AurovilleConsulting

LeBracs
Rubber Linings Pvt. Ltd.

GREENHOUSE GAS INVENTORY

FY 2019-20

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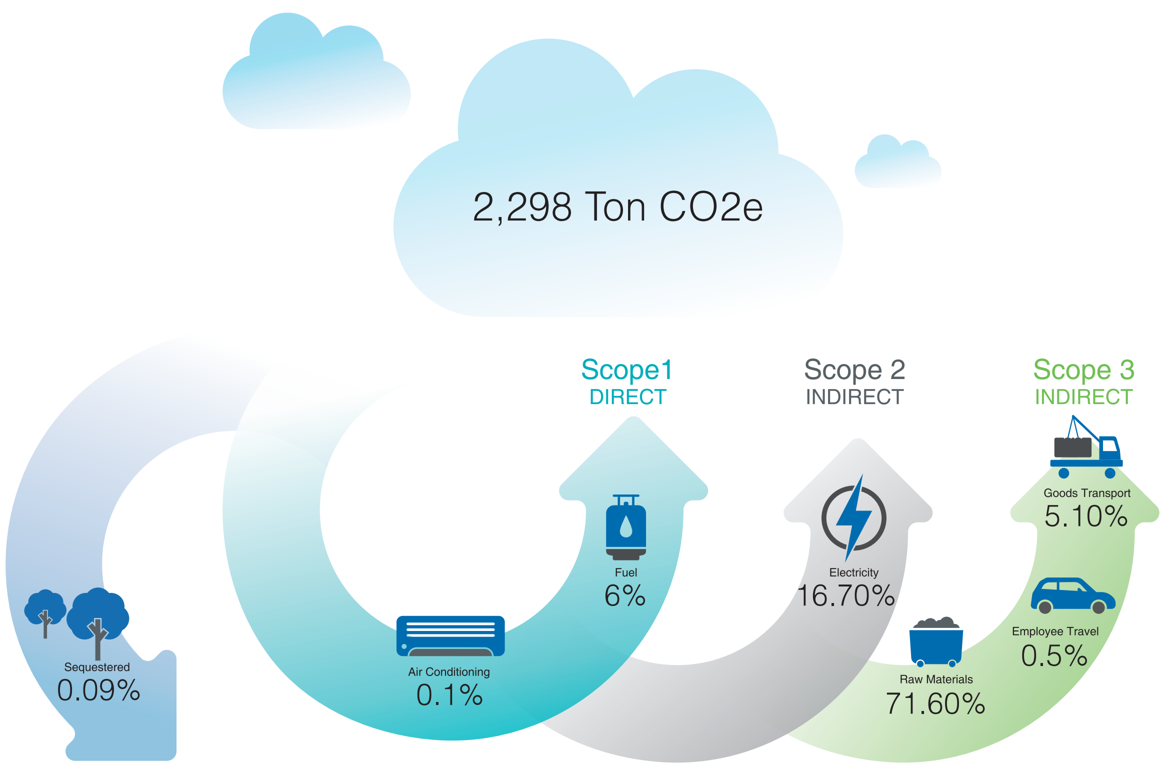
Summary



	Rubber sheet manufactured (m2)	Carbon steel lined with rubber (m2)
Emissions Intensity	67.58 kg CO_2e	78.98 kg CO_2e
Water Footprint	117.32 litres	207.2 litres
Waste generated	0.03 kg	0.04 kg

Environmental Impact by square meter of product manufactured

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Introduction

Climate change is one of the most pressing challenges faced by planet Earth today. Human activities have contributed to a global temperature rise of over 1˚C from the pre-industrial era. This rise of temperature can be attributed to the presence of greenhouse gases (GHGs) in the atmosphere. The consequences can be seen in the form of extreme weather conditions, extinction of plant and animal species, rise in sea level, reduction in crop yields and scarcity of water, to name a few.

