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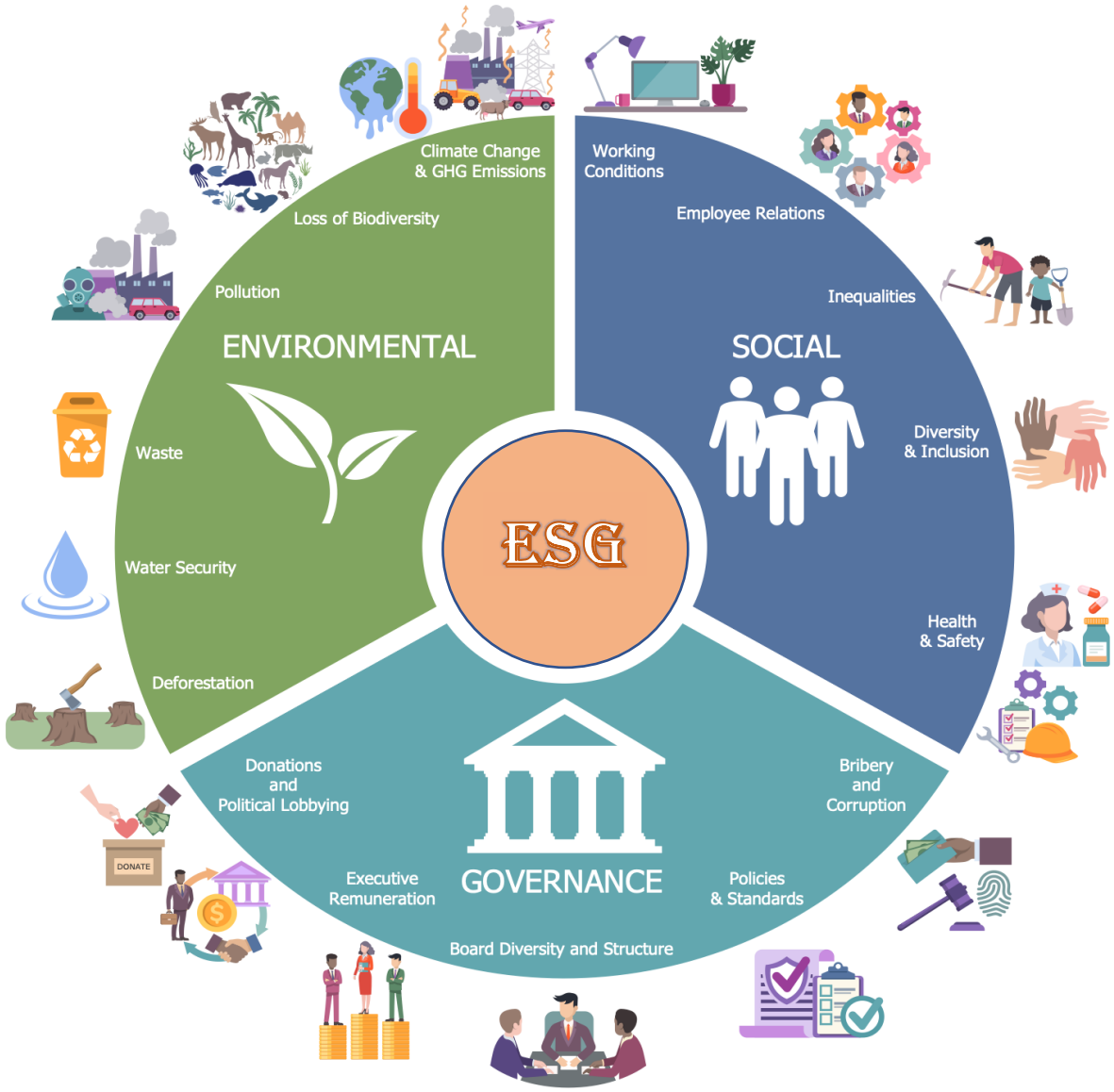

SSEL ESG REPORT

FY 24-25

Released On
26th November 2025

Report by
ESG Department

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ABBREVIATIONS

Abbreviations	
AC	Air Conditioning
ACT	Assessing low Carbon Transition
AMDT	Amorphous Metal Distribution Transformer
ANSI	American National Standards Institute
AP	Andhra Pradesh
AR	Assessment Report
AUM	Asset Under Management
BEE	Bureau of Energy Efficiency
BIS	Bureau of Indian Standards
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
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
CVM	Brazilian Securities and Exchange Commission
D&A	Governance & Accountability Institute
DEI	Diversity, Equity, and Inclusion
DEFRA	Department for Environment Food and Rural Affairs
DG	Diesel Generator
DGFASLI	Directorate General, Factory Advice and Labour Institutes
DJSI	Dow Jones Sustainability Indexes
DOE	U.S. Department of Energy
e.g.,	Example
EF	Emission Factors
EFRAG	European Financial Reporting Advisory Group
EHS	Environment, Health, and Safety
EI	Emission Intensity
ELV	Emissions Limit Values
EPA	Environmental Protection Agency
EPC	Engineering, Procurement, and Construction
EPEAT	Electronic Product Environmental Assessment Tool
EPR	Environmental Permitting Regulations
ERM	Enterprise Risk Management
ESG	Environmental Social Governance
ESOS	Energy Savings Opportunity Scheme

ESRS	European Sustainability Reporting Standards
ETS	Emissions Trading Scheme
EU	European Union
EV	Electric Vehicle
FO	Furnace Oil
FRFI	Federally Regulated Financial Institutions
FY	Financial Year
GC	General Counsel
GCV	Gross Calorific Value
GHG	Green House Gas
GRI	Global Reporting Initiative
GWP	Global Warming Potential
H1	First half of the year.
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
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IPCC SR15	IPCC Special Report on Global Warming of 1.5°C
ISO	International Organization for Standardization
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
M & T	Monitoring and Targeting

MCPD	Medium Combustion Plant Directive
MCR	Mandatory Carbon Reporting
MDV	Medium Duty Vehicle
MEPS	Australia's Minimum Energy Performance Standards
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
Sr. No.	Serial Number
SME	Small and Medium Enterprises
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
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. ESG – THE KEY PILLARS TO BUILD A RESILIENT BUSINESS

In today's rapidly evolving business landscape, sustainability and responsible corporate practices are no longer optional—they are essential. Environmental, Social, and Governance (ESG) principles provide a structured framework for companies to assess and improve their impact on the planet, society, and stakeholders.

In other words, ESG is a framework used to assess a company's impact on the environment, its relationships with stakeholders (employees, customers, communities etc.,), and the effectiveness of its corporate governance. ESG has become a key factor for investors, regulators, and customers in evaluating business sustainability and long-term financial performance.

Figure 1: Three Pillars of Sustainability

The three key pillars drive long-term value creation and responsible business conduct:

- **Environmental (E):** Focuses on how a company manages its environmental impact, including energy efficiency, greenhouse gas (GHG) emissions, waste management, and responsible resource consumption. For a transformer manufacturing company, this involves optimizing energy use, reducing emissions in production processes, and ensuring the responsible disposal of materials such as transformer oils and metals.
- **Social (S):** Addresses the company's relationships with employees, suppliers, customers, and communities. This includes maintaining a safe and inclusive workplace, adhering to ethical labor practices, and engaging with local communities. As a manufacturer, ensuring worker safety, fostering diversity, and promoting customer satisfaction through high-quality, reliable products are crucial social responsibilities.
- **Governance (G):** Covers corporate leadership, ethical business conduct, and transparency. Strong governance practices ensure compliance with regulations, integrity in financial reporting, and responsible decision-making. For a transformer manufacturer, governance includes upholding ethical sourcing practices, ensuring

compliance with environmental and safety regulations, and fostering transparency with stakeholders.

As the energy sector transitions towards sustainable solutions, transformer manufacturers play a critical role in supporting energy efficiency, grid modernization, and renewable energy integration. By embedding ESG principles into our operations, we not only minimize environmental impact but also strengthen our social and governance frameworks, ensuring long-term resilience and value creation for all stakeholders.

This ESG report outlines our commitment to sustainable manufacturing, responsible business practices, and continuous improvement in alignment with global ESG standards. Through this report, we aim to demonstrate transparency, accountability, and our ongoing efforts to contribute to a more sustainable future.

1.1 Recent Global ESG Trends

Recent trends in Environmental, Social, and Governance (ESG) practices reflect a complex landscape influenced by regulatory changes, corporate strategies, and evolving investor priorities.

The European Union's Corporate Sustainability Reporting Directive (CSRD) has come into effect for the first time in the 2024 financial year, for reports published in 2025. Companies subject to the CSRD have to report in alignment to European Sustainability Reporting Standards (ESRS). On 26 February 2025, the Commission adopted a package of proposals (Omnibus Packages) to simplify EU rules and boost competitiveness. Among other things, the package proposes to apply the CSRD only to the largest companies (those with more than 1000 employees), focusing the sustainability reporting obligations on the companies which are more likely to have the biggest impacts on people and the environment. Moreover, it seeks to ensure that reporting requirements on large companies do not burden smaller companies in their value chains.

Whereas, the United States has experienced a resurgence of policies favouring deregulation and has created an uncertain regulatory environment for sustainable investments, leading to volatility in ESG-focused strategies.

However, an analysis regarding policy changes, corporate reporting trends, statements from business leaders, evidence of evolving communication strategies, and perspectives from financial institutions and stakeholders indicate that while the recent changes in policies have created less supportive federal environment for ESG, a reversal has not o ccurred. Instead, many companies are continuing their sustainability efforts, often driven by market forces and stakeholder expectations, and are **increasingly using alternative terminology** to discuss these initiatives amidst a politicized landscape.

