SHIRDI SAI ELECTRICALS LTD 25+ Years

INDOSOL SOLAR PRIVATE LIMITED

INDO TECH TRANSFORMERS LIMITED
A subsidiary of Shirdi Sai Electricals Limited

SSEL GROUP
CARBON FOOTPRINT BASELINE STUDY

FY 23-24

Released On

Report by

EXECUTIVE SUMMARY

Sustainability and ESG have become keywords in the contemporary world, and hence have taken an important place in every business process also. Businesses are no longer measured by their success in delivering profits alone, the triple bottom line of Planet, People and Profits is here to stay.

Environment Social and Governance (ESG) are the areas wherein companies are expected to implement processes, whereby the natural resources of the planet are responsibly utilized and replenished, the people in the value chain are treated fairly and business maintains transparency of economic and governance processes. Adherence to ESG factors strengthens investors' confidence of the resilience of the companies in which they invest, job-seekers and customers confidence of the social responsibility of the companies and regulators confidence of ethical and legal business process followed.

Humanity, and all living beings are running a race against global warming and climate change because of which life, as we know it, will cease to exist once the 1.5 degrees centigrade tipping point is crossed. The below picture shows how life of a human born in different decades will be impacted due to global warming. One look at this illustration will spur into implementation Green House Gases (GHG) emission reduction plans and contribute to limiting global warming within the 1.5 degrees centigrade cutoff.

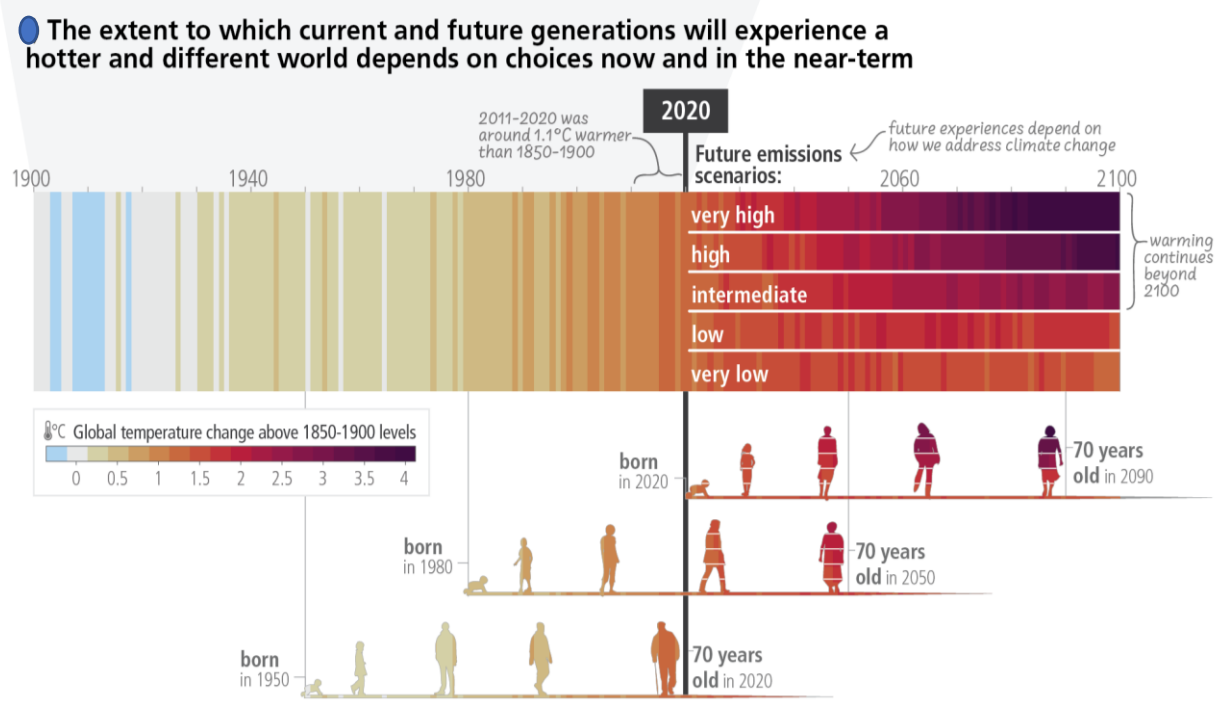


Figure 1: Global Warming Impact on Current and Future Generation

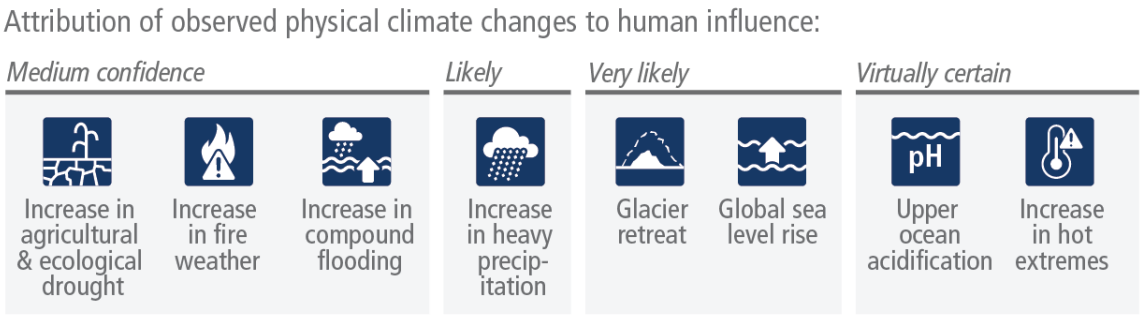


Figure 2: Climate Change Causes due to human influence

The journey of reduction of industrial GHG emissions starts with measurement of several GHG emissions and converting all emissions into a single unit called tCO2e – tonnes carbon dioxide equivalent – which is also known as carbon footprint.

It is in this context that the baseline study of carbon footprint has been taken up in SSEL group of companies.

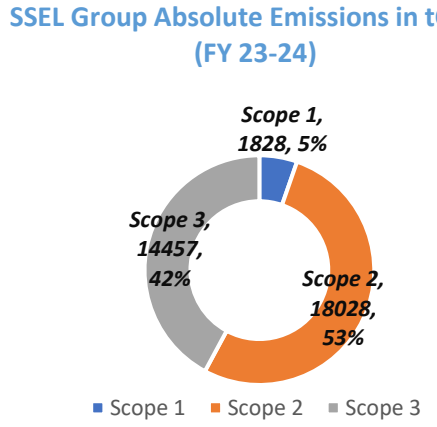
The Group companies considered for Carbon Footprint Study (GHG Emissions) are:

Shirdi Sai Electricals Limited (SSEL)	Indo Tech Transformers Limited (INDOTECH)	Indosol Solar Private Limited (ISPL)
Corporate office, Begumpet Kadapa Unit 1 (Service) Kadapa Unit 2&3 (Manufacturing) Kadapa Unit 4 (Project) Naini Manufacturing Plant	Manufacturing Plant, Kancheepuram	Corporate Office, Hitech City Manufacturing plant, Ramayapatnam

Table 1: The SSEL Group companies considered for Carbon Footprint Study

The activity data from **April 2023 to March 2024 (FY23-24)** has been considered for the carbon footprint studies and also to establish baseline carbon footprint so that the reduction strategy and road map can be put in place against these numbers to finally achieve carbon neutrality and net zero footprint in a planned and phased manner.

The outcome of the baseline study is as below:



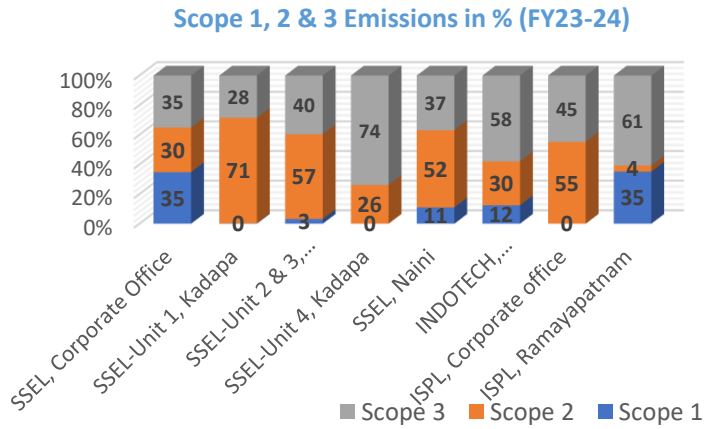
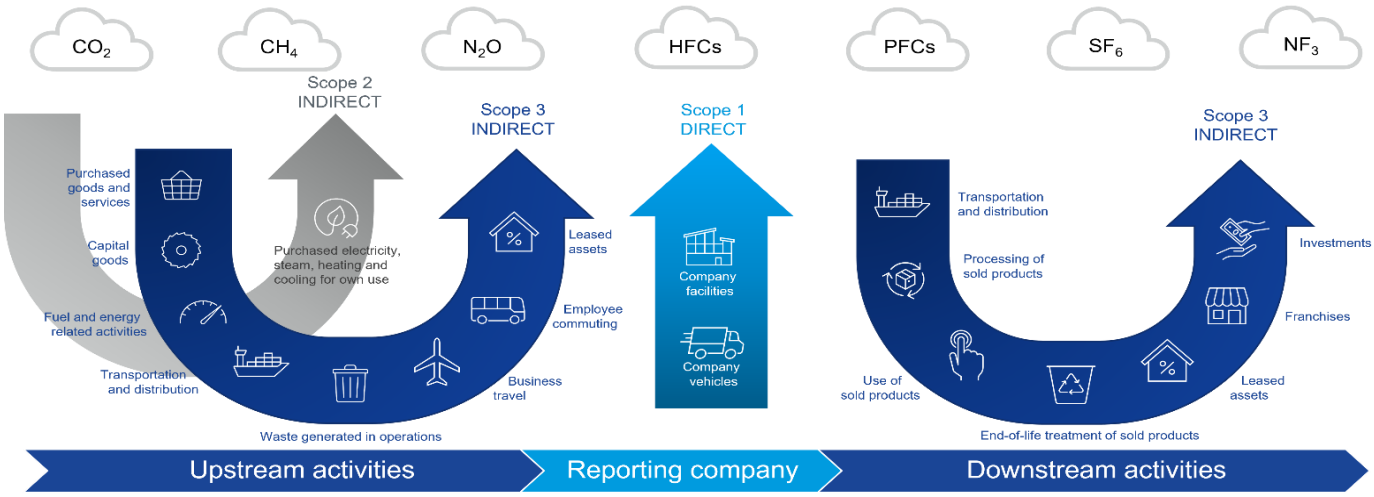


Figure 3: SSEL Group Absolute Emissions in tCO2e (FY23-24) Figure 4: Location Wise Scope 1,2 & 3 Emissions in %

As shown in figure 3, The SSEL Group companies' absolute emission for Scope 1, Scope 2 and Scope 3 is **1828 tCO2e, 18028 tCO2e and 14457 tCO2e** respectively and the total is **34313 tCO2e**. And figure 4 is the location wise emission bifurcated as Scope 1, 2 & 3.

Scope 1 is direct GHG emissions that occur from sources owned or controlled by the reporting company, while Scope 2 is the indirect emissions generated from consumption of purchased energy. Scope 3 is all other indirect emissions that occur in a company's value chain. Please refer to figure 5 for a detailed representation of the same.

Figure 5: Snap shot of classification of scope 1, 2 and 3 emissions can be understood from the below figure



This Carbon Footprint Study follows GHG Protocol Corporate Accounting and Reporting Standard for GHG inventory and emission calculation. Under this Standard, reporting Scope 1 & 2 is mandatory and Scope 3 is voluntary. We considered six emission categories out of fifteen Categories under Scope 3 emissions for voluntary reporting, namely Category 3 - Fuel and energy related emissions, Category 4 - Upstream transportation and distribution, Category 5 - Waste generation in operations, Category 6 - Business travel, Category 7 - Employee Commute, Category 9 – Downstream transportation and distribution.

SSEL Group Absolute Carbon Emissions - FY 23-24

Sl.No	Company Name	Site Name	Scope 1	Scope 2	Scope 3	Total	Absolute Emissions
					t CO2 e		
1	SSEL	SSEL, Corporate Office	71	62	72	205	**29102**
2		SSEL-Unit 1, Kadapa	0.42	103	41	144	
3		SSEL-Unit 2 & 3, Kadapa	817	14783	10207	25807	
4		SSEL-Unit 4, Kadapa	0.00	41	117	158	
5		SSEL, Naini	306	1453	1029	2788	
6	INDOTECH	INDOTECH, Kancheepuram	610	1454	2845	4909	**4909**
7	ISPL	ISPL, Corporate office	0	130	105	235	**302**
8		ISPL, Ramayapatnam	24	3	41	67	
		Total	**1828**	**18028**	**14457**		**34313**

Table 2: The SSEL Group Absolute Carbon Emissions (FY23-24)

Once absolute emissions are calculated we move on to calculation of Emission Intensity (EI) as seen in figure 6. EI or intensity ratio is the GHG impact per unit of production or unit of economic value (e.g., tCO2e emissions per MVA production or tCO2e per revenue in dollars). Many industries, particularly manufacturing, utilities, and energy, calculate their emission intensity using just Scope 1 and 2 emissions as it offers a clear, operationally-focused view of emissions that the company can control and reduce in the near term.

When calculating EI, the choice of which emissions scopes to include (Scope 1+2 versus Scope 1+2+3) depends on the context, the standards followed, and the industry requirements.

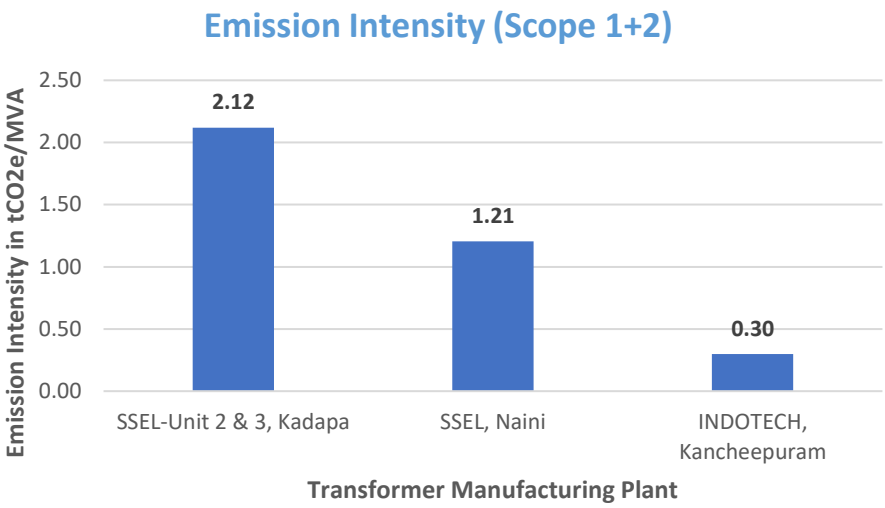


Figure 6*: Emission Intensity of Transformer Manufacturing Plant (FY23-24)*

Emission Intensity (EI) of Transformer Manufacturing Plant					
Company Name		**SSEL**		**INDOTECH**	**Total Group**
Site Name		**SSEL-Unit 2 & 3, Kadapa**	**SSEL, Naini**	**INDOTECH, Kancheepuram**	
Production	MVA	7363	1459	6933	**15755**
Scope 1		817	306	610	**1733**
Scope 2	tCO2e	14783	1453	1454	**17690**
Total (Scope1+2)		**15600**	**1759**	**2064**	**19422**
Emission Intensity (Scope 1+2)	**tCO2e/MVA**	**2.12**	**1.21**	**0.30**	**1.23**
Scope 3 (6 Categories)	tCO2e	10207	1029	2845	14081
Total (Scope1+2+3)	tCO2e	25807	2788	4909	33503
Emission Intensity (Scope 1+2+3)	**tCO2e/MVA**	**3.51**	**1.91**	**0.71**	**2.13**

Table 3: Emission Intensity of SSEL Group/Individual Transformer Manufacturing Plants (FY23-24)

Emission Intensity (EI) can be reported based on production/manpower/built up area and also on revenues. In industries where several products are manufactured the EI is measured as per sales. Given below in table 4 are examples from both solar and transformer industries.

Also, when comparing we need to compare only the EI based on scope 1+2 calculation and if scope 1+2+3 is taken into account it needs to be all 15 categories or corresponding categories of scope 3 which the peer has disclosed.

Since companies can directly influence their energy use and fuel consumption, both of which fall under Scope 1 and 2, EI is often calculated separately for Scope 1+2 only. Another set of EI calculation is also done taking into consideration Scope 1, 2 & 3. However, the EI against Scope 1+2 is considered sufficient for regulatory and reporting purposes under frameworks like the Greenhouse Gas Protocol Corporate Standards (GHG Protocol) and CDP (Carbon Disclosure Project). But, many sustainability frameworks, such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB), encourage or require reporting on Scope 3 for full transparency. Investors and stakeholders are pushing for companies to include Scope 3 emissions to evaluate total climate risk.

Peer EI Disclosures:

Name	Emission Intensity (EI) FY 2023	FY 2022	UOM	Remarks
ABB				
Scope 1+2	4.7	7.6	tCO2e/million Doller sale	
Scope 1+2+3	13541	13326	tCO2e/million Doller sale	Scope 3 includes all 15 categories.
Hitachi Energy	EI Not disclosed publicly			GHG emissions only disclosed.
Schneider Electric				
Scope 1+2	5.6	6.7	tCO2e/million Euro	
Scope 3	1581	1779	tCO2e/million Euro	Total 10 categories included. Excluded Categories: C8,C10,C13,C14 & C15
First Solar				
Scope 1+2	65	63	tCO2e/MW	
Jinko Solar				
Scope 1+2	23.14	27.25	tCO2e/MW	
Scope 1+2+3	154.78	172.60	tCO2e/MW	11 out of 15 categories included. Excluded Categories:C10, C11, C12&C14
LONGi				
Scope 3	-	23061	tCO2e/100 million RMB revenue	8 out of 15 Categories included. Excluded Categories: C2, C8, C10, C11, C13, C14 & C15.

Table 4: Peer EI Disclosure

The SSEL group wide data that has been gathered pertains to FY 23-24 and the Global Warming Potential (GWP) conversion for emission values used for this data is as per GHG IPCC AR5 report which came into effect in 2014.

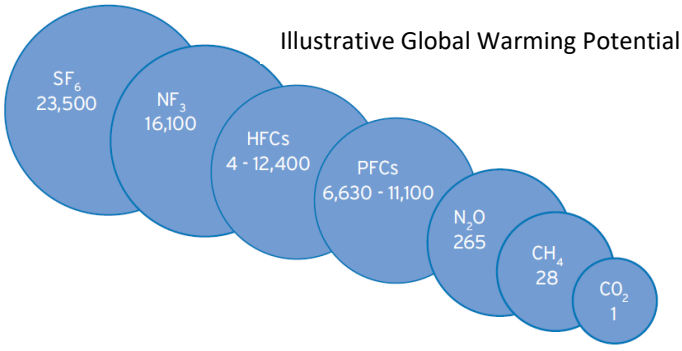


Figure 7: The GWP of IPCC recognized GHGs, AR5

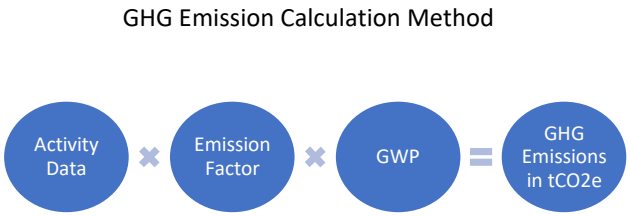


Figure 8: The GHG Emission Formula

On 7th Aug 2024 GHG IPCC AR6 has been released as the standards with recommendation to use the latest conversion values. Henceforth while calculating carbon footprint, we will use the latest recommended standards as per GHG IPCC. It is important to adhere to global recommendations because 3rd party verification/certification will take into account

conversion values especially when we are submitting numbers in the context of CSRD and other such regulations. A small example of difference between AR4, AR5 and AR6 can be seen in the Methane conversion values given below.

Sl.No	GHG	GWP value for 100-year horizon. Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)	Sixth Assessment Report (AR6)
1.	Methane – Non-Fossil (CH4)	25	28	27
2.	Methane – Fossil (CH4)	N/A	30	29.8

Table 5: Methane GWP value with respect to different assessment report

It is important to recognize some of the challenges faced while gathering data and cross verification of data with source. We need to keep in mind several important parameters like period authenticity, plant distinction, and classification specificity. This study, though internal, has been done with the intention of public disclosure of data and report; as well as preparedness for scrutiny by client or any other stakeholder, including third party audit. While gathering groupwide data several deficiencies at the source have been identified and rectified because of which data accuracy can be claimed to a large extent. Yet, some more discipline is needed to be completely accurate.

For example, total production MVA of Unit 2&3 Kadapa was showing less than Naini and Indotech due to a manual error. Similarly, DG set diesel consumption in unit 2&3 Kadapa, on verification with store entry was found to have data pertaining to Jan-March of FY 22-23 instead of FY 23-24. Calendar year data was provided instead of financial year.

An example of data collection, discipline that has to be discussed and implemented pertains to SAP entries of Scope 3 Category 4 (Upstream T&D). Here, inward materials as varied as cotton gloves, screws and 10 kVA UPS were entered in SAP as number of items (nos.) but when the weight of each materials/item was required to calculate the emission values (as it pertains to transportation) the data was simply converted to tons and presented. On verification it was found that there was no record maintained of weight of materials/item in any inward registers. So, we were constrained to use unsubstantiated data or simply ignore the data – we chose the former. Table 6 below reflects this issue.

Material Sl.no	Material Name	Actual qty received Values	UOM	After Conversion Values	UOM
191	Screws	119716	Nos	119.72	Tonne
226	Cotton hand gloves	55000	Nos	55	Tonne
293	10 kVA UPS	21	Nos	0.02	Tonne

Table 6: Some examples of uncertainty conversion done by site team

Emission Reduction:

As shown in table 4, peers who are part of the transformer industry have not separately reported EI on absolute emission for transformer manufacturing because they have multiple products. Hence, the suggestions on high emissions and reduction strategy are general reduction idea/processes and the comparison is largely between our own three separate plants in three different locations showing EI in tCO2e per MVA production.

On a study of table 3, Unit 2 & 3 Kadapa produced 7363 MVA against Indotech production of 6933 MVA but the scope 2 emissions of Unit 2 & 3 Kadapa are 14783 tCO2e compared to 1454 tCO2e of Indotech. This is because of high electricity consumption at Kadapa while Indotech has to its advantage both outsourced tank fabrication and renewable energy source. As, Indotech has outsourced the tank, this emission is added under scope 3 of upstream categories C1 & C4 which deals with purchased goods and transportation. And, the absolute emissions scope 1+2+3 is 25807 tCO2e for Kadapa and only 4909 for Indotech for the same MVA as mentioned above.

However, in-house tank fabrication is seen as a strength for cost-effectiveness as well as efficient timelines. In this specific case to give a recommendation on emission reduction, we need to separate data of energy use for fabrication unit 3 at Kadapa and analyse consumption patterns. In the detailed report we will talk about other such observations on emission comparisons.

One more example that can be cited here is emission due to inhouse canteen which is reflected in huge numbers in Kadapa under scope 1 (LPG use) where as in both Naini and Indotech this service is outsourced. Thus, to become more energy efficient and reduce our EI, the commonly adapted method is outsourcing production of certain high energy consumption and possibly non-core production components/process.

For emission reduction we have worked out several obvious opportunities and you can see a couple of examples below which are common to all three transformer manufacturing plants.

Reduction Opportunities	**Unit 2&3 Kadapa**		**SSEL, Naini**		**Indotech**	
tCO2e	**From**	**To**	**From**	**To**	**From**	**To**
Switch Diesel Fork lift to Electric Fork lift powered by renewable energy (Scope 1)	134.23	0	6.94	0	N/A - Only Electric forklift are in use.	
Modify DG set to run on dual fuel (Now mandatory in Maharashtra, NCR, optional if fitted with retrofit emission control device (RECD) in Goa, Gujarat. (Scope 1)	191.25	154	26.56	21.38	96.48	77.66
Total Reduction in tCO2e	**171.48**		**12.25**		**19.30**	

Table 7: Example of Emission Reduction Opportunities

The main report lists out several other such opportunities which can lead to total reduction of **5542 tCO2e** – as below:

UOM: tCO2e

Site Name	Unit 2&3 Kadapa		Naini		Indotech		Total Reduction
	From	To	From	To	From	To	
Scope 1	817	124	306	286	610	245	**988**
Scope 2	14783	11087	1453	1235	1454	1236	**4132**
Scope 3	10207	9901	1029	998	2845	2760	**422**
Reduction	25807	21202	2788	2519	4909	4241	
Total Reduction	**4605 (18%)**		**269 (9.6%)**		**668 (13.6%)**		**5542**

Table 8: Expected Emission Reduction

An example of emission and cost reduction is worked out in detail in the table 9 below. This is with respect to 15 nos. diesel run forklift in Unit 2&3 Kadapa which currently accounts for 134 tCO2e under scope 1, i.e., approximately 8.95 tCO2e per forklift. If they are converted to renewable electricity, we reduce not just emission to zero tCO2e but also save on fuel by Rs.3 Lakhs per year after the payback period of 4.3 years with an initial investment of Rs. 13 Lakhs. It is pertinent to note here that @ 304 working days per year, each of the 15 forklift runs on an average only for 2 h 45 minutes per day, but we have 15 forklift operators on our rolls.

Cost Reduction - Switch from 3-ton Diesel Fork lift to Electric Fork lift			
Description	**UOM**	**SSEL Unit 2&3 Kadapa**	**SSEL Naini**
One Diesel Forklift (FY 23-24)			
Operating hour	h/year	835	648
Diesel consumption	L/year	3339	2590
Diesel Cost@Rs.97/L for Kadapa & Rs.88.51 for Naini	Rs/year	323889	229241
GHG Emission	tCO2e	8.95	6.94
1. Proposed Conversion - Electric Forklift Powered by Grid Electricity			
Electricity Consumption	kWh/annum	10017	7770
Electric Cost @Rs.5.85 for Kadapa & Rs.7.1 for Naini	Rs/year	58601	55167
Total Investment (CAPEX Electric forklift)	Rs	1106000	1106000
GHG Emission	tCO2e	7.17	5.56
Annual Net Saving on fuel	**Rs/year**	**265289**	**174074**
GHG Emission Reduction	**tCO2e**	**1.78**	**1.38**
Payback Period	**Year**	**4.17**	**6.35**
ROI	**%**	**23.99**	**15.74**
2. Proposed Conversion - Electric Forklift Powered by Renewable Electricity			
Capacity (Capacity = No of Module *550 wp) 9 module / 256 sq.ft for Kadapa & 7 module / 186 sq.ft for Naini	kW	5	4
Roof top Solar Power (PV Cost + Invertor + Installation)	Rs	194166	158909
Maintenance cost / instead of fuel	Rs/year	22452	1264909
Total Investment (CAPEX Electric forklift + Roof top Solar + Maintenance)	Rs	1300166	1264909
Annual Net Saving on fuel	**Rs/year**	**301437**	**211825**
GHG Emission Reduction	**tCO2e**	**8.95**	**6.94**
Payback Period	**Year**	**4.31**	**5.97**
ROI	**%**	**23.18**	**16.75**

Table 9: Costing for switching from current Diesel forklift to Electric forklift + Renewable power

Similarly, you will find details in this report on how with Dual Fuel DG set cost efficiency can be reduced about Rs.20 Lakhs per annum by following Government Compliance & Rules for Diesel Generators in India. Under this compliance State Pollution Control Board of Maharashtra has made it mandatory for DG set to use Dual Fuel Kit/Retrofit Emission Control Devices (RECD). While investing approx. Rs.6.6 Lakhs for Dual Fuel Kit per DG set we will save Rs.20 Lakhs on fuel as per our current expenditure and also GHG emission reduction of 37 tCO2e (from 191 tCO2e to 154 tCO2e). To further reduce GHG emission, we can switch to Biogas or Biofuel based on availability for up to 80 to 90 % emission reduction.

Business Impact in Global Context:

Since the release of the Intergovernmental Panel on Climate Change (IPCC) "Global Warming of 1.5°C" report in 2018 which positioned the efforts of the private sector as integral to ensure that global warming stays within the 1.5°C limit; reporting frameworks, voluntary and mandatory, have grown to facilitate the integration of sustainability into organisations' strategies and to guide them towards greater transparency for their stakeholders.