Companies across the world are increasingly aware of the global drive towards sustainable development. To ensure long-term success in a competitive business environment, companies are developing effective strategies to take early action. The first step for any company is to have a detailed understanding of its GHG emissions. An emissions inventory helps them:

- Identify reduction opportunities and thereby improve operational efficiency
- Prepare for future climate policies, e.g. regulations on energy efficiency, carbon taxes
- Communicate their commitment to key stakeholders, such as customers and investors

LeBracs Rubber Linings Pvt. Ltd. (LeBracs) a manufacturing company in Tamil Nadu decided to put together a baseline GHG emissions report for the financial year 2019-20. LeBracs, established in 1989, manufactures patented anti-corrosive and anti-abrasive rubber lining materials. The rubber linings are used in carbon steel process equipment by the chemical manufacturing, water treatment and desalination and pollution control sectors. The company supplies to engineering companies and other manufacturing companies both domestically and internationally.

Scope of work

This study is put together using the guidelines of the globally-recognised tool, the GHG Protocol: Corporate Accounting and Reporting Standard. The standard helps organisations identify, calculate and report their GHG emissions in an accurate, consistent and transparent manner.

The tool incorporates national emission factors where available or default global values to convert different organisational activities into the respective greenhouse gases emitted. The seven greenhouse gases reported under this standard include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbon (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3). The combined emissions are expressed in kilograms of carbon dioxide equivalent (kg CO2e), which compares all the greenhouses to carbon dioxide. The use of CO2e helps simplify the accounting process and analysis as the emissions are represented by a single value.

The GHG Protocol mandates that the activities of organisations be split into three categories or scopes for a more transparent accounting structure. The activities covered under each scopes are shown below in Table 1:

Table 1: Definition of scopes for corporate accounting

Scope 1	Direct emissions	Emissions from sources owned and controlled by the company; e.g. emissions from equipment and vehicles owned by the company
Scope 2	Indirect emissions	Emissions from the generation of purchased electricity consumed at company facilities
Scope 3	Other indirect emissions (optional)	Emissions that occur as a consequence of the company's activities, but from sources not owned by the company, e.g. transport of purchased goods, work-related travel

In order to undertake a more wholistic approach, the report delves into the details of the waste production, segregation and disposal, and the total water consumption and harvesting techniques adopted by the organisation.

Annual GHG Emissions

The sources of emissions covered under each scope are given below.

Scope 1

Emissions from machines and processes inside the operational control of the company, i.e. the factory premises in Sedarapet, Puducherry. The sources include:

- Diesel burnt for operating of generators, cranes and company owned vehicles
- LPG for the fabrication process
- LPG for cooking in the canteen
- Refrigerant leakage from air conditioners in the form of HFCs and HCFCs

Scope 2

Grid-supplied electricity consumed by the factory or the electricity produced outside the factory premises by the state utility.

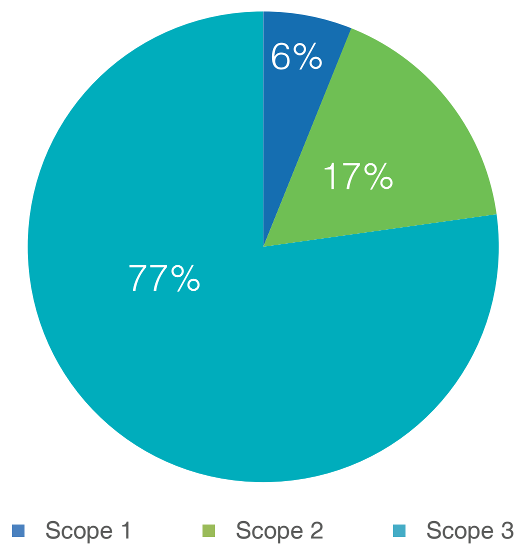
Scope 3

Indirect emissions from activities outside the operational boundary of the factory. The categories covered are:

- Primary raw materials used namely rubber and steel,
- Transportation
  • Employee business travel
  • Finished goods transport
- Waste from manufacturing process

In addition to emissions generated, the report considers the CO2 sequestered by trees planted on site. No offsetting activities outside the factory have been carried out so far.