1.1.1 Status of ESG Integration in companies globally

ESG reporting and sustainability initiatives remain prevalent among US corporations despite the changes in policies. A 2024 study conducted by the New York-based Governance & Accountability Institute, Inc. (G&A) specializing in ESG (Environmental, Social, and Governance) reporting, sustainability strategies, and corporate responsibility analysis gives an interesting perspective.

In 2012, G&A's analysts began researching the sustainability reporting of the S&P 500 companies for the 2011 publication year. This became the foundation for their annual examination of corporate sustainability reporting trends in subsequent years. The results of their initial research 13 years ago showed that just 20% of the S&P 500 companies published sustainability reports or disclosures. G&A has examined sustainability reporting trends of the S&P 500 companies each calendar year since then and today the percentage of non-reporters is just over 1%.

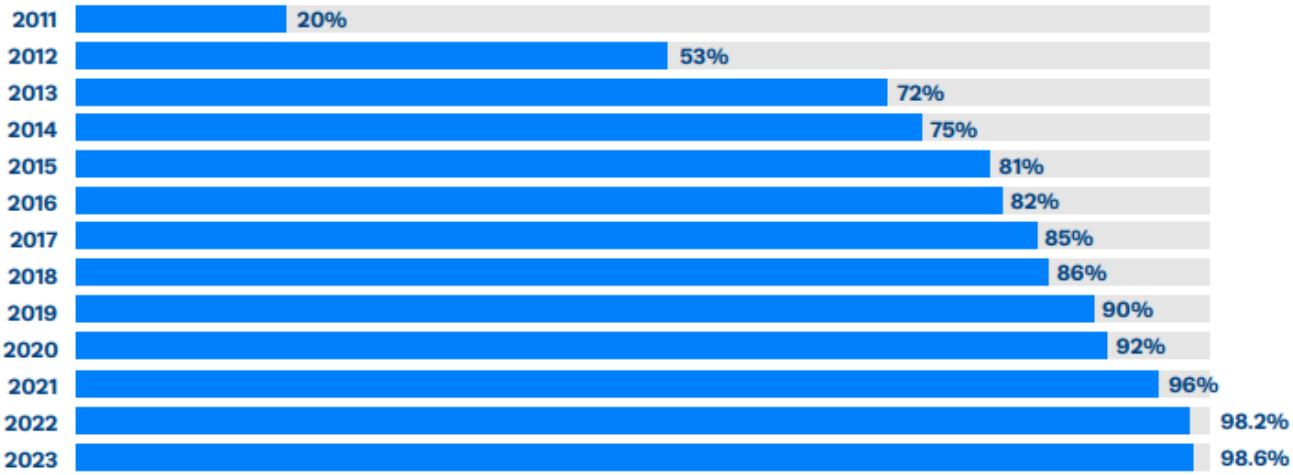


Figure 2: Sustainability Reporting trends of S&P 500 Companies

In 2023, 93% of the companies included in the Russell 1000 Index published sustainability reports and data disclosures. Only 7% of this important universe of publicly-traded companies did not report during 2023. Throughout our annual research on corporate reporters, we continue to see a steady decrease of sustainability reporting laggards. However, some sectors are progressing more quickly than others.

PwC's Global Sustainability Reporting Survey 2025 (published 25 September 2025) has come out with the below observations:

1. Pressure to Report Is Rising

- Despite shifts and recalibrations in regulation, more than 50% of companies surveyed say that the pressure from stakeholders (investors, customers, regulators) to disclose sustainability data has increased. ESG Today+1
- In the sample of ~496 companies across ~40 countries (respondents to CSRD/ISSB-type frameworks), only 7% said pressure has decreased.
- Of the respondents: about 36% have already published reports under Corporate Sustainability Reporting Directive (CSRD) or the International Sustainability Standards Board (ISSB) framework; another ~41% plan to report under CSRD; ~23% under ISSB.

2. Reporting Is Delivering Value Beyond Compliance

- More than two-thirds of companies that have already reported under CSRD or ISSB say they derived moderate to significant business value from the data and insights gathered during the reporting process.
- The kinds of business areas benefiting include:

1. Strategy (using sustainability data to inform strategy).

2. Supply-chain transformation (e.g., capturing sustainability-related risk in suppliers).
3. Workforce transformation (people/organisation aspects).
4. Marketing, risk management: the data is no longer just for regulatory tick boxes but is feeding business domains.

3. Timelines, Scope & Regulatory Flux

- The survey finds that about 40% of the respondents planning to report under CSRD in the future say they will postpone statutory reporting by two years (in line with the EU's "stop the clock" directive). At the same time, an equal ~40% say they will stay on the original timeline even if not legally required yet.
- Regulatory context: Mandatory sustainability reporting has begun in many jurisdictions (e.g., via CSRD) and the ISSB framework is gaining traction globally; yet many regulators are recalibrating (simplifying, delaying) requirements.

4. Leadership, Resources & Technology Becoming More Important

- Companies reporting higher value from disclosures are more likely to invest resources and senior leadership time in sustainability reporting: the survey notes that firms with the "highest value outcomes" increased senior executive involvement in 2025 (≈40% of that subgroup) compared with ≈16% across all respondents.
- On the technology side: use of tools for data-collection, validation, disclosure drafting is increasing — for example, there is a near-tripling in the use of AI for reporting tasks in 2025.

5. Companies Still Building Their Capabilities — Variation Remains

- Although many companies are starting to report, there is significant variation in how mature their reporting systems are (data, process, assurance).
- Some companies still omit external stakeholder engagement in their assessments of materiality, and disclosures vary greatly in depth (some cover fewer than 15 impacts/risks, others more than 80). PwC
- The shifts in regulation (scope, timing) add complexity and uncertainty for companies.

1.1.2 Terminology shift – ESG to Sustainability focus

An analysis of 2024 sustainability reports revealed an interesting shift in terminology. While the acronym "ESG" remained prevalent within the reports, appearing an average of 62 times, "Sustainability" overtook "ESG" as the most common keyword in report titles, with 39% using "Sustainability" compared to 24% using "ESG" (down from 35% in 2023). This change suggests a potential strategic communication shift, possibly to navigate the politicized landscape surrounding the term "ESG" while still addressing the core principles within a "Sustainability" framework. Notably, the length of sustainability reports continued to increase for the third consecutive year, averaging 83 pages in 2024, a 20% increase from 2021. This increase in length indicates a growing volume and detail of information being disclosed.

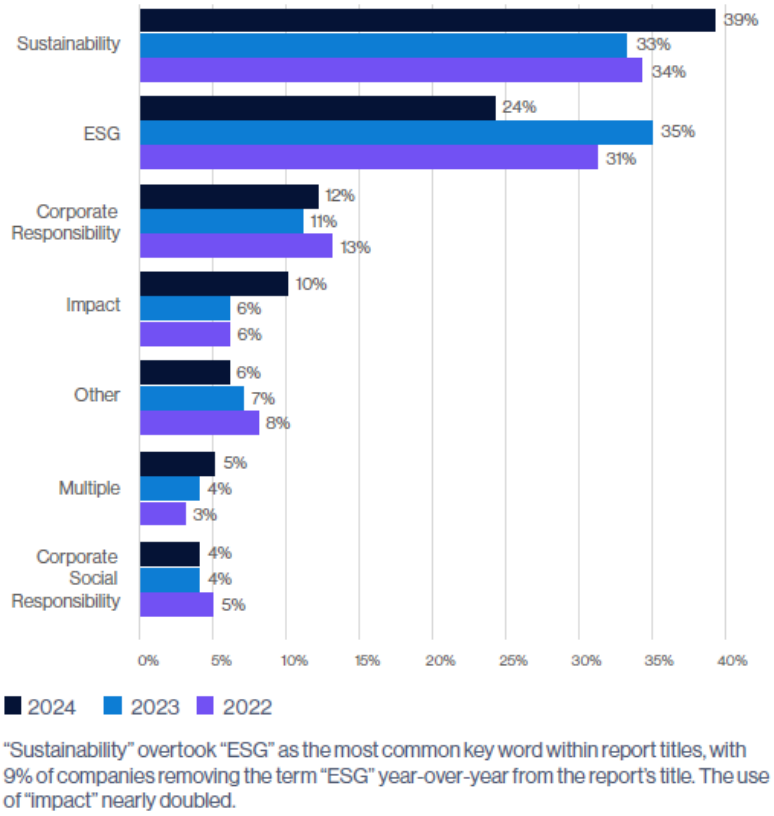


Figure 3: Key Word of 2024 Sustainability Report Titles (2022-2024)

Furthermore, external assurance of ESG data increasingly includes "Social" data points, with 32% of companies adding social data when getting environmental data assured in 2024, up from 22% in 2023. This indicates a growing importance and scrutiny of social metrics in ESG reporting.