Globally, legislation mandating carbon emission disclosure has gained momentum as governments aim to combat climate change and ensure accountability from businesses. Various countries and regions have introduced laws, regulations, or frameworks requiring companies to disclose their greenhouse gas (GHG) emissions, particularly carbon dioxide (CO_2), as part of broader efforts to track progress toward climate targets such as the Paris Agreement.

Some of the important standards for energy & emissions are GHG protocol, ISO 14064, ISO 50001, ISO 14001, Net Zero Standards SBTi, among several others including legislation like CSRD, CBAM, and BRSR SEBI reporting. Government of India has announced "Panchamrit" at COP 26 with its short term and long-term targets which includes;

- Increasing non-fossil fuel capacity by 500GW by 2030.
- 50 per cent of its energy requirements to come from renewable energy by 2030.
- Reduction of total projected carbon emissions by one billion tonnes from now to 2030.
- Reduction of the carbon intensity of the economy by 45 per cent by 2030, over 2005 levels.
- Achieving the target of net zero emissions by 2070.

Target Setting for SSEL Group Companies:

As the FY 23-24 data for footprint has been successfully gathered and baseline established, the roadmap for reduction strategy will fall under two broad categories.

Long term target:

- To become a carbon neutral company by 2040 with respect to only scope 1+2.
- To reduce scope 3 emission by 50% from a 2023 base year by 2030 (EU has a target of reducing net GHG emission by 55% by 2030 and India has a target of reducing carbon emissions by 50% by 2030 and for the entire economy to be net zero by 2070)
- To become a net zero company by 2060
- Reach RE100 status by 2035

Short term target:

Based on above long term targets the roadmap for short term target can be modeled as below for a 3-year period and review, course correct in 2027.

- Reduce Scope 1+2 absolute emission by 5 % annually from a 2023 base year.
- Reduce Scope 3 absolute emission by 3 % annually from a 2023 base year.
- Increase renewable energy share by 5 % annually from a 2023 base year.

As already mentioned, Sustainability & ESG now need to be embedded in business processes, practices and must be seen in the culture of an organization. The ask for ESG is important from the investor and regulatory point of view because these are the principles which ensure the resilience of a company. The process makes it important to assess every pillar under a risk assessment model and build in a risk culture.

Companies are expected to establish a structure of Risk Governance for ESG risk, predominantly climate risks. It is not to become risk averse but to become risk aware, build resilience based on an ever-ready and evolving risk recognition, mitigation, preparedness processes.

Further to the regulatory & legislative frameworks and adherences as per the umbrella or standalone standards and 3rd party certified public disclosures, the businesses seek ESG scores through recognized assessment agencies. There are several assessing agencies which give scores to businesses based on their ESG adherences and public disclosures – for example, S&P Global, Bloomberg, MSCI among others.

Below table shows a few of our peers' S&P Global ESG Scores 2023.

Peer/Country	S&P ESG Score	Peer/ Country	S&P ESG Score
Schneider Electric/France	88	LONGi/PRC	50
ABB Ltd/ Swiss Confed.	65	First Solar Inc/USA	50
Toshiba Corp/Japan	48	JA Solar /PRC	42
Hitachi Corp/Japan	38	Jinko Solar/PRC	39

Table 10: Peer S&P ESG Score

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ABBREVIATIONS

Abbreviations	
AC	Air Conditioning
ACT	Assessing low Carbon Transition
ANSI	American National Standards Institute
AP	Andhra Pradesh
AR	Assessment Report
BRSR	Business Responsibility and Sustainability Report
C	Category
CBAM	Carbon Border Adjustment Mechanism
CCA	Climate Change Agreement
CCL	Climate Change Levy
CDP	Carbon Disclosure Project
CFD	Climate-related Financial Disclosure
CH4	Methane
CII	Confederation of Indian Industry
CNG	Compressed natural gas
CO2	Carbon Dioxide
CO2-FFI	Carbon dioxide from Fossil Fuel combustion and Industrial processes
CO2-LULUCF	Carbon dioxide and Land Use, Land-Use Change, and Forestry
COP	Coefficient of Performance
COP	Conference of the Parties
CRC	Carbon Reduction Commitment
CRD	Climate Related Disclosures
CRGO	Cold Rolled Grain Oriented Steel
CSA	Corporate Sustainability Assessment
CSDDD	Corporate Sustainability Due Diligence Directive
CSRD	Corporate Sustainability Reporting Directive
CVM	Brazilian Securities and Exchange Commission
DEFRA	Department for Environment Food and Rural Affairs
DG	Diesel Generator
DJSI	Dow Jones Sustainability Indexes
e.g.,	Example
EF	Emission Factors
EHS	Environment, Health, and Safety
EI	Emission Intensity
ELV	Emissions Limit Values
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
EPR	Environmental Permitting Regulations
ESG	Environmental Social Governance
ESOS	Energy Savings Opportunity Scheme
ETS	Emissions Trading Scheme
EU	European Union
EV	Electric Vehicle
FO	Furnace Oil
FRFI	Federally Regulated Financial Institutions
FY	Financial Year
GHG	Green House Gas
GRI	Global Reporting Initiative
GWP	Global Warming Potential
HDV	Heavy Duty Vehicle
HFC	Hydrofluorocarbon
HSD	High Speed Diesel
HVAC	Heating, Ventilation, and Air Conditioning
ICAO	International Civil Aviation Organization

IEC	International Electrotechnical Commission
IFRS	International Financial Reporting Standards
INDOTECH	Indo Tech Transformers Limited
IPCC	Intergovernmental Panel on Climate Change
IPCC SR15	IPCC Special Report on Global Warming of 1.5°C
ISO	International Organization for Standardization
ISPL	Indosol Solar Private Limited
ISSB	International Sustainability Standards Board
kg	Kilogram
km	Kilometre
kVA	Kilo Volt Ampere
L	litre
LCA	Life Cycle Assessments
LDV	Light Duty Vehicle
LED	Light-emitting diode
LLP	Limited Liability Partnership
LPG	Liquefied Petroleum Gas
MCPD	Medium Combustion Plant Directive
MCR	Mandatory Carbon Reporting
MDV	Medium Duty Vehicle
MS	Mild Steel
MSCI	Morgan Stanley Capital International
MVA	Mega Volt Ampere
MW	Megawatt
N/A	Not Applicable
N2O	Nitrous oxide
NF3	Nitrogen trifluoride
NFRD	Non-Financial Reporting Directive
Nos	Numbers
NSF	National Sanitation Foundation
NZD	New Zealand Dollar
OHS	Occupational Health and Safety
OIP	Oil Impregnated Paper
OLTC	On-Load Tap Changer
PAS	Publicly Available Specification
Pax-km	passenger-kilometre
PCR	Product Category Rules
PFC	Perfluorocarbon
PPA	Power Purchase Agreement
ppb	Parts per billion
ppm	Parts per million
PRC	People's Republic of China
PSR	Product-Specific Rules
PV	Photovoltaic
RE	Renewable Energy
REACH	Registration, Evaluation, Authorisation, and Restriction of Chemicals
REC	Renewable Energy Certificates
RMB	Chinese yuan
RoHS	Restriction of Hazardous Substances
RTCC	Remote Tap Changer Control
S&P	Standard & Poor's
SAF	Sustainable Aviation Fuel
SAP	Systems Applications and Products in Data Processing
SASB	Sustainability Accounting Standards Board
SBTi	Science Based Targets initiative
SDG	Sustainable Development Goals
SEBI	Securities and Exchange Board of India
SEC	Securities and Exchange Commission
SECR	Streamlined Energy & Carbon Reporting
SF6	Sulphur hexafluoride
SFC	Specific Fuel Consumption
SFRD	Sustainable Finance Disclosure Regulation
Sl.no	Serial Number
SOP	Standard Operating Procedure
SSEL	Shirdi Sai Electricals Limited

t	Tonne
T&D	Transportation and Distribution
TC	Technical Committee
TCFD	Task Force on Climate-related Financial Disclosures
tCO2e	Tonne of Carbon Dioxide equivalent
TG	Telangana
TN	Tamil Nadu
TNFD	Task Force on Nature-related Financial Disclosures
ts	short ton
UAE	United Arab Emirates
UK	United Kingdom
UL	Underwriters Laboratories
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNSDG	United Nations Sustainable Development Group
UOM	Unit of Measurement
UP	Uttar Pradesh
UPS	Uninterruptible Power Supply
USA	United States of America
USD	United States Dollar
VCS	Voluntary Carbon Standards
VERRA	verification
WBCSD	World Business Council for Sustainable Development
WEEE	Waste from Electrical and Electronic Equipment
WRI	World Resources Institute
WTT	Well-To-Tank
WWF	World-Wide Fund for Nature
YoY	year over year

1. INTRODUCTION

A carbon footprint study is a systematic analysis of the total greenhouse gas (GHG) emissions generated by an organization's activities, including manufacturing, energy usage, transportation, and supply chain operations. This study measures emissions in **carbon dioxide equivalents (CO_2e)**, covering various GHGs such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), Hydrofluorocarbon (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF_6) and Nitrogen trifluoride (NF3).

1.1 Overview of the scopes

- **Scope 1 (Direct emissions)**:
  Emissions from operations that are owned or controlled by the reporting company.
  Examples: Emissions from stationary combustions, Mobile Sources (Owned Vehicle), Refrigeration/AC equipment use, Fire suppression and Purchased gases.
  Scope 1 emissions considered for our organization is shown in below table 10.

	Scope 1
1	Company Owned Vehicles
2	Refrigerant top up
3	CO2 used for refilling into fire extinguisher
4	Gas mixture used in welding (Argon + Carbon dioxide)
5	Acetylene (used in Brazing, Cutting)
6	LPG used in Brazing, Cutting
7	LPG used in Canteen
8	Diesel used in DG sets
9	Biomass used in Canteen (Carbon Neutral)
10	Fuel used in Thermic Fluid Heater

Table 11: Scope 1 Emissions Considered

- **Scope 2 (Indirect emissions)**:
  Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company.
  Examples: Use of purchased electricity, steam, heating, or cooling.

	Scope 2
1	Power obtained from GRID
2	Purchased DG Power
3	Purchased Cooling

Table 12: Scope 2 Emissions Considered

- **Scope 3 (Indirect emissions):**
  All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.
  Examples: Cradle-to-gate emissions of purchased goods and services, emissions from use of sold products etc.,

  Scope 3 has 15 categories as mentioned in table 12 and the highlighted categories are considered for emission accounting.

Scope 3			
Category	**Upstream**	**Category**	**Downstream**
C1	Purchased goods and Services	C9	Downstream Transportation & Distribution
C2	Capital goods	C10	Processing of sold products
C3	Fuel & Energy related Activities	C11	Use of Sold products
C4	Upstream Transportation & Distribution	C12	End of life treatment of sold products
C5	Waste Generation	C13	Downstream Leased assets
C6	Business Travel	C14	Franchises
C7	Employee Commute	C15	Investments
C8	Upstream leased assets		

Table 13: Scope 3 Emissions Considered (Highlighted)

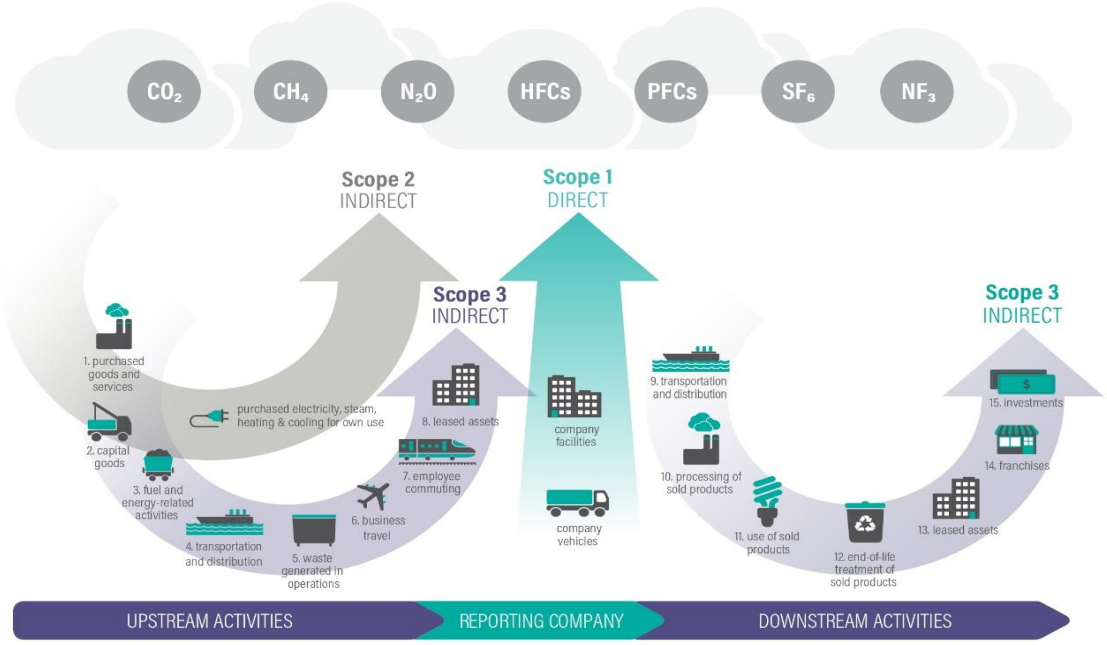


Figure 9: Scope and Emissions across value chain

1.2 Methodology for Calculating Carbon Footprint in tCO2e

1. **Data Collection**: Gathering data on Scope 1, Scope 2 and Scope 3 emissions.
2. **Emission Calculation**: Using standardized protocols such as the Greenhouse Gas Protocol or ISO 14064 to calculate emissions from the collected data.
3. **Analysis and Reporting**: Analysing the results to identify key areas of emission and opportunities for reduction. Reporting the findings in accordance with industry standards.

A carbon footprint study helps organizations:

1. **To Quantify their carbon emissions**: This provides a clear picture of where emissions are coming from.
2. **Identify reduction opportunities**: By understanding their emission sources, companies can make targeted efforts to reduce their carbon footprint.

3. **Comply with regulations**: Many governments have implemented emission reduction targets, and a carbon footprint study can help organizations ensure compliance with these policies.
4. **Build sustainable business practices**: Consumers, investors, and governments increasingly demand that companies operate in an environmentally responsible manner.

1.3 Financially Measurable and Quantifiable Benefits

1. **Cost Savings through Energy Efficiency**
    - **How it works**: A carbon footprint study helps organizations and individuals understand where and how energy is being consumed. By pinpointing high-energy-use areas, they can target improvements more effectively. By optimizing energy consumption (e.g., using energy-efficient machinery, reducing waste, and upgrading facilities), organizations can lower energy costs.
    - **Example**: A manufacturing plant switching to LED lighting or improving insulation can reduce electricity consumption by 20-30%, directly translating into reduced utility bills resulted in reduced emissions.
    - **Benefit**: Tangible cost reductions and increased profitability.
2. **Reduction in Operational Costs**
    - **How it works**: Reducing emissions often involves cutting down on unnecessary waste, improving resource management, and reducing the consumption of raw materials.
    - **Example**: A company adopting a lean manufacturing process can reduce material waste, cutting both costs and carbon emissions.
    - **Benefit**: Reduced material costs and lower waste disposal fees.
3. **Carbon Credits and Financial Incentives**
    - **How it works**: Many governments and carbon trading systems offer incentives for reducing emissions. By lowering their carbon footprint, companies can earn carbon credits, which can be sold or traded in carbon markets.
    - **Example**: A company that invests in renewable energy can earn carbon credits that can be sold, generating revenue.
    - **Benefit**: Direct financial gain from carbon credits or tax benefits from government programs promoting lower emissions.
4. **Regulatory Compliance and Avoidance of Fines**
    - **How it works**: Many countries are implementing carbon pricing mechanisms, emissions trading schemes, and stricter regulations on GHG emissions. A carbon footprint study helps organizations stay compliant with these regulations, avoiding penalties.
    - **Example**: In the European Union, non-compliance with emissions targets can lead to heavy fines. A carbon footprint study ensures organizations meet the regulatory thresholds.
    - **Benefit**: Avoidance of legal fees, penalties, and potential shutdowns.
5. **Enhanced Supply Chain Efficiency**
    - **How it works**: By assessing the emissions generated throughout the supply chain, organizations can identify inefficiencies in sourcing, manufacturing, and logistics.
    - **Example**: A company identifying and sourcing raw materials from low-carbon suppliers or using more efficient transportation can reduce both emissions and supply chain costs.

- **Benefit**: Streamlined operations, reduced transportation and sourcing costs, and a more resilient supply chain.

1.4 Non-Financial Measurable Advantages

1. **Improved Corporate Reputation and Brand Value**
   - **How it works**: Consumers are becoming more conscious of environmental sustainability, and companies that reduce their carbon footprint often receive positive recognition. A carbon footprint study demonstrates a commitment to sustainability.
   - **Example**: Companies like Unilever and Patagonia have gained significant market share and brand loyalty by being recognized as environmentally responsible.
   - **Benefit**: Enhanced corporate image, increased customer loyalty, and differentiation from competitors.
2. **Attracting Eco-conscious Consumers and Investors**
   - **How it works**: Investors and consumers are increasingly aligning their decisions with sustainability goals. By actively reducing carbon emissions, companies attract eco-conscious investors and customers who prioritize environmental responsibility.
   - **Example**: Tesla's focus on reducing its carbon footprint has made it highly attractive to both sustainability-focused investors and customers.
   - **Benefit**: Increased market value, stronger investor interest, and a larger customer base.
3. **Employee Morale and Retention**
   - **How it works**: Employees, particularly younger generations, value working for environmentally responsible companies. A carbon footprint study can lead to programs that engage employees in sustainability efforts.
   - **Example**: Google offers employees incentives for using electric vehicles and participating in sustainability initiatives, improving employee satisfaction.
   - **Benefit**: Higher employee morale, improved retention rates, and a more motivated workforce.
4. **Future-proofing Against Environmental Risks**
   - **How it works**: Climate change can lead to resource shortages, extreme weather, and other disruptions. A carbon footprint study helps organizations adapt to these changes by focusing on sustainable practices that reduce environmental risks.
   - **Example**: A company that relies on water-intensive processes might reduce water usage in anticipation of future water shortages.
   - **Benefit**: Reduced vulnerability to climate-related risks, such as resource scarcity and supply chain disruptions.
5. **Sustainability Leadership and Innovation**
   - **How it works**: Companies that take the lead in reducing emissions often drive innovation. A carbon footprint study pushes organizations to find new ways to reduce emissions, which can result in technological advancements.
   - **Example**: IKEA’s commitment to reducing its carbon footprint led to innovations in sustainable furniture design and renewable energy usage.
   - **Benefit**: Positioned as a leader in sustainability, driving innovation and influencing industry trends.

6. **Enhanced Stakeholder Relationships**
    - **How it works**: Stakeholders, including customers, employees, suppliers, and regulators, are increasingly concerned with environmental performance. A carbon footprint study shows a company's commitment to addressing climate change, improving trust and relationships with stakeholders.
    - **Example**: A company reporting a successful carbon reduction strategy to shareholders may receive stronger support and advocacy.
    - **Benefit**: Stronger stakeholder trust and long-term relationship building

1.5 Climate Change: The result of increasing GHG emissions

As the world becomes more conscious of climate change, industries are under increasing pressure to manage their environmental impact. Climate change refers to significant shifts in global temperatures and weather patterns over time. While Earth's climate has naturally fluctuated over millions of years, the current phase of change is largely driven by human activities.

Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above pre-industrial level (1850–1900) in 2011–2020. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.

Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts on food and water security, human health and on economies and society and related losses and damages to nature and people. Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected.

Climate change represents an urgent and potentially irreversible threat to human societies and the planet. In recognition of this, the overwhelming majority of countries around the world adopted the Paris Agreement in December 2015, the central aim of which includes pursuing efforts to limit global temperature rise to 1.5°C.

Figure 10 shows, the causal chain from emissions to resulting warming of the climate system. Emissions of GHG have increased rapidly over recent decades.
Panel (a): Global net anthropogenic GHG emissions include CO2 from fossil fuel combustion and industrial processes (CO2-FFI) (dark green); net CO2 from land use, land-use change and forestry (CO2-LULUCF) (green); CH4; N2O; and fluorinated gases (HFCs, PFCs, SF6, NF3) (light blue). These emissions have led to increases in the atmospheric concentrations of several GHGs including the three major well-mixed GHGs CO2, CH4 and N2O
Panel (b), annual values: To indicate their relative importance each subpanel's vertical extent for CO2, CH4 and N2O is scaled to match the assessed individual direct effect (and, in the case of CH4 indirect effect via atmospheric chemistry impacts on tropospheric ozone) of historical emissions on temperature change from 1850–1900 to 2010–2019. This estimate arises from an assessment of effective radiative forcing and climate sensitivity. The global surface temperature (shown as annual anomalies from an 1850–1900 baseline) has increased by around 1.1°C since 1850–1900.
Panel (c): The vertical bar on the right shows the estimated temperature (very likely range) during the warmest multi-century period in at least the last 100,000 years, which occurred around 6500 years ago during the current interglacial period (Holocene). Prior to that, the next most recent warm period was about 125,000 years ago, when the assessed multi-century

temperature range [0.5°C to 1.5°C] overlaps the observations of the most recent decade. These past warm periods were caused by slow (multi-millennial) orbital variations. Formal detection and attribution studies synthesise information from climate models and observations and show that the best estimate is that all the warming observed between 1850–1900 and 2010–2019 is caused by humans.

Panel (d): The panel shows temperature change attributed to: total human influence; its decomposition into changes in GHG concentrations and other human drivers (aerosols, ozone and land-use change (land-use reflectance)); solar and volcanic drivers; and internal climate variability.

Figure 11 shows the Impact from human caused climate change.

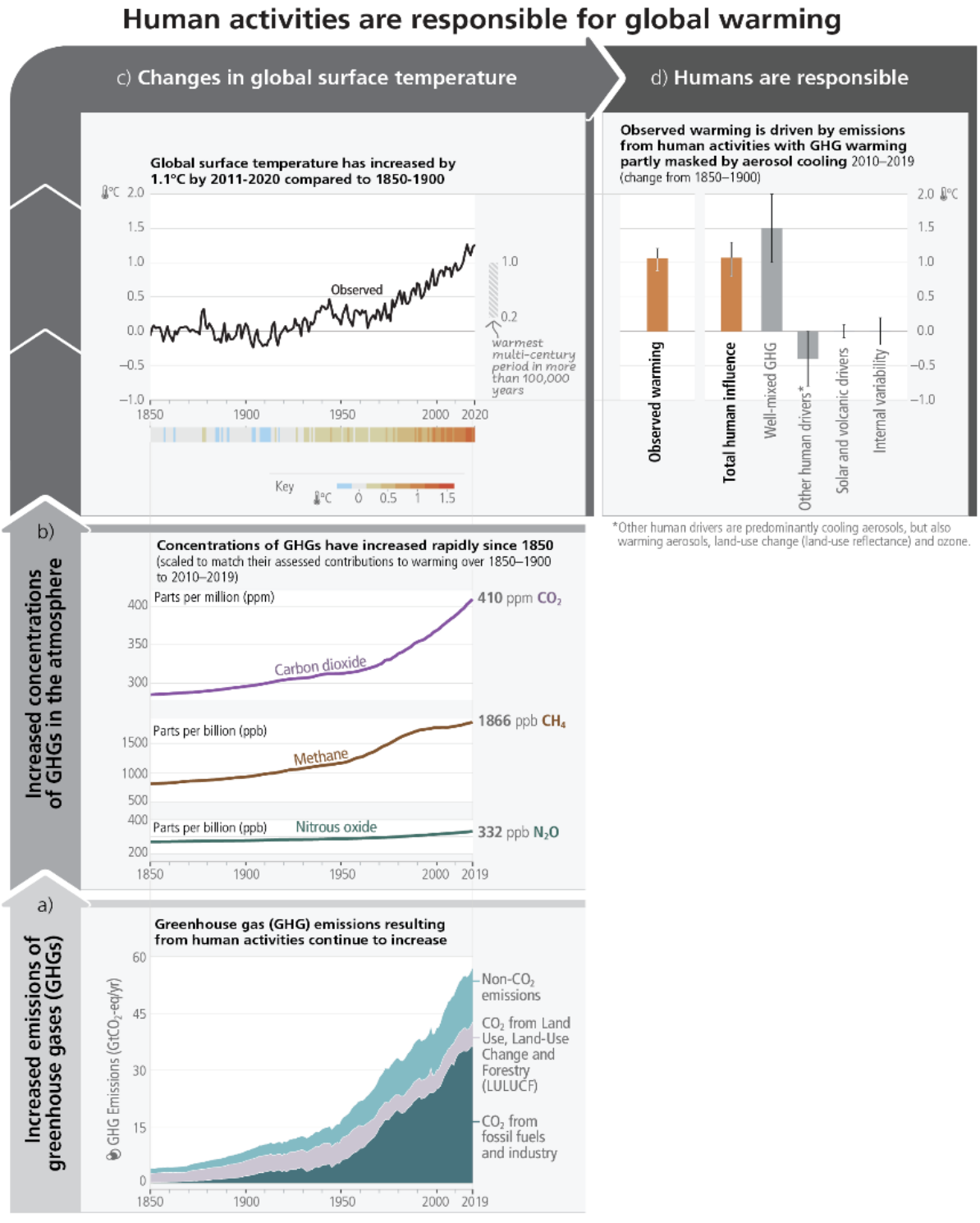


Figure 10: Human activities are responsible for global warming

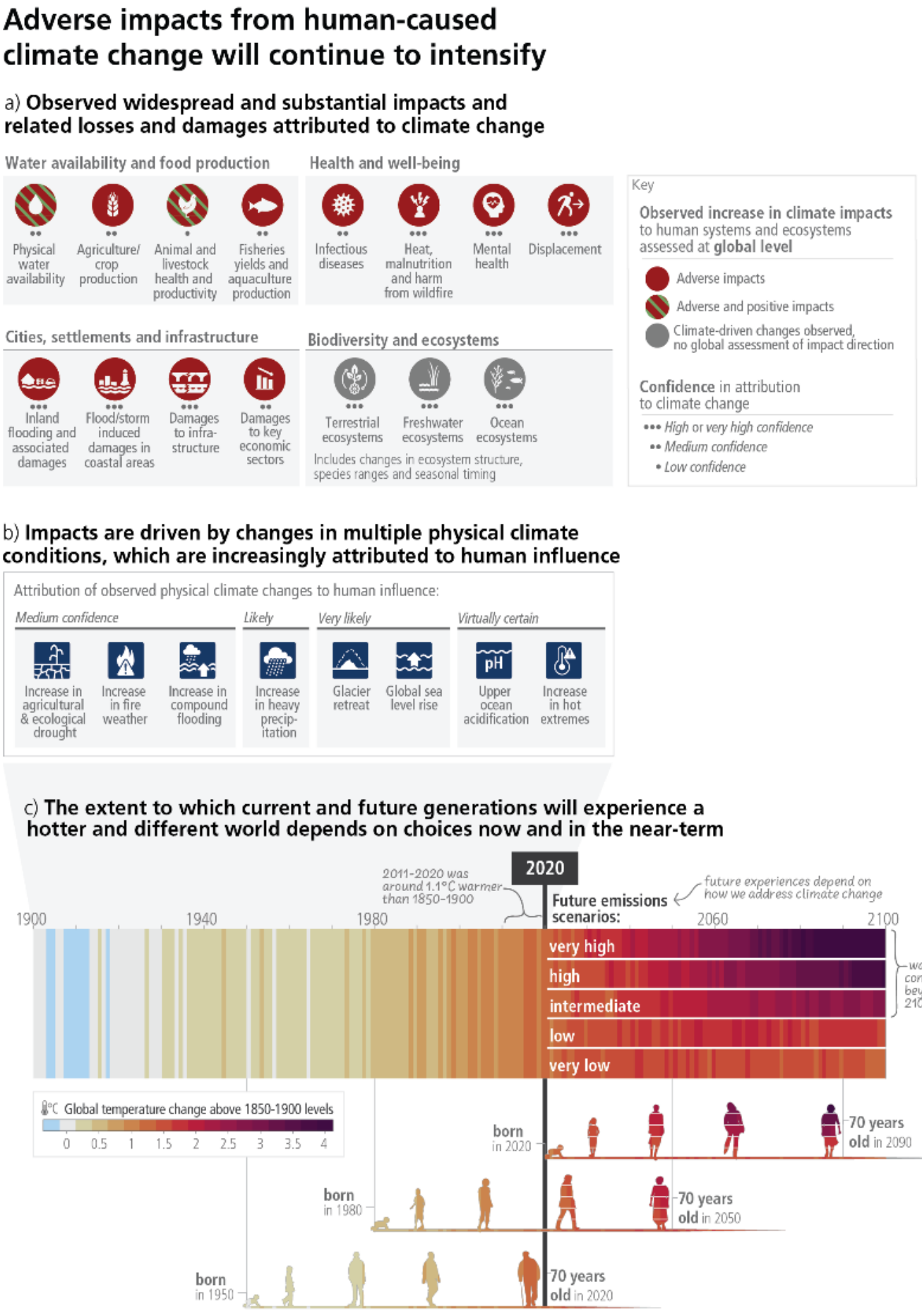


Figure 11: Impact from human caused climate change

2. GHG ACCOUNTING FRAMEWORK & METHODOLOGY

GHG Accounting Framework & Methodology refers to the standards, principles, and processes used to measure and report an organization's greenhouse gas (GHG) emissions. This accounting is essential for companies, governments, and organizations that are working towards climate goals, emissions reductions, or sustainability. It allows entities to track their emissions accurately and transparently.