Figure 1: Emissions by scope (%)



The annual emissions of Lebracs for FY 2019-20 are 22,98,768 kg CO2e.

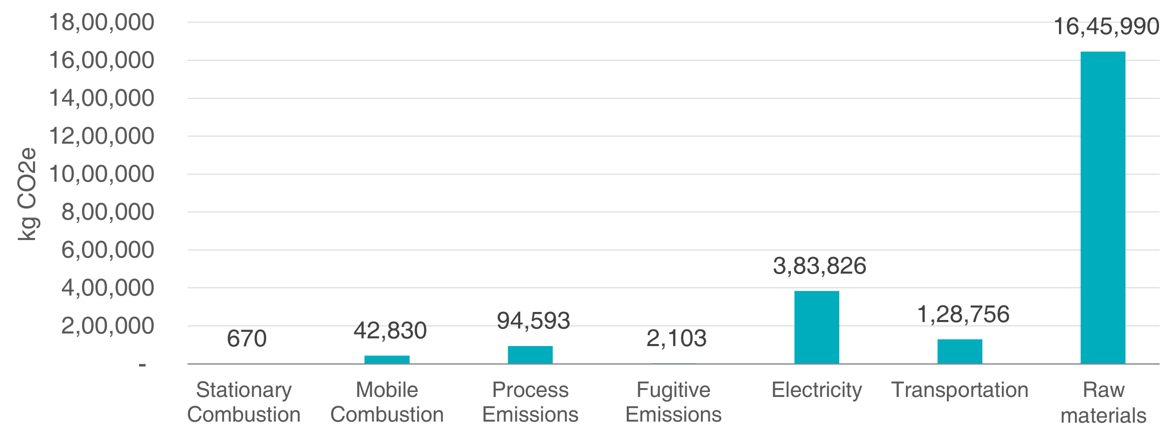
As seen in figure 1 , scope 3 emissions cover 77% (17,74,746 kg CO2e) and hence is the highest contributor of all the scopes followed by scope 2 which is 27% (3,83,826 kg CO2e) and scope 1 at 6% (1,40,197 kg CO2e).

The emissions from scope 3 can be attributed to the upstream emissions from the raw materials in the rubber manufacturing process and the large footprint of carbon steel sheets, pipes and fittings. These emissions are attributed to external factors not within the operational control of the organization and may be occurring in Scope 1 or direct emissions of the manufacturing organizations.

Emissions by category

The objective of analysing emissions based on category is to provide awareness on major causes of emissions, which can lead to targeted interventions. In addition, inputs on improving the quality of data and recommendations for future inventories have also been provided below.

Figure 2: Emissions by category (kg CO2e)



Fuels

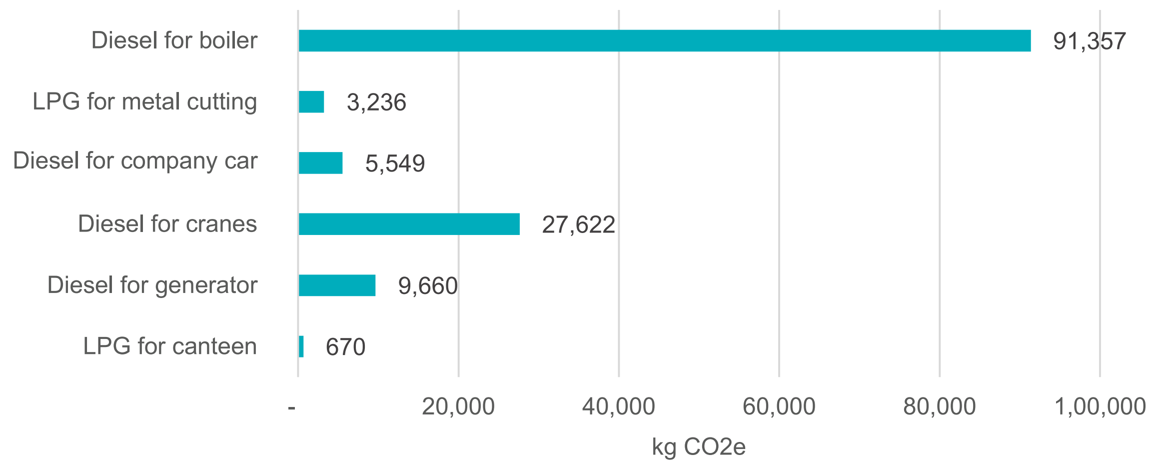
The company uses fuels for manufacturing processes and in stationary and mobile equipment, all of which form part of scope 1 emissions.

