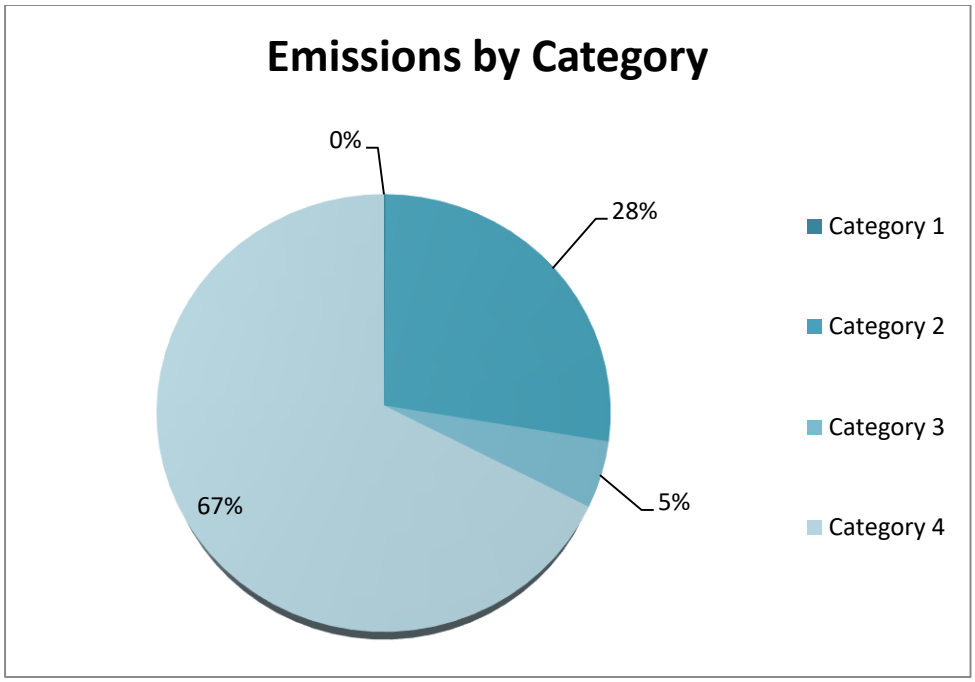
Total emissions from purchased goods	5723.4 t CO_2 eq./year
Emissions due to water supply and waste water generation	1.551 t CO_2 eq./year
Emissions due to solid waste generation	0.0036 t CO_2 eq./year
Total Category 4 Emissions (t CO_2 eq. /year)	**5724.955 t CO_2 eq./year**

Table 13 Emissions of Category 4 for unit 2

4.2.5 Total emissions

Category	Emissions (t CO_2 eq./year)
1	10.495
2	2334.55
3	418.508
4	5724.955
Total emissions (t CO_2 eq. /year)	**8488.508**

Table 14 Total emissions for unit 2



Graph 2 Representation of emissions by category for unit 2

4.3 Unit 3- SEZ

4.3.1 Category 1

Direct GHG emissions due to fuel consumption

Fuel type	Fuel consumption	Total emissions(kg CO_2 eq./year)	Total emissions (t CO_2 eq. /year)
Diesel	21600 lit/ year	57024	57.024
LPG	5907 lit/ year	9197.73	9.197
Petrol	600 lit/ year	1362	1.363
Total Category 1 emissions (t CO_2 eq. /year)			**67.584**

Table 15 Emissions of Category 1 for unit 3

4.3.2 Category 2

Indirect GHG emissions due to purchased electricity

Category	Consumption (kWh/ year)	Total emissions (kg CO_2 eq./year)	Total emissions (t CO_2 eq. /year)
Electricity	3833328	3495995.136	3496
Total Category 2 emissions (t CO_2 eq. /year)			**3496**

Table 16 Emissions of Category 2 for unit 3

4.3.3 Category 3

Indirect GHG emissions due to transportation

(a) Employee Commuting

Types of vehicles	No. of vehicles	Distance (Km/day)	Total (Km/year)	Total emission (t CO_2 eq. /year)
Car	4	30	43800	7.722
2 wheeler	25	25	228125	9.513
Bus	5	20	36500	19.306
Total emissions due to employee commuting (t CO_2				**36.541**

eq./year)	