1.1.3 ESG Integration into Core Business Strategy – A Reality Check

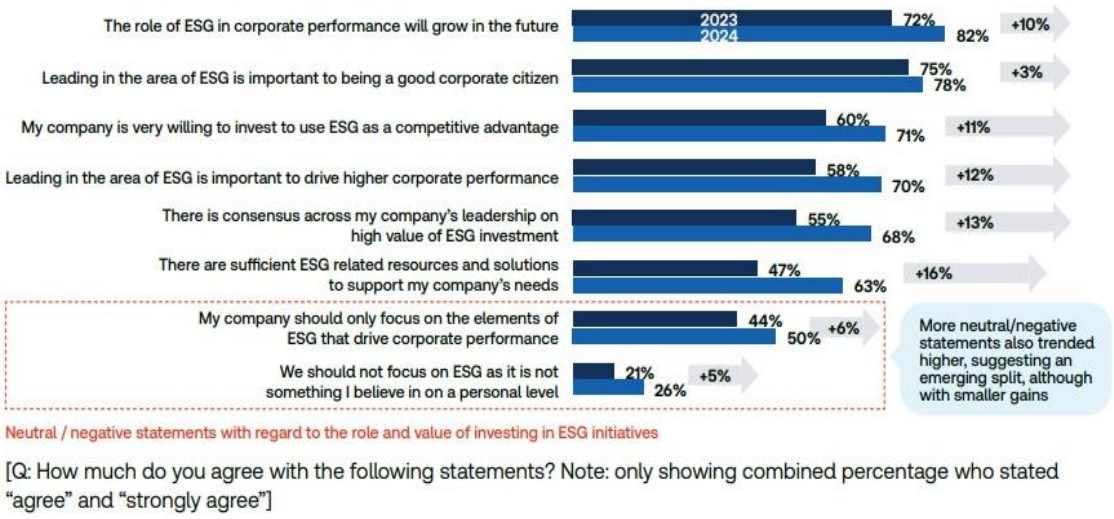


Figure 4: C-suite and Functional Leaders See ESG Growing in Importance

ESG is also increasingly being integrated into core business strategy. In 2024 Thomson Reuters Institute published "The 2024 State of Corporate ESG" report, which found that 82% of corporate leaders believe that ESG is crucial for corporate success, moving beyond mere compliance. It revealed a shift towards integrating ESG into the core financial and operational strategies of companies. Moreover, there is an increasing trend of companies investing in third-party solutions and AI technologies to manage their ESG activities, indicating a deeper commitment to effective ESG management and reporting.

Additionally, a recent report released by PwC towards end March 2025 has revealed that a vast majority, 84 % of public companies are either retaining or ramping up their climate commitments, with companies found to be more than twice as likely to be increasing their emissions reduction goals than decelerating them, based on data from climate research provider and environmental disclosure platform CDP.

The study also found that the practice of setting climate goals is progressing down the value chain as companies increase engagement efforts, with smaller companies representing a growing proportion of those introducing new targets.

For the report, PwC's 2025 State of Decarbonization, PwC examined data from 4,163 public companies that submitted the full CDP questionnaire in the 2024 disclosure cycle, using GenAI to analyse more than 1 million entries of long form free text and quantitative responses, in addition to drawing on information from S&P Capital IQ, the Science-Based Targets initiative, and various public sources of information.

The report found that, while headlines suggest that companies are scaling back their sustainability efforts, 47% of companies maintained their decarbonization targets in 2024, and 37% actually increased their ambitions, while only 16% pulled back on their climate goals.

Even among those scaling back, PwC found that more than half are recalibrating their expectations lower from overly ambitious goals set in the absence of a detailed plan, as companies gain a better view of what it achievable.

The increase in participation by smaller companies in setting climate commitments comes as companies appear to be ramping engagement in order to tackle their Scope 3 value chain emissions, with 72% of companies reporting that they are now engaging with their suppliers, and 67% engaging with customers and clients.

The value chain focus was also apparent in disclosure data, with more than 3,600 companies reporting Scope 3 emissions in 2024, up by 80% from around 2,000 in the prior year.

Despite the increased focus on engagement and reporting, the report found that only 54% of companies were on track to meet their Scope 3 emissions goals. Notably, however, this metric improved from 50% in 2023.

The report found a better success rate on operational and energy emissions, with 67% of companies on track to meet their Scope 1 and 2 targets. Progress appears to be much faster on Scope 2, with on-track companies reporting an aggregate reduction of 12%, compared to a 6% reduction in Scope 1 emissions.

According to PwC, the faster progress on Scope 2 emissions highlights the centrality of low-carbon electricity to current emissions reduction efforts, with a shift to renewable energy accounting for more than 40% of Scope 1 and 2 emissions reductions last year, indicating a need to focus in the future on direct Scope 1 emissions in the future to maintain momentum.

As companies increasingly set decarbonization commitments, the report also found that they anticipate spending more on climate initiatives, with expectations for an 18% higher proportion of capex and 21% higher proportion of operating expenses to be allocated to climate mitigation and adaptation by 2030.

The higher spending expectations come as companies also see opportunities to add value through their climate efforts, with 60% of companies already having low-carbon products in their portfolio, and PwC's analysis finding a potential uplift of 6% to 25% from products featuring sustainability attributes. PwC also highlighted potential value to be derived from progress on Scope 3 emissions, with less energy and materials needed to produce products translating to lower costs and improved margins.

1.1.4 Evidence of Continued Sustainability Efforts: Downplaying the "ESG" Label

Figure 5: Type of Greenwashing

The political backlash against ESG has contributed to a phenomenon known as "green-hushing," where companies are deliberately downplaying their ESG ambitions and initiatives to avoid scrutiny, litigation, and negative attention. This is distinct from "greenwashing," where companies exaggerate or misrepresent their environmental or social activities. The trend of "green-hushing" suggests that while some companies might be less vocal about their ESG efforts, the underlying work may still be ongoing. Some investors are also reportedly removing references to ESG from their reports and websites while continuing their ESG-related activities quietly.

Despite knowing that communicating about net-zero goals can be beneficial for their bottom line, a significant percentage of companies admit to "green-hushing" due to the fear of greenwashing accusations and heightened scrutiny from various stakeholders. This creates a challenging environment where companies are hesitant to be fully transparent about their sustainability initiatives, potentially leading to a decrease in overall transparency and ambition around climate goals. By downplaying their actions, companies risk lowering the bar on climate ambition, hindering momentum, and missing opportunities to engage with customers and stakeholders.

However, the fundamental drivers for sustainable business remain strong. Companies that want to remain relevant are unlikely to completely abandon action on sustainability, as the impacts of climate change and the increasing importance of diversity and inclusion continue to grow. Historical examples demonstrate that even when the US government has retreated from climate action or on social issues, many large companies have stepped up to maintain their commitments and support their stakeholders. This suggests a resilience and commitment to sustainability that extends beyond political cycles. The high rates of ESG reporting and the increasing focus on specific ESG issues discussed earlier also serve as evidence that companies are continuing their efforts, even if they are not prominently using the term "ESG." The adoption of international reporting frameworks and the response to state-level regulations further indicate ongoing engagement with sustainability principles.

1.1.5 Continuing ESG focus across the world

While the ESG landscape in the United States faces increasing political headwinds, the rest of the world, particularly Europe and Asia, is demonstrating a continued and, in many cases, strengthened commitment to ESG principles.

Key Trends:

- Regulatory Momentum:

    - **Singapore:**
        - SGX (Singapore Exchange) mandates climate-related disclosures (aligned with ISSB) for all listed companies in phased manner starting from FY2025. From FY2030, large NLCos (defined as those with annual revenue of at least $1 billion and total assets of at least $500 million) will be required to do the same.
        - MAS (Monetary Authority of Singapore) green finance taxonomy (Dec 2024 draft expected to become final in 2025 (Date not yet confirmed)).

    - **South Korea**
        - Mandatory ESG reporting for large listed companies by 2025 (market cap > KRW 2 trillion), extended to all KOSPI-listed companies by 2030.
        - The Korea Sustainability Standards Board (KSSB) is also developing sustainability disclosure standards aligned with ISSB standards.
    - **India**
        - BRSR Core (Business Responsibility and Sustainability Report – Core) mandatory for top 150 listed companies from FY 2023–24, expanding to top 1000 companies by FY 2026–27.
        - SEBI has indicated alignment with ISSB standards in progress.
    - **China**
        - 2024: Draft ESG disclosure guidelines by China Securities Regulatory Commission (CSRC).
        - Push for mandatory ESG reporting for key sectors (e.g., high-emitting industries) by 2026.
        - Growing emphasis on green finance and taxonomy-based investments.
- Investor Demand:
    - Institutional investors in Europe and Asia increasingly integrating ESG factors into their investment decisions.
    - Over 100 companies and investors—including EDF, Nokia, Allianz, IKEA—urged the EU not to dilute sustainability reporting rules, stating these are essential to "guide capital toward green technologies" and "competitiveness and growth"
    - There is a growing recognition that ESG considerations are not just ethical concerns but also crucial for managing risk and identifying long-term value.
- Focus on Transparency and Reporting:
    - There is a strong emphasis on standardized and comparable ESG reporting, driven by both regulatory requirements and investor demand.
    - This focus on transparency is leading to increased scrutiny of companies' ESG performance.
- Regional Differences:
    - While there is a general trend towards greater ESG integration, there are regional differences in priorities and approaches.
    - Europe tends to place a strong emphasis on environmental issues, while Asia is increasingly focused on social and governance factors as well.
- Technological influence:
    - The use of AI and blockchain technologies are being more heavily invested in, to provide greater transparency and accountability in ESG reporting.
    - AI is increasingly central to ESG: automating data capture, enabling real-time insights, validating claims, and linking executive compensation to performance.
    - Blockchain is emerging as a critical tool for verifiable ESG data and supply-chain transparency.
    - Real-time monitoring via IoT and sensors is shifting ESG from retrospective reports to proactive risk management.
    - Academic advances are demonstrating that tailored LLMs can enhance ESG disclosure accuracy and performance.

In essence, the overall trend shows that ESG is here to stay and the fundamental shift in how businesses are evaluated and operated can be attributed to the gradually increasing integration of ESG values in business operations.