The **process based emissions** include diesel, which is used for generating steam in boilers and LPG, which is used in cutting metal cutting for production. With a total of 94,593 kg CO2e, process emissions contributes to 67% of total scope 1 emissions and is the highest contributing category of emissions.

Consumption of diesel in generators, cranes, process equipment and company owned cars form the sources of emissions under **mobile combustion**. With a total of 42,830 kg CO2e, mobile combustion contributes to 31% of the total scope 1 emissions and is the second highest contributor.

LPG used in the canteen kitchens for cooking food for the staff is the only source of emissions under **stationary emissions**. LPG usage released 670 kg CO2e contributing to 1% of total scope 1 emissions.

Figure 3: Annual emissions from fuel consumption



The diesel consumption data was collated based on purchase details through monthly bills from the local petrol station. The segregation between consumption for generators, cranes and cars was based on estimates. The data on the quantity of LPG was collected in the form of purchase records of cylinders and is found to be accurate.

A few recommendations to reduce process-based emissions include:
- Maintaining machines regularly to ensure proper functioning and high fuel efficiency
- Recording machine-wise fuel consumption to make sure machines are functioning properly and to improve data quality
- Transitioning from diesel-based boilers to agro brickets or other biofuels
- Maintaining equipment used for metal cutting to ensure efficiency and low consumption of LPG

The emissions from mobile combustion of diesel can be reduced by:
- Regular maintenance of vehicles to ensure proper functioning and efficiency
- Recording machine-wise fuel consumption to make sure machines are functioning properly and to improve data quality
- Transitioning to renewable energy generation to reduce reliance on diesel-based equipment
- Transitioning to electric vehicles to reduce transportation emissions

Emissions from stationary Emissions can be reduced by:
- Transitioning to electric cook stoves as the plant begins to generate renewable energy

Refrigerants

Fugitive emissions caused by the leakage of refrigerants from the use of air conditioners, which form part of scope 1 emissions, released 2,103 kg CO2e or 2% of the total scope 1 based emissions.

For this year's inventory, the data available was the number of air conditioners used by the company and the year of purchase. From this data, the total fugitive emissions was derived based on the average leakage and possible refrigerant type.

The following are a couple of recommendations to reduce fugitive emissions:
- Leakage from air conditioners can be minimized through regular maintenance and inspection
- Detailed records of maintenance activities undertaken on air conditioners along with type and volume of refrigerant gas refilled will help enhance accuracy of future inventories