The most widely accepted framework is provided by the Greenhouse Gas Protocol (GHG Protocol), developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The GHG Protocol divides emissions into three scopes and provides methods for calculating and reporting emissions in each.

In 2016, 92% of Fortune 500 companies responding to the CDP used GHG Protocol directly or indirectly through a program based on GHG Protocol. It provides the accounting platform for virtually every corporate GHG reporting program in the world.

2.1 GHG accounting and reporting principles

Relevance:
Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.

Completeness:
Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.

Consistency:
Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.

Transparency:
Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.

Accuracy:
Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

These principles are intended to underpin all aspects of GHG accounting and reporting. Their application will ensure that the GHG inventory constitutes a true and fair representation of the company's GHG emissions. Their primary function is to guide the implementation of the GHG Protocol Corporate Standard.

2.2 GHG Protocol Corporate Standard

The GHG Protocol Corporate Standard provides standards and guidance for companies and other types of organizations preparing a GHG emissions inventory. It covers the accounting and reporting of the seven greenhouse gases covered by the UNFCCC/Kyoto Protocol.

The standard and guidance were designed with the following objectives in mind:

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

Both business and other stakeholders benefit from converging on a common standard. For business, it reduces costs if their GHG inventory is capable of meeting different internal and external information requirements. For others, it improves the consistency, transparency, and understandability of reported information, making it easier to track and compare progress over time.

2.3 GreenHouse Gas Accounting Terminology

1. GreenHouse Gases (GHG)
2. Global warming Potential (GWP)
3. Tonnes of Carbon Dioxide Equivalent (tCO2e)
4. Emission Factors (EF)
5. Activity Data
6. Boundary

2.3.1. GreenHouse Gases

GHGs trap heat radiated from the sun in the atmosphere, warming the planet's surface. Many GHGs occur naturally in the atmosphere, but their increase in concentration from human activities has altered the earth's radiative balance. The GHG Protocol, Corporate Accounting and Reporting Standard covers the accounting and reporting of seven GHGs covered by the Kyoto Protocol which is:

1. Carbon dioxide (CO2)
2. Methane (CH4)
3. Nitrous oxide (N2O)
4. Hydrofluorocarbons (HFCs)
5. Perfluorocarbons (PFCs)
6. Sulphur hexafluoride (SF6)
7. Nitrogen trifluoride (NF3)

2.3.2. Global Warming Potential

GHGs released into the atmosphere have different radiative effects depending on the unique qualities of the gas. The factor describing the radiative forcing impact of one unit of a given GHG relative to one unit of CO2 is known as the Global Warming Potential (GWP).

Since the amount of warming a gas cause over a given period (normally 100 years) varies, GHG emission calculations must account for the GWP of each gas. GWP is an index with CO2 having an index value of 1. The GWP for all other GHGs refers to the amount of warming they cause compared to CO2. For instance, the radiative forcing impact of one unit of methane (CH4) is 28 times more powerful than one unit of CO2.

The GHG Protocol and the majority of accounting standards use GWP values established by the Intergovernmental Panel on Climate Change (IPCC). The IPCC updates GWP values as scientific understanding develops and the sixth assessment report, AR6, contains the most recent values. The complete list of GWP values relative to CO2 is provided by the GHG Protocol. But the GHG protocol updated AR6 values in 7th Aug 2024, at the time we almost completed the data collection and calculation using the AR5 values. In this report all calculations are done based on the AR5 GWP values only.

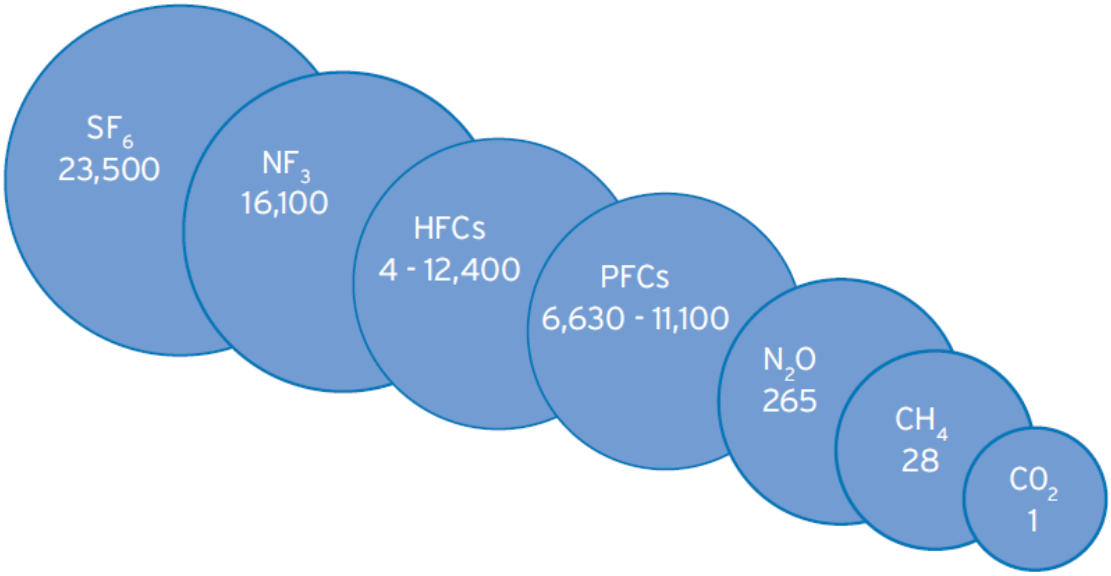


Figure 12: The Global Warming Potential of IPCC recognized GHGs, AR5

2.3.3. Tonnes Carbon Dioxide Equivalent (tCO2e)

Tonnes Carbon dioxide equivalent (tCO2e) is the standard unit used to compare and account for emissions from various GHGs based on their global warming potential. For instance, Figure 13 illustrates that CO2 has a GWP of 1 and CH4 (methane) has a GWP of approximately 28 (on a 100-year time horizon). Therefore, for every tonne of CH4 emitted, an equivalent of 28 tonnes of CO2 would be emitted. Since one tonne of a particular GHG is not the same GWP as one tonne of another, this standard unit is a simple way to normalize and express GHGs as an equivalent of tCO2.

2.3.4. Emission Factor

An emission factor is a value used to estimate the emissions of pollutants or greenhouse gases (GHGs) from a particular source or activity. It represents the average emission rate of a pollutant for a given quantity of activity, fuel consumption, or production. Emission factors are typically expressed as the mass of emissions per unit of activity, making it easier to calculate emissions for various processes without direct measurements.

Eg: kgCO2/tonne or kgCO2/kVA or kgCO2/ton-km etc.,

Emission Factors converts activity data into GHG emissions. Based on choice of emission factor, methodology employed to calculate emissions is categorized into Tier 1, Tier 2, and Tire 3. These tiers are based on the level of complexity, accuracy, and data specificity involved in calculating emissions. They are commonly used in IPCC guidelines for GHG inventories and other environmental reporting frameworks, with Tier 1 being the most basic and Tier 3 being the most advanced.

Comparison of the Tiers:

Tier	Data Source	Accuracy	Complexity	Example
Tier 1	Global or regional default emission factors (IPCC or international databases).	Low	Simple	2.68 kg CO_2/liter of diesel (global average).
Tier 2	Country-specific or region-specific emission factors based on local data.	Medium	Moderate	2.65 kg CO_2/liter of diesel (India country-specific).
Tier 3	Uses more complex approaches, such as models, and is the most detailed tier	High	Complex & Most accurate	2.60 kg CO_2/liter of diesel (facility-specific, measured).

Table 14: Emission Factor - Tier Comparison

2.3.5. Activity Data

Activity data refers to quantitative information that represents the extent or magnitude of human activities that result in emissions or removals of greenhouse gases (GHGs). It is a critical input used in calculating emissions or removals by applying emission factors. Essentially, activity data measures the scale of an activity that generates emissions (or absorbs CO_2), such as the amount of energy consumed (fuel, electricity etc.,), kilometers traveled, or tons of material processed.

How Activity Data is Used:

Activity data is combined with emission factors to estimate GHG emissions.
The basic formula is:

Emissions = Activity Data × Emission Factor × GWP

Sources of Activity Data:

Activity data is often sourced from a wide range of records and systems, including:

- Fuel purchase records: For fuel consumption data.
- Utility bills or energy meters: For energy use data.
- Vehicle logs or GPS systems: For transportation-related data.
- Production logs: For industrial or agricultural production data.
- Waste management records: For data on waste generation and treatment.
- National statistics or databases: Provided by government agencies.

Importance of Activity Data:

- Accuracy of Emission Estimates: Accurate and detailed activity data is essential for producing reliable emission estimates. Poor or incomplete activity data can lead to significant errors in GHG inventories.
- Compliance and Reporting: For organizations and countries reporting to frameworks like the Kyoto Protocol, Paris Agreement, or voluntary GHG programs, the quality of activity data is vital for meeting regulatory and reporting requirements.
- Tracking Performance: Activity data allows organizations to track their emission trends over time, assess the effectiveness of emission reduction measures, and set targets.

Challenges with Activity Data:

- **Data Availability:** In some cases, specific data on activities may not be readily available, particularly in developing regions.
- **Data Accuracy:** Inaccurate or incomplete records can lead to errors in emission calculations.
- **Consistency:** Data needs to be collected consistently across years or reporting periods for reliable trend analysis.

2.3.6. Boundary

- **Organizational Boundaries:**
  These determine which operations, facilities, or units within a company are included in GHG accounting.
  Two approaches are used:
    - **Equity Share Approach:** GHG emissions are accounted for based on the organization's equity share in an operation.
    - **Control Approach:** Organizations account for 100% of GHG emissions if they have control over the operations.
- **Operational Boundaries:**
  These define which activities and emissions sources are included under Scope 1, Scope 2 and Scope 3.
    - **Scope 1:** Direct emissions from sources that are owned or controlled by the company (e.g., fuel combustion, company vehicles).
    - **Scope 2:** Indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the reporting entity.
    - **Scope 3:** All other indirect emissions that occur in the value chain (e.g., supply chain, product use, waste disposal).

2.4 Methodology Used

ESG team has carried out the carbon footprint study based on GHG Protocol Corporate Standard. Execution of the carbon footprint study was carried out in the following method.

2.4.1 Organizational Boundaries

We have used the Operational control approach to setting up the organizational boundaries and it is shown below.

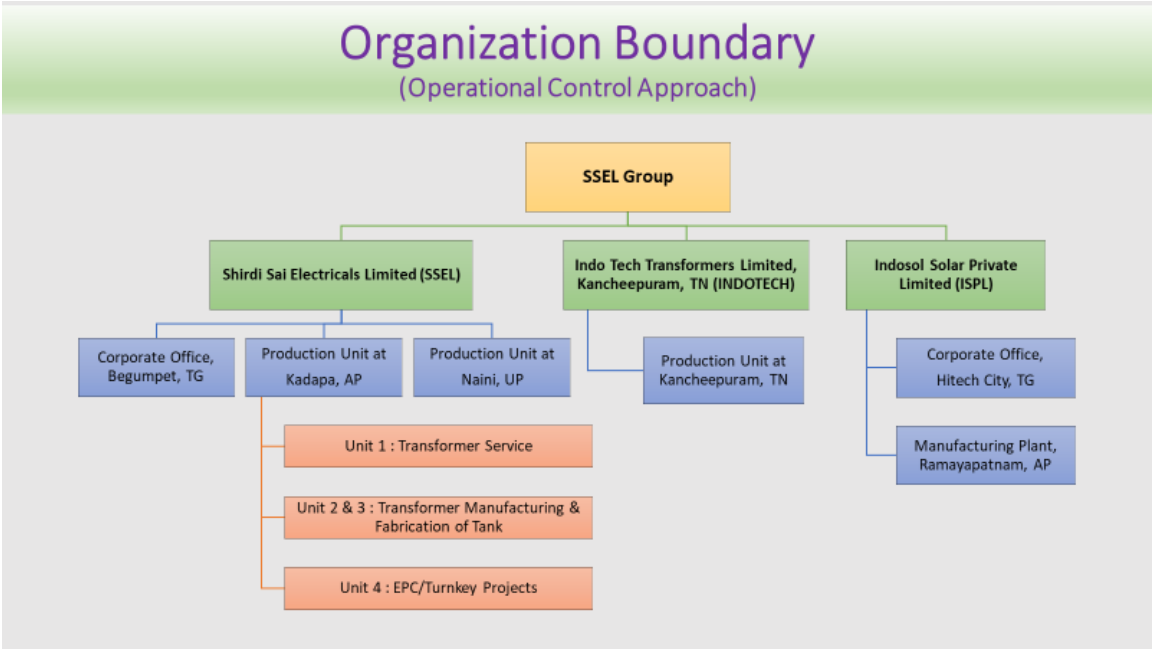


Figure 13: Organization Boundary

2.4.2 Operational Boundaries

The following Scope are considered under the operational boundary:

SSEL Group Companies Carbon Footprint Operational Boundaries - FY 2023-2024									
Sl. No	Description	Site Name							
		SSEL, Corporate Office	SSEL-Unit 1, Kadapa	SSEL-Unit 2 & 3, Kadapa	SSEL-Unit 4, Kadapa	SSEL, Naini	INDOTECH, Kancheepuram	INDOSOL, Corporate office	INDOSOL, Ramayapatnam
Scope 1									
1	Company Owned Vehciles	✗	✗	✓	✗	✓	✗	✗	✓
2	Refrigerant top up	✓	✓	✓	✗	✓	✓	✓	✓
3	CO2 used for refilling into fire extinguisher	✗	✓	✓	✓	✓	✓	✗	✓
4	Gas mixture used in welding (Argon+Carbon dioxide)	✗	✗	✓	✗	✗	✗	✗	✗
5	Acetylene (used in Brazing, Cutting)	✗	✗	✓	✗	✓	✓	✗	✗
6	LPG used in Brazing, Cutting	✗	✓	✓	✗	✗	✗	✗	✗
7	LPG used in Canteen	✓	✗	✓	✗	✗	✗	✗	✗
8	Diesel used in DG sets	✗	✗	✓	✗	✓	✓	✗	✓
9	Biomass used in Canteen (Carbon Neutral)	✗	✗	✓	✗	✗	✗	✗	✗
10	Fuel used in Thermic Fluid Heater	✗	✗	✗	✗	✓	✓	✗	✗
Scope 2									
1	Net Power consumed from GRID	✓	✓	✓	✓	✓	✓	✓	✓
2	Purchased DG Power	✗	✗	✗	✗	✗	✗	✓	✗
3	Purchased Cooling	✗	✗	✗	✗	✗	✗	✓	✗
Scope 3									
1	C3 - Fuel & Energy related Activities	✓	✓	✓	✓	✓	✓	✓	✓
2	C4 - Upstream Transportation & Distribution	✗	✗	✓	✓	✓	✓	✗	✓
3	C5 - Waste Generation	✗	✓	✓	✓	✓	✓	✗	✗
4	C6 - Business Travel	✓	✗	✓	✗	✓	✓	✓	✗
5	C7 - Employee Commute	✓	✗	✓	✗	✓	✓	✓	✓
6	C9 - Downstream Transportation & Distribution	✗	✗	✓	✓	✓	✓	✗	✗

Table 15: Operational Boundary

2.4.3 Data Collection

Scope 1 & 2 Questionnaire and Scope 3 questionnaire prepared and shared to all SSEL Group Companies to collect the primary activity data along with the supporting reference documents and the same has been cross verified with entries made in the SAP, Purchase order, Electricity bills available online.
The activity data collected for the FY 23-24 is shown below.

Scope 1 & 2 Activity Data Collected:

Scope 1 & 2 Activity Data (FY 23-24)										
S.No	Emission Source	UOM	SSEL Corporate office	SSEL Kadapa Unit 1	SSEL Kadapa Unit 2 & 3	SSEL Kadapa Unit 4	SSEL Naini	Indotech	ISPL Corporate office	ISPL , Ramaya patnam
Scope 1										
1	LPG (used in Brazing, Cutting)	kg	0	133	8645	0	0	0	0	0
2	Acetylene (used in Brazing, Cutting)	kg	0	0	921	0	55	1838	0	0
3	Diesel used in DG sets	litres	0	0	71360	0	9910	36000	0	6495
4	Company Owned Vehciles (Fuel operated forklift, doser, Fire tender, Cars, Buses, Ambulance, Excavators, any vehicles to shuttle									
	Diesel (Car, buses, Ambulances)	litres	0	0	43402	0	2590	0	0	2310
	Petrol (Car, buses, Ambulances)	litres	0	0	164	0	0	0	0	0
	Diesel (hydras, tractor cranes, forklifts tractors)	litres	0	0	73056	0	0	0	0	0
	Petrol (hydras, tractor cranes, forklifts tractors)	litres	0	0	0	0	0	0	0	0
5	LPG used in Canteen	kg	114	0	34010	0	0	0	0	0
6	Biomass used in Canteen (Wood)	kg	0	0	124670	0	0	0	0	0
7	Refrigerant used/refilled									
	R 22	kg	36	0	38	0	61	8	0	0
	R 32	kg	0	0	15	0	0	0	0	0
	R 410 A	kg	4	0	25	0	0	0	0	0
	R 134A	kg	0	0	8	0	0	0	0	0
8	CO_2 used for refilling into fire extinguisher	kg	0	23	248	0	45	65	0	0
9	Gas mixture used in welding (Argon+Carbon dioxide)	kg	0	0	286723	0	0	0	0	0
10	Fuel used in Thermic Fluid heater									
	Furness Oil	litres	0	0	0	0	0	167260	0	0
	Biomass	t	0	0	0	0	137	0	0	0
	HSD	litres	0	0	0	0	53800	0	0	0
Scope 2										
1	Net Power consumed from GRID	kWh	86259	143610	20646808	57760	2028945	2030393	89919	3880
2	Renewable energy export to GRID	kWh	0	0	149906	0	0	509397	0	0
3	Renewable energy consumption (On Site)	kWh	0	0	1372937	0	0	0	0	0
4	Purchased DG Power Diesel Consumption	litres	0	0	0	0	0	0	309	0
5	Purchased Cooling Electricity Power Consumption	kWh	0	0	0	0	0	0	90110	0

Table 16: Scope 1 & 2 Activity data (FY 23-24)

Scope 3 Activity Data Collected:

We have collected the Scope 3 activity data for 6 categories namely category 3 fuel and energy related activities, category 4 upstream transportation and distribution, category 5 waste generation, category 6 business travel, category 7 employee commuting and category 9 downstream transportation and distribution. Refer the link provided in chapter 7 for the Scope 3 activity data.

2.4.4 Assumptions and Limitations

SSEL Corporate Office:

- The electricity bill for the SSEL corporate office for FY 23-24 is not available or has faded. Only the month-wise payments are available. Based on the January 2023 electricity bill, we determined the unit price as ₹11.58/kWh and calculated the electricity consumption for FY 23-24 as 86,259.27 kWh.
- Under Scope 3, Category 6 (business travel), train and bus travel data were not included due to the unavailability of data. Air travel data is available only from November 2023 and has been considered for FY 23-24.
- For Scope 3, Category 7 (employee commute), a common survey was conducted for both the SSEL corporate office and the ISPL corporate office. A total of 27 out of 65 employees from the SSEL corporate office participated. Based on this, we extrapolated the emissions for the remaining employees.

ISPL Corporate Office:

- Since ISPL corporate office purchase DG Power and Cooling for office space it will come under scope 2. Only split ACs are under scope 1, and during FY 23-24, no refrigerant top-up was done. Cooking for employees are outsourced and induction stove were used in pantry. Therefore, the Scope 1 emissions for the ISPL corporate office are zero.
- Under Scope 2, to calculate the purchased DG power and cooling capacity, we assumed the Diesel Generator generate 3 kWh electricity per liter of diesel consumed, and the Coefficient of Performance (COP) of the chiller is 2.4867 (Output kWh / Input kWh).
- Under Scope 3, Category 6 (business travel), train and bus travel data were not included due to the unavailability of data. Air travel data is available only from November 2023 and has been considered for FY 23-24. This air travel includes the ISPL manufacturing site as well.
  However, wherever data was available the distance flown was not calculated as crow flies but with knowledge of stopover and via routes.
- For Scope 3, Category 7 (employee commute), a common survey was conducted for both the SSEL corporate office and the ISPL corporate office. A total of 75 out of 89 employees from the ISPL corporate office participated. Based on this, we extrapolated the emissions for the remaining employees, excluding those who joined in FY 24-25.

SSEL Unit 1, Kadapa:

- Due to the unavailability of the CO2 refilling bill for fire extinguishers, it is assumed that all CO2 cylinders were refilled.
- Under Scope 2, the electricity bill for July 2023 is not available, so an average consumption of 11,967.5 kWh has been used for that month.
- Under Scope 3, Category 4 (Upstream T&D) and Category 9 (Downstream T&D): Logistics for the service unit are managed solely by Unit 2. So, the activity data received from Units 2+3 Kadapa includes this activity data, and due to the complexity of separating it, the associated emissions are included in Units 2+3 Kadapa emissions.
- Under Scope 3, Categories 6 (Business Travel) and 7 (Employee Commuting), the activity data received from Units 2+3 Kadapa includes unit 1, Kadapa data, and due to

the complexity of separating it, the associated emissions are included in Units 2+3 Kadapa emissions.

SSEL Unit 2 & 3, Kadapa:

- Due to the unavailability of the CO2 refilling bill for fire extinguishers, it is assumed that all CO2 cylinders were refilled.
- Under Scope 3, Category 4 (Upstream T&D), the site team assumed that 1 unit = 1 kg when converting the material purchased quantity from numbers to kilograms, regardless of the actual weight of the material. In future, to improve data quality, this should be corrected based on the actual weight of the goods. A small example is provided for clarity:

Material Sl.no	Material Name	Actual qty received		After Conversion	
		Values	UOM	Values	UOM
191	Screws	119716	Nos	119.72	Tonne
226	Cotton hand gloves	55000	Nos	55	Tonne
293	10 kVA UPS	21	Nos	0.02	Tonne

Table 17: Example of Unit Conversion used

The table 17 shows that 21 units of a 10 kVA UPS were purchased during FY 23-24, and the equivalent weight was calculated by assuming 1 unit = 1 kg, resulting in a total weight of 0.02 tons. Although the actual weight is greater than 1 kg, it was considered as 1 kg, and the same approach was applied even when the unit weight of goods was less than 1 kg like screws and cotton hand gloves.

Also, under category 4 complete inward data of 345-line items have been submitted.

SSEL Unit 4, Kadapa:

- This unit does not have any split AC, HVAC system, Combustion activities, Company owned vehicle, canteen facility and the fire extinguisher system does not have the CO2 gas, So the scope 1 emissions for this unit is zero.
- Under Scope 3, Category 6 (Business Travel), employees use their own vehicles to commute to various work locations as needed. Due to the complexity of collecting this data, these emissions are excluded for this site.
- Under Scope 3, Categories 7 (Employee Commuting), the activity data received from Units 2+3 Kadapa includes this information, and due to the complexity of separating it, the associated emissions are included in Units 2+3 Kadapa emissions.

SSEL Naini,

- In the thermic fluid heater, the fuel was switched from high-speed diesel (HSD) to wood briquettes starting in January 2024. This was included post verification.
- Under Scope 3, Category 4 (Upstream T&D), only six major raw materials are considered for emission calculations: Copper, CRGO, HSD, Insulation, MS tank/Yoke clamp, and Transformer oil. Uniformity of reporting needs to be implemented here.

INDOTECH, Kancheepuram:

- Under Scope 3, Category 4 (Upstream T&D), only ten major raw materials are considered for emission calculations: Copper, CRGO, Tank, Radiator, Oil, OLTC, Marshalling box/RTCC, OIP Bushing, Frame and Insulation. Some values mentioned in quantity (nos) were converted to tonnes by the ESG team, assuming the approximate average weight of the goods irrespective of the specification. Uniformity of reporting needs to be implemented here.
  The conversion factors are shown below:

Sl.No	Description of goods	Conversion factor of the goods (kg/unit)
1.	Radiator	35
2.	OLTC	150
3.	Marshalling box/RTCC	1
4.	OIP Bushing	150

Table 18: Conversion factor assumed for Indotech

- The unit of measurement in the received Scope 3 questionnaire under Category 9 (Downstream T&D) was unclear. Therefore, the ESG team used the supporting documents provided by the site team to calculate the emissions.

ISPL, Manufacturing Plant, Ramayapatnam:

- The electricity connection for the site was established on March 29, 2024, so the electricity consumption for FY 23-24 is for only three days.
- Production at the site has not yet started; therefore, the emissions from this plant are minimal.

2.4.5 Emission Factor Used

The following emission factors are considered for the emission calculations.