1.1.6 Evolution from MDGs to UNSDGs

Figure 6: MDGs Goals

Figure 7: UNSDGs Goals

MDGs (2000 – 2015)	SDGs (2015 – 2030)
Adopted by 189 countries at the UN Millennium Summit in 2000.	Adopted by 193+ countries in 2015 as part of the UN 2030 Agenda for Sustainable Development.
Focused on 8 goals: poverty, education, gender equality, child mortality, maternal health, diseases, environmental sustainability, and global partnerships.	Introduced 17 goals covering a wider range: sustainability, economic growth, social inclusion, and more.
Achievements: Reduced extreme poverty, improved health and education.	Expanded scope to include developed and developing countries.
Gaps remained, especially in inequality, climate, and sustainability.	Emphasis on environmental sustainability, economic growth, and social inclusion.
Limited indicators	169 targets and 232 indicators. https://unstats.un.org/sdgs/indicators/indicators-list/

Table 1: MDGs vs UNSDGs

1.1.7 ESG in India – The SEBI – BRSR & NGRBC

NGRBC

The National Guidelines on Responsible Business Conduct (NGRBC) is a comprehensive framework developed by the Ministry of Corporate Affairs (MCA), Government of India, aimed at fostering ethical, sustainable, and socially responsible business practices across all sectors.

- Introduced as National Voluntary Guidelines (NVGs) in 2011
- Renamed and updated as NGRBC in 2019
- Voluntary in principle, but widely encouraged as a benchmark for responsible corporate behavior

Purpose and Global Alignment

The NGRBC is designed to help businesses integrate Environmental, Social, and Governance (ESG) considerations into their strategy and day-to-day operations. Its purpose is closely aligned with India's development agenda and international standards such as the United Nations Sustainable Development Goals (UN SDGs).

Nine Principles and relevance to UNSDGs and ESG

Nine NGRBC Principle	ESG Pillar	Relevant UN SDGs
1.Ethical, Transparent, and Accountable Governance	Governance	SDG 16 (Peace, Justice & Strong Institutions)
2.Product Life Cycle Sustainability	Environmental	SDG 12 (Responsible Consumption & Production)
3.Employee Well-being	Social	SDG 3 (Good Health), SDG 8 (Decent Work)
4.Stakeholder Engagement	Social	SDG 17 (Partnerships for the Goals)
5.Human Rights	Social	SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities)
6.Environmental Protection	Environmental	SDG 13 (Climate Action), SDG 15 (Life on Land)
7.Responsible Public Policy Advocacy	Governance	SDG 16 (Strong Institutions)
8.Inclusive Growth and Equitable Development	Social	SDG 1 (No Poverty), SDG 10 (Reduced Inequalities)
9.Consumer Value and Protection	Social	SDG 12 (Sustainable Consumption)

Table 2: Nine Principles and relevance to UNSDGs and ESG

BRSR – Core BRSR – Disclosure in XBRL Format:

BRSR (Business Responsibility and Sustainability Report)

Definition: A comprehensive ESG (Environmental, Social, Governance) disclosure format introduced by SEBI in 2021 as part of the effort to enhance transparency and accountability in sustainability reporting.

Applicability: Mandatory for the top 1,000 listed companies in India (by market capitalization) from FY 2022–23 onwards.

Core BRSR

Definition: A standardized, limited subset of the BRSR disclosures introduced in 2023 under SEBI's ESG regulatory framework to ensure comparability and consistency in ESG disclosures.
Applicability: Applies to companies under the proposed ESG rating and assurance framework. Voluntary for FY 2023–24 and mandatory for top 150 listed entities from FY 2024–25.

Focus:

- Focused only on quantifiable, essential ESG indicators**.**
- Enables third-party assurance.
- Designed for use in ESG ratings and investment decision-making.

Key Areas Covered:

- GHG emissions (Scope 1 & 2) Water consumption
- Water consumption
- Gender diversity
- Median wages
- Waste management
- Social impact
- Board diversity, etc.

Disclosure in XBRL Format

The deadline for filing BRSR (Business Responsibility and Sustainability Report) in XBRL format is generally within 5 months from the end of the financial year. For example, if the financial year ends on March 31st, the BRSR in XBRL format should be submitted by August 31st of the same year.

Here's a more detailed breakdown:

• XBRL Format: The BRSR is required to be filed in XBRL (Extensible Business Reporting Language) format.
• Due Date: The deadline for BRSR filing is within 5 months from the end of the financial year.
• Example: For the financial year 2024-25 (which ends on March 31, 2025), the BRSR in XBRL format should be filed by August 31, 2025.

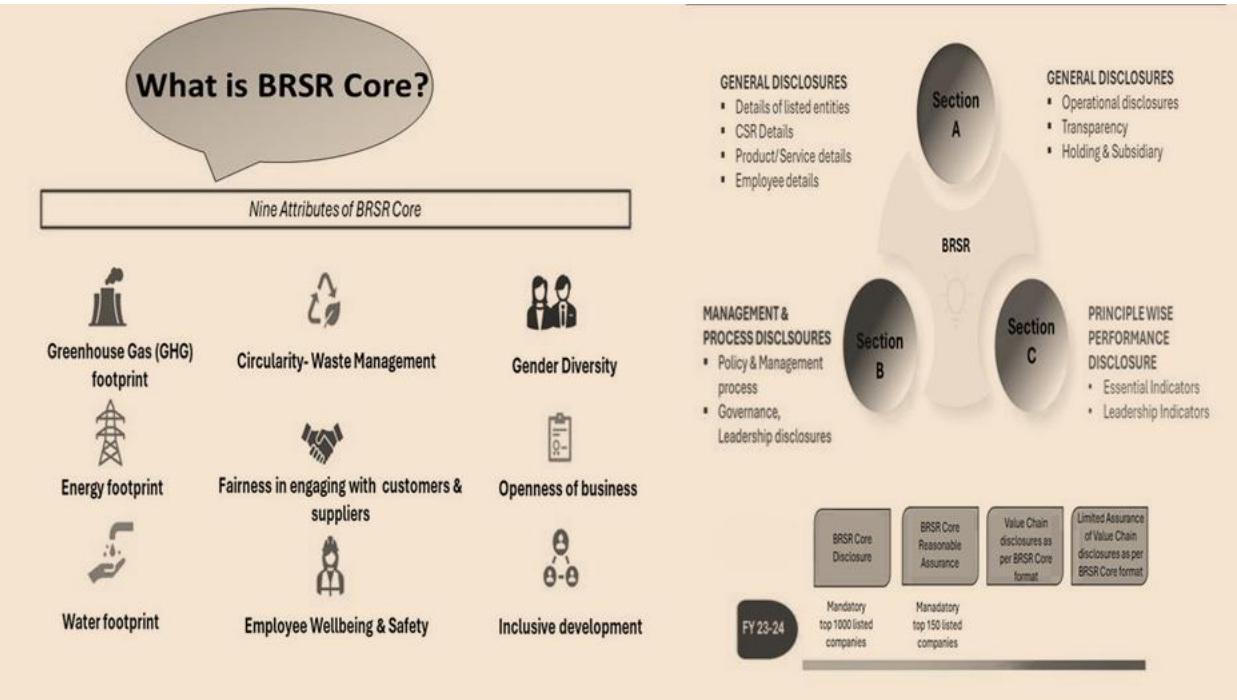


Figure 8: BRSR Core

ESG Disclosures for value chain

- Disclosures for value chain shall be made by the listed company as per BRSR Core, as part of its Annual Report. For this purpose, value chain shall encompass the top upstream and downstream partners of a listed entity, cumulatively comprising 75% of its purchases/sales (by value) respectively.
- Listed entities shall report the KPIs in the BRSR Core for their value chain to the extent it is attributable to their business with that value chain partner. Such reporting may be segregated for upstream and downstream partners or an be reported on an aggregate basis.

- The scope of reporting and any assumptions or estimates, if any, shall be clearly disclosed.

Applicability

- ESG disclosures for the value chain shall be applicable to the top 250 listed entities (by market capitalization), on a comply-or-explain basis from FY 2024-25.
- The limited assurance of the above shall be applicable on a comply-or-explain basis from FY 2025-26.

1.1.8 India's Nationally Determined Contributions (NDC)

The 21st session of the Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC) was held in Paris in November and December 2015. 195 participating countries negotiated and adopted the Paris Agreement, which includes objectives to peak greenhouse gas emissions as soon as possible, to limit the global average temperature increase above pre-industrial levels to well below 2°C, and to pursue efforts to limit the increase to 1.5°C. [1]

The Paris Agreement, which entered into force on 4 November 2016, requires Parties to put forward their best efforts through "Nationally Determined Contributions" (NDCs). These NDCs represent targets and actions for the post-2020 period with reference to the base year 2005.