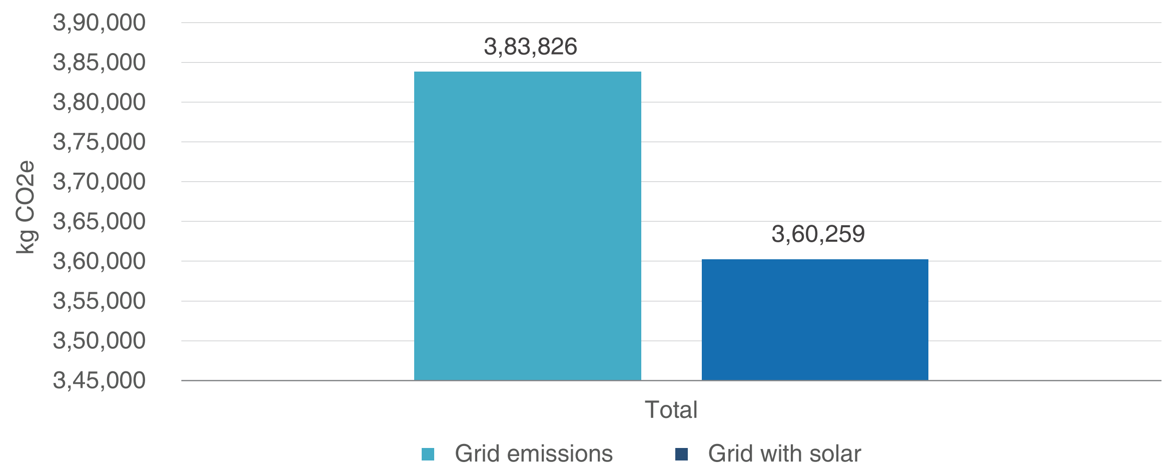
Electricity

Grid-supplied electricity contributed to a total of 3,83,826 kg CO2e or 17% of the total emissions of the plant. The consumption data was collected through the utility bills, which is a reliable and accurate source of data.

The company can explore the following options to reduce the energy demand:
- Invest in energy efficient pumps, motors and fabrication equipment
- Measure and monitor the consumption of individual departments and processes for further accuracy and efficiency
- Implement systems, procedures and training to reduce consumption on the long term

In FY 2020-21, the organization has begun transitioning to renewable sources of energy by installing a 28 KW on-site rooftop solar photovoltaic (PV) system. If the consumption of electricity in FY 2020-21 is the same as this year, it is estimated that through the rooftop solar system, the company can avoid 6% of its total electricity emissions. Futhermore, adding solar capacity as per available funds will continue to reduce the environmental impact of the organisation.

Figure 4: Potential emissions avoided through solar



Transportation

Transport information was provided in two categories – business travel by employees in trains, buses and flights and outgoing goods transported from the facility by road. Total transport-related emissions amounted to 1,28,756 kg CO2e and contributed to 7% of scope 3 emissions.

The data was collated from bills of freight companies which provided details on the destination of the goods. Based on the distance travelled, the emissions were estimated through the known mode of transport, which in all cases were either medium or heavy freight vehicles. The data on business travel was put together through the invoices of flight, rail and bus travel logged by the company.

Some recommendations around transportation are listed below:

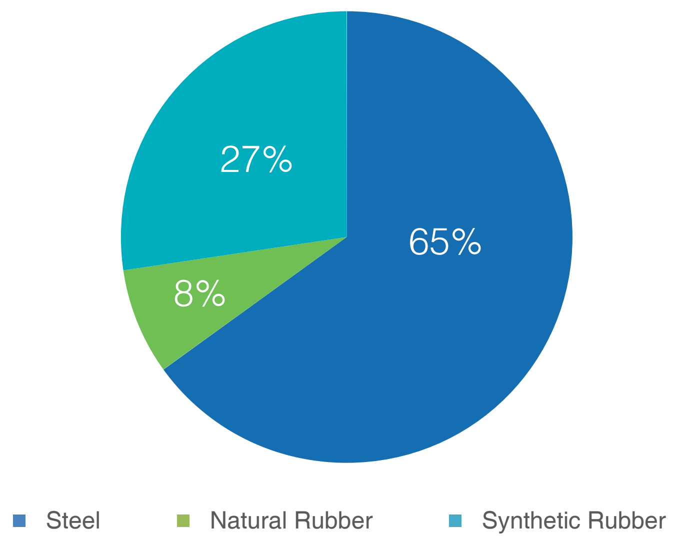
- Although travelling to visit potential and existing clients cannot be avoided, switching over to electronic modes of communication when possible would lead to significant reduction in emissions
- The company can begin collecting data on incoming goods and can gradually select appropriate suppliers based on their proximity to the factory
- Data on employee commute to and from the plant can be recorded to give a more comprehensive understanding of transportation emissions

Raw materials

The total emissions from the purchase of raw materials are 16,45,990 kg CO2e or 72% of the total emissions of the organisation. Out of the total raw material emissions, 65% was from the procurement of steel, 27% from the purchase of synthetic rubber and 3% from natural rubber.