Emission Factors				
Scope 1 & 2				
S.No	**Emission Source**	**Emission Factors**	**UoM**	**Source**
1	Diesel	2.68	kgCO2/l	IPCC
2	LPG Consumption	2.97	kgCO2e/kg	IPCC
3	HSD consumption	2.68	kgCO2/l	IPCC
4	FO	2.95	tCO2e/kL	IPCC
5	Acetylene	3.38	kgCO2/kg	IPCC
6	Biomass (Wood)	0.15	kgCO2e/kg	IPCC
7	R- 22	1760	kg CO2e/kg	IPCC (AR5)
8	R- 32	677	kg CO2e/kg	IPCC (AR5)
9	R- 410	1924	kg CO2e/kg	IPCC (AR5)
10	R-134a.	1300	kg CO2e/kg	IPCC (AR5)
11	Grid Electricity	0.716	kg CO2e/kwh	Central Electricity Authority
12	Petrol	2.28	kgCO2/l	IPCC
13	CNG	2.7	kgCO2/kg	IPCC

Scope 3				
C3	Petrol	0.6066	$kgCO_2e$/Ltr	DEFRA
	Biomass	0.0304	T CO_2e/T	DEFRA
	Diesel	0.6241	$kgCO_2e$/Ltr	DEFRA
	LPG	349.290	$kgCO_2e$/T	DEFRA
	FO	0.69539	$kgCO_2e$/Ltr	DEFRA
	Acetylene	0.9800	$kgCO_2e$/T	DEFRA
	Grid electricity WTT	0.1675	TCO_2e/MWh	WRI
	Electricity T&D 2022-23	15.80	%	India Climate & Energy Dashboard
	Electricity 2022-23	0.7160	$kgCO_2e$/kWh	Central Electricity Authority
	Refrigerant - R22	13.10	kgCO2e/kg	IPCC
	Refrigerant - R32	9.20	kgCO2e/kg	IPCC
	Refrigerant - R410A	22.00	kgCO2e/kg	IPCC
	Refrigerant - R134A	11.20	kgCO2e/kg	IPCC
C5	Copper (Recycle)	0.18	t CO2/ts	EPA
	Aluminium (Recycle)	0.04	t CO2/ts	EPA
	Food Waste	0.58	t CO2/ts	EPA
	Mixed Paper (Winding Core Paper)	0.03	t CO2/ts	EPA
	Dimensional Lumber (Parma Wood)	0.09	t CO2/ts	EPA
	Mixed Metals (Empty Oil Barrels etc.,)	0.23	t CO2/ts	EPA
	Waste Oil	0.2	t CO2/ts	EPA
	Mixed Electronics	0.02	t CO2/ts	EPA
	Cotton Hand Gloves (Incineration)	1.62	kg CO2/kg	IPPC
	Paint Tins Waste (Incineration)	0.01	t CO2/ts	EPA
	CRGO	0.32	t CO2/ts	EPA
	Rubber	0.1	t CO2/ts	EPA
	Corrugated Containers (Recycle)	0.11	t CO2/ts	EPA
	MS scrap (Mixed Metals) (Recycle)	0.23	t CO2/ts	EPA
	Process Waste, Residues and sludge (Landfill)	0.5203	t CO2/t	DEFRA
	Used/Spent Oil (Recycle)	0.0213	t CO2/t	DEFRA
	Repair job - used / Spent oil	0.0213	t CO2/t	DEFRA
	Waste & Residues containing oil	0.0213	t CO2/t	DEFRA
	Spent Solvent	0.0213	t CO2/t	DEFRA
	Discarded container	0.0213	t CO2/t	DEFRA
C6	Air	Default	kg CO2e/pax-km	ICAO Tool
	Rail	0.0078	kg CO2e/pax-km	India GHG Program
	Road - Car - Petrol Sedan <1600)	0.153	kg CO2e/km	India GHG Program
	Road – bus	0.0152	kg CO2e/pax-km	India GHG Program
C7	Car-Sedan(<1600CC)	0.141	kg CO2e/km	India GHG Program
	Motorcycle(<135CC)	0.0356	kg CO2e/km	India GHG Program
	Bus	0.0152	kg CO2e/pax-km	India GHG Program
C4 & C9	Road – LDV (<3.5T)	0.0877	kg CO2e/ton-km	India GHG Program
	Road - MDV(<12T)	0.0741	kg CO2e/ton-km	India GHG Program
	Sea- Bulk Carrier cargo ship	0.0035	kg CO2e/ton-km	DEFRA
	Road - HDV(>12T)	0.0615	kg CO2e/ton-km	India GHG Program

Table 19: Emission Factor used for calculations

3. RESULT AND ANALYSIS

3.1 GHG Emissions Formula

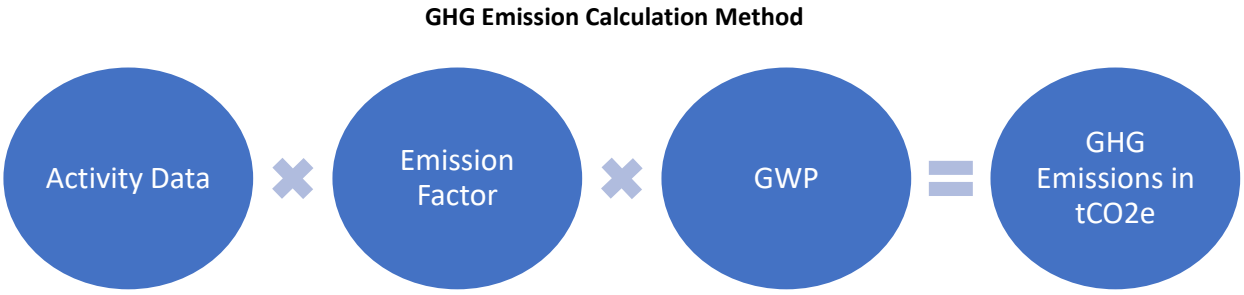


Figure 14: The GHG Emission Formula

3.2 SSEL Group Absolute Emissions for the FY23-24

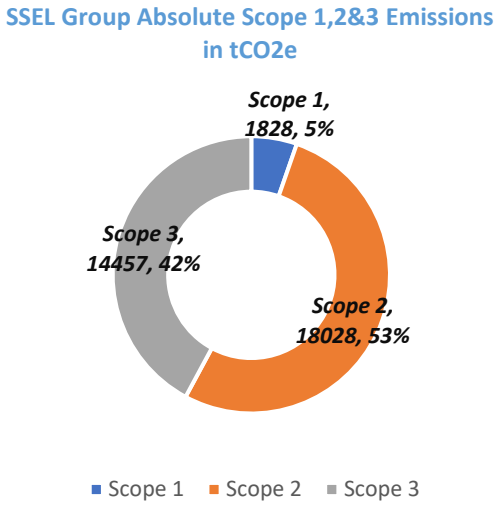


Figure 15:SSEL Group Absolute Scope 1,2 &3 Emissions

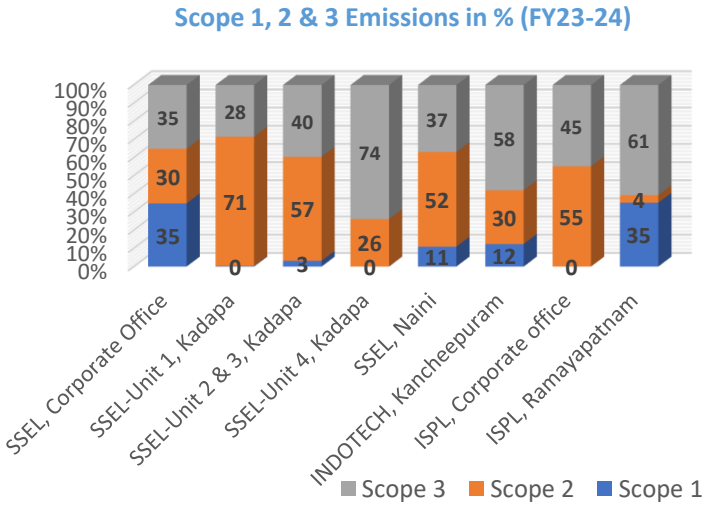


Figure 16: Location Wise Scope 1,2 & 3 Emissions in %

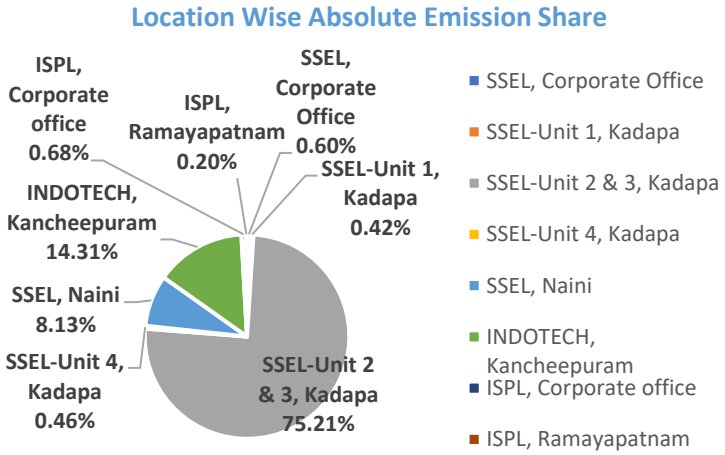


Figure 17: Location Wise Absolute Emission Share

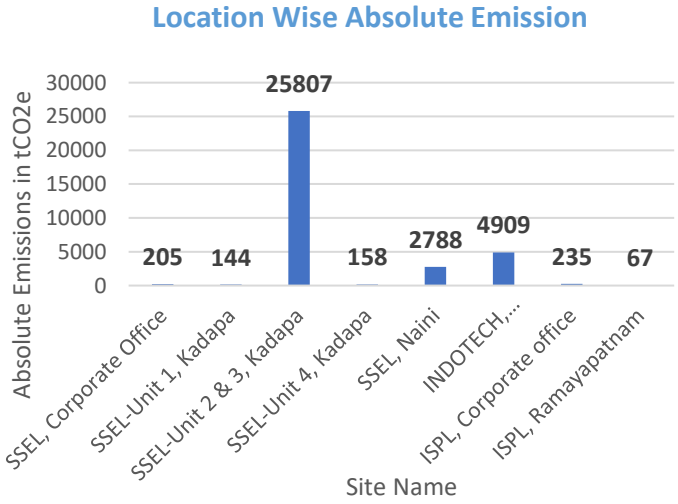


Figure 18: Location Wise Absolute Emission in tCO2e

SSEL Group Companies Absolute Emissions - FY 2023 -2024							
Sl.No	Company Name	Site Name	Scope 1	Scope 2	Scope 3	Total	Absolute Emissions
					t CO2 e		
1	SSEL	SSEL, Corporate Office	71	62	72	205	**29102**
2		SSEL-Unit 1, Kadapa	0	103	41	118	
3		SSEL-Unit 2 & 3, Kadapa	817	14783	10207	25807	
4		SSEL-Unit 4, Kadapa	0	41	117	158	
5		SSEL, Naini	306	1453	1029	2788	
6	INDOTECH	INDOTECH, Kancheepuram	610	1454	2845	4909	**4909**
7	ISPL	ISPL, Corporate Office	0	130	105	235	**302**
8		ISPL, Ramayapatnam	24	3	41	67	
		Total	**1828**	**18028**	**14457**		**34313**

Table 20: Site Wise Absolute Emissions

As shown in figure 15, The SSEL Group companies' absolute emission for scope 1, scope 2 and scope 3 is **1828 tCO2e, 18028 tCO2e and 14457 tCO2e** respectively and the total is **34313 tCO2e**.

Figure 16 shows the location wise scope 1,2 &3 emissions share in percentage.

From figure 17, the highest absolute emission share is from SSEL Unit 2 & 3 Kadapa, accounting for **75.21%**, while the lowest share is from the ISPL Ramayapatnam plant, contributing only **0.20%**.

Figure 18 shows the location wise absolute emissions in tCO2e

Table 20 shows the company wise/site wise absolute emissions, the SSEL, INDOTECH and ISPL has the absolute emission of **29102 tCO2e, 4909 tCO2e and 302 tCO2e** respectively.

3.2.1 Scope 1 Emissions

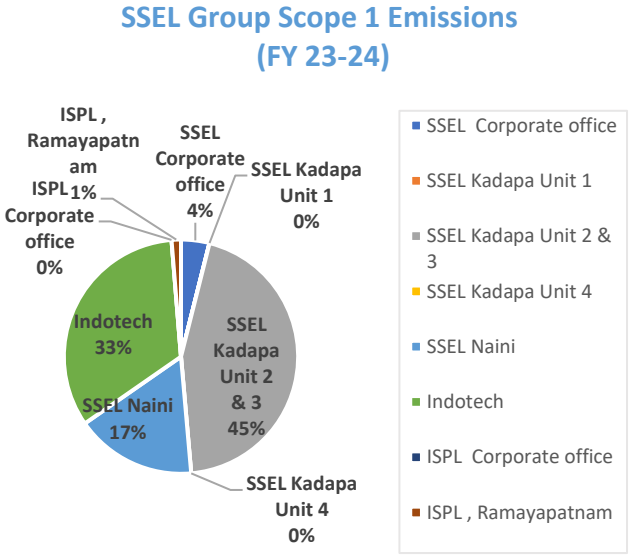


Figure 19: Plant wise scope 1 emissions percentage (FY 23-24)

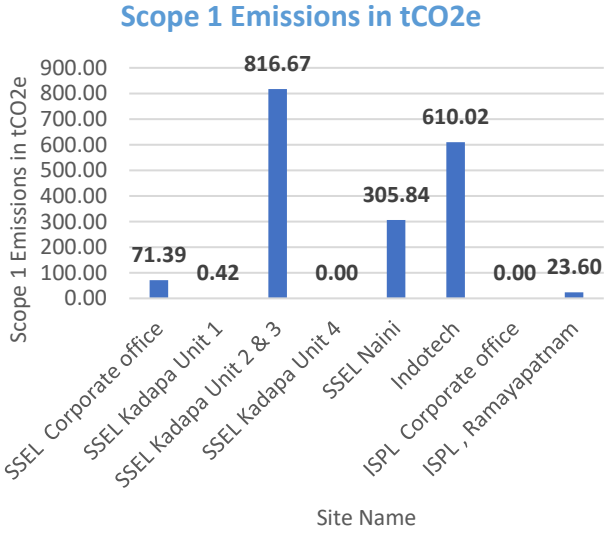


Figure 20: Plant wise scope 1 emissions in tCO2e (FY 23-24)

Scope 1 Emissions in tCO2e										
S.No	Emission Source	SSEL Corporate office	SSEL Kadapa Unit 1	SSEL Kadapa Unit 2 & 3	SSEL Kadapa Unit 4	SSEL Naini	Indotech	ISPL Corporate office	ISPL , Ramayapatnam	Total
1	LPG (used in Brazing, Cutting)	0.00	0.40	25.68	0.00	0.00	0.00	0.00	0.00	**26.07**
2	Acetylene (used in Brazing, Cutting)	0.00	0.00	3.12	0.00	0.19	6.22	0.00	0.00	**9.52**
3	Diesel used in DG sets	0.00	0.00	191.25	0.00	26.56	96.48	0.00	17.41	**331.69**
4	Company Owned Vehciles									**0.00**
	Diesel (Car, buses, Ambulances)	0.00	0.00	116.32	0.00	6.94	0.00	0.00	6.19	**129.45**
	Petrol (Car, buses, Ambulances)	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	**0.37**
	Diesel (hydras, tractor cranes, forklifts tractors)	0.00	0.00	195.79	0.00	0.00	0.00	0.00	0.00	**195.79**
	Petrol (hydras, tractor cranes, forklifts tractors)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	LPG used in Canteen	0.34	0.00	101.01	0.00	0.00	0.00	0.00	0.00	**101.35**
6	Biomass used in Canteen (Wood)	0.00	0.00	18.70	0.00	0.00	0.00	0.00	0.00	**18.70**
7	Refrigerant used/refilled									**0.00**
	R 22	63.36	0.00	66.88	0.00	107.36	14.08	0.00	0.00	**251.68**
	R 32	0.00	0.00	10.16	0.00	0.00	0.00	0.00	0.00	**10.16**
	R 410 A	7.69	0.00	48.09	0.00	0.00	0.00	0.00	0.00	**55.78**
	R 134A	0.00	0.00	10.40	0.00	0.00	0.00	0.00	0.00	**10.40**
8	CO_2 used for refilling into fire extinguisher	0.00	0.02	0.25	0.00	0.05	0.07	0.00	0.00	**0.38**
9	Gas mixture used in welding (Argon+Carbon dioxide)	0.00	0.00	28.67	0.00	0.00	0.00	0.00	0.00	**28.67**
10	Fuel used in Thermic Fluid heater									
	Furness Oil	0.00	0.00	0.00	0.00	0.00	493.18	0.00	0.00	**493.18**
	Biomass	0.00	0.00	0.00	0.00	20.57	0.00	0.00	0.00	**20.57**
	HSD	0.00	0.00	0.00	0.00	144.18	0.00	0.00	0.00	**144.18**
Total		**71.39**	**0.42**	**816.67**	**0.00**	**305.84**	**610.02**	**0.00**	**23.60**	**1828**

Table 21: Emission source wise scope 1 emissions in tCO2e

3.2.2 Scope 2 Emissions

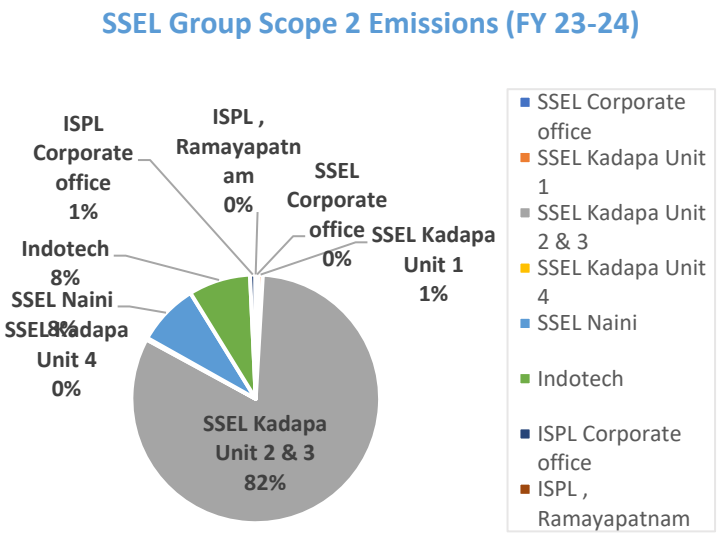


Figure 21: Plant wise scope 2 emissions percentage (FY 23-24)

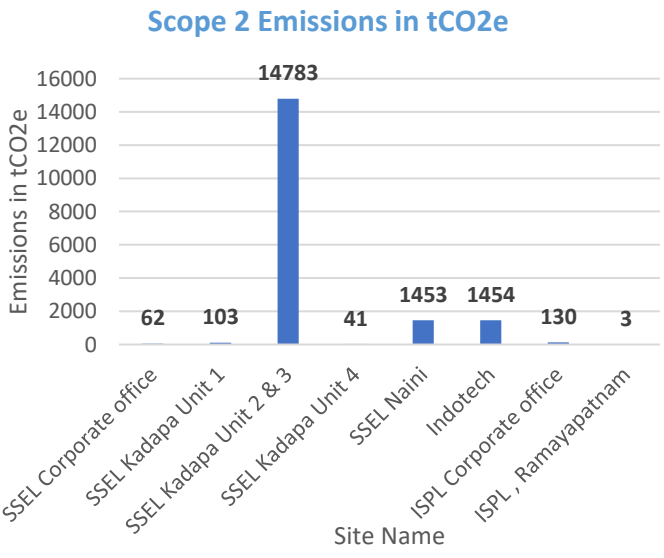
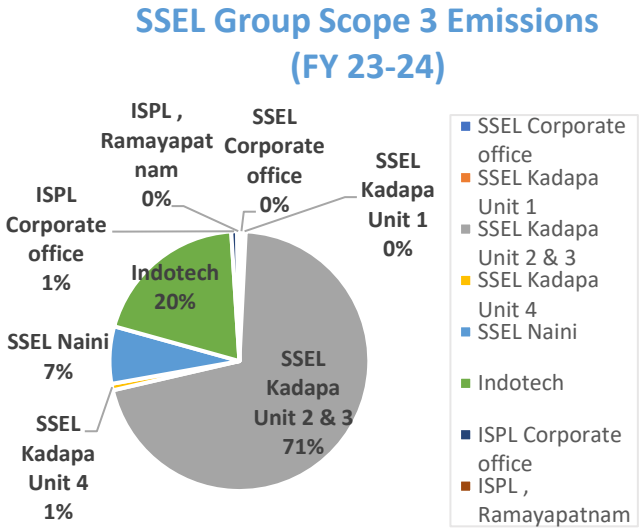


Figure 22: Plant wise scope 2 emissions in tCO2e (FY 23-24)

Scope 2 Emissions in tCO2e										
S.No	Emission Source	SSEL Corporate office	SSEL Kadapa Unit 1	SSEL Kadapa Unit 2 & 3	SSEL Kadapa Unit 4	SSEL Naini	Indotech	ISPL Corporate office	ISPL , Ramayapatnam	Total
1	Net Power consumed from GRID	62	103	14783	41	1453	1454	64	3	**17963**
2	Purchased DG Power Diesel Consumption	-	-	-	-	-	-	1	-	**1**
3	Purchased Cooling Electricity Power Consumption	-	-	-	-	-	-	65	-	**65**
Total		**62**	**103**	**14783**	**41**	**1453**	**1454**	**130**	**3**	**18028**

Table 22: Emission source wise scope 2 emissions in tCO2e

3.2.3 Scope 3 Emissions



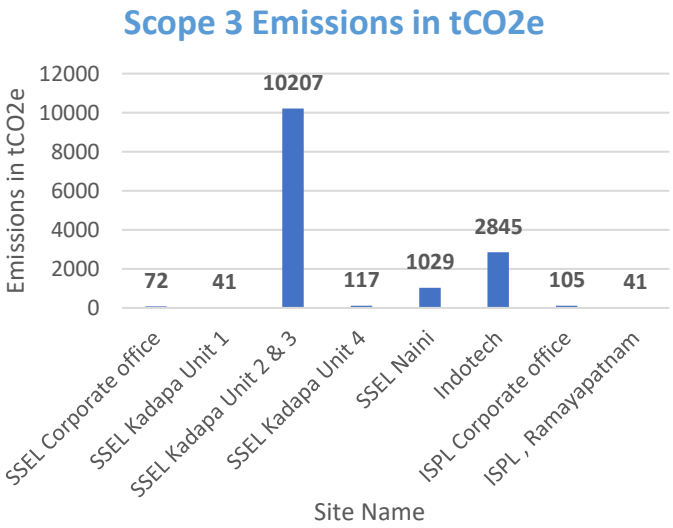


Figure 23: Plant wise scope 3 emissions percentage (FY 23-24) *Figure 24: Plant wise scope 3 emissions in tCO2e (FY 23-24)*

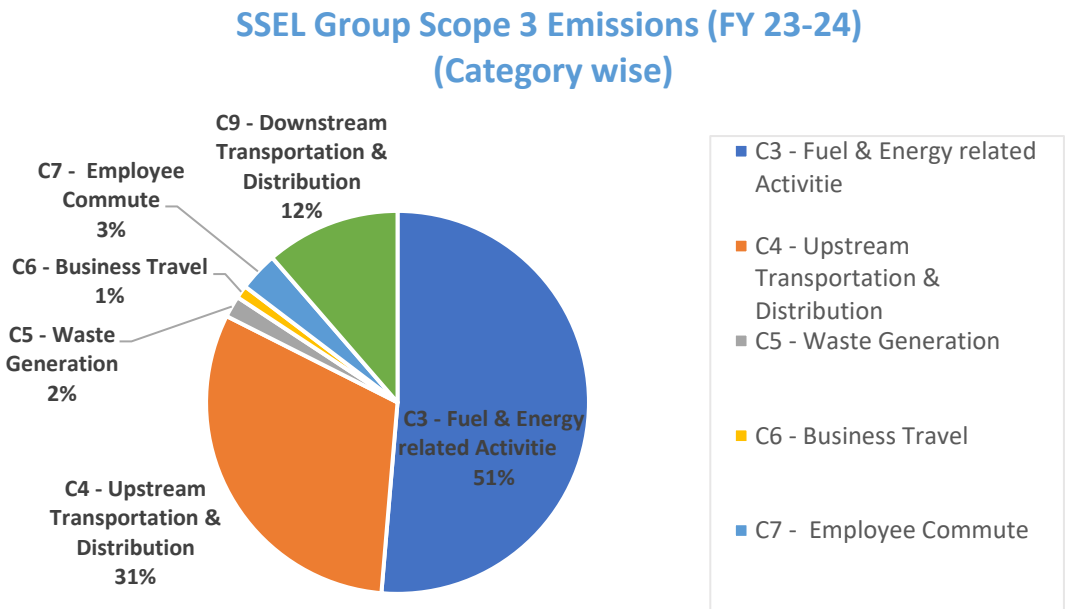


Figure 25: Category wise scope 3 emissions percentage (FY 23-24)

Scope 3 Emissions in tCO2e										
S.No	Emission Source	SSEL Corporate office	SSEL Kadapa Unit 1	SSEL Kadapa Unit 2 & 3	SSEL Kadapa Unit 4	SSEL Naini	Indotech	ISPL Corporate office	ISPL , Ramayapatnam	Total
1	C3 - Fuel & Energy related Activitie	24.80	40.37	5959.86	16.21	615.73	708.69	50.71	6.58	**7422.96**
2	C4 - Upstream Transportation & Distribution	-	-	3527.30	39.75	186.31	715.07	-	26.91	**4495.34**
3	C5 - Waste Generation	-	0.73	137.32	12.42	52.42	59.24	-	-	**262.13**
4	C6 - Business Travel	28.54	-	10.94	-	3.78	83.23	31.45	-	**157.94**
5	C7 - Employee Commute	18.65	-	187.25	-	56.65	183.89	23.00	7.23	**476.66**
6	C9 - Downstream Transportation & Distribution	-	-	384.44	48.36	114.53	1094.70	-	-	**1642.03**
Total		**72**	**41**	**10207**	**117**	**1029**	**2845**	**105**	**41**	**14457**

Table 23: Emission source wise scope 2 emissions in tCO2e

3.2.4 Analysis

SSEL & ISPL Corporate Office:

- 40 kg of refrigerant was refilled into the air conditioning system at the SSEL corporate office during FY 23-24, while no refrigerant was refilled at the ISPL corporate office during the same period. These emissions reflected as scope 1 in SSEL corporate office.
- ISPL purchases DG power and cooling capacity for its office, so these emissions fall under Scope 2.
- On the other hand, SSEL does not have a centralized HVAC system or a DG set. Instead, SSEL uses an AC system (Scope1) and a UPS for power backup (Scope2), which contributes to its Scope 1 & 2 emissions.
- ISPL uses an induction stove in its pantry, these emissions fall under scope 2. Whereas SSEL uses LPG, contributing to SSEL's Scope 1 emissions.
- Both offices outsource food services for their employees, so this does not contribute to Scope 1 or 2 emissions but falls under scope 3.
- All the above lead to higher Scope 2 emissions for ISPL corporate office compared to SSEL corporate office.
- ISPL corporate office has more air travel compared to SSEL, leading to higher business travel emissions (Category 6).
- ISPL corporate office's location and employee count leads to higher emissions related to employee commuting (Category 7).

Manufacturing Plant: ISPL Ramayapatnam:

The ISPL Ramayapatnam plant is designed for the manufacture of solar PV modules. However, solar PV production did not begin during FY 23-24, and the grid electricity connection was only established at the end of the fiscal year, on March 29, 2024. As a result, the emissions for this site for FY 23-24 are very low, with Scope 3, Category 4 (Upstream T&D) emissions contributing more significantly to the overall emissions for this site.

Service Unit: SSEL Unit 1 Kadapa:

The absolute emission and energy intensity of SSEL Unit 1 Kadapa is shown in table 24:

Description	Value	UOM
Transformer Serviced	113.97	MVA
Absolute emission (Scope 1+2)	103.24	tCO2e
Absolute emission (Scope 1+2+3)	144.34	tCO2e
Emission intensity (Scope 1+2)	0.91	tCO2e/MVA
Emission Intensity (Scope 1+2+3)	1.27	tCO2e/MVA

Table 24: SSEL Unit 1, Kadapa Absolute Emission & Energy Intensity (FY23-24)

Project Unit: SSEL Unit 4 Kadapa:

The absolute emission and energy intensity of SSEL Unit 4 Kadapa is shown in table 25:

Description	Value	UOM
Production	4251	tonne
Absolute emission (Scope 1+2)	41.36	tCO2e
Absolute emission (Scope 1+2+3)	158.09	tCO2e
Emission intensity (Scope 1+2)	0.01	tCO2e/t
Emission Intensity (Scope 1+2+3)	0.04	tCO2e/t

Table 25: SSEL Unit 4, Kadapa Absolute Emission & Energy Intensity (FY23-24)

3.3 SSEL Group Transformer Manufacturing Business Emission (FY 23-24)

SSEL Group Transformer Manufacturing Business Emission (FY 23-24)			
Sl.No	**Descriptions**	**UOM**	**Emissions**
1.	Absolute Emissions	tCO2e	33503
2.	Emission Intensity	tCO2e/MVA	1.23

Note: SSEL Group Total Transformer Production = 15755 MVA

Table 26: SSEL Group Transformer Manufacturing Business Emission (FY23-24)

3.3.1 Absolute Emissions

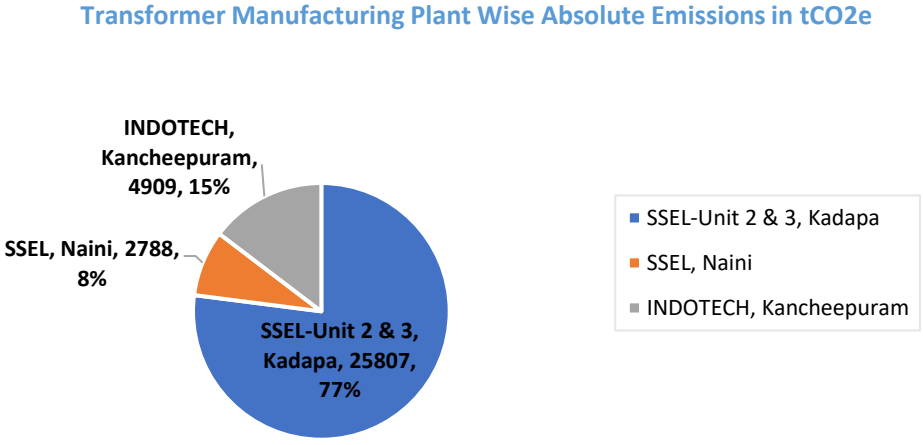


Figure 26: Transformer Manufacturing Plant Wise Absolute Emissions (FY23-24)

SSEL Group Transformer Manufacturing Plant Wise Absolute Emissions					
Company Name		**SSEL**		**INDOTECH**	
Site Name		**SSEL-Unit 2 & 3, Kadapa**	**SSEL, Naini**	**INDOTECH, Kancheepuram**	**Total**
Scope 1	tCO2e	817	306	610	**1733**
Scope 2		14783	1453	1454	**17690**
Scope 3		10207	1029	2845	**14081**
Total		**25807**	**2788**	**4909**	33503
Group Total			**33503**		

Table 27: SSEL Group Transformer Manufacturing Plant Wise Absolute Emission (FY23-24)

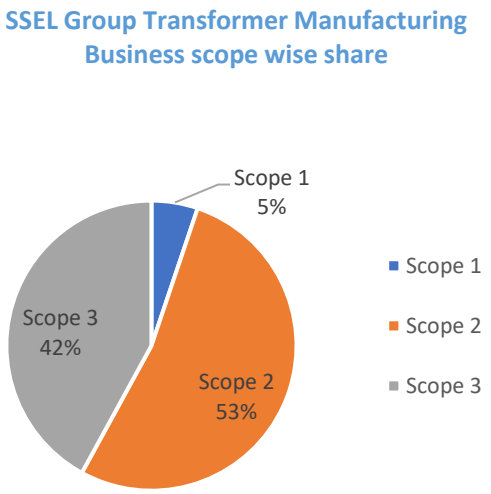


Figure 27: Transformer Manufacturing Business Scope Wise Emission Share (FY23-24)

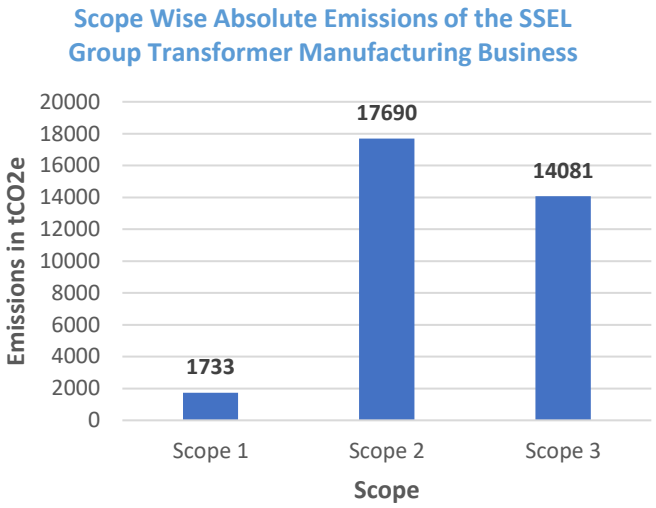


Figure 28: Transformer Manufacturing Business Scope Wise Absolute Emission (FY23-24)

Table 27 shows the absolute emission of the transformer business unit namely, SSEL 2 &3 kadapa, SSEL Naini and Indotech, Kancheepuram as **25807 tCO2e, 2788 tCO2e and 4909 tCO2e** respectively and the total SSEL Group Transformer Business absolute emission is **33503 tCO2e**.