India initially submitted its Intended Nationally Determined Contribution (INDC) in October 2015, before the Paris Agreement was adopted in December 2015 and India ratified its contribution on 2nd of October 2016 and it became the India's first NDC.
India's NDC Target and current progress shown in below table:

India's NDC Target and Current Progress		
Category	**Commitments & Updates**	**Achievements/Running Targets/Current Progress**
Emissions Intensity Reduction	**NDC 2015**: To reduce Emissions Intensity of India's GDP by 33 % -36% by 2030, from 2005 level.	• Achieved 36% by 2020[2] (33% by 2019)[3]
	Updated NDC 2022: To reduce Emissions Intensity of its GDP by 45 % by 2030, from 2005 level.	Running Target
Non-Fossil Fuel Electric Power Capacity	**NDC 2015**: To achieve 40 % cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030	• Achieved 40% in 2021[3]
	Updated NDC 2022: To achieve about 50 % cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030	• Achieved **50.08%** in June-25[4] five years ahead of the target set under its NDC
Promoting Sustainable Living	**NDC 2015**: To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation	Current progress: • Mission LiFE launched Oct 2022, aiming to mobilize 1 billion people by 2028.[5]
	Updated NDC 2022: To put forward and further propagate a healthy and	

	sustainable way of living based on traditions and values of conservation and moderation, including through a mass movement for 'LIFE'– 'Lifestyle for Environment' as a key to combating climate change	
NDC 2015 Target and continuing		
Additional Carbon Sink from base year 2005	To create an additional carbon sink of 2.5 to 3 GtCO2e through additional forest and tree cover by 2030, from base year 2005.	• India's forest and tree cover has consistently increased from 20.60% in 2005 and as on year 2023 stands at 25.17% of the total geographical area of the country. [2] • Achieved 2.29 GtCO2e by 2021.[1] (1.97 GtCO2e by 2019)[2] Running target: • 0.21 GtCO2e away from achieving the 2030 target.
Adopting a Cleaner Development Path	To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.	Current progress: • India is promoting circular economy principles to reduce waste and resource use. • Initiatives like the Solid Waste Management Rules and Plastic Waste Management Rules push for better recycling, reduction of single-use plastics, and waste segregation at source.
Enhancing Climate Change Adaptation	To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.	Current progress: • Adaptation-relevant expenditure increased to 5.60% of GDP by 2021-2022[2]
Mobilizing Finance	To mobilize domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.	Current progress: • ₹36,000 crore raised via sovereign green bonds in 2023.[2] • $66 billion annual finance gap remains.[3]
Building Capacity & Technology Transfer	To build capacities, create domestic framework and international architecture for quick diffusion of cutting-edge climate technology in India and for joint collaborative R&D for such future technologies.	Current progress: • Reliance on domestic resources due to lack of international technology transfer (as of Dec 2024, 4th BUR).[4]

Table 3: India's NDC Target and Current Progress

1. Press Information Bureau, Government of India. (2025, January 3). India submits its Fourth Biennial Update Report (BUR-4) to UNFCCC [Press release]
2. Press Information Bureau. (2024, July 22). Despite Being One of The Fastest-Growing Economies in the World, India's Annual Per Capita Carbon Emission is Only About One-Third of the Global Average, Government of India.
3. *Economic Survey: India on track to create additional carbon sink through forest cover*, Mint
4. Lack of tech transfer slowing climate action in India: Government to UNFCCC. The Times of India
5. https://cea.nic.in/installed-capacity-report/

In addition to that at the 26th Conference of the Parties (COP26) in Glasgow, Prime Minister Modi outlined several significant commitments, often referred to as the "Panchamrit" (five nectars) goals [1], along with other key points:

Panchamrit Goals:

- **Achieve 500 GW of non-fossil fuel energy capacity by 2030:** This target aims to significantly boost India's green energy capacity. The break-up of all installed capacity of energy sources from Central Electricity Authority database for **Aug-25** [5] is as follows.

Category	Energy Source	Total (GW)	% Share
Fossil Fuel	Coal	216.8	43.75%
	Lignite	6.62	1.34%
	Gas	20.13	4.06%
	Diesel	0.59	0.12%
	Total	**244.14**	**49.27%**
Non-Fossil Fuel	Nuclear	8.78	1.77%
	Hydro	50.11	10.11%
	Small Hydro Power	5.11	1.03%
	Wind Power	52.68	10.63%
	Bio-Power	11.6	2.34%
	Solar Power	123.13	24.85%
	Total	**251.41**	**50.73%**
Grand total		**495.55**	**100%**

Table 4: Percentage Share of Installed Capacity as of June-25

- **Meet 50% of energy requirements from renewable energy by 2030:** This includes sources like solar, wind, and hydropower, marking a transformative step towards reducing dependency on fossil fuels.
- **Reduce total projected carbon emissions by 1 billion tonnes by 2030:** This commitment focuses on cutting down India's carbon footprint without hindering economic growth.
- **Lower carbon intensity of the GDP by 45% by 2030:** This goal aims to decouple economic growth from carbon emissions by improving energy efficiency and promoting sustainable practices across industries.
- **Achieve net-zero emissions by 2070:** This signifies a long-term commitment to neutralize greenhouse gas emissions by balancing them with carbon absorption through natural and technological solutions.

Other Noteworthy Points:

- **Greener Infrastructure:** Prime Minister Modi announced that the Indian railway system had set a target of achieving "Net Zero" emissions by 2030, aiming to reduce emissions by 60 million tonnes annually. He indicated that this trend would extend to other infrastructure areas as well [3].

1. Press Information Bureau. (2022, February 3). *India's stand at COP-26* [Press release]. Ministry of Environment, Forest and Climate Change, Government of India.
2. Central Electricity Authority, Government of India. Installed capacity report for June-25.
3. https://www.roedl.com/insights/india-modi-panchamrit-cop26-implication-industrial-perspective

- **Climate Finance Expectations:** Modi reiterated the expectation for developed countries to provide $1 trillion in climate finance. However, he also noted that past promises regarding climate finance had been "hollow," signalling India's understanding that it cannot solely depend on developed nations for funding and would pursue self-financing through initiatives like "Make-in-India" and "Vocal-for-Local"

1.2 Importance of ESG for Transformer Manufacturing Industry

The transformer manufacturing industry is deeply interlinked with all three pillars of ESG: Environmental, Social, and Governance. As a critical component of energy infrastructure, especially with the global shift towards renewable energy, the industry's sustainability performance is under increasing scrutiny.

Figure 9: SSEL Transformer

Here's how each aspect of ESG connects with transformer manufacturing:

Environmental (E)
The "E" in ESG for transformer manufacturing primarily revolves around reducing the ecological footprint of production and the transformers themselves throughout their lifecycle.

- **Material Consumption and Sourcing:**
  - **Raw Materials:** Transformers require significant amounts of materials like copper, steel, and insulating materials. The extraction and processing of these virgin materials contribute to carbon emissions, habitat destruction, and resource depletion.
  - **Sustainable Materials:** The industry is moving towards using recycled copper and steel, and eco-friendly insulating materials (e.g., biodegradable vegetable-based oils instead of mineral oil). Amorphous metal cores are gaining traction as they significantly reduce energy losses compared to traditional silicon steel.
- **Energy Consumption and Emissions:**
  - **Energy-Intensive Production:** Manufacturing transformers is an energy-intensive process, leading to a high carbon footprint.
  - **Renewable Energy in Manufacturing:** Manufacturers are increasingly transitioning to renewable energy sources like solar, wind, and

hydroelectric power to fuel their production facilities, aiming to minimize reliance on fossil fuels and reduce greenhouse gas emissions (Scope 1 and 2 emissions).
    - **Energy Efficiency of Transformers:** Inefficient transformers contribute to energy losses in the grid, leading to higher CO2 emissions over their operational life (Scope 3 emissions). The industry is focused on developing more energy-efficient transformers, including smart transformers that optimize voltage levels in real-time, and high-temperature superconducting (HTS) transformers that promise near-zero energy loss. Regulations like the EU's Eco-design Directive and US Department of Energy standards are pushing for higher efficiency.
- **Waste Management and Circular Economy:**
    - **Production Waste:** Manufacturing processes generate waste. Implementing circular economy principles, such as closed-loop recycling systems for scrap materials, can reduce waste significantly.
    - **End-of-Life Management:** Responsible disposal and recycling of old transformers are crucial. This includes recovering valuable materials like copper and steel and safely managing hazardous substances (e.g., PCB-contaminated oil). Retrofit programs also extend the lifespan of existing transformers, reducing the need for new production.
- **Pollution Control:**
    - **Oil Spills:** Traditional mineral oil used in liquid-filled transformers poses a risk of spills and contamination. The shift to biodegradable, non-toxic alternatives (like natural or synthetic esters) mitigate this risk.
    - **Noise Pollution:** Large transformers can produce significant noise, which can impact nearby communities and ecosystems. Developing low-noise models is an environmental consideration.

Social (S)

The "S" in ESG addresses the human element and the impact of the transformer industry on people and communities.

- **Labor Practices and Worker Safety:**
    - **Working Conditions:** Ensuring safe and ethical working conditions in manufacturing plants, including fair wages, reasonable working hours, and protective equipment.
    - **Human Rights in Supply Chain:** Given that a significant portion of a manufacturer's ESG impact can be in its supply chain, responsible sourcing and due diligence on human rights are critical to prevent issues like child labor or forced labor.
- **Community Engagement and Impact:**
    - **Local Communities:** Minimizing negative impacts on local communities from manufacturing operations (e.g., noise, air pollution) and contributing positively through job creation and local economic development.
    - **Access to Energy:** Transformers are fundamental to providing reliable electricity, which has a direct social benefit by powering homes, businesses, and essential services, particularly in developing regions.

- **Product Safety and Reliability:**
    - **Safety Standards:** Adhering to rigorous safety standards to ensure transformers are safe for installation, operation, and maintenance, protecting both workers and the public.
    - **Reliability:** Producing durable and reliable transformers contributes to grid stability, which is essential for societal well-being and economic activity.

Governance (G)

The "G" in ESG focuses on the leadership, internal controls, and ethical conduct of transformer manufacturing companies.

- **Ethical Business Practices:**
    - **Anti-Corruption and Bribery:** Implementing strong policies and procedures to prevent corruption, bribery, and other unethical practices within the company and its supply chain.
    - **Fair Competition:** Adhering to anti-trust laws and promoting fair competition in the market.
- **Board Structure and Oversight:**
    - **Board Diversity:** Ensuring a diverse board of directors with a range of skills and perspectives, including expertise in sustainability.
    - **Executive Compensation:** Linking executive compensation to ESG performance metrics to incentivize sustainable practices.
- **Transparency and Reporting:**
    - **ESG Reporting:** Transparently disclosing ESG performance through sustainability reports, aligning with frameworks like GRI, SASB, or ISSB. This allows stakeholders (investors, customers, regulators) to assess the company's sustainability efforts.
    - **Regulatory Compliance:** Adhering to all relevant environmental, social, and labor laws and regulations (e.g., Eco-design Directive, WEEE Directive, energy efficiency standards, labor laws).
- **Risk Management:**
    - **ESG Risk Assessment:** Identifying, assessing, and managing ESG-related risks, such as supply chain disruptions due to climate change, reputational damage from social issues, or financial penalties from regulatory non-compliance.
    - **Cybersecurity:** Protecting sensitive data and operational technology, which is increasingly relevant with the rise of smart transformers and connected grids.