It is important to note that the company reused the initial cutting residue of steel and rubber back in the process and sold the unusable cutting residue from the final stages of the process to recyclers, which prevented the waste from being landfilled. A total of 1,095 kg of rubber was recycled saving 4,194 kg CO2 of emissions arising from sending the materials to the landfill while 12,270 kg of steel scrap was recycled saving 1,58,407Kg CO2 arising from sending the material to the landfill.

Figure 5: Break up of emissions by type of raw material

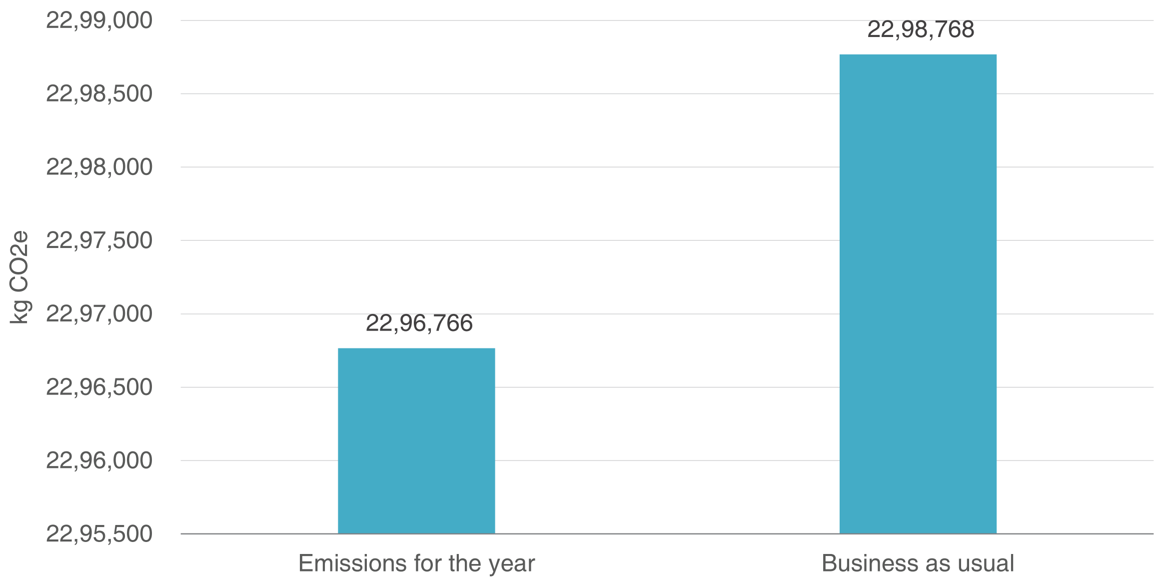


Data on the quantities of raw materials procured was collected from the accounts department which has details on all purchase orders, thus providing accurate information.

Raw materials used by the company are integral to its manufacturing process thus it cannot altogether be avoided. However, a greater understanding of supplier details and their emissions, will help make informed decisions and improve the estimates for reducing scope 3 emissions over time.

Carbon sequestration through tree planting

Figure 6: Comparison between business as usual and carbon sequestration



Over the last 15 years, LeBracs has planted 91 trees spanning 15 different species on its factory premises. During this inventory year, it is estimated that the trees sequestered 2,002 kg CO2e which is 0.09% of the total emissions.

This does not take into account the various tree planting projects outside the campus, funded by the organisation in the past. From the next inventory, the company can record its planting efforts in order to have a fuller understanding of its carbon offsets.

Process-based water use

The consumption, treatment and disposal of water is an important factor to consider for every entity in order to ensure global water security. Its scope covers GHG emissions but goes well beyond it as it also considers the depletion of the natural resource, which is vital for plant and animal life.

The company uses water primarily for the quality control processes of the fabricated metal components and in the form of steam for the vulcanisation of rubber. It sources groundwater with a borewell and also locally purchases water. In FY 2019-20, a total of 4,632,000 litres was used from the borewell or 77% of the total water used while and 1,400,000 litres or 23% of the total water consumed was purchased.