(b) Raw material Transportation

Material type	**Means of Transportation**	**Material transported (t-Km/year)**	**Total emissions(t CO_2 eq. /year)**
Raw materials	By road	22582800	3807.460
Total emissions due to raw material distribution			**3807.460**

Total emissions due to employee commuting	36.541 t CO_2 eq./year
Emissions due to raw material transportation	3807.460 t CO_2 eq./year
Total Category 3 Emissions (t CO_2 eq. /year)	**3844.001 t CO_2 eq./year**

Table 17 Emissions of Category 3 for unit 3

4.3.4 Category 4

Indirect GHG emissions from purchased goods and disposal of solid and liquid waste

(a) Purchased goods

Sr. No.	**Raw material**	**Quantity (MT/year)**	**Total embodied carbon (Kg CO2 eq./ year)**	**Total embodied carbon (t CO2 eq./ year)**
1	PP	3240000	7711200	7711.2
2	LDPE	108000	277560	277.56
3	LLDPE	60000	139200	139.2
4	RP	384000	190080	190.08
5	MB	480000	2779200	2779.2
Emissions from purchased goods (t CO_2 eq./year)				**11097.24**

(b) Liquid waste

Category	**Quantity (m^3/year)**	**Total emissions (t CO_2 eq. /year)**
Water supply	7300	1.095
Waste water generation	2190	0.596
Emissions due to waste water generation and water supply (t CO_2 eq./year)		**1.691**

(c) Solid waste

Waste	Quantity (ton/ year)	Total emissions (kg CO_2 eq. /year)	Total emissions (t CO_2 eq. /year)
Solid waste	1.779	37.882	0.038
Emissions due to solid waste generation (t CO_2 eq./year)			**0.038**

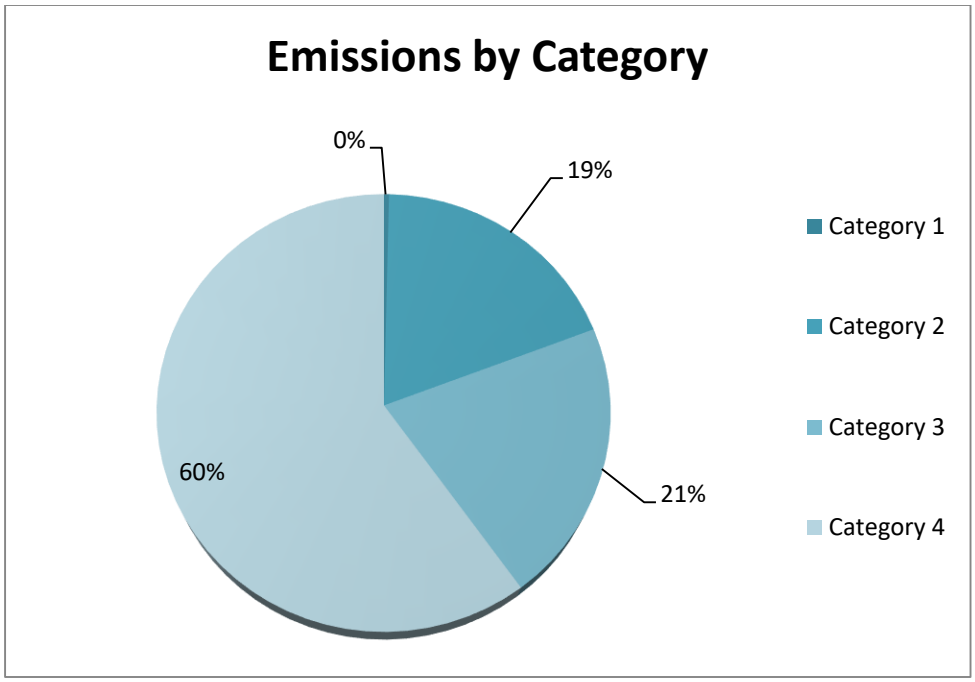
Total emissions from purchased goods	11097.24 t CO_2 eq./year
Emissions due to water supply and waste water generation	1.691 t CO_2 eq./year
Emissions due to solid waste generation	0.038 t CO_2 eq./year
Total Category 4 Emissions (t CO_2 eq. /year)	**11098.969 t CO_2 eq./year**