Why it is Critical?

- Regulatory Compliance: Governments worldwide are tightening environmental and safety regulations. Non-compliance can result in fines, legal issues, and reputational damage.
- Investor & Customer Expectations: Investors and businesses are increasingly considering ESG factors before investing or making procurement decisions.
- Cost Savings: Energy-efficient manufacturing, waste reduction, and recycling can lower operational costs.

- Competitive Advantage: Companies with strong ESG policies attract customers, investors, and talent, gaining a competitive edge in the market.
- Long-Term Sustainability: A sustainable business model ensures long-term growth, reduces environmental impact, and enhances brand value.

In summary, the transformer manufacturing industry's interlinkage with ESG is multifaceted. Addressing ESG factors is not just about compliance but also about enhancing operational efficiency, reducing costs, attracting investment, building brand reputation, mitigating risks, and contributing to a more sustainable and equitable energy future. As the world transitions to renewable energy, the demand for transformers is growing, making their sustainable production even more critical.

1.2.1 Importance of ESG for Transformer Export Market

Table 5: Continent wise key ESG Regulatory Implications

Continent	Key ESG Regulatory Implications	Notes for Transformer Export
Europe (EU)	• CBAM (Carbon Border Adjustment Mechanism) • EU Eco-Design Regulation REACH / RoHS / WEEE Directives • Corporate Sustainability Reporting Directive (CSRD) + supply chain due diligence laws	• Must meet strict eco-design efficiency norms. • Need to declare product's carbon footprint • Need to declare SF_6 (greenhouse gas) content. • Supplier sustainability data required under CSRD.
North America (USA, Canada)	• US SEC Climate Disclosure Rule (large buyers) • Canadian CETA rules (carbon reporting on metals) • State-level green procurement rules (USA) • Energy efficiency regulations (DOE in USA)	• Buyers may ask for Scope 3 carbon data. • Transformers must meet energy efficiency standards. • SF_6 phaseout trends in California, other states.
Australia	• Safeguard Mechanism (large emitters) • Modern Slavery Act (supply chain disclosure) • Energy efficiency import requirements	• Buyers may request carbon footprint data. • Supply chain must declare no forced labour (modern slavery).
Asia	• Japan Green Procurement Law • China Dual Carbon targets • ASEAN energy efficiency norms (Vietnam, Indonesia growing focus)	• Japan, Korea buyers may demand low-carbon transformers. • Efficiency standards tightening in ASEAN. • SF_6 scrutiny growing across Asia.
Africa	• EU Deforestation & Supply Chain Laws (if re-exporting) • Local energy efficiency programs (South Africa)	• Mostly indirect pressure via EU or global buyers. • African utilities starting to adopt eco-efficient transformers.

South America	• Energy efficiency standards • ESG reporting growing for listed companies	• If exporting to Brazil, eco-efficiency norms apply. • Carbon footprint reporting starting to influence procurement.

EU Eco-design Directive (EN 50708 Series):

- EN 50708 is the European harmonized standard series that specifies eco-design, efficiency, and performance requirements for transformers in line with the EU Eco-Design Regulation (EU) 2019/1783.
- This series essentially replaces the older EN 50588 series and supports compliance with EU Regulation 2019/1783, which is legally binding in all EU countries.
- This is crucial for transformer manufacturers. It focuses on energy efficiency, setting minimum requirements for losses in different transformers. Compliance is mandatory for selling transformers within the EU.
- This directly relates to the "E" in ESG, focusing on the environmental impact of energy consumption.
- Breakdown of the EN 50708 Series:

Standard Number	Title / Scope
EN 50708-1-1:2020	General requirements for eco-design of power transformers
EN 50708-1-2:2020	Transformers with rated power ≤ 3150 kVA (distribution transformers)
EN 50708-1-3:2020	Transformers with rated power > 3150 kVA (large power transformers)
EN 50708-2-x series	Specific requirements by technology (liquid-filled, dry-type) and voltage class

Table 6: Breakdown of the EN 50708 Series

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals):

- REACH is the European Union's (EU) regulation (EC No 1907/2006) on Registration, Evaluation, Authorisation, and Restriction of Chemicals. It aims to protect human health and the environment from the risks posed by chemicals, while also fostering innovation and competitiveness within the EU's chemical industry. REACH places responsibility on industry to manage the risks associated with chemicals and provide safety information.
- This regulation concerns the safe use of chemicals. Transformer manufacturers must ensure their products and manufacturing processes comply with REACH restrictions, particularly regarding substances of very high concern (SVHCs).
- This addresses both "E" (environmental) and "S" (social, in terms of human health) aspects.
- Scope of REACH:
    - REACH applies to all chemical substances manufactured, imported, marketed, or used within the EU, whether alone, in mixtures, or in articles.

    - This includes consumer products, industrial chemicals, and substances used in various industries.
- Impact of REACH:
    - REACH has a significant impact on businesses that manufacture, import, or use chemical substances in the EU.
    - It requires companies to take proactive measures to identify and manage the risks associated with their products.
    - REACH also fosters innovation by encouraging the development of safer and more sustainable alternatives to hazardous chemicals.

RoHS (Restriction of Hazardous Substances):

- RoHS, or the Restriction of Hazardous Substances Directive, is a European Union (EU) directive that restricts the use of certain hazardous substances in electrical and electronic equipment (EEE).
- This directive, originally implemented in 2002 and updated in 2006, aims to reduce the environmental and health risks associated with electronic waste. It achieves this by limiting the concentration of specific substances in materials used in the manufacturing of EEE.
- This is a key "E" factor, aimed at reducing environmental pollution.
- Purpose: To protect human health and the environment by reducing the use of hazardous substances in EEE, thus improving the recyclability of electronic waste.
- Scope: Applies to a wide range of EEE, including appliances, gadgets, and industrial equipment.
- Restricted Substances: The directive restricts the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs). It also includes four phthalates (DEHP, BBP, DBP, DIBP).

Figure 10: RoHS Restricted Substances

- Compliance: Manufacturers must ensure their products comply with RoHS regulations, meaning they cannot exceed the maximum permitted concentrations of the restricted substances. This requires thorough material assessment and design modifications to avoid using banned substances.
- Global Impact: While originating in the EU, RoHS-like regulations are now adopted in many countries, including the UAE, China, Japan, South Korea, India, and some U.S. states like California.

- RoHS in India: While RoHS originated in the EU, India has also implemented similar regulations to address the growing problem of electronic waste. The Ministry of Environment and Forest (MoEF) and the Government of India have implemented the Restriction of Hazardous Substance directive in India, which is also known as electronic waste.
- In essence, RoHS is a crucial initiative for promoting environmental sustainability in the electronics industry by reducing the use of harmful substances and improving the manageability of electronic waste.

Corporate Sustainability Reporting Directive (CSRD):

- While primarily aimed at companies operating within the EU, the CSRD increasingly impacts non-EU companies that supply to the European market. It mandates detailed reporting on ESG performance.
- This covers all aspects of ESG, requiring companies to disclose their environmental, social, and governance impacts.
- In 26th Feb 2025 the European Commission has adopted a package of proposals called as **"Omnibus Packages"** to reduce reporting burdens and compliance costs on companies, particularly SMEs, while maintaining ESG objectives of the Green Deal and Sustainable Finance Action Plan.
- The revised CSRD applicability and timeline are updated based on Omnibus Packages Proposal amendment in the below table 7.

Sl.No	Companies	Applicability/Criteria	Implementation Timeline
1	Companies Under NFRD or Large Public Interest Companies)	• Publicly listed, employ more than 500 employees (**Now Revised to >1000 employees**). • Total Assets > €25 million, or net turnover > €50 million.	• From January 1, 2024 • First report due in 2025
2	Large Companies (Non-NFRD)	Meet at least two of the following: • Total Assets > €25 million • Net turnover > €50 million • Employee count > 250	• From January 1, 2025 (**Now Revised to 2027**) • First report due in 2026 (**Revised to 2028**)
3	Listed SMEs	Listed on EU markets, and meet two or more of: • More than 50 employees • Total Assets > €5 million • Net turnover > €10 million	• From January 1, 2026 (**Now Revised to 2028**) • First report due in 2027 (**Revised to 2030**) • Optional two-year opt-out with an explanatory statement

4	Non-EU Companies	Non-EU companies with a significant EU presence, either through meeting any of the criteria above, or: • A net turnover > €150 million (**Now Revised to > €450 million**) in the EU for two consecutive years, and fulfils any of the following: ▪ At least one subsidiary in the EU considered a "large company" ▪ At least one listed subsidiary on an EU market ▪ Has an EU branch with net turnover > €40 million	• From January 1, 2028 • First report due in 2029

Table 7: CSRD Applicability and Timeline

Carbon Border Adjustment Mechanism (CBAM):

- The Carbon Border Adjustment Mechanism (CBAM) is the EU's policy to ensure imported goods face the same carbon costs as domestically produced goods, aiming to prevent carbon leakage and encourage cleaner industrial production in non-EU countries. It works by imposing a charge on the embedded carbon content of imports equivalent to the charge on domestic goods under the EU Emissions Trading System (ETS).
- This is a large "E" factor, that will increasingly affect trade with the EU.
- Goal: The primary aim of CBAM is to prevent "carbon leakage," where EU companies relocate carbon-intensive production to countries with less stringent climate policies to avoid carbon costs. By ensuring imported goods have a carbon price, CBAM levels the playing field between EU and non-EU producers.
- Mechanism: CBAM works by requiring importers to:
  - Declare the quantity of goods imported into the EU.
  - Declare the embedded Greenhouse Gas (GHG) emissions of those goods.
  - Surrender a corresponding number of CBAM certificates.
- Scope: Initially, CBAM focuses on high-emitting sectors like cement, electricity, fertilizers, aluminum, iron, steel, and hydrogen, along with some upstream and downstream products. The scope is planned to expand gradually to include other sectors, including chemicals and polymers, by 2030.
- Implementation: CBAM has a transitional phase (2023-2025) where importers are required to submit quarterly reports on imported goods, embedded emissions, and any carbon price paid in the country of origin. A definitive regime, where importers will be required to purchase CBAM certificates, will be implemented starting in 2026.
- Alignment with WTO: The CBAM is designed to be compatible with World Trade Organization (WTO) rules.