3.3.2 Emission Intensity (EI)

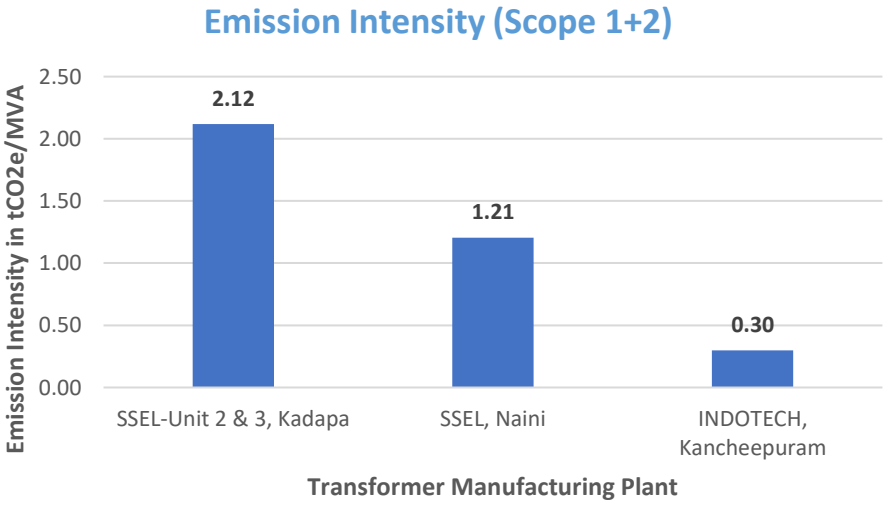


Figure 29: Emission Intensity of Transformer Manufacturing Plant (FY23-24)

Emission Intensity of SSEL Group Transformer Manufacturing Plant					
Company Name		**SSEL**		**INDOTECH**	
Site Name		**SSEL-Unit 2 & 3, Kadapa**	**SSEL, Naini**	**INDOTECH, Kancheepuram**	**Total**
Production	MVA	7363	1459	6933	**15755**
Scope 1		817	306	610	**1733**
Scope 2	tCO2e	14783	1453	1454	**17690**
Total (Scope1+2)		**15600**	**1759**	**2064**	**19422**
Emission Intensity (Scope 1+2)	**tCO2e/MVA**	**2.12**	**1.21**	**0.30**	**1.23**
Scope 3 (6 Categories)	tCO2e	10207	1029	2845	14081
Total (Scope1+2+3)	tCO2e	25807	2788	4909	33503
Emission Intensity (Scope 1+2+3)	**tCO2e/MVA**	**3.51**	**1.91**	**0.71**	**2.13**

Table 28: SSEL Group Transformer Manufacturing Plant Wise Emission Intensity (FY23-24)

EI or intensity ratio is the GHG impact per unit of production or unit of economic value (e.g., tCO2e emissions per MVA production or tCO2e per revenue in dollars). Many industries, particularly manufacturing, utilities, and energy, calculate their emission intensity using just Scope 1 and 2 emissions as it offers a clear, operationally-focused view of emissions that the company can control and reduce in the near term.

When calculating EI, the choice of which emissions scopes to include (Scope 1+2 versus Scope 1+2+3) depends on the context, the standards followed, and the industry requirements.

Emission Intensity (EI) can be reported based on production/manpower/built up area and also on revenues. In industries where several products are manufactured the EI is measured as per sales. Given below are examples from both solar and transformer industries.

Also, when comparing we need to compare only the EI based on scope 1+2 calculation and if scope 1+2+3 is taken into account it needs to be all 15 categories or corresponding categories of scope 3 which the peer has disclosed.

Since companies can directly influence their energy use and fuel consumption, both of which fall under Scope 1 and 2, EI is often calculated separately for Scope 1+2 only. Another set of EI calculation is also done taking into consideration Scope 1, 2 & 3. However, the EI against Scope 1+2 is considered sufficient for regulatory and reporting purposes under frameworks like the Greenhouse Gas Protocol (GHG Protocol) and CDP (Carbon Disclosure Project). But, many sustainability frameworks, such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB), encourage or require reporting on Scope 3 for full transparency. Investors and stakeholders are pushing for companies to include Scope 3 emissions to evaluate total climate risk.

Table 28 showing EI in tCO2e per MVA production ranging from **0.3 to 2.12 (Scope 1+2) and 0.71 to 3.51 (Scope 1+2+3)** in three different locations**.**

Peer EI Disclosures:

Name	Emission Intensity (EI) FY 2023	FY 2022	UOM	Remarks
ABB				
Scope 1+2	4.7	7.6	tCO2e/million Doller sale	
Scope 1+2+3	13541	13326	tCO2e/million Doller sale	Scope 3 includes all 15 categories.
Hitachi Energy	EI Not disclosed publicly			GHG emissions only disclosed.
Schneider Electric				
Scope 1+2	5.6	6.7	tCO2e/million Euro	
Scope 3	1581	1779	tCO2e/million Euro	Total 10 categories included. Excluded Categories: C8,C10,C13,C14 & C15
First Solar				
Scope 1+2	65	63	tCO2e/MW	
Jinko Solar				
Scope 1+2	23.14	27.25	tCO2e/MW	
Scope 1+2+3	154.78	172.60	tCO2e/MW	11 out of 15 categories included. Excluded Categories:C10, C11, C12&C14
LONGi				
Scope 3	-	23061	tCO2e/100 million RMB revenue	8 out of 15 Categories included. Excluded Categories: C2, C8, C10, C11, C13, C14 & C15.

Table 29: Peer EI Disclosure

Table 29 shows how our peer companies are disclosing their Emissions Intensity (EI).

If the same group of companies manufactures different products, they prefer to report EI in tCO2e against revenue instead of per unit of production. Additionally, some industries disclose separate EI for Scope 3 emissions as well.

All peers are showing a trend of emission reduction, except First Solar. The increase in First Solar's emission intensity from 63 to 65 tCO2e/MW is due to the ramp-up of their new manufacturing facilities.

3.3.3 Analysis

Scope 1:

Under scope 1 emission SSEL unit 2&3, Kadapa has higher emissions and SSEL Naini has lowest which is 817 tCO2e, 306 tCO2e respectively and Indotech has 610 tCO2e.

The emission differences are due to the following points:

- **Employee Commute:** SSEL Unit 2 & 3 has company-owned vehicles for employee commuting, whereas SSEL Naini and Indotech have outsourced this service. As a result, 117 tCO2e emissions were added to the Scope 1 emissions of Unit 2 & 3 Kadapa, while these emissions were excluded from Scope 1 in SSEL Naini and Indotech.
- **Canteen Facility:** Both SSEL Naini and Indotech have outsourced their canteen facilities, whereas SSEL Unit 2 & 3 Kadapa has an in-house canteen. This resulted in an additional 101 tCO2e emissions being added to the Scope 1 emissions of Unit 2 & 3 Kadapa.
- **Refrigerant Usage:** SSEL Unit 2 & 3 topped up 86 kg of refrigerant, while SSEL Naini and Indotech used 61 kg and 8 kg, respectively. Consequently, the associated emissions for SSEL Unit 2 & 3 Kadapa are higher in this case.
- **Tank Fabrication:** SSEL Unit 2 & 3 includes emissions from in-house tank fabrication (Unit 3), whereas the other two plants, SSEL Naini and Indotech, purchase tanks from vendors, and thus do not have emissions from tank fabrication.

Scope 2:

Under Scope 2 emissions, SSEL Unit 2 & 3 Kadapa has higher emissions, while SSEL Naini and Indotech have nearly the same emissions, at 14,783 tCO2e, 1,453 tCO2e, and 1,454 tCO2e respectively. As we know, Scope 2 emissions are related to purchased electricity. To provide a clearer understanding, the table 30 shows the electrical energy consumption of each plant along with their renewable energy share.

SSEL Group Transformer Manufacturing Business Electrical Energy Consumption (FY 23-24)

Sl. No	Description	UOM	Site Name			Total
			SSEL Kadapa Unit 2 & 3	SSEL Naini	Indotech	
1	Production	MVA	7363	1459	6933	15755
2	**Specific Electrical Energy Consumption**	**MWh/MVA production**	**3.01**	**1.39**	**0.37**	**1.70**
3	Total Electricity Consumption	MWh	22170	2029	2540	26738
4	From Grid	MWh	20647	2029	2030	24706
5	From Solar (Including Wheeling)	MWh	1523	0	0	1523
6	From Wind (Including Wheeling)	MWh	0	0	509	509
7	**% Grid**	**%**	**93**	**100**	**80**	**92**
8	**% RE**	**%**	**7**	**0**	**20**	**8**

Table 30: SSEL Group Transformer Manufacturing Business Electrical Energy Consumption (FY23-24)

The table 30 shows that the total electrical energy demand for SSEL Unit 2 & 3 Kadapa, SSEL Naini, and Indotech is 22,170 MWh, 2,029 MWh, and 2,540 MWh, respectively. The higher electricity demand at SSEL Kadapa is due to differences in product manufacturing and the associated machinery.

SSEL Kadapa uses an electric thermic fluid heater, while Indotech and SSEL Naini use non-electric (fuel-based) thermic fluid heaters.

Due to the adoption of renewable energy, SSEL Kadapa mitigated 1,090.47 tCO2e, and Indotech mitigated 364.44 tCO2e. In terms of renewable energy share, Indotech has a higher share compared to SSEL Kadapa, at 20% and 7%, respectively. SSEL Naini does not have any renewable energy share.

The specific electrical energy consumption for SSEL Kadapa, SSEL Naini, and Indotech is 3.01, 1.39, and 0.37, respectively. A lower value indicates higher efficiency. By improving the efficiency of plant operations and machinery, we can further reduce this specific electrical energy consumption as well as the associated emissions.

Scope 3:

The Scope 3 emissions of SSEL Kadapa, SSEL Naini, and Indotech are 10,207 tCO2e, 1,029 tCO2e, and 2,845 tCO2e, respectively.
The emission differences are due to the following factors:

- **Category C3 (Fuel- and Energy-related Activities):**

  In this category, we account for fuel and energy-related emissions not included in Scope 1 or Scope 2. This includes upstream emissions of purchased fuels (extraction, production, and transportation of fuels consumed by the company) and upstream emissions of purchased electricity (extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling). Due to higher fuel and electricity consumption at SSEL Kadapa, Scope 3 Category 3 emissions are higher compared to the other two manufacturing units. Which is 5960 tCO2e for SSEL Kadapa and 709 tCO2e, 616 tCO2e for Indotech and SSEL Naini respectively.

- **Category C4 (Upstream Transportation and Distribution):**

  The difference in emissions under this category is due to the variation in inward materials accounted for by each plant. SSEL Kadapa accounted for all inward materials received during FY 23-24, whereas SSEL Naini accounted for only six major raw materials, and Indotech accounted for ten major raw materials which accounts for major inward materials. Emissions under this category for SSEL Kadapa, Indotech, and SSEL Naini are 3527 tCO2e, 715 tCO2e, and 186 tCO2e, respectively.

- **Category C5 (Waste Generated in Operations):**

  The difference in emissions is due to the quantity of waste generated at each manufacturing plant. SSEL Kadapa generated 1,031 tons of waste, while SSEL Naini and Indotech generated 213 tons and 342 tons of waste, respectively. Emissions under this category for SSEL Kadapa, Indotech, and SSEL Naini are 137 tCO2e, 59 tCO2e, and 52 tCO2e, respectively. For details of breakup of waste generation please refer to attachments.

- **Category C6 (Business Travel):**

  The difference emission due to the mode of transportation used by the employees. Indotech has higher emissions (83.23 tCO2e), while SSEL Naini has the lowest emissions (3.78 tCO2e), and SSEL Kadapa has 10.94 tCO2e. Air travel contributes the most to emissions in this category.

- **Category C7 (Employee Commuting):**

  The difference in emissions is due to the number of employees at each plant and the mode of transportation used to commute. Emissions under this category for SSEL Kadapa, Indotech, and SSEL Naini are 187 tCO2e, 184 tCO2e, and 57 tCO2e, respectively.

- **Category C9 (Downstream Transportation and Distribution):**

  The difference in emissions is due to the weight of the final products, the distance from the manufacturing site to the client location, and the mode of transportation used. Emissions under this category for Indotech, SSEL Kadapa, and SSEL Naini are 1,095 tCO2e, 384 tCO2e, and 48.36 tCO2e, respectively.

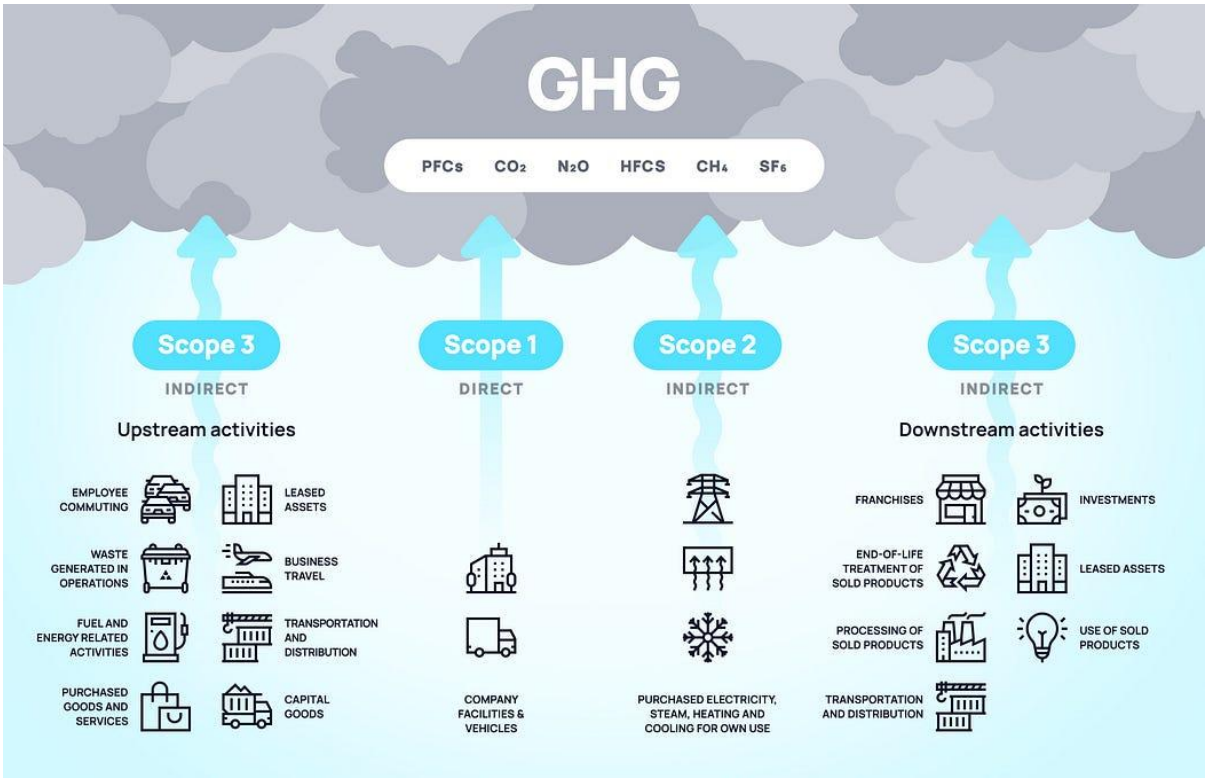


Figure 30: Scope 1, 2&3 emissions. Data source: GHG Protocol

3.4 SSEL Group Renewable Energy Share

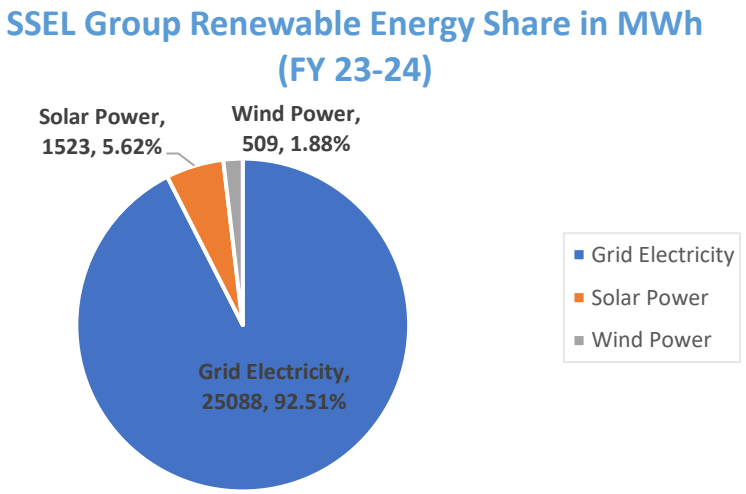


Figure 31: SSEL Group Renewable Energy Share (FY23-24)

SSEL Group Electrical Energy Consumption in MWh (FY 23-24)							
Sl.No	**Site name**	**Total Electricity Consumption**	**From Grid**	**From Solar (Including Wheeling)**	**From Wind (Including Wheeling)**	**% Grid**	**% RE**
1	SSEL Corporate office	86	86	0	0	100.00	0.00
2	SSEL Kadapa Unit 1	144	144	0	0	100.00	0.00
3	SSEL Kadapa Unit 2 & 3	22170	20647	1523	0	93.13	6.87
4	SSEL Kadapa Unit 4	58	58	0	0	100.00	0.00
5	SSEL Naini	2029	2029	0	0	100.00	0.00
6	Indotech	2540	2030	0	509	79.94	20.06
7	ISPL Corporate office	90	90	0	0	100.00	0.00
8	ISPL , Ramayapatnam	4	4	0	0	100.00	0.00
	Total	**27120**	**25088**	**1523**	**509**	**92.51**	**7.49**

Table 31: SSEL Group Transformer Manufacturing Business Electrical Energy Consumption (FY23-24)

The SSEL Group's renewable energy share is 7.5 %, with solar power contributing 5.62 % and wind power contributing 1.88 %. The remaining 92.51% of the SSEL Group's electrical energy consumption relies on grid electricity.

4. REDUCTION STRATEGY AND RECOMMENDATIONS

4.1 Reduction Strategy

The Intergovernmental Panel on Climate Change's (IPCC) Special Report on Global Warming of 1.5°C (SR15, 2018), was widely accepted as a warning that we must limit global temperature rise to 1.5°C above pre-industrial levels and reach net-zero carbon dioxide (CO2) emissions by 2050 for the best chance of avoiding catastrophic climate breakdown. More recently, the IPCC's Sixth Assessment Report (2021) has confirmed that climate change is already affecting every region on Earth, its impacts increasingly visible in the form of extreme weather, worsened droughts and heightened risk of forest fires.

Against this backdrop, companies are increasingly adopting net-zero targets. The number of businesses committing to reach net-zero emissions has grown rapidly, but not all net-zero targets are equal. Without adhering to a common definition, net-zero targets can be inconsistent, and their collective impact is strongly limited.

While the growing interest in net-zero targets represents an unparalleled opportunity to drive corporate climate action, it has also created a pressing need for a common understanding of 'net-zero' in a corporate context. Business leaders need a robust, science-based framework for setting net-zero targets. Otherwise, they risk continuing to invest in business models that are inconsistent with the goals of the Paris Agreement.

The Science Based Targets initiative (SBTi) developed the first global science-based standard for companies to set net-zero targets, published in 2021. The SBTi Corporate Net-Zero Standard gives business leaders confidence that their greenhouse gas (GHG) mitigation targets are aligned with what is needed for a habitable planet, and it provides clarity on business climate action to a wide range of stakeholders.

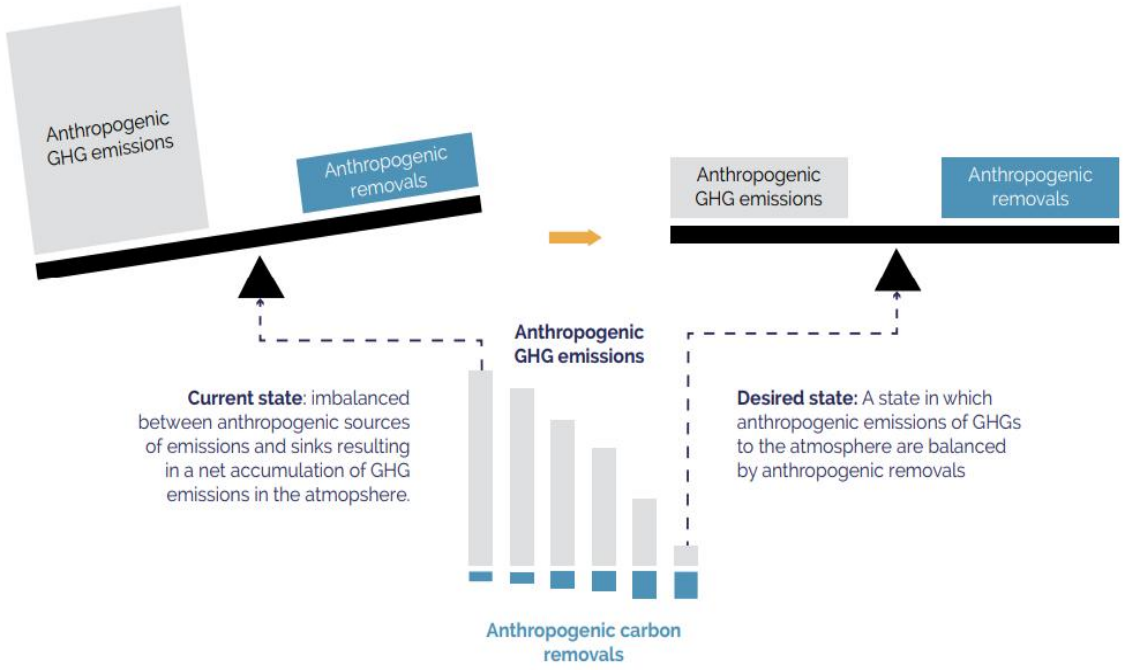


Figure 32: Net Zero Emission at Global Level

4.1.1 Science Based Target initiative (SBTi)

The Science Based Targets initiative (SBTi) is a corporate climate action organization that enables companies and financial institutions worldwide to play their part in combating the climate crisis. SBTi develop standards, tools and guidance which allow companies to set greenhouse gas (GHG) emissions reductions targets in line with what is needed to keep global heating below catastrophic levels and reach net-zero by 2050 at latest.

The SBTi is incorporated as a charity, with a subsidiary which will host its target validation services. SBTi partners are CDP, the United Nations Global Compact, the We Mean Business Coalition, the World Resources Institute (WRI), and the World-Wide Fund for Nature (WWF).

Figure 33: a five-step approach to setting science-based targets

4.1.2 Guiding Principles for Science based Net-Zero Targets

Guiding Principle 1:

Reaching net-zero emissions for a company involves achieving a state in which its value chain results in no net accumulation of carbon dioxide in the atmosphere and in no net-impact from other greenhouse gas emissions.

Guiding Principle 2:

In accordance with the best available science, the Paris Agreement and Sustainable Development Goals, companies should transition towards net-zero in line with mitigation pathways that are consistent with limiting warming to 1.5°C with no or limited overshoot.

Guiding Principle 3:

The mitigation strategy followed by the company should inform long-term strategies and investments that mitigate exposure to climate-related transition risks, ensuring that the business model of the company will continue to be viable in a net-zero economy

4.1.3 Initial recommendations for corporate net-zero target setting

the following initial recommendations are provided by SBTi for companies seeking to set and implement robust net-zero targets.

1. Boundary: A company's net-zero target should cover all material sources of GHG emissions within its value chain.

2. Transparency: Companies should be transparent about the sources of emissions included and excluded from the target boundary, the timeframe for achieving net-zero emissions, the amount of abatement and neutralization planned in reaching net-zero emissions, and any interim targets or milestones.

3. Abatement: Companies must aim to eliminate sources of emissions within its value-chain at a pace and scale consistent with mitigation pathways that limit warming to 1.5°C with no or limited overshoot. During a company's transition to net zero, compensation and neutralization measures may supplement, but not substitute, reducing value chain emissions in line with science. At the time that net zero is reached, emissions that are not feasible for society to abate may be neutralized with equivalent measure of CO2 removals.

4. Timeframe: Companies should reach net-zero GHG emissions by no later than 2050. While earlier target years are encouraged, a more ambitious timeframe should not come at the expense of the level of abatement in the target.

5. Accountability: Long-term net-zero targets should be supported by interim science-based emission reduction targets to drive action within timeframes that are aligned with corporate planning and investment cycles and to ensure emission reductions that are consistent with Paris-aligned mitigation pathways.

6. Neutralization: Reaching net-zero emissions requires neutralizing a company's residual GHG emissions with an equivalent amount of carbon removals. An effective neutralization strategy involves removing carbon from the atmosphere and storing it for a long-enough period to fully neutralize the impact of any GHG that continues to be released into the atmosphere.

7. Compensation: While reaching a balance between emissions and removals is the end goal of a netzero journey, companies should consider undertaking efforts to compensate unabated emissions in the transition to net-zero as a way to contribute to the global transition to net-zero.

8. Mitigation hierarchy: Companies should follow a mitigation hierarchy that prioritizes eliminating sources of emissions within the value chain of the company over compensation or neutralization measures. Land-based climate strategies should prioritize interventions that help preserve and enhance existing terrestrial carbon stocks, within and beyond the value chain of the company.

9. Environmental and social safeguards: Mitigation strategies should adhere to robust social and environmental principles, ensuring amongst others, protection and/or restoration of naturally occurring ecosystems, robust social safeguards, and protection of biodiversity, amongst others.

10. Robustness: Compensation and neutralization measures should: (a) ensure additionality, (b) have measures to assure permanence of the mitigation outcomes, (c) address leakage and (d) avoid double counting.