Table 18 Emissions of Category 4 for unit 3

4.3.5 Total emissions

Category	Emissions (t CO_2 eq./year)
1	67.584
2	3496
3	3844.001
4	11098.969
Total emissions (t CO_2 eq. /year)	**18506.554**

Table 19 Total emissions for unit 3



Graph 3 Representation of emissions by category for unit 3

CHAPTER 5 GHG REDUCTION INITIATIVES AND AVOIDED EMISSIONS

The GHG reduction initiatives practiced are sequestration of carbon by tree plantation and avoiding emissions by using renewable source of energy. Both the initiatives are given below.

5.1Carbon Sequestration

At **Comsyn,** trees planted at unit 1, unit 2, and unit 3 (SEZ) are 130, 100, 250 respectively.

The total carbon sequestered through trees at unit 1(130 trees) **=16.250 t CO_2 eq. /year**

The total carbon sequestered through trees at unit 2(100 trees) **=12.500 t CO_2 eq. /year**

The total carbon sequestered through trees at unit 3 (SEZ) (250 trees) **=31.250 t CO_2 eq. /year**

5.2 Avoided emissions

Avoided emissions due to use of renewable energy i.e. solar panels installed on unit 2 is considered. (Solar power plant of capacity 475 kWp)

Renewable energy source	Quantity /Year	Unit	Emissions(t CO_2 eq./year)
Solar energy + wind mill	652500	kWh	**600.300**
Total Avoided Emissions (t CO_2 eq./year)			**600.300**

Table 20 Avoided emissions

CHAPTER 6 CONCLUSION

6.1 Unit 1

Category	Emissions (t CO_2 eq. /year)
Category 1	12.517
Category 2	4325.83
Category 3	1266.012
Category 4	16308.553
Gross emissions	21912.912
Emission reduction	16.250
Net emissions	**21896.662**

- The net emissions of Comsyn Unit 1are **21896.662 t CO2 eq. / year.**

6.2 Unit 2

Category	Emissions (t CO_2 eq. /year)
Category 1	10.495
Category 2	2334.55
Category 3	418.508
Category 4	5724.955
Gross emissions	8488.508
Emission reduction	612.8
Net emissions	**7875.708**

- The net emissions of Comsyn Unit 2 are **7875.708 t CO2 eq. / year.**

6.3 Unit 3 (SEZ)

Category	Emissions (t CO_2 eq. /year)
Category 1	67.584
Category 2	3496
Category 3	3844.001
Category 4	11098.969
Gross emissions	18506.554
Emission reduction	31.250
Net emissions	**18475.304**

- The net emissions of Comsyn unit 3 (SEZ) are **18475.304 t CO2 eq. / year.**

- The total gross emissions of Comsyn i.e. Unit 1, Unit 2 and Unit 3 (SEZ) collectively are 48907.974 t CO2 eq. / year. The total emission reductions achieved by carbon sequestration and due to use of renewable source of energy are 660.30 t CO2 eq. / year.

  Therefore, the total net emissions of Comsyn are 48247.674 t CO2 eq. / year. The total savings in emissions achieved are 1.35%.

	Net Emissions (t CO2 eq. /year)	Production in MT	CO2 emission per kg of FIBC
UNIT-1	21897	3098.30	7.07
UNIT-2	7876	8273.93	0.95
SEZ	18475	3381.70	5.46
Total	**48248**	**14753.92**	**3.27**

CHAPTER 7 RECOMMENDATIONS

1) Tree plantation should be increased to sequester more carbon.
2) The capacity of electricity generation by solar plant can be increased if space is available to reduce the emissions.
3) Carbon footprint study should be done every year to track greenhouse gases emission and to set target of GHG gases reduction for next year.