- Incentives: By ensuring a carbon price for imported goods, CBAM encourages non-EU countries to adopt cleaner production methods and decarbonize their industries.
- Carbon Pricing: The CBAM price is linked to the EU ETS carbon price, ensuring that imported goods pay a carbon price equivalent to that of domestic production.
- Reporting and Registry: Importers need to register in the CBAM Transitional Registry to facilitate reporting and communication between the EU Commission, customs authorities, and traders.

Corporate Sustainability Due Diligence Directive (CSDDD):

- The Corporate Sustainability Due Diligence Directive (CSDDD) is an EU law requiring companies to actively manage and address human rights and environmental risks within their operations and supply chains. It mandates companies to identify, prevent, mitigate, and account for adverse impacts, including those from their own activities, subsidiaries, and business partners. The CSDDD aims to create a more sustainable global economy by holding companies accountable for their impact.
- This affects the "S" and "E" factors of ESG.
- Scope: The directive applies to large companies with a specified number of employees and turnover, both in the EU and non-EU countries operating within the EU.
- Due Diligence Process: Companies are required to integrate due diligence into their policies and management systems, identify and assess adverse human rights and environmental impacts, prevent and cease actual and potential adverse impacts, and monitor and communicate their due diligence practices.
- Focus on Supply Chain: The CSDDD extends due diligence obligations to companies' value chains, including suppliers and other business partners.
- Transparency: Companies are required to publicly report on their sustainability performance, including their due diligence efforts and measures taken to address adverse impacts.
- Accountability: The directive provides mechanisms for holding companies accountable for non-compliance, including potential administrative penalties and the ability for victims to seek redress.
- Enforcement: National supervisory authorities will be responsible for enforcing the CSDDD and investigating substantiated concerns about non-compliance.
- Enhanced Trust: Effective due diligence practices demonstrate a company's commitment to sustainability and builds trust with stakeholders.
- Reduced Risk: Identifying and addressing adverse impacts proactively helps companies avoid reputational damage, legal liabilities, and financial losses.
- Increased Sustainability: The CSDDD promotes a more sustainable business model by encouraging companies to prioritize human rights and environmental protection alongside profits.
- Implementation and Timing: The CSDDD entered into force on July 25, 2024, and EU member states are required to transpose it into national law by July 2026 now it is **revised to July 2027** and first wave company compliance

start from July 2028 (EU Companies >= 5000 staff, >= €1.5B global turnover | Non-EU Companies:>= 5000 staff, >= €1.5B in EU).

- The directive's provisions will be phased in, with different deadlines for different categories of companies.

1.3 Sustainability & Energy Related Framework & Standards

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 organizations' 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:

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
	ISO 14068-1:2023	An internationally recognized voluntary standard for carbon neutrality, ISO 14068-1:2023 replaced PAS 2060 and provides requirements through which companies can demonstrate and certify achievement of carbon neutrality.
	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 recognized 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 standardization 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 organization has a strategy aligned with the decarbonization trajectories of its sector

Figure 11: Energy & Emission related Standards

Sustainability	Environment, Social and Governance	SDG	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 recognized and comprehensive framework for sustainability reporting, with standards covering economic, environmental, and social topics, providing requirements, recommendations, and guidance for disclosures
	Investor-led	ISSB Standards	A set of recommendations to assist companies in better accounting for climate-related risks in their financial and mainstream disclosures. In 2023, the ISSB published two standards to facilitate the risks & opportunities reporting of any company's value chain.
		TNFD	Global science-based initiative that develops and delivers risk management and disclosure frameworks for organizations to report and act on evolving nature-related issues
		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	As of 2025, the EU's CSRD is set to gradually extend ESG reporting to thousands of large companies, though proposed threshold changes may reduce the total number from the originally planned 50,000.
		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 in United Kingdom.

Figure 12: Sustainability related framework

1.4 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 8: 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 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. However, it will soon be replaced by newly developed UK Sustainability Reporting Standards (UK SRS) which is based on ISSB Standard.
Canada	Federal climate-related financial disclosure requirements for large corporations. As of 2025, 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. • Canadian Sustainability Standards Board (CSSB) has published voluntary sustainability reporting standards — the Canadian Sustainability Disclosure Standards (CSDS) - in December 2024. This standard is built upon ISSB Standard which will replace TCFD. • The government also aims to integrate climate disclosures in investment and pension fund management.
Australia	Australia has adopted mandatory climate-related financial disclosures for large, medium and small sized companies starting from 1st January 2025.	• Entities in scope are required to lodge a 'sustainability report' containing climate-related disclosures prepared in accordance with Australian Sustainability Reporting Standards (ASRS), which have been issued by the Australian Accounting Standards Board (AASB) • It 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 Aotearoa New Zealand's Climate Standards. • 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 SSBJ standards for large companies	• The Tokyo Stock Exchange encourages listed companies to disclose climate-related risks in line with TCFD. • The Sustainability Standards Board of Japan (SSBJ) has also issued its three sustainability disclosure standards (SSBJ standards) on 5th March 2025. The standards are aligned with the ISSB standards with some jurisdiction-specific alternatives. • Following the issuance of the SSBJ Standards, Prime-listed companies are given two years of voluntary compliance period before such rules become mandatory as early as March 2027. • 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. • They are also developing "Sustainability Disclosure Standards for Business Enterprises", a national unified sustainability disclosure standards that reflect the beneficial experience of ISSB Standards. • A growing number of Chinese companies are voluntarily adopting GRI and ISSB 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 45% by 2030.

1.5 ESG – To Build a Sustainable Business

Environmental, Social, and Governance (ESG) factors have become a crucial consideration for investors worldwide. Companies that integrate ESG principles into their operations attract capital by demonstrating sustainability, ethical business practices, and effective risk management.

1.5.1 ESG as a Risk Mitigation Tool

Companies with strong ESG policies:

- Manage climate-related and regulatory risks more effectively.
- Reduce exposure to fines, lawsuits, and reputational damage.
- Foster ethical governance, minimizing corruption and fraud risks.
- Strengthen supply chain resilience, reducing operational disruptions.

1.5.2 Enhanced Financial Performance & Competitive Advantage

Numerous studies indicate that ESG-compliant companies achieve superior long-term financial performance.

Benefits include:

- Improved operational efficiency, leading to cost savings in energy, waste management, and resource utilization.
- Higher revenue growth due to increased customer trust and loyalty.
- Better valuation multiples and lower capital costs compared to non-ESG firms.
- Outperformance in economic downturns, as observed during the COVID-19 crisis.

1.5.3 Growing ESG Investment Opportunities

The ESG investment landscape is rapidly expanding, with sustainable assets under management (AUM) exceeding **$40 trillion globally**.

Investment opportunities include:

- ESG Exchange-Traded Funds (ETFs) and Mutual Funds.
- Green bonds and sustainability-linked loans.
- Inclusion in ESG indices such as the MSCI ESG Index and Dow Jones Sustainability Index**.**

1.5.4 Regulatory & Compliance Advantages

Governments and regulatory bodies worldwide are implementing stringent ESG reporting requirements, such as:

- EU Taxonomy and Sustainable Finance Disclosure Regulation (SFDR) in Europe.
- Task Force on Climate-related Financial Disclosures (TCFD) framework.
- Business Responsibility and Sustainability Reporting (BRSR) by SEBI in India. Companies that proactively adopt ESG frameworks position themselves ahead of compliance requirements, avoiding legal and financial penalties.

1.5.5 Meeting Investor Demand & Fiduciary Responsibility

Institutional investors, including pension funds and sovereign wealth funds, are shifting capital toward ESG-focused investments.

This shift is driven by:

- Increased investor demand for sustainable investment options.
- ESG integration as part of fiduciary duty to ensure long-term value creation.
- Greater alignment between investment strategies and global sustainability goals.

1.5.6 Resilience in Market Downturns

Empirical evidence suggests that ESG-focused companies demonstrate stronger resilience during economic downturns by:

- Prioritizing employee well-being and corporate social responsibility.

- Strengthening supply chain ethics and risk management.
- Attracting long-term investors who value stability over short-term gains.

1.5.7 Improved Brand Reputation & Customer Loyalty

Consumers are increasingly favouring brands with strong sustainability commitments. ESG-focused companies:

- Build brand loyalty and trust, reducing customer acquisition costs.
- Enhance their corporate reputation, attracting ethical investors.
- Differentiate themselves from competitors in a saturated market.

1.5.8 Stronger Human Capital & Innovation

ESG-aligned companies attract and retain top talent, leading to:

- Higher employee engagement and productivity.
- A culture of innovation that fosters breakthrough technologies (e.g., renewable energy, circular economy solutions).
- Improved diversity and inclusion, which correlates with better financial performance.