4.1.4 Mitigation strategy and tactics

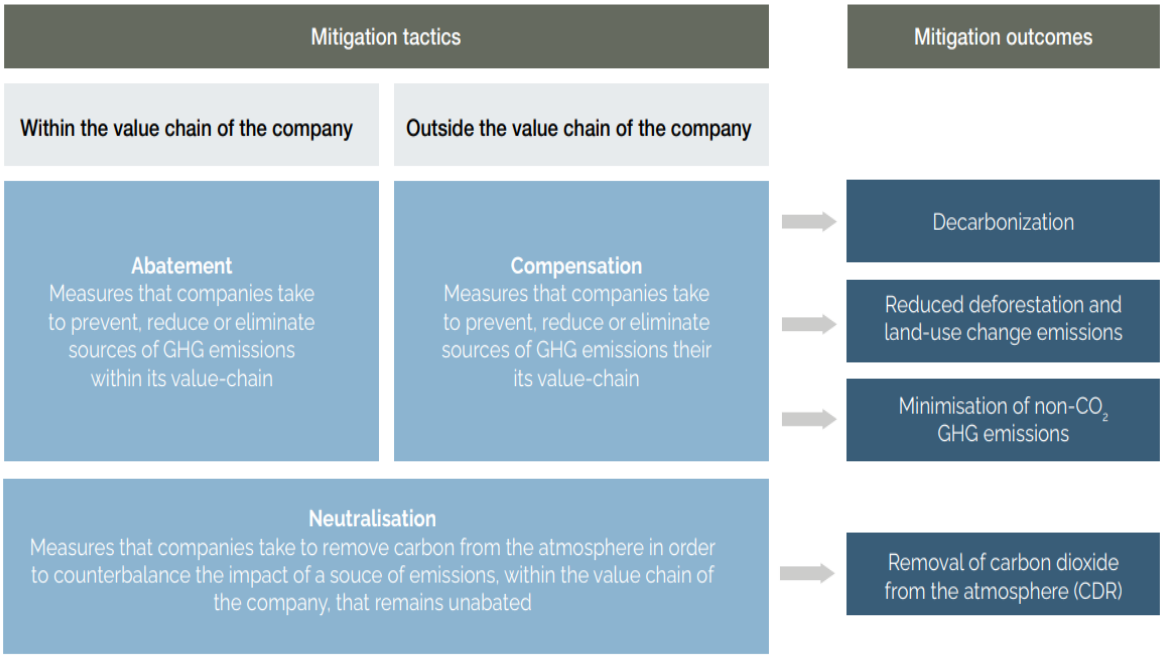


Figure 34: Taxonomy of climate mitigation tactics and outcomes

The most important aspect that differentiates corporate climate targets is the strategy used by companies to achieve their targets, to mitigate their impacts on the climate, and to contribute to society's transition to net-zero. The combination of measures deployed to attain their targets will determine whether a company is effectively eliminating their impact on the climate, the effectiveness with which a company is addressing the transition risks to which they are exposed, and ultimately, will have an impact on our collective ability to reach net-zero emissions at the global level.

4.1.5 GHG Mitigation Opportunities

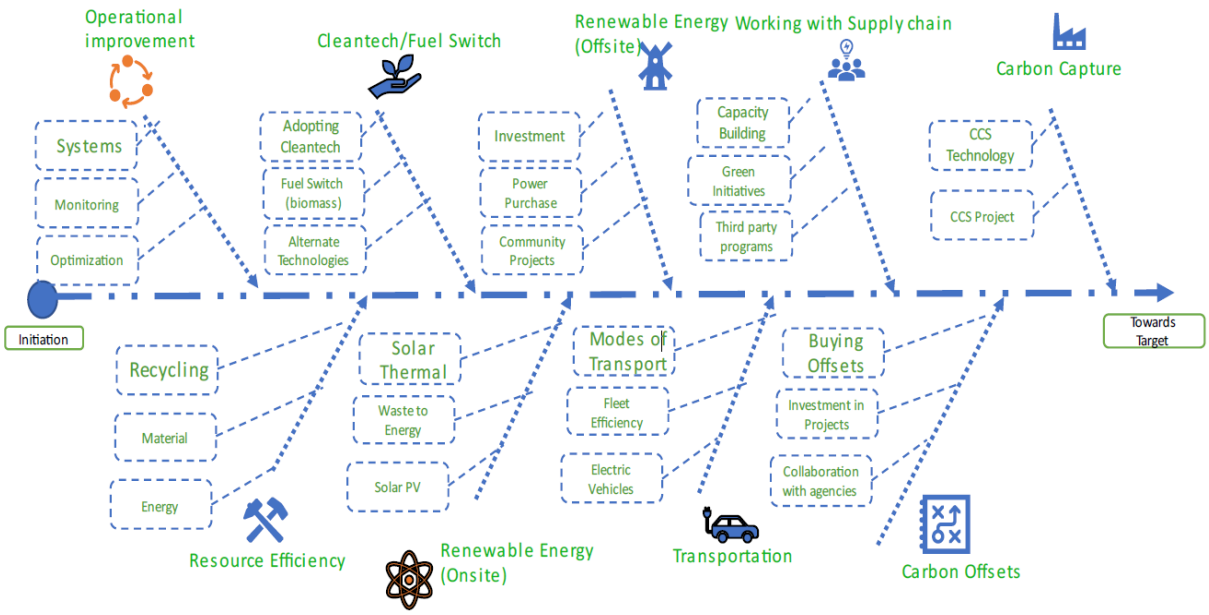


Figure 35: GHG Mitigation Opportunities

4.1.6 Summarized Assessment of Corporate Net-Zero Strategies by SBTi

Strategy	Value chain emissions abatement	Measures to balance unabated value chain emissions	Principle 1: consistent with no net accumulation of GHGs in the atmosphere?	Principle 2: consistent with the attainment of the Paris Agreement and SDGs?	Principle 3: business model resilient in a net zero economy?
Strategy 1 Replacing abatement with carbon credits representing emission reductions	Value chain emissions are abated by an arbitrary amount	Unabated emissions are balanced by carbon credits representing emission reductions	No	No. The Paris Agreement cannot be attained without halting accumulating of GHGs in the atmosphere	No. Retaining a relatively high-emissions business model is unlikely to meet stakeholder expectations
Strategy 2 Replacing abatement with avoided emissions		Unabated emissions are balanced by avoided emissions due to sold products or services			
Strategy 3 Replacing abatement with negative emissions		Unabated emissions are balanced by an appropriate amount of CO_2 removal	Yes, if CO_2 sequestration is permanent	No. Overreliance on CO_2 removal generates trade-offs with other social and environmental goals	Uncertain. Overreliance on negative emissions may not address stakeholder expectations
Strategy 4 Abatement of emissions in line with science	Value chain emissions are abated at a rate consistent with Paris-aligned climate change mitigation scenarios	Unabated emissions are balanced by an appropriate amount of CO_2 removal	Yes, if CO_2 sequestration is permanent	Yes	Yes
Strategy 5 Climate positive approach		During the transition to net zero, unabated emissions are compensated. When net zero is achieved, emissions are balanced with an appropriate amount of CO_2 removal			

Figure 36: Summarized Assessment of Corporate Net-Zero Strategies by SBTi

4.2 Emission Reduction Recommendations for SSEL Group

4.2.1 Under Scope 1

Sl.No	Site Name	Focus Area	Recommendations	Expected emissions reduction in tCO2e
1.	SSEL Unit 2 & 3, Kadapa	Company owned vehicle and Canteen Facilities	1. Outsource non-core activities such as Company owned transport used for Employee commute & Logistics activities and Canteen facilities to 3rd party venders.	432
		Forklift	Replace diesel forklift with Electric forklift powered by Renewable Energy.	134.25
		DG Set	1. Modify DG set to run on dual fuel or biodiesel or biogas or other biofuels. 2. Improve combustion efficiency by commencing the performance study.	37.25
2.	SSEL, Naini	Forklift	Replace diesel forklift with Electric forklift powered by Renewable Energy.	6.94
		DG Set	1. Modify DG set to run on dual fuel or biodiesel or biogas or other biofuels. 2. Improve combustion efficiency by commencing the performance study.	5.31
		Thermic Fluid Heater:	1. Improve combustion efficiency by commencing the performance study. 2. Reduce heat losses with proper insulation. 3. To **achieve zero emissions** - If budget allows the highly recommended solution would be switching to electricity from renewable energy source to heat the thermic fluid heater.	8.24
3	INDOTECH, Kancheepuram	DG Set	1. Modify DG set to run on dual fuel or biodiesel or biogas or other biofuels. 2. Improve combustion efficiency by commencing the performance study.	19.30
		Thermic Fluid Heater:	1. Improve combustion efficiency by commencing the performance study. 2. Reduce heat losses with proper insulation. 3. Switch the fuel from furnace oil to biomass 4. To **achieve zero emissions** - If budget allows the highly recommended solution would be switching to electricity from renewable energy source to heat the thermic fluid.	345.22
Total Scope 1 Emission Reduction per annum at current production output				**988 tCO2e**

Table 32: Emission Reduction Recommendations Under Scope 1

4.2.2 Under Scope 2

Sl.No	Site Name	Focus Area	Recommendations	Expected emissions reduction
1.	SSEL Unit 2 & 3, Kadapa (Approximate emission Reduction will be 3696 tCO2e)	Energy Efficiency	Conduct detailed energy audit and machinery efficiency study based on which generally 20 to 30 % energy conservation can be implemented.	2957 tCO2e @ 20% reduction
		Onsite Renewable Energy generation (Solar)	1. Clean panels regularly to remove dust, dirt, and debris that can block sunlight. 2. Ensure proper orientation and tilt angle and use solar tracking system. 3. Increase the capacity of onsite renewable energy generation (Currently Unit 2 & 3 Kadapa plant has the total of 2 MW rooftop solar power generation).	Even if 5% Renewable Energy (RE) addition happens totally against all these four options reductions of 739 tCO2e can be achieved.
		Offsite Renewable Energy generation	Generate electricity from renewable energy in offsite and wheeling it.	
		Offset Mechanism options	1. Purchase of renewable energy certificates (RECs) 2. Purchase renewable energy through power purchase agreement (PPAs) 3. Purchase renewable energy directly from the generator through open access policy.	
		Carbon Credits	1. Invest in projects that significantly reduce emissions can generate carbon credits under various carbon market mechanisms. 2. Tree plantation/afforestation and registration of project under voluntary carbon standards (VCS) – VERRA – Gold standards etc., for carbon credits. 3. Installation of Carbon capture technology.	
2.	SSEL, Naini (Approximate emission Reduction will be 218 tCO2e)	Energy Efficiency	Conduct detailed energy audit and machinery efficiency study based on which generally 20 to 30 % energy conservation can be implemented. As Naini plant has shown reduced scope 2 emission already it might be result of inherited efficiency practices, hence assumption of 10 to 15 % reduction is taken in this case.	145 tCO2e @10% reduction
		Onsite Renewable Energy generation	Explore the rooftop solar power generation or any other kind of solar power farming.	Even if 5% Renewable Energy (RE) addition happens totally against all these four
		Offsite Renewable Energy generation	Generate electricity from renewable energy in offsite and wheeling it.	

		Offset Mechanism options:	1. Purchase of renewable energy certificates (RECs) 2. Purchase renewable energy through power purchase agreement (PPAs) 3.Purchase renewable energy directly from the generator through open access policy.	options reductions of 73 tCO2e can be achieved.
		Carbon Credits	1. Invest in projects that significantly reduce emissions can generate carbon credits under various carbon market mechanisms. 2. Tree plantation/afforestation and registration of project under voluntary carbon standards (VCS) – VERRA – Gold standards etc., for carbon credits. 3. Installation of Carbon capture technology.	
3	INDOTECH, Kancheepuram (Approximate emission Reduction will be 218 tCO2e)	Energy Efficiency	Conduct detailed energy audit and machinery efficiency study based on which generally 20 to 30 % energy conservation can be implemented. As INDOTECH has shown reduced scope 2 emission already, so the expected emission reduction range will be minimum **5 to 15 %**	145 tCO2e @ 10% reductions
		Onsite Renewable Energy generation	Explore the rooftop solar power generation or any other kind of solar power farming.	Even if 5% Renewable Energy (RE) addition happens totally against all these four options reductions of 73 tCO2e can be achieved.
		Offsite Renewable Energy generation	1. Indotech already has offsite wind mill plant capacity of 450 kW/day at Thirunelveli. Recommend further increase this wind mill capacity and wheeling it. 2. Explore other source of renewable energy power generation in offsite and wheeling it.	
		Offset Mechanism options	1. Purchase of renewable energy certificates (RECs) 2. Purchase renewable energy through power purchase agreement (PPAs) 3. Purchase renewable energy directly from the generator through open access policy.	
		Carbon Credits	1. Invest in projects that significantly reduce emissions can generate carbon credits under various carbon market mechanisms. 2. Tree plantation/afforestation and registration of project under voluntary carbon standards (VCS) – VERRA – Gold standards etc., for carbon credits. 3. Installation of Carbon capture technology.	
Total Scope 2 Emission Reduction per annum at current production output				**4132 tCO2e**

Table 33: Emission Reduction Recommendations Under Scope 2

4.2.3 General Recommendations Under Scope 3 emissions

Sl. No	Scope 3 Category	Focus Area	Recommendations
1.	C3 - Fuel and Energy-Related Activities (not included in Scope 1 or 2)	Renewable Energy Contracts	Secure renewable energy for the entire value chain by working with energy providers, not just for direct operations but also encouraging suppliers to adopt renewable energy sources.
		Energy Efficiency Programs	Collaborate with suppliers to improve energy efficiency in their operations, providing training or incentives for adopting low-energy production technologies.
2.	C4 - Upstream Transportation and Distribution	Logistics Optimization	Optimize shipping routes, consolidate shipments, and use larger loads to reduce the number of trips. This helps reduce fuel consumption and emissions.
		Low-Emission Transport	Shift to low-carbon transportation modes such as electric trucks, rail, or sea freight wherever possible. Work with logistics partners that offer green transportation options.
		Local Sourcing	Source raw materials, components, and sub-assemblies from suppliers closer to the manufacturing plant to reduce the carbon footprint from transportation.
3.	C5 - Waste Generated in Operations	Waste Minimization	Implement lean manufacturing techniques to minimize material waste in the production process. Recycle scrap metals, insulation materials, and other production by-products.
		Circular Economy Initiatives	Establish take-back or recycling programs for transformer components that reach the end of their useful life. This reduces waste and recycles valuable materials.
		Packaging Optimization	Reduce packaging material use, and switch to recyclable or reusable packaging materials for both inbound and outbound goods.
4.	C6 - Business Travel	Virtual Collaboration	Minimize business travel by increasing the use of virtual meeting tools for collaboration with suppliers, clients, and internal teams.
		Sustainable Travel Policies	Implement a company-wide sustainable travel policy that prioritizes low-emission transportation options (e.g., trains over flights, electric vehicles over fossil-fuel-based vehicles).
5.	C7 - Employee Commuting	Telecommuting Options	Provide flexible work-from-home policies to reduce emissions from commuting.
		Carpooling and EV Adoption	Encourage carpooling and the use of electric vehicles (EVs) among employees. Provide EV charging stations at company facilities.

		Public Transport Incentives	Offer incentives for employees who use public transportation or adopt other sustainable commuting options like cycling or walking.
6.	C8 - Downstream Transportation and Distribution	Green Distribution Networks	Partner with distribution companies that prioritize the use of low-emission vehicles or carbon offset programs. Encourage customers to opt for lower-emission shipping options.
		Demand Forecasting	Improve demand forecasting to reduce the need for express or air freight, which tends to have higher emissions than other shipping methods.
		Reverse Logistics	Implement systems for customers to return used transformers for recycling or refurbishment, minimizing waste and transportation emissions associated with product disposal.

Table 34: Emission Reduction Recommendations Under Scope 3

Assuming 3 % reduction in Scope 3 emission will result in **422 tCO2e** emission reduction for the SSEL Group Transformer Manufacturing Business.
It is very important that we commence measurement of scope 3 emissions of all applicable 15 categories because EI can be disclosed as per scope 1+2 or scope 1+2+3. But while doing the latter it is important to include all applicable categories under scope 3.
Even for peer comparison inclusion of all categories under scope 3.

For transformer business applicable categories are C1 Purchased goods and Services, C2 Capital goods, C10 Processing of sold products, C11 Use of Sold products, C12 End of life treatment of sold products. We need to gather information on applicability of categories C8 Upstream leased assets, C13 Downstream Leased assets, C14 Franchises, C15 Investments.

4.2.4 General recommendation to reduce other scope 3 emissions

1. Category 1: Purchased Goods and Services

- Material Sourcing: Prioritize the use of recycled or sustainably sourced materials such as copper, steel, and insulation materials, which are key components in transformers.
- Supplier Sustainability: Engage with suppliers to ensure they are adopting energy-efficient manufacturing processes and low-carbon energy sources in their operations.
- Eco-friendly Components: Partner with suppliers to develop and procure more energy-efficient and longer-lasting components like high-efficiency cores and advanced insulation.

2. Category 2: Capital Goods

- Low-Carbon Machinery: Invest in manufacturing equipment and infrastructure that are energy-efficient, durable, and use renewable energy where possible.
- Sustainable Facility Design: Ensure manufacturing facilities and capital assets are built and maintained with sustainability in mind, incorporating renewable energy systems and waste-reducing technologies.

3. Category 8: Upstream Leased Assets

- Energy-Efficient Leases: Ensure that leased assets, such as office spaces or warehouses, meet high energy-efficiency standards. Work with landlords to install renewable energy sources like solar panels on leased buildings.

- Sustainable Asset Management: Ensure any leased manufacturing equipment is energy-efficient and regularly maintained to minimize energy consumption and emissions.

4. Category 10: Processing of Sold Products

- End-of-Life Treatment Programs: Develop and promote programs that help customers properly recycle or refurbish transformers at the end of their life to minimize environmental impacts.
- Product-as-a-Service Models: Consider offering transformers on a service or leasing model, where you retain control over end-of-life processing, ensuring products are disposed of sustainably.

5. Category 11: Use of Sold Products

- Energy-Efficient Design: Design transformers with high energy efficiency to reduce the operational emissions from electricity loss during use. Use advanced materials and technologies to minimize core and copper losses.
- Demand-Side Management: Work with customers to optimize transformer sizing and load management to ensure that transformers are operating at optimal efficiency.
- Smart Grid Integration: Design transformers to be compatible with smart grid technologies, enabling more efficient energy distribution and reducing emissions associated with electricity consumption.

6. Category 12: End-of-Life Treatment of Sold Products

- Take-Back Programs: Implement take-back or recycling programs for transformers that have reached the end of their useful life. This ensures that materials like copper, steel, and insulation are recovered and recycled.
- Recycling Partnerships: Partner with specialized recycling companies to ensure proper disposal and recovery of valuable materials from transformers, minimizing landfill waste and the emissions associated with raw material extraction.

7. Category 13: Downstream Leased Assets

- Energy-Efficient Leasing Options: Offer energy-efficient transformers to customers on a leasing basis. This ensures that the latest, most efficient models are in use and that the products can be managed at end-of-life by the manufacturer for recycling or refurbishment.
- Renewable Energy Integration: Encourage customers leasing transformers to use renewable energy sources, reducing operational emissions associated with the electricity flowing through the transformers.

8. Category 14: Franchises

- Sustainability Standards for Franchisees: If the company operates franchises, set stringent environmental performance standards for them, particularly regarding energy use, waste management, and sourcing of materials.
- Franchise Training: Provide training and tools to franchisees to help them reduce their emissions, including using energy-efficient products and optimizing their supply chains.

9. Category 15: Investments

- Sustainable Investment Strategies: For any investments in external businesses, prioritize those with strong environmental, social, and governance (ESG) practices.
- Green Innovation Funding: Invest in green technologies and companies that focus on developing more sustainable transformer materials, designs, and manufacturing processes.

4.3 Emission Reduction Road Map – Where we start

UOM: tCO2e

Site Name	Unit 2&3 Kadapa		Naini		Indotech		Total Reduction
	From	To	From	To	From	To	
Scope 1	817	124	306	286	610	245	**988**
Scope 2	14783	11087	1453	1235	1454	1236	**4132**
Scope 3	10207	9901	1029	998	2845	2760	**422**
Reduction	25807	21202	2788	2519	4909	4241	
Total Reduction	**4605 (18%)**		**269 (9.6%)**		**668 (13.6%)**		**5542**

Table 35: Expected Emission Reduction

As shown in Table 35, the total expected emission reduction for the transformer manufacturing business under Scope 1, Scope 2, and Scope 3 is 988 tCO2e, 4132 tCO2e, and 422 tCO2e, respectively, totaling 5542 tCO2e.

4.4 Cost Reduction

4.4.1 Switch from 3-ton Diesel Fork lift to Electric Fork lift

Cost Reduction - Switch from 3-ton Diesel Fork lift to Electric Fork lift			
Description	**UOM**	**SSEL Unit 2&3 Kadapa**	**SSEL Naini**
One Diesel Forklift (FY 23-24)			
Operating hour	h/year	835	648
Diesel consumption	L/year	3339	2590
Diesel Cost@Rs.97/L for Kadapa & Rs.88.51 for Naini	Rs/year	323889	229241
GHG Emission	tCO2e	8.95	6.94
1. Proposed Conversion - Electric Forklift Powered by Grid Electricity			
Electricity Consumption	kWh/annum	10017	7770
Electric Cost @Rs.5.85 for Kadapa & Rs.7.1 for Naini	Rs/year	58601	55167
Total Investment (CAPEX Electric forklift)	Rs	1106000	1106000
GHG Emission	tCO2e	7.17	5.56
Annual Net Saving on fuel	**Rs/year**	**265289**	**174074**
GHG Emission Reduction	**tCO2e**	**1.78**	**1.38**
Payback Period	**Year**	**4.17**	**6.35**
ROI	**%**	**23.99**	**15.74**
2. Proposed Conversion - Electric Forklift Powered by Renewable Electricity			
Capacity (Capacity = No of Module *550 wp) 9 module / 256 sq.ft for Kadapa & 7 module / 186 sq.ft for Naini	kW	5	4
Roof top Solar Power (PV Cost + Invertor + Installation)	Rs	194166	158909
Maintenance cost / instead of fuel	Rs/year	22452	1264909
Total Investment (CAPEX Electric forklift + Roof top Solar + Maintenance)	Rs	1300166	1264909
Annual Net Saving on fuel	**Rs/year**	**301437**	**211825**
GHG Emission Reduction	**tCO2e**	**8.95**	**6.94**
Payback Period	**Year**	**4.31**	**5.97**
ROI	**%**	**23.18**	**16.75**

Table 36: Costing for switching from current Diesel forklift to Electric forklift + Renewable power

An example of cost reduction is worked out in detail in the table 35. This is with respect to 15 nos. diesel run forklift in Unit 2&3 Kadapa which currently accounts for 134 tCO2e under scope 1, i.e., approximately 8.95 tCO2e per forklift. If they are converted to renewable electricity run forklift, we reduce not just GHG emission to zero from 134 tCO2e but also save on fuel by Rs.3,01,437 per year after the payback period of 4.3 years with an initial investment of Rs. 13 Lakhs. It is pertinent to note here that at the rate of 304 working days per year, each of the 15 forklift runs on an average only for 2 h 45 minutes per day, however we have 15 forklift operators on our rolls.

SSEL's Naini plant has one diesel forklift, and replacing it with an electric forklift powered by renewable energy, with an investment of Rs. 12.65 lakhs, will reduce GHG emissions from 6.94 tCO2e to zero. Additionally, it will result in fuel savings of Rs. 2,11,825 per year after a payback period of 5.97 years.

4.4.2 Modification of DG set to run on dual fuel

Costing - DG Set Modification (Dual Fuel DG set)				
Description	**UOM**	**Unit 2&3 Kadapa**	**Naini**	**Indotech**
Before Modification				
Diesel Consumption	L/year	71360	9910	36000
Diesel Cost @ Rs.97/L for Kadapa, Rs.88.51/L for Naini and Rs. 93/L for Indotech	Rs/year	6921954	877134	3348000
GHG Emission	tCO2e	191.25	26.56	96.48
After Modification				
Diesel (35.8 MJ/L) Consumption	L	21408	2973	10800
CNG (50 MJ/kg) Consumption (70 % of diesel is replaced with CNG)	kg	35766	4967	18043
Diesel Cost @ Rs.97/L for Kadapa, Rs.88.51/L for Naini and Rs. 93/L for Indotech	Rs/year	2076586	288381	1047600
CNG Cost @ Rs.79/L for Kadapa, Rs.91.5/L for Naini and Rs. 87.5/L for Indotech	Rs/year	2825499	454471	1578780
Total Fuel Cost	Rs/year	4902085	742852	2626380
GHG Emission from Diesel	tCO2e	57.37	7.97	28.94
GHG Emission from CNG	tCO2e	96.57	13.41	48.72
Total GHG Emission	tCO2e	153.94	21.38	77.66
No of DG set	Nos.	9	2	4
Cost of Dual Fuel Kit	Rs	5400000	1200000	2400000
Cost of Dual Fuel Kit installation	Rs	540000	120000	240000
Total Investment	Rs	5940000	1320000	2640000
Cost Savings	**Rs/year**	**2019869**	**134282**	**721620**
Emission Reduction	**tCO2e**	**37.30**	**5.18**	**18.82**
Payback Period	**Year**	**2.94**	**9.83**	**3.66**
ROI	**%**	**34.00**	**10.17**	**27.33**

Table 37: Costing for DG set modification to run on dual fuel

The Maharashtra States Pollution Control Board has made it mandatory to convert for all Diesel Generators to Dual Fuel (Gas and Diesel) or retrofit them with an Emission Control Device (RECD). Some other state pollution control board also made it mandatory to convert DG set to run on dual fuel, which is Gujarat, Karnataka & Goa.

As shown in table 36, modification of DG set to run on dual fuel can be reduced about Rs.20 Lakhs/annum, Rs.1.34 Lakhs/annum and Rs.7.21 Lakhs/annum in unit 2&3 Kadapa, SSEL Naini, and Indotech respectively as per our current expenditure, while investing approx. Rs.6.6 Lakhs for Dual Fuel Kit per DG set. Also, GHG emission reduction of 37 tCO_2e, 5.18 tCO_2e and 18.82 tCO_2e respectively. To further reduce GHG emission, switch to Biogas or Biofuel based on availability for up to 80 to 90 % emission reduction.

4.5 Target Setting for SSEL Group Companies

As the FY 23-24 data for footprint has been successfully gathered and baseline established, the roadmap for reduction strategy will fall under two broad categories.

Long term target:

- To become a carbon neutral company by 2040 with respect to only scope 1+2.
- To reduce scope 3 emission by 50% from a 2023 base year by 2030 (EU has a target of reducing net GHG emission by 55% by 2030 and India has a target of reducing carbon emissions by 50% by 2030 and for the entire economy to be net zero by 2070)
- To become a net zero company by 2060
- Reach RE100 status by 2035

Short term target:

Based on above long term targets the roadmap for short term target can be modeled as below for a 3-year period and review, course correct in 2027.

- Reduce Scope 1+2 absolute emission by 5 % annually from a 2023 base year.
- Reduce Scope 3 absolute emission by 3 % annually from a 2023 base year.
- Increase renewable energy share by 5 % annually from a 2023 base year.

5. GLOBAL CONTEXT

Since the release of the Intergovernmental Panel on Climate Change (IPCC) "Global Warming of 1.5°C" report in 2018 which positioned the efforts of the private sector as integral to ensure that global warming stays within the 1.5°C limit, reporting frameworks, voluntary and mandatory, have grown to facilitate the integration of sustainability into organisations' strategies and to guide them towards greater transparency for their stakeholders.
There are more than 30 voluntary environmental reporting frameworks that companies can use. It is therefore difficult to determine which ones are the most appropriate.

Below are a few of the important such frameworks that we run into on a regular basis:

5.1 Energy & Emissions - Standards

Standard	GHG Protocol	An internationally credible methodology for the calculation of Scopes 1, 2 & 3 emissions which can be used in mandatory and voluntary reporting frameworks
	ISO 14064	An internationally credible standard for the calculation of Scopes 1, 2 & 3 emissions which can be used in mandatory and voluntary reporting frameworks
	PAS 2060	An internationally recognised voluntary standard for operational carbon neutrality through which companies can gain certification
	ISO 50001	An international energy management standard which assists in implementing a continual improvement approach to energy efficiency
	ISO 14001	ISO 14001 is an internationally agreed and recognised standard for Environmental Management Systems
	Net-Zero Standard	New Net-Zero Standard from the Science-Based Targets initiative (SBTi), considered global best practice for companies setting net-zero strategies
	Net-Zero Guidelines	The Net-Zero Guidelines, published by the ISO, establish a standardisation framework based on 12 guidelines to help companies achieve net-zero emissions
	ACT Initiative	The ACT (Assessing low Carbon Transition) initiative offers several sector-specific methodologies to assess the extent to which an organisation has a strategy aligned with the decarbonisation trajectories of its sector.