The data on water consumption was collected through metre readings for groundwater and invoice records for the purchased water, both of which provide accurate information.

A few recommendations around water use are listed below:

- Water used for processes such as fabrication and vulcanization should be reused as much as possible; therefore processes that allow for the storage of water after use can be looked into
- Data on the amount of rainwater harvested, which feeds the groundwater system, can be collected; moreover more pits for the collection of rainwater can be dug on site to prevent runoff and increase ground water reserves; this can help prevent the purchase of water and eventually help the company become net neutral, meaning that it harvests as much rainwater as it needs during the manufacturing process

Process-based waste generation

The management of waste is an important factor to consider for all manufacturing companies. The scope for waste management, like water, goes beyond the GHG emissions. Waste if not treated properly can contaminate natural resources and affect the health of the planet and its inhabitants.

The company has a waste segregation protocol, which mainly includes rubber and steel. None of the waste at the site is hazardous, hence the treatment of waste before disposal is not needed. All the rubber and steel waste is sold recyclers and thus it prevented the waste from being landfilled. For FY 2019-20, a total of 1,095 kg of rubber was recycled along with 12,270 kg of steel scrap. The data on scrap rubber and steel was collected from log books, which document the weight of the waste at time of sale.

For the next inventories, waste from other categories such plastic and paper used during packaging and organic waste from kitchen can be collected to understand waste better and to eventually reduce it.

Conclusion

With this baseline report, LeBracs has a broad overview of its GHG emissions.

It is recommended that the company add additional emissions categories as explored in the category-wise emissions section. For the next inventory, the company may also choose to set itself an emissions target. Typically one of two approaches are taken up by companies:

- reduction of absolute emissions, which is the reduction of total emissions to zero, or
- reduction of emission intensity, which sees the reduction of the volume of emissions per unit of turnover, employee or product manufactured

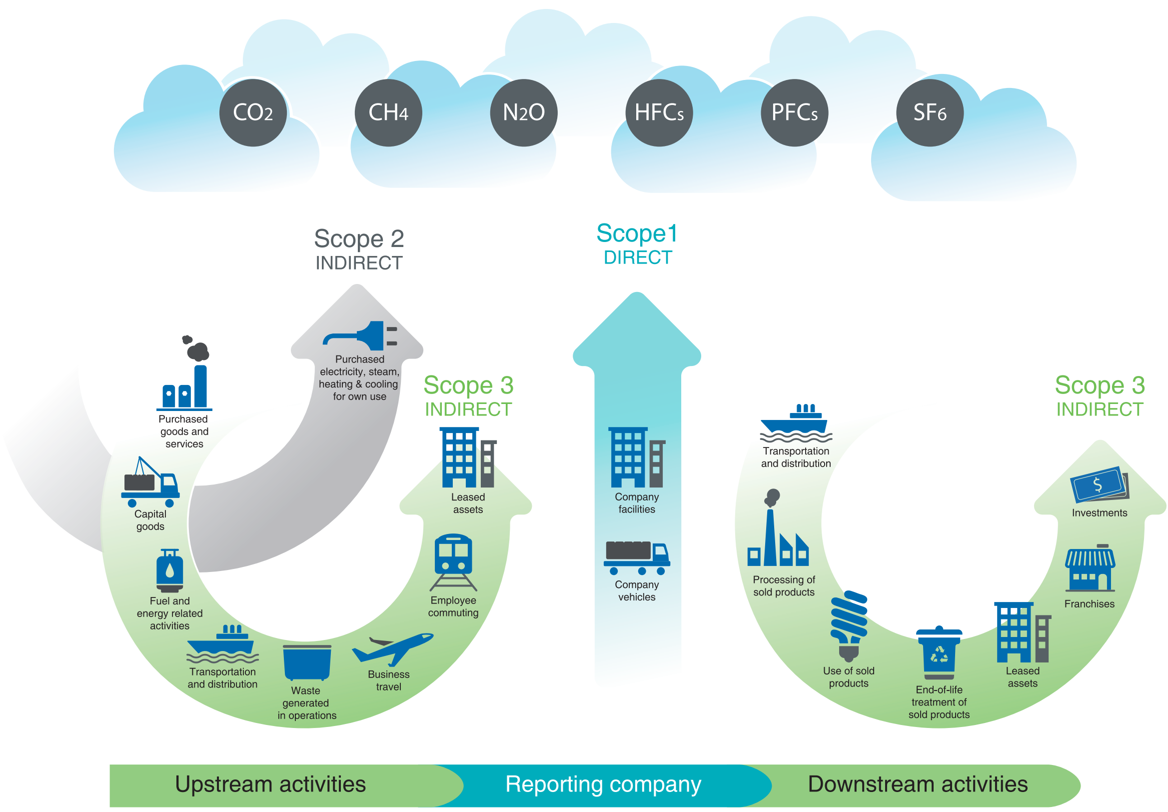
If LeBracs chooses the second approach, which is typically the intermediary approach, the **emission intensity** for its baseline year is 67.58 kg CO_2e / square metre of rubber sheet and 78.98 kg CO_2e / square metre of steel lined with rubber sheet. In addition, the **water footprint** is 117.32 literes / square metre of rubber sheet and 207.2 litres / square metre of steel lined with rubber sheet. Furthermore, the **waste generated** is 0.03 kg / square metre of rubber sheet and 0.04 kg / square metre of steel lined with rubber sheet.