Figure 37: Energy & Emission related Standards

5.2 Sustainability Related Framework & Standards

Sustainability	Environmental, Social & Governance (ESG)	SDGs	17 UN environmental, social and economic goals with 169 associated targets that companies can voluntarily demonstrate that they are contributing to
		Ecovadis	An online sustainability framework that provides performance ratings for companies within global supply chains
		GRI	An internationally recognised and extremely broad framework of standards for reporting on sustainability with requirements, recommendations and guidance on 900 sustainability topics
	Investor-led	TCFD	A set of recommendations to assist companies in better accounting for climate-related risks in their financial and mainstream disclosures
		TNFD	Global science-based initiative that develops and delivers risk management and disclosure frameworks for organisations to report and act on evolving nature-related issues
		IFRS I and II	In 2023, the ISSB published two standards to facilitate the risks & opportunities reporting of any company's value chain
		DJSI	Published indices of the top 10% of companies who respond to a questionnaire covering Economic, Environmental and Social issues
		CDP	One of the largest international, investor-led sustainability reporting frameworks. It is voluntary, but companies can be asked to respond by their stakeholders
		RE100	The Renewable Energy 100 initiative brings together major companies that want to source 100% of their energy from renewable energy sources by 2050
		EV100	Global initiative promoted by the Climate Group to bring together companies that are committed to electrifying their owned and contracted fleets
	Legislation	CSRD	From 2024, 50,000 companies will gradually be covered by extended and harmonised ESG reporting on ESG criteria
		EU Taxonomy	A regulatory classification system under which companies may define which of their economic activities are environmentally sustainable
		CFD	The Companies (Strategic Report) (Climate-related Financial Disclosure) (CFD) Regulations were implemented from April 2022
		International TCFD regulations	Several jurisdictions outside of Europe have implemented their own climate risk reporting requirements aligned to the recommendations of the TCFD and/or IFRS I & II.
		SEC	Aims to enhance the climate-related disclosures of US publicly traded companies by including information relating to climate-related risks.

Figure 38: Sustainability related framework

We have elaborated below a few of the important frameworks and standards which we need to commence/renew/improve upon and include the newer additions in the series. While some are specifically related to energy or environment, certain others are evolving frameworks in a global and national (Indian) context, the adherence to which is not just important but increasingly mandatory to be accepted as a partner or vendor.

ISO 14000 Series:

- ISO 14001 (Environmental management systems) "provides requirements with guidance for use that relate to environmental management systems. Other standards in the ISO 14000 series focus on specific approaches such as audits, communications, labelling and life cycle analysis, as well as environmental challenges such as climate change".
- Within the ISO 14000 series, a notable standard is ISO 14067 (Carbon footprint of products), which provides guidance and requirements on the carbon footprint reporting for a product while following life cycle assessments (LCAs) as specified in ISO 14040 and ISO 14044.
- Aligned with the Greenhouse Gas (GHG) Protocol and compatible with most GHG programmes, the ISO 14064 series gives specifications for the quantification, monitoring and validation/verification of greenhouse gas emissions, while ISO 14067 specifies the principles, requirements and guidelines for quantifying and reporting the carbon footprint of products.

IEC 63366:

IEC 63366, which is under development in TC 111 (Environmental standardisation), is intended to provide common rules for the LCA of electrical and electronic products. It will be used as a template for product committees (like TC 82) to develop their own LCA standards with product-specific rules (PSRs)/product category rules (PCRs). TC 111 is asking for IEC 63366 to be published as a horizontal publication, which means two things:

- For LCA practitioners, this horizontal standard shall be applied when there is no PSR standard; LCA practitioners could use the applicable requirements and adapt requirements according to the specific product or product group/product family applied.
- For product committees, this horizontal standard shall be used as a starting point for developing their PSR standard. If a PSR standard is available, it will take precedence over this horizontal PCR standard.

Some examples where countries/regions are mandating stronger compliance to ESG requirements include (but are not limited to):

Corporate Sustainability Reporting Directive (CSRD):

- The European Union in 2023 commenced the enforcement of its Corporate Sustainability Reporting Directive (CSRD), which provides updated guidance on the rules concerning the social and environmental information that companies (across different sectors and industry) must report. The main objective of this legislation is to provide investors/stakeholders with information they require on how people and the environment are impacted by the operational activities of firms in which they would invest financially and/or identify opportunities arising from climate change and other

sustainability issues. Companies that are subject to the CSRD are obliged to report on their ESG compliance according to European Sustainability Reporting Standards.

CBAM:

- The EU's Carbon Border Adjustment Mechanism (CBAM) is the EU's tool to put a fair price on the carbon emitted during the production of carbon intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries.
- CBAM will apply in its definitive regime from 2026, while the current transitional phase lasts between 2023 and 2025. The CBAM will initially apply to imports of certain goods and selected precursors whose production is carbon intensive and at most significant risk of carbon leakage: cement, iron and steel, aluminium, fertilisers, electricity and hydrogen.
- Carbon leakage occurs when companies based in the EU move carbon-intensive production abroad to countries where less stringent climate policies are in place than in the EU, or when EU products get replaced by more carbon-intensive imports.
- If the production of transformers involves significant greenhouse gas (GHG) emissions, and if these emissions are not already accounted for in the exporting country's carbon pricing system, these could fall under CBAM in the future, particularly if the mechanism's scope expands to include finished electrical equipment.

US Securities and Exchange Commission (SEC):

- The US Securities and Exchange Commission (SEC) in 2024 issued a ruling mandating that public registrants provide climate disclosure in their registration statements, IPOs and annual reports for the fiscal year ending in 2025 (United States Securities and Exchange Commission, 2024). Reporting on greenhouse gas emissions (scopes 1 and 2), the tangible impact of climate risks on business model and strategy, and a declaration of climate target goals are some of the key provisions included in the SEC rulings in an effort to introduce broad ESG compliance into the US economy.

Australia's Treasury Law:

- In August 2024, Australia has also passed an amendment to its Treasury Law which requires large and medium-sized firms, starting in 2025, to disclose climate related risks and opportunities – in tandem with GHG emission reporting. Australia is also planning to establish a Net Zero Economy Authority that will provide support to workers in the energy sector with access to skills development opportunities as well as guiding new investors towards net zero transformation avenues.

UAE sustainable finance regulatory framework:

- As the host country for COP 28 in 2023, the UAE announced USD 30 billion pledge to support the development of clean energy projects globally. During the UAE's recent COP presidency, the Abu Dhabi Global Market implemented its own sustainable finance regulatory framework which provides guidance and regulations on ESG disclosures by companies which engage in this market.

5.3 ESG impact on Solar PV business

- Closely tied to the **EU CSRD**, the Waste from Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU applies the principle of extended producer responsibility. This principle requires manufacturers to ensure their operational responsibilities also cover management of the post-consumer stage to ensure national/EU recycling and/or recovery targets are met (EU Commission, 2024b; EUROPEN, 2015). Solar PV panels, inverters and charging stations are covered under this legislation.
- The **US Federal Regulation Acquisition** FAR 23.108 includes requirements for PV modules and inverters, recognising the EPEAT ecolabel to meet government sustainability goals through federal procurement of solar energy in construction and power purchase agreements (PPAs) via EPEAT- SOLAR PV SUPPLY CHAINS: TECHNICAL AND ESG STANDARDS FOR MARKET INTEGRATION 48 registered PV modules and inverters (United States Government, 2024). While the US federal government is not yet a significant purchaser of PV modules and inverters, it procures a significant amount of PV-generated electricity via PPAs.

There are also several PRIVATE ESG STANDARDS AND SERVICES:

- The Global Electronics Council has established the Electronic Product Environmental Assessment Tool (EPEAT) Ecolabel for the electronics sector. This includes PV modules.
- Used by private and public buyers globally since 2006, the EPEAT Ecolabel relies on transparent, multi-attribute, life-cycle based ESG criteria developed by industry stakeholders (ANSI/NSF/UL)
- To ensure the high technical and sustainable quality of products, many purchasing entities are starting to require or prefer the presence of the EPEAT Ecolabel. For example, in the United States EPEAT is currently the only approved ecolabel for PV modules and PPAs in the US Environmental Protection Agency's Recommendations of Specifications, Standards and Ecolabels for Federal Purchasing (Global Electronics Council, 2024).

Climate change mitigation	Sustainable use of resources	Reduction of chemicals of concern	Corporate ESG performance
• Manufacturing energy efficiency • GHG emissions in manufacturing • LCA and disclosure of cumulative energy demand and global warming potential • Carbon footprint	• Recycled content • Design for recycling • Product take back and responsible recycling • Disclosure of recovery and recycling achievement • Material recovery targets • Efficient water uses in manufacturing	• Restricted substances in product – RoHS[7], REACH[8], halogenated substance • Substance inventory and disclosure • Alternatives assessment	• Social performance and audits • Worker and health safety • Environmental management system • Responsible material sourcing • Hot spot identification and leadership compared to industry

Figure 39: The ESG adherences required under EPEAT

5.4 Country Wise GHG Emissions Linked Regulations

Globally, legislation mandating carbon emission disclosure has gained momentum as governments aim to combat climate change and ensure accountability from businesses. Various countries and regions have introduced laws, regulations, or frameworks requiring companies to disclose their greenhouse gas (GHG) emissions, particularly carbon dioxide (CO_2), as part of broader efforts to track progress toward climate targets such as the Paris Agreement.

Here's an overview of key global legislation mandating carbon emission disclosures:

Table 38: Country Wise Legislation Mandating Carbon Emission Disclosures

Country	**Regulation-Implementations**	**Key features**
European Union (EU)	Corporate Sustainability Reporting Directive (CSRD) (formerly Non-Financial Reporting Directive, NFRD) is effective from 2024, with the first reporting required in 2025.	• Requires detailed climate-related disclosures, including the company's transition plans toward net-zero emissions. • Aligns with the EU's Taxonomy Regulation, which defines what qualifies as environmentally sustainable activities. • Additional Legislation: EU Emissions Trading System (ETS) and Sustainable Finance Disclosure Regulation (SFDR)
United States	SEC Climate Disclosure Rule	• It implies publicly traded companies to disclose their climate-related risks and GHG emissions, including Scope 1, Scope 2, and in some cases Scope 3. • Focus on material risks and opportunities related to climate change. • Applies to companies listed on U.S. stock exchanges, integrating climate risk into financial filings (e.g., 10-K forms). • Many U.S. companies are already disclosing emissions voluntarily through the Task Force on Climate-Related Financial Disclosures (TCFD) framework or the Carbon Disclosure Project (CDP).
United Kingdom	Streamlined Energy and Carbon Reporting (SECR) Introduced in April 2019	• Requires large UK companies to report their energy use, carbon emissions, and energy efficiency measures. • Applies to quoted companies, large unquoted companies, and large Limited Liability Partnerships (LLPs). • Builds on the previous Mandatory Carbon Reporting (MCR) regime, which required listed companies to disclose their GHG emissions. • TCFD Compliance: From 2022, the UK government also mandates TCFD-aligned

		climate disclosures for large companies and financial institutions, making the UK the first G20 country to require TCFD reporting.
Canada	Federal climate-related financial disclosure requirements for large corporations. As of 2024, Canada is phasing in mandatory climate disclosures for federally regulated financial institutions (FRFIs), including banks and insurance companies.	• Requires large financial institutions to disclose climate-related risks and GHG emissions using the TCFD framework. • Applies to companies with assets over certain thresholds and publicly traded companies. • The government also aims to integrate climate disclosures in investment and pension fund management.
Australia	Australia is expected to adopt mandatory climate risk disclosure requirements in line with TCFD recommendations by 2024.	• Likely to apply to large listed companies and financial institutions. • Requires reporting on climate-related financial risks, including emissions and the impact of climate change on business operations.
New Zealand	Climate-Related Disclosures (CRD) Bill New Zealand became the first country to pass mandatory climate risk disclosure legislation in 2021.	• Requires companies, including banks, insurers, and investment managers, to disclose climate-related risks and opportunities based on the TCFD framework. • Mandatory for large publicly listed companies and financial institutions. • Applies to entities with assets over NZD 1 billion, banks with total assets over NZD 1 billion, and insurance companies with premiums over NZD 250 million.
Japan	While Japan has not fully mandated carbon disclosures, it has developed TCFD-compliant disclosure requirements for large companies.	• The Tokyo Stock Exchange encourages listed companies to disclose climate-related risks in line with TCFD. • Japan's Corporate Governance Code encourages companies to address sustainability issues, including climate change, within their reporting. • Government initiatives like the Green Growth Strategy aim to support industries in reducing carbon emissions through transparency and regulation.
South Korea	Korea Stock Exchange ESG Guidelines	• South Korea encourages companies listed on the Korea Stock Exchange to disclose ESG factors, including carbon emissions. • The country has a voluntary framework for climate-related financial disclosures, with

		growing pressure to mandate emissions reporting for large companies and certain sectors. • South Korea's K-ETS (Emissions Trading System) also obligates industries with high emissions to report their carbon footprints.
China	China has not mandated comprehensive carbon emissions disclosure, but there are movements toward increased transparency.	• China's government encourages large companies to disclose environmental impacts, especially those listed on the Shanghai Stock Exchange. • A growing number of Chinese companies are voluntarily adopting GRI and TCFD standards. • As part of its Dual Carbon Goals (carbon peak by 2030 and carbon neutrality by 2060), China is expected to move toward stricter reporting requirements for industries with high emissions.
Brazil	Brazilian Securities and Exchange Commission (CVM) ESG Reporting Guidelines	• In 2022, the CVM introduced requirements for publicly listed companies to disclose ESG information, including GHG emissions. • Brazil is developing frameworks for mandatory climate risk disclosures as part of its commitment to the Paris Agreement.
India	Business Responsibility and Sustainability Report (BRSR) Introduced by the Securities and Exchange Board of India (SEBI) in 2021.	• The BRSR mandates listed companies to disclose ESG data, including carbon emissions, from the 2022-23 fiscal year. • This reporting aligns with India's national sustainability and climate targets, including reducing carbon intensity by 33-35% by 2030.

5.5 Global Trends and Future Outlook

Governments are increasingly aligning their carbon emission disclosure mandates with internationally recognized frameworks, such as the Task Force on Climate-related Financial Disclosures (TCFD) and the Global Reporting Initiative (GRI)**.** This trend reflects growing recognition of the need for transparency, accountability, and global cooperation in addressing climate change.

In addition, voluntary carbon markets and initiatives like the Carbon Disclosure Project (CDP) encourage companies to report emissions, even in jurisdictions without mandatory requirements. As the global climate crisis intensifies, more countries are expected to adopt legislation requiring carbon disclosures, particularly for industries with high emissions.

6.WAY AHEAD

6.1 Corporate Sustainability Assessments

As we move towards implementing ESG into our business plans and corporate culture we need to understand from a global point of view what needs to be done to be recognized as a company that is driven by global standards of adherences.

Working backwards from achieving scores, we can make the journey more focused and thus a clarity of the path that we take.

Assessment Agencies that provide scores that are a touchstone to ESG adherences are multiple in number and also have slightly different assessment frameworks. The most popular and most respected are the DJSI scores which are given by S&P Global on an annual basis based on a CSA questionnaire that is answered by the participant company. This CSA – Corporate Sustainability Assessment is the basis for companies with the eligible market capitalization to be listed in the Dow Jones Sustainability Index – World, USA, Europe, Asia Pacific and Emerging Markets.

There are several other assessment agencies which provide scores on basis of disclosures done by the companies that they track which includes MSCI, Bloomberg, Sustainalytics. What is important for a good score is adherence to the respective guidelines, frameworks and standards of Environment Social and Governance standards advocated by global guidelines like UNSDGs, frameworks & standards like the SBTi, TCFD, CDP. It would be pertinent to mention the CII GreenCo Rating certification at this juncture.

The CII GreenCo Rating System is a first-of-its-kind framework that recognizes and facilitates the growth of top-notch green companies in India. This framework is developed by the CII Sohrabji Godrej Green Business Centre and launched in 2011. Total GreenCo Rated companies are 880+ and 1170+ companies are working on to get the GreenCo Rating.

This rating system reflects the collective wisdom and expertise of industry leaders, policymakers, and environmental experts. This collaborative effort ensures that the framework encompasses diverse perspectives and addresses the evolving needs of industries in achieving sustainability.

The objective of the GreenCo rating system is to assist companies in improving their environmental performance in a comprehensive manner and go beyond sheer compliance.

The GreenCo rating system embraces a life cycle approach that focuses on key environmental performance aspects addressing energy efficiency, renewable energy, water conservation, greenhouse gas emissions reduction, waste management, material conservation, green supply chain, product stewardship & life cycle assessment, innovation for environment and green infrastructure & ecology. These areas provide a framework for evaluating and enhancing sustainability practices across industries.

The rating system categorizes companies based on their total score, across Platinum, Gold, Silver, Bronze, and Certified, providing recognition and motivation for continual improvement. The threshold criteria for certification levels are provided in the figure 40.

GreenCo Version IV

Rating Levels

Sl. No	Parameter	Points
1	Mandatory Requirements	-
2	Management Systems	75
3	Energy Management	150
4	Carbon Management	150
5	Water Management	125
6	Material Resource Management	125
7	Green Supply Chain	100
8	Product Stewardship & Life Cycle Approach	125
9	Innovation for Environment	50
10	Green Built Environment & Others	100
	Total	1000

Platinum+ Applicable to Platinum companies – continue to improve & excel to next higher level

Figure 40: CII GreenCo Rating Levels and Points

Under Environment of ESG the process would start with aligning the policies and activities of the companies with such standards and frameworks right from the structuring of the Environmental Policy. The policies need to take into its drafting the Pillars on which it is being structured, what are the Operational processes, the Legal and regulatory matrix which is being adhered to, how and who support the Implementation of the policies, Influencers & Champions who are responsible to drive it and the Yardstick on which the YoY targets achievement will be measured.

The roadmap should include important ISO certification like ISO 14001:2015 - Environmental management systems, ISO 14064:2018 – GHG emission inventory and reporting standards, ISO 14067:2018 – Carbon Footprint of Products, ISO 14072:2024 – Life Cycle Assessment (LCA) and the ISO 50001 – Energy Management.

Having established the Carbon Footprint Baseline, we need to move on to include water usage, waste management and focus on circularity, procurement efficiency, vendor categorization, human rights due diligence, effective EHS and OHS implementation.

Leaders in Environment Stewardship have shown the way by implementing and showing excellent results in this area. A few examples from globally acclaimed Environment related activities are shown in table 38.

6.2 Leadership in Sustainability Practices by Peer

Peer	Emissions	Energy management
Schneider Electric S.E	• Have their **net-zero targets, validated by the SBTi.** • Since 2021, emissions from Schneider Electric's operations (Scopes 1 and 2) have **decreased by 31% in absolute**, • Scope 3 emissions **decreased by 7% from 2022 to 2023** • As part of the decarbonization approach to air transportation, the Group is committed to replace at least **5% of conventional jet fuel** use with **Sustainable Aviation Fuel (SAF) by 2030**	• Schneider Electric is part of the FTSE EO Energy Efficiency indices. • Targets to **increase energy efficiency** in its sites by **15% by 2025** and double energy productivity by 2030 compared to 2005 (EP100), • Has a Group's **Energy Policy**. • 128 Schneider Electric sites are **ISO 50001 certified** as part of the Group's Integrated Management System to **drive energy excellence**, focusing on the highest energy consuming sites.
ABB Ltd.	• Aims to **reduce absolute scope 1 and 2 emissions** by at least **80 percent by 2030** and by **100 percent by 2050**, versus 2019. • Has established **science-based, net-zero-aligned targets for 2030 and 2050and submitted for validation.** • Since 2019, has reduced **GHG emissions** by **76 percent**	• Plans to **electrify vehicle fleet**, amounting to more than 10,000 cars, source **100 percent of electricity from renewable energy sources by 2030.** • Implements **energy efficiency measures** across operations that include installation of **energy-efficient lighting**, upgradation of **HVAC** systems and implementation of building automation systems that enable a high level of efficiency.
Siemens Limited	• Aims to **achieve Net Zero** operations **by 2030** and in supply chain by 2050 • **Joined Science-Based Targets initiative (SBTi),** pledged to **reduce** emissions from its own operations (Scope 1 and 2) by **50%**and its value chain (Scope 3) **by 15% by 2030** compared to 2019. • Has **reduced VOC emis**sions by another **9%** from the previous year to 250 metric tons in fiscal 2023	• Siemen's is committed to **100% renewable electricity by 2030**. • Aims to improve overall **energy efficiency by 10%** by 2030 compared to 2021 • Has **increased energy efficiency** by **39%** in fiscal 2023 compared to fiscal 2021. • **45 Siemens sites** have implemented energy management systems compliant with **ISO 50001.**
Toshiba Corporation	• Plans to achieve **carbon neutrality** throughout the entire value chain by **FY2050.** • Aims for **100% reduction** of emissions generated from Toshiba Group business activities by **FY2030** • Achieved **70.4% of reduction** of **GHG emissions** in products and services associated with power supply (compared to FY2019)	• Promotes the development of energy technologies to realize decarbonization and to improve the **energy efficiency of products** • Toshiba Group Kawasaki headquarters with the purchases of FIT non-fossil certificated, the Centre is **100% powered by renewables.**

Table 39 : Illustrative Practices/Initiatives of Peers

6.3 Charting the ESG Journey

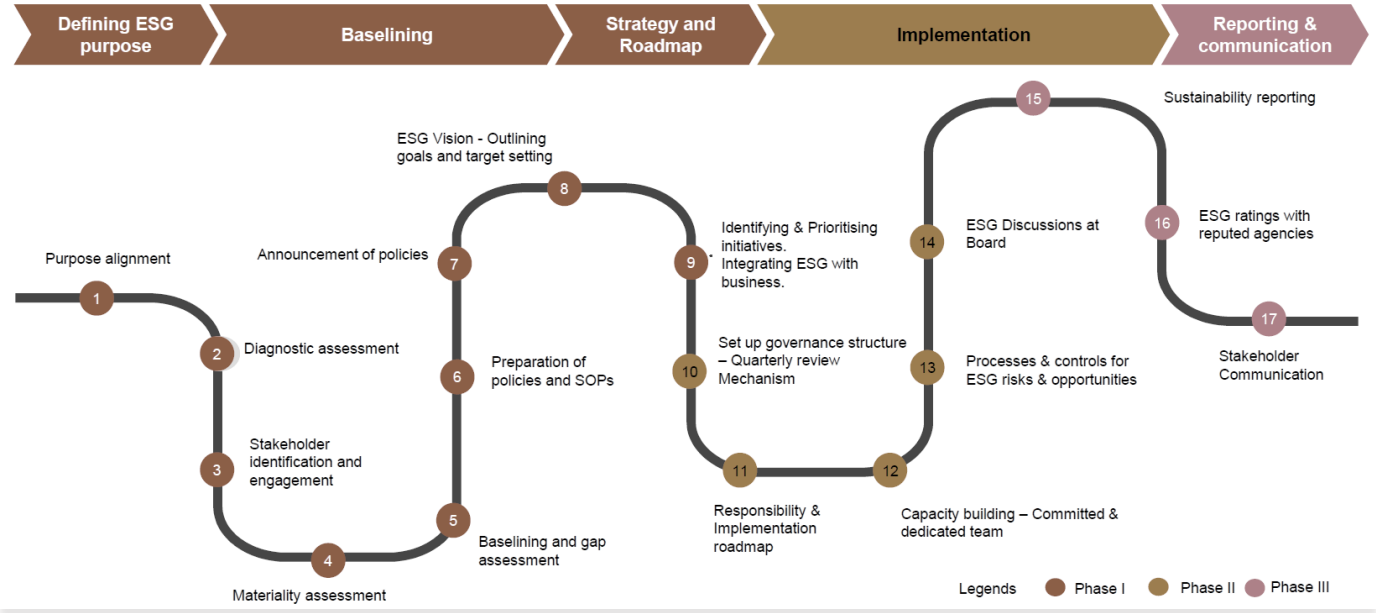


Figure 41: Typical phases of the ESG journey of a company

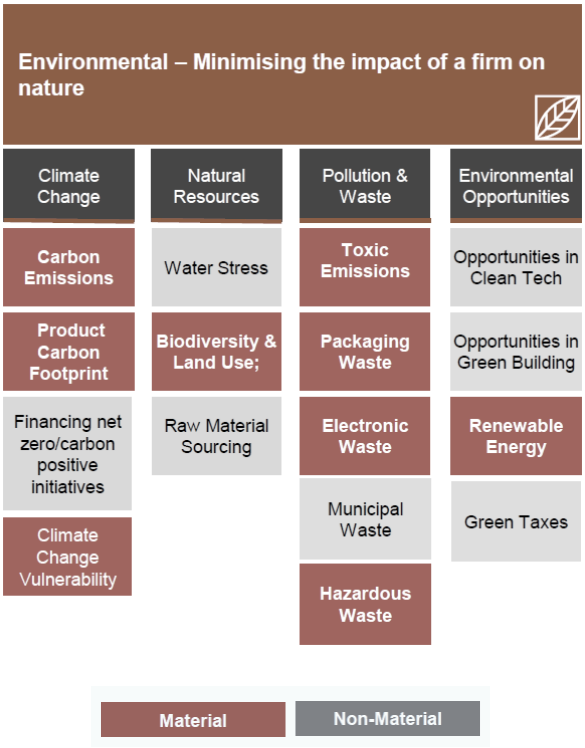


Figure 42: Key focus areas under Environment, E of ESG, for manufacturing companies

It is important now more than ever to implement necessary processes and drive top-down cultural change that multiple stakeholders are giving priority to. Stakeholder capitalism is becoming mainstream, stakeholders are increasingly interested in knowing **"How do you make profits" rather than "How much profit do you make"**

Regulators are setting high social, governance and environmental standards.
Investors invest in companies that are responsible sustainable and resilient.
Talented staff are prioritizing purpose over salaries.
Consumers are increasingly embracing brands that align with their social values.

7. SOURCE DOCUMENTS & TEAM DETAILS

7.1 Source Documents

The following source documents are available for access by clicking the respective titles:

1. Scope 1 & 2 Questionnaire
2. Scope 3 Questionnaire
3. GHG Emission Calculations – Also attached as Annexure at the end of the report

Please note that the links are password-protected and intended for internal use. For any assistance with accessing the documents, including password retrieval, please contact the ESG team.

7.2 Team Details

ESG Department has received support from several teams across group companies who have sent data and supporting documents for verification. Our extended team members who have participated in this study are as below. We sincerely thank leadership across locations without whose support this herculean task would not have been possible.

SSEL Kadapa:	**SSEL Naini:**	**SSEL Corporate Office:**
Mr. Surya, Mr. Bixam Reddy, Mr. Dharma Reddy S Ms. Sireesha.K, Mr. Koteswara Rao Ms. Pavani.D Mr. Naresh Kumar Mr. Satyanarayana Mr. Raju Mr. Reddaiah Mr. Mahendra Mr. Sambath Mr. Arun Reddy	Mr. Arunkumar Yadav Mr. Ravindra Kumar Gupta Mr. Ramendra Singh Mr. Shubham Ghosh **INDOTECH, Kancheepuram:** Mr. Gandhirasan KKS **ISPL Ramayapatnam:** Mr. Jagadeesh Nellore Mr. Ramakrishna.P Mr. Bala Venkata Sai Krishna Y Mr. Ramarao Padamata	Mr. Jagannadham Naidu. A Ms. Renu Dandoli Mr. Chandra.D **ISPL Corporate Office:** Mr. Srinivasa Rao Kauluri Mr. Niranjan Reddy A
Data compilation & coordination, verification with source documents, GHG calculation - Mr. Kalaiventhan K		
SSEL Group Carbon Footprint Baseline Study - FY 23-24 by Mrs. Madhusree Vemuru		

Table 40: GHG Team Members

REFERENCES

1. Global Warming of 1.5 °C by IPCC
   https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf
2. Climate Change 2023 Synthesis Report (AR6) by IPCC
   https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf
3. A Corporate Accounting and Reporting Standard by GHG Protocol
   https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf
4. Corporate Value Chain (Scope 3) Accounting and Reporting Standard by GHG Protocol
   https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard-EReader_041613_0.pdf
5. Scope 1 & 2 GHG Inventory Guidance.
   https://ghgprotocol.org/sites/default/files/2023-03/Guidance_Handbook_2019_FINAL.pdf
6. IPCC GWP Values
   https://ghgprotocol.org/sites/default/files/2024-08/Global-Warming-Potential-Values%20%28August%202024%29.pdf
7. ABB Ltd Sustainability Dashboard
   https://global.abb/group/en/sustainability/reports/sustainability-disclosure-dashboard#climate
8. Hitachi Sustainability Report
   https://publisher.hitachienergy.com/preview?DocumentID=8DBR001198&LanguageCode=en&DocumentPartId=&Action=launch
   https://www.hitachi.com/sustainability/download/pdf/en_sustainability2024.pdf
9. Schneider Electric Sustainability Report
   https://www.se.com/ww/en/assets/564/document/466155/2023-sustainability-report.pdf?p_enDocType=EDMS&p_File_Name=2023%20Sustainable%20Development%20Report
10. First Solar Sustainability Report
    https://www.firstsolar.com/-/media/First-Solar/Sustainability-Documents/FirstSolar_Sustainability-Report_2024.ashx?la=en
11. Jinko Solar Sustainability Report
    https://jinkosolar.eu/wp-content/uploads/2023-Jinko-ESG-Report.pdf
12. LONGi Climate Action White Paper
    https://static.longi.com/2023_LON_Gi_Climate_Action_White_Paper_efb952f280.pdf
13. The Big eBook of Sustainability Reporting Frameworks
    https://info.eco-act.com/en/the-big-ebook-of-sustainability-reporting-frameworks
14. Solar PV Supply Chains: Technical and ESG standards for market integration
    https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Sep/IRENA_Solar_PV_supply_chains_technical_ESG_standards_2024.pdf
15. SBTi Corporate Net-Zero Standard V1.2
    https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf
16. Foundations For Science-Based Net-Zero Target Setting In The Corporate Sector
    https://sciencebasedtargets.org/resources/files/foundations-for-net-zero-full-paper.pdf
17. GreenCo_Annual_Report_2023-24
    https://www.greenco.in/publication/GreenCo_Annual_Report_2023-24.pdf
18. Siemens Limited Sustainability Report
    https://assets.new.siemens.com/siemens/assets/api/uuid:00095b96-4712-4cd1-b045-19d5df704358/sustainability-report-fy2023.pdf

19. Toshiba Sustainability Report
https://www.global.toshiba/content/dam/toshiba/jp/sustainability/corporate/report/pdf/report23_en.pdf
20. ISO Standards: https://www.iso.org/standards.html
21. S&P Global:
https://www.spglobal.com/ratings/en/about/understanding-credit-ratings
22. CSRD:
https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en
23. CBAM
https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en
24. SEC Climate Disclosure Rule
https://www.sec.gov/newsroom/press-releases/2024-31
25. SECR
https://www.gov.uk/government/publications/streamlined-energy-and-carbon-reporting-secr-for-academy-trusts/streamlined-energy-and-carbon-reporting-secr-for-academy-trusts
26. Federal climate-related financial disclosure
https://fasab.gov/projects/active-projects/climate-impact-and-risk-reporting/
27. TCFD: https://www.tcfdhub.org/
28. Climate-Related Disclosures (CRD)
https://www.companiesoffice.govt.nz/all-registers/climate-related-disclosures/
29. ESG Regulation in South Korea
https://insights.issgovernance.com/posts/esg-regulation-in-south-korea-disclosure-guidance/#:~:text=Mandatory%20ESG%20Disclosure&text=The%20requirement%20was%20initially%20planned,of%20the%20KOSPI%2Dlisted%20companies.
30. Brazilian Securities and Exchange Commission (CVM) ESG Reporting Guidelines
https://www.gov.br/cvm/en/foreign-investors/regulation-of-interest
31. BRSR
https://www.sebi.gov.in/sebi_data/commondocs/may-2021/Business%20responsibility%20and%20sustainability%20reporting%20by%20listed%20entitiesAnnexure1_p.PDF
32. Solar PV module specification
https://cdn.shopify.com/s/files/1/2980/5140/files/SHARK_550_Wp_Mono_Half_Cut_144_Cells_Data_Sheet.pdf
33. Three-ton electric forklift specifications.
https://www.indiamart.com/proddetail/3ton-godrej-uno-series-electric-forklift-23850863755.html?srsltid=AfmBOopygFj3c7ZBHGx79odwnFuHEA_YTgZI9VfuyiJHfJ-92kMRf9NU
34. Dual Fuel Kit: https://www.energeia.in/dualfuel
35. The Commission for Air Quality Management in National Capital Region and Adjoining Areas Act 2021
https://www.energeia.in/_files/ugd/cf5404_5eac8ab9be044e08b24db047cf27b93a.pdf
36. Maharashtra Pollution Control Board
https://www.energeia.in/_files/ugd/cf5404_8a14455a869f46f082d5d16977be6d40.pdf
37. Gujarat State Pollution Control Board
https://www.energeia.in/_files/ugd/cf5404_fc4e2cc512854cd9bc84e387cbea4e72.pdf
38. Karnataka State Pollution Control Board
https://www.energeia.in/_files/ugd/cf5404_1c8c6973b6594b259af3c39ba1a2fcfb.pdf

ANNEXURES

SSEL Corporate Office, Begumpet

SSEL, Corporate Office - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in t CO2 e**
Scope 1 Emissions							
1	Refrigerant top up						
	R-22	36	kg	1760	t CO2/t	IPCC (AR5)	63.36
	R-32	0	kg	677	t CO2/t	IPCC (AR5)	0.00
	R-410A	4	kg	1924	t CO2/t	IPCC (AR5)	7.69
2	LPG used in Canteen	114	kg	2.97	kgCO2e/kg	IPCC	0.34
						Total	**71.39**
Scope 2 Emissions							
1	Power obtained from GRID (Electricity bill not provided - EB Total = Rs. 9,99,093)	86259.27	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	61.76
						Total	**61.76**
Scope 3 Emissions							
1	Business Travel						
	Air	350833	Pass-km	ICAO		ICAO	27.774
	Car - Diesel (Sedan <1600 cc)	4412	km	0.141	kg CO2/km	India GHG Program	0.62
	Car - Petrol (Sedan <1600 cc)	939	km	0.153	kg CO2/km	India GHG Program	0.14
2	Employee Commute	439184.4	km	Refer Survey Spreadsheet		India GHG Program	18.65
3	C3 - Fuel & Energy related Activities	Refer Scope 3, Category 3 calculation sheet					24.804
						Total	**71.99**
						Total Scope 1+2	**133.15**
						Total Scope 1+2+3	**205.14**

SSEL Unit 1, Kadapa

SSEL-Unit 1, Kadapa - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Refrigerant top up						
	R-22	0	kg	1760	t CO2/t	IPCC (AR5)	0
	R-32	0	kg	677	t CO2/t	IPCC (AR5)	0
	R-410A	0	kg	1924	t CO2/t	IPCC (AR5)	0
2	CO2 used for refilling into fire extinguisher	22.5	kg	1	t CO2/t	IPCC (AR5)	0.02
3	LPG used in Brazing, Cutting	133	kg	2.97	kgCO2e/kg	IPCC	0.40
						Total	**0.42**
Scope 2 Emissions							
1	Power obtained from GRID (Since Jul'23 bill is not available, Avg kWh of 11967.5 is taken for Jul'23)	143610.00	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	102.82
						Total	**102.82**
Scope 3 Emissions							
1	C5 Waste Generation	450	kg	1.62	kg CO2/kg	IPPC	0.73
2	C3 Fuel & Energy related Activities		Refer Scope 3, Category 3 calculation sheet				40.37
						Total	**41.10**
						Total Scope 1+2	**103.24**
						Total Scope 1+2+3	**144.34**

SSEL Unit 2&3, Kadapa

SSEL Unit 2&3 Kadapa - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Company Owned Vehicles						
	Diesel (Car, buses, Ambulances)	43401.8	L	2.68	kg CO2 /l	IPCC	116.32
	Petrol (Car, buses, Ambulances)	164.1	L	2.28	kgCO2/l	IPCC	0.37
	Diesel (hydras, tractor cranes, forklifts tractors)	73056	L	2.68	kg CO2 /l	IPCC	195.79
	Petrol (hydras, tractor cranes, forklifts tractors)	0	L	2.28	kgCO2/l	IPCC	0.00
2	Refrigerant top up						
	R-22 (45 kg)	38	kg	1760	t CO2e/t	IPCC (AR5)	66.88
	R-32 (35 kg)	15	kg	677	t CO2e/t	IPCC (AR5)	10.16
	R-410A (45 kg)	25	kg	1924	t CO2e/t	IPCC (AR5)	48.09
	R 134A (10 kg)	8	kg	1300	t CO2e/t	IPCC (AR5)	10.40
3	CO2 used for refilling into fire extinguisher (270 kg)	247.5	kg	1	t CO2/t	IPCC (AR5)	0.25
4	Gas mixture used in welding (Argon + Carbon dioxide)	286723	kg	0.1	t CO2/t	IPCC (AR5)	28.67
5	Acetylene (used in Brazing, Cutting)	921.2	kg	3.38	t CO2/t	IPCC	3.12
6	LPG used in Brazing, Cutting (4712 kg)	8645	kg	2.97	kgCO2e/kg	IPCC	25.68
7	LPG used in Canteen	34010	kg	2.97	kgCO2e/kg	IPCC	101.01
8	Diesel used in DG sets (Jan'23 to Dec'23 = 75100 L)	71360.35	L	2.68	kgCO2/l	IPCC	191.25
9	Biomass used in Canteen (Wood) (Other than CO2)	124670	kg	0.15	t CO2e/t	IPCC (2006)	18.70
						Total	**816.67**
Scope 2 Emissions							
1	Net Power Consumed from GRID (20605297 kWh)	20646808	kWh	0.716	tCO2/MWh	India CO2 Baseline Database V.19	14783.11
2	Slolar Power Consumed by plant	1372937	kWh	0	tCO2/MWh		0.00
3	Solar Power Export to Grid	149906	kWh	0	tCO2/MWh		0.00
						Total	**14783.11**

Scope 3 Emissions							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
1	C4 - Upstream Transportation & Distribution	165083685	t-km	India GHG Program			3527.30
2	C9 - Downstream T&D	6255340	t-km	India GHG Program			384.44
3	Waste Disposal						
	Copper	110000.00	kg	0.18	t CO2/ts	EPA	21.825
	Aluminium	344000.00	kg	0.04	t CO2/ts	EPA	15.168
	Food Waste	111219.00	kg	0.58	t CO2/ts	EPA	71.106
	Mixed Paper (Winding Core Paper)	384000.00	kg	0.03	t CO2/ts	EPA	12.698
	Dimensional Lumber (Parma Wood)	26750.00	kg	0.09	t CO2/ts	EPA	2.654
	Mixed Metals (Empty Oil Barrels)	52005.00	kg	0.23	t CO2/ts	EPA	13.185
	Waste Oil	270.00	kg	0.2	t CO2/ts	EPA	0.060
	Mixed Electronics	1712.00	kg	0.02	t CO2/ts	EPA	0.038
	Cotton Hand Gloves (Incineration)	358.00	kg	1.62	kg CO2/kg	IPPC	0.580
	Paint Tins Waste (Incineration)	740.00	kg	0.01	t CO2/ts	EPA	0.008
4	Business Travel						
	Air	120500	Pass - km	ICAO		ICAO	8.22
	Train	147343	Pass - km	0.0078	kg CO2/ Pass – km	India GHG Program	1.15
	Road	103878.6	Pass - km	0.0152	kg CO2/ Pass – km	India GHG Program	1.58
5	Employee Commute						
	Car	48640	Pass - km	0.141	kg CO2/km	India GHG Program	6.86
	Bike	5067072	Pass - km	0.0356	kg CO2/km	India GHG Program	180.39
6	C3 Fuel & Energy related Activities		Refer Scope 3, Category 3 calculation sheet				5959.859
						Total	**10207.11**
						Total Scope 1+2	**15599.78**
						Total Scope 1+2+3	**25806.89**

Note: Marked in red colour indicates the received activity data from site, after verifying with reference document it was corrected to actual value

SSEL Unit 4, Kadapa

SSEL-Unit 4, Kadapa - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in t CO2 e**
Scope 1 Emissions							
1	CO2 used for refilling into fire extinguisher	0	kg	1	t CO2/t	IPCC (AR5)	0.00
						Total	**0**
Scope 2 Emissions							
1	Power obtained from GRID	57760.00	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	41.36
						Total	**41.36**
Scope 3 Emissions							
1	C4 - Upstream Transportation & Distribution	646277.84	t-km	0.0615	kg CO2e/ t-km	India GHG Program	39.75
2	C9 - Downstream T&D	786870	t-km			India GHG Program	48.36
3	Waste Disposal						
	Mixed Metals	49000.00	kg	0.23	t CO2/ts	EPA	12.423
4	C3 Fuel & Energy related Activities		Refer C3 calculation sheet				16.208
						Total	**116.74**
						Total Scope 1+2	**41.36**
						Total Scope 1+2+3	**158.10**

SSEL, Naini

SSEL, Naini - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Company Owned Vehicles						
	Diesel (Forklift)	2590	L	2.68	kg CO2 /l	IPCC	6.94
2	Refrigerant top up						
	R-22	61	kg	1760	t CO2/t	IPCC (AR5)	107.36
	R-32	0	kg	677	t CO2/t	IPCC (AR5)	0.00
	R-410A	0	kg	1924	t CO2/t	IPCC (AR5)	0.00
	R 134A	0	kg	1300	t CO2/t	IPCC (AR5)	0.00
3	CO2 used for refilling into fire extinguisher (1606 kg)	45	kg	1	t CO2/t	IPCC (AR5)	0.05
4	Acetylene (used in Brazing, Cutting)	54.94	kg	3.38	t CO2/t	IPCC	0.19
5	Diesel used in DG sets	9910	L	2.68	kg CO2 /l	IPCC	26.56
6	Wood Briquette used in Thermic Fluid heater	137.13	t	0.15	t CO2/t	IPCC	20.57
7	HSD used in Thermic Fluid Heater	53800	L	2.68	kg CO2 /l	IPCC	144.18
						Total	**305.84**
Scope 2 Emissions							
1	Power obtained from GRID (1638360 kWh)	2028945	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	1452.72
						Total	**1452.72**
Scope 3							
1	C4 - Upstream Transportation & Distribution	2514249.68	t-km	0.0741	kg CO2e/t-km	India GHG Program	186.306
2	C9 - Downstream T&D	1545667.00	t-km	0.0741	kg CO2e/t-km	India GHG Program	114.534
3	Waste Disposal						
	Copper	32500.00	kg	0.18	t CO2/ts	EPA	6.448

	Aluminum	3630.00	kg	0.04	t CO2/ts	EPA	0.160
	CRGO	23100.00	kg	0.32	t CO2/ts	EPA	8.148
	Mixed Metal	147015.00	kg	0.23	t CO2/ts	EPA	37.272
	Rubber	2850.00	kg	0.1	t CO2/ts	EPA	0.314
	Mixed Electronics	3430.00	kg	0.02	t CO2/ts	EPA	0.076
4	Buisness Travel						
	Air	43281	Pass - km			ICAO	2.56
	Train	128900	Pass - km	0.0078	kg CO2e/ Pass – km	India GHG Program	1.01
	Road	13989	Pass - km	0.0152	kg CO2e/ Pass – km	India GHG Program	0.21
5	Employee Commute						
	Car	89936	Pass - km	0.141	kg CO2e/km	India GHG Program	12.68
	Bike	1235160	Pass - km	0.0356	kg CO2e/km	India GHG Program	43.97
6	C3 Fuel & Energy related Activities		Refer Scope 3, Category 3 calculation sheet				615.728
						Total	**1029.42**
						Total Scope 1+2	**1758.56**
						Total Scope 1+2+3	**2787.98**

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INDOTECH, Kancheepuram

INDOTECH - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Refrigerant top up						
	R-22	8	kg	1760	t CO2/t	IPCC (AR5)	14.08
	R-32	0	kg	677	t CO2/t	IPCC (AR5)	0.00
	R-410A	0	kg	1924	t CO2/t	IPCC (AR5)	0.00
	R 134A	0	kg	1300	t CO2/t	IPCC (AR5)	0.00
2	CO2 used for refilling into fire extinguisher (66 kg)	65	kg	1	t CO2/t	IPCC (AR5)	0.07
3	Acetylene (used in Brazing, Cutting)	1838	kg	3.38	t CO2/t	Derived	6.22
4	Diesel used in DG sets	36000	L	2.68	kgCO2/l	IPCC	96.48
5	FO used in Thermic Fluid heater	167260	L	GHG Protocol Tool			493.18
						Total	**610.02**
Scope 2 Emissions							
1	Net Power Consumed from GRID	2030393	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	1453.76
2	Wind Power Export to Grid	509397	kWh	0	tCO2/MWh		0.00
						Total	**1453.76**
Scope 3 Emissions							
1	C4 - Upstream Transportation & Distribution	11304869.14	t-km	Refer calculation sheet		India GHG Program	715.07
2	C9 - Downstream T&D	17131009.00	t-km	Refer calculation sheet		India GHG Program	1094.7
3	Waste Disposal						
	Coper (Recycle)	70000.00	kg	0.18	t CO2/ts	EPA	13.889
	Corrugated Containers (Recycle)	185000.00	kg	0.11	t CO2/ts	EPA	22.432

	MS scrap (Mixed Metals) (Recycle)	87000.00	kg	0.23	t CO2/ts	EPA	22.057
	Process Waste, Residues and sludge (Landfill)	1.26	t	0.52033	t CO2/t	DEFRA	0.656
	Used/Spent Oil (Recycle)	2.75	t	0.0213	t CO2/t	DEFRA	0.059
	Repair job - used / Spent oil	1.40	t	0.0213	t CO2/t	DEFRA	0.030
	Waste & Residues containing oil	1.09	t	0.0213	t CO2/t	DEFRA	0.023
	Spent Solvent	1.60	t	0.0213	t CO2/t	DEFRA	0.034
	Discarded container	3.00	t	0.0213	t CO2/t	DEFRA	0.064
4	Business Travel						
	Air - Domestic	588618	Pass - km	Default	kg CO2/ pass-km	ICOA	48.568
	Road - Car - Petrol	226560	km	0.153	kg CO2e/km	India GHG Program	34.66
5	Employee Commute						
	Car	330240	Pass - km	0.141	kg CO2/km	India GHG Program	46.56
	Bike	1451116.8	Pass - km	0.0356	kg CO2/km	India GHG Program	51.66
	Bus	5635718.4	Pass - km	0.0152	kg CO2/ pax km	India GHG Program	85.66
6	C3 Fuel & Energy related Activities		Refer C3 calculation sheet				708.694
						Total	**2844.82**
						Total Scope 1+2	**2063.78**
						Total Scope 1+2+3	**4908.60**

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ISPL Corporate Office, Hitech City

ISPL Corporate Office - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Refrigerant top up						
	R-32	0	kg	677	t CO2/t	IPCC(AR5)	0
	R-410A	0	kg	1924	t CO2/t	IPCC(AR5)	0
						Total	**0**
Scope 2 Emissions							
1	Power obtained from GRID	89918.56	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	64.38
2	Purchased DG Power	928.063	kWh				
	Diesel Consumption	0.309	kL	2.68	tCO2/kL	IPCC	0.83
3	Purchased Cooling Capacity	224076	kWh				
	Electricity Power Consumption for cooling	90109.78	kWh	0.716	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.19	64.52
						Total	**129.73**
Scope 3 Emissions							
1	Business Travel						
	Air	472869	Pass-km	ICAO GHG Emission Tool			31.45
2	Employee Commute	573097	km	Refer Survey Spreadsheet		India GHG Program	23
3	C3 Fuel & Energy related Activities		Refer Scope 3, Category 3 calculation sheet				50.71
						Total	**105.162**
						Total Scope 1+2	**129.73**
						Total Scope 1+2+3	**234.89**

ISPL, Ramayapatnam

ISPL, Ramayapatnam - Carbon Emission Calculations - FY 23-24							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Company Owned Vehicles						
	Diesel (Car, buses, Ambulances etc.,) (9593 L)	2309.87	L	2.68	kgCO2/l	IPCC	6.19
2	Refrigerant top up						
	R-22	0	kg	1760	t CO2/t	IPCC(AR5)	0.00
	R-32	0	kg	677	t CO2/t	IPCC(AR5)	0.00
	R-410A	0	kg	1924	t CO2/t	IPCC(AR5)	0.00
	R 134A	0	kg	1300	t CO2/t	IPCC(AR5)	0.00
3	CO2 used for refilling into fire extinguisher	0	kg	1	t CO2/t	IPCC(AR5)	0.00
4	Diesel used in DG sets	6495.3	L	2.68	kgCO2/l	IPCC	17.41
						Total	**23.60**
Scope 2 Emissions							
1	Power obtained from GRID	3880	kWh	0.716	tCO2/MWh	India CO2 Baseline Database V.19	2.78
						Total	**2.78**
Scope 3 Emissions							
1	C4 - Upstream Transportation & Distribution						
	Sea	4464837	t-km	0.0035	kg CO2e/t-km	DEFRA	15.80
	Road	149933.56	t-km	0.0741	kg CO2e/t-km	India GHG Program	11.11
2	Employee Commute						
	Car - Petrol	9664	km	0.153	kg CO2e/km	India GHG Program	1.48
	Bike - Petrol	152208	km	0.0356	kg CO2/km	India GHG Program	5.42
	Bus	21744	km	0.0152	kg CO2/ pax km	India GHG Program	0.33
3	C3 Fuel & Energy related Activities		Refer Scope 3, Category 3 calculation sheet				6.584
						Total	**40.72**
						Total Scope 1+2	**26.38**
						Total Scope 1+2+3	**67.10**

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Scope 3, Category 3 - Fuel & Energy Related Emission Calculations

Scope 3 - C3																	
S. No	Emission Source	UOM	SSEL Corporate office		SSEL Kadapa Unit 1		SSEL Kadapa Unit 2 & 3		SSEL Kadapa Unit 4		SSEL, Naini		Indotech		ISPL Corporate office		ISPL, Ramayapatnam	
			Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e	Activity Data	Emission in tCO2e
1	LPG (used in Brazing, Cutting)	kg	0	0	133	0.046	8645	3.020	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
2	Acetylene (used in Brazing, Cutting)	kg	0	0	0	0	921.2	0.000903	0	o	54.94	0.000054	1838	0.001801	0	0.000000	0	0.000000
3	Diesel used in DG sets	L	0	0.000	0	0.000	71360.35	44.535	0	0.000	9910	6.185	36000	22.467	0	0.000	6495.3	4.054
4	Company Owned Vehicles (Fuel operated forklift, dozer, Fire tender, Cars, Buses, Ambulance, Excavators, any vehicles to shuttle employees)																	
	3-a. Diesel (Car, buses, Ambulances)	L	0	0.000	0	0.000	43401.8	27.087	0	0.000	2590	1.616	0	0.000	0	0.000	2309.87	1.442
	3-b. Petrol (Car, buses, Ambulances)	L	0	0.0000	0	0.0000	164	0.0995	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000
	3-a. Diesel (hydras, tractor cranes, forklifts tractors)	L	0	0.000	0	0.000	73056	45.594	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
	3-b. Petrol (hydras, tractor cranes, forklifts tractors)	L	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000
5	LPG used in Canteen	kg	114	0.040	0	0.000	34010	11.879	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000

6	Biomass used in Canteen (Wood)	kg	0	0.0000	0	0.0000	124670	3.7900	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000
7	Refrigerant used/refilled																	
	5-a. R 22	kg	36	0.4716	0	0	38	0.4978	0	0	61	0.7991	8	0.1048	0	0	0	0
	5-b. R 32	kg	0	0	0	0	15	0.138	0	0	0	0	0	0	0	0	0	0
	5-c. R 410 A	kg	4	0.088	0	0	25	0.55	0	0	0	0	0	0	0	0	0	0
	5-d. R 134A	kg	0	0	0	0	8	0.0896	0	0	0	0	0	0	0	0	0	0
8	CO_2 used for refilling into fire extinguisher	kg	0	0	22.5	0.0225	247.5	0.2475	0	0	45	0.045	65	0.065	0	0	0	0
9	Gas mixture used in welding (Ar+CO2)	kg	0	0	0	0	286723	28.6723	0	0	0	0	0	0	0	0	0	0
10	Fuel used in Thermic Fluid heater																	
	Furness Oil	L	0	0	0	0	0	0	0	0	0	0	167260	116.3109314	0	0	0	0
	Biomass	t					0	0	0	0	137.13	4.17	0	0	0	0	0	0
	HSD	L					0	0	0	0	53800	33.576	0	0	0	0	0	0
1	Power obtained from GRID	kWh	86259.27	24.205	143610	40.298	20646808	5793.659	57760	16.208	2028945	569.338	2030393	569.745	89918.56	25.232	3880	1.089
2	Purchased DG Power Diesel Consumption	L	0	0	0	0	0	0	0	0	0	0	0	0	309	0.193	0	0.000
3	Purchased Cooling Electricity Power Consumption	kWh	0	0	0	0	0	0	0	0	0	0	0	0	90109.78	25.286	0	0.000
Total Emissions in tCO2e				**24.80**	**Total**	**40.37**	**Total**	**5959.86**	**Total**	**16.21**	**Total**	**615.73**	**Total**	**708.69**	**Total**	**50.71**	**Total**	**6.58**

Scope 3, Category 7 - Employee Commuting Calculations of SSEL & ISPL Corporate Office

SSEL Corporate Office - FY 23-24							
						No of Working day	**278**
Sl.No	**Mode of Transport**	**One way km**	**Km/year**	**EF**	**Unit**	**Source**	**Total emissions tCO2e**
1	Bike (<200 cc)	205.9	114480.4	0.0458	kg CO2/km	India GHG Program	5.24
2	Bus	6	3336	0.015161	kg CO2/Pax km		0.05
3	Car - Petrol	29	16124	0.153	kg CO2/km		2.47
	Car - Diesel	75	41700	0.141	kg CO2/km		5.88
	Car - CNG	0	0	0.068	kg CO2/km		0.00
	Carpool	0	0	0.153	kg CO2/km		0.00
	Taxi	0	0	0.153	kg CO2/km		0.00
4	Auto/Share Auto	0	0	0.10768	kg CO2/km		0.00
5	Metro	66	36696	0.007976	kg CO2/km		0.29
6	Walk	0	0	0	0		0.00
7	EV	18	10008	0.1432	kg CO2/kWh		1.43
8	others	10	216840	0.015161	kg CO2/Pax km		3.29
	Total km/year		**439184.4**	**Total GHG Emissions**			**18.65**

ISPL Corporate Office - FY 23-24							
						No of Working day	**278**
Sl.No	**Mode of Transport**	**One way km**	**per yr km**	**EF**	**Unit**	**Source**	**Total emissions tCO2 e**
1	Bike	187	103972	0.0458	kg CO2/km	India GHG Program	4.76
2	Bus	29	16124	0.015161	kg CO2/Pax km	India GHG Program	0.24
3	Car - Petrol	71	39476	0.153	kg CO2/km	India GHG Program	6.04
	Car - Diesel	57	31692	0.141	kg CO2/km	India GHG Program	4.47

	Car - CNG	10	5560	0.068	kg CO2/km	India GHG Program	0.38
	Carpool	8.25	4587	0.153	kg CO2/km	India GHG Program	0.70
	Taxi	0	0	0.153	kg CO2/km	India GHG Program	0.00
4	Auto/Share Auto	35.5	19738	0.10768	kg CO2/km	India GHG Program	2.13
5	Metro	261	145116	0.007976	kg CO2/km	India GHG Program	1.16
6	Walk	2	1112	0	0	India GHG Program	0.00
7	others	10	205720	0.015161	kg CO2/Pax km	India GHG Program	3.12
	Total km/year		**573097**	**Total GHG Emissions**			**23.00**


Switch to green energy
Recycle and recover
Unplug unused devices
Live in a small home
Reduce diary
Reduce waste
Drive less
CO2
REDUCE CARBON FOOT PRINT
Avoid mass market
Save water
Fly less
Reuse and repair
Avoid meat
Upgrade light bulbs
Plant more trees
Buy seasonal and local
Refuse single-use plastic
Travel smartly
Wash laundry cold
Eat a plant-based diet
Buy clothes secondhand