Auroville Consulting, which put together this baseline report, can help Lebracs manage its carbon, bring down its emissions intensity and pave its way towards carbon neutrality. Some of the practices that Lebracs would require to undertake on a regular basis are the following:

- preparing annual emissions inventories
- setting a science-based target
- identifying and implementing mitigation measures
- compensating emissions through offsetting programs
- reporting progress to stakeholders, and
- evaluating carbon strategy

Annexure A – Methodology

Figure 4: Potential emissions avoided through solar



For all emission sources, GHG emissions are estimated by multiplying activity data by an emission factor associated with the activity that is being measured. Activity data is a quantitative measure of an activity during a given period of time that results in GHG emissions (e.g. litres of diesel used, kilometres driven and tonnes of waste sent to landfill). An emission factor is a measure of the mass of GHG emissions relative to a unit of activity. For example, data on electricity consumed to power a factory, measured in kilowatt-hours (kWh), is multiplied by the emission factor for electricity (kgCO2/kWh) to estimate the total amount of GHG emissions.

Each GHG has different characteristics, the two most prominent ones for the purpose of measuring them are: the amount of heat it absorbs and its lifespan. This is measured by the Global Warming Potential (GWP) which describes the warming potential of one unit of a given GHG relative to carbon dioxide.

Emissions from each activity are reported in metric tonnes of GHGs emitted as well as their carbon dioxide equivalent (CO2e). CO2e is a universal unit that simplifies the accounting process by producing a single number to describe the impact of all the greenhouse gases; this is done by using the GWP of each GHG.

Annexure B – References

The sources of emission factors used to derive the Lebracs emissions inventory are listed below.

Table 2: Sources of emission factors

SL No.	Emission factory Category	Reference
1	Diesel	India GHG Program – India specific road transport emissions (2015)
2	LPG	The data taken from UK Government GHG Conversion Factors 2016 for Company Reporting.
3	Electricity	Electricity emission factor CEA report 2016
4	Natural Rubber	Tampere University of technology 2017 Nokian Tyres report (Jawjit 2010)
5	Synthetic Rubber	Japan Automobile Tyre Manufacturer's association (2012)
6	Steel	Cbalance_white paper – Overview of Indian_Steel sector (Jan 2013)

LeBracs Rubber Linings Pvt. Ltd.
Greenhouse Gas Inventory (FY 2019-20)

AUROVILLE CONSULTING
Kalpana Community, Crown Road, Auroville, TN - 605101, India.
www.aurovilleconsulting.com