Companies that adopt ESG frameworks gain a competitive advantage by

1. Attracting long-term investors.
2. Reducing financial and operational risks.
3. Aligning with regulatory expectations and global sustainability goals.
4. Enhancing their brand reputation and financial performance.

2. THREE DECADES OF SSEL

Shirdi Sai Electricals Limited is founded by Mr. N. Visweswara Reddy in 1994. Under his guidance, a small team strived relentless days and nights to make sure that farmers had access to good electrical transformers, which led to lower power outages due to transformer failure.

Over time, this small repair unit evolved into a large, integrated energy-solutions company with diversified capabilities. At its core, the SSEL Group is dedicated to delivering smart, sustainable, and efficient solutions for the power sector, and has grown to become India's largest manufacturer of distribution transformers. The organization expanded from repairing transformers to manufacturing a full portfolio of highly energy-efficient units ranging from 5 kVA to 500 MVA in the 400 kV class, along with reactors up to 125 MVAr, positioning itself as a comprehensive one-stop provider for transmission and distribution needs. Supported by modern production facilities and strong backward-integrated component manufacturing, the Group further diversified into EPC services, conductors and alloys, and renewable-energy projects. With continuous capacity additions, enhanced technical expertise, and a growing presence across India and global markets, Shirdi Sai Electricals has matured into a significant industry player known for reliability, scale, and engineering excellence.

SSEL's customer portfolio spans major state power utilities, including DISCOMs across Andhra Pradesh, Telangana, Kerala, and Gujarat, as well as leading private-sector energy developers and infrastructure groups engaged in renewable power and transmission. The company also exports its products to more than 40 countries, including the USA, UK, Australia, Poland, and Finland. Company has a niche specialization in Peterson Coil Transformers and Shunt Reactors for distribution transformers. In addition, the organization offers customized transformer-design solutions tailored to customer needs.

The company's R&D and engineering efforts include development of Delta Core Transformers, Shunt Reactors, and Peterson-coil-based transformer technologies, ensuring alignment with evolving grid needs. All testing laboratories are calibrated by NABL in accordance with ISO 17025, enabling a consistent and traceable quality-assurance process. Manufacturing and testing operations comply with major national and international standards, including IS, ANSI, British Standards, IEC, and NBR (Brazil). The company's key innovation and sustainability focus are the advancement of amorphous-core and delta-core transformer technologies, which significantly improve energy efficiency and reduce losses.

SSEL is a two-time recipient of "**National Energy Conservation Award**" for achievement in energy conservation, conferred by Government of India, for manufacture of BEE star labelled Distribution Transformers.

SSEL has also been Recognized as one of the **Most Trusted Brands of India 2023** (3rd Edition).

Behind these recent awards is a three decades long history of dedication, perseverance passion and hard work – aptly captured by the timeline below.

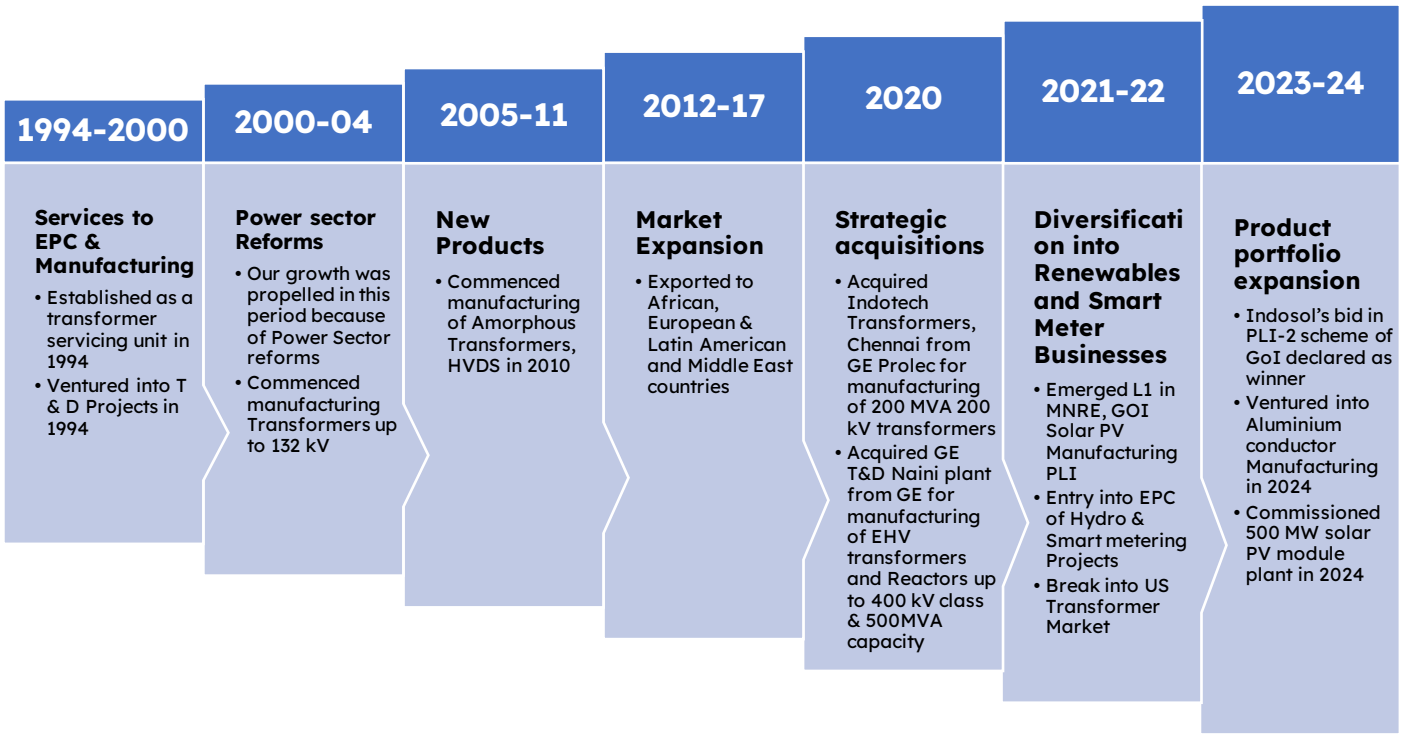


Figure 13: Evolution of SSEL

Group Vision

To build a sustainable organization with competency to cater to the emerging needs of Energy sector. We are focused on product and process innovation to comply with and exceed the expectations of clients on sustainable basis.

The demand for energy is set to augment exponentially, supporting the world's economic investment into the future. With wide-ranging experience and expertise, SSEL provides extremely effective solutions that cater to a meticulous ecosystem of energy sector. Our pursuit of excellence, while delivering the best quality output has empowered us to become leading players in the electrical industry Pan India.

Group's Mission

We are focused on product and process innovation to meet customers expectation on sustainable basis :-

- Leveraging our competence, experience and expertise for safer, reliable and cost effective solutions
- Investing in People, Technology and Processes - Lead by action on social responsibility

2.1 SSEL Group Business Verticals

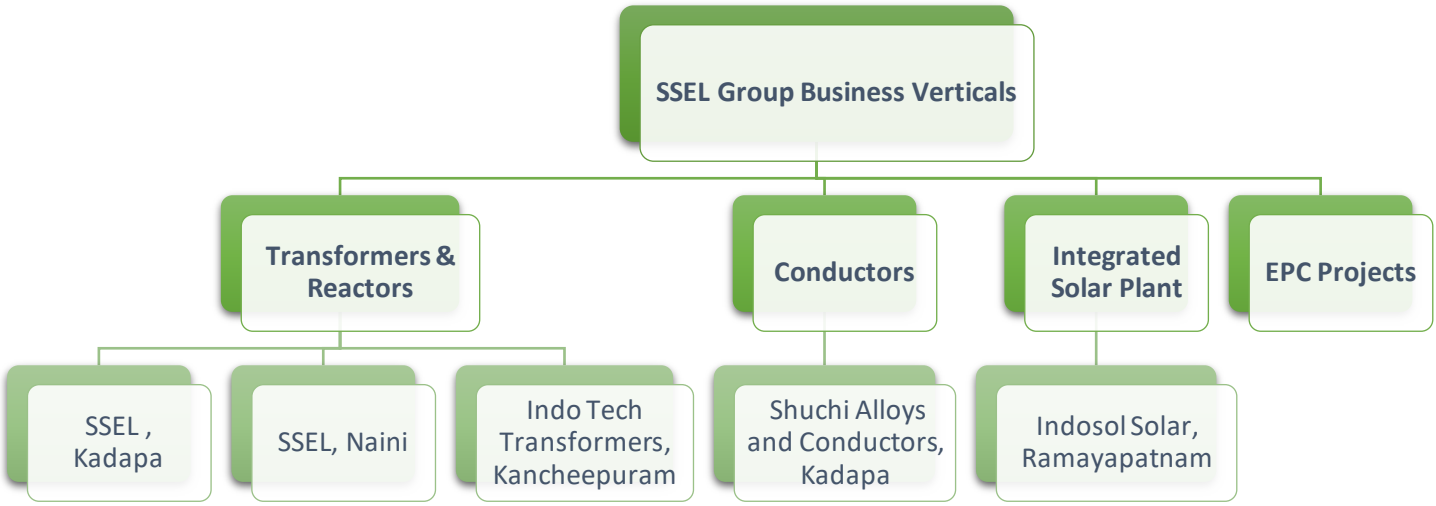


Figure 14: SSEL Group Business Verticals

2.2 A Brief Introduction to SSEL Kadapa Manufacturing Facility.

The primary manufacturing facility of SSEL is located in Kadapa, Andhra Pradesh, serving as the backbone of the company's transformer production. The plant has a capacity of 10,000 MVA, with an additional 4,000 MVA under expansion. It produces Distribution and Medium Voltage Transformers with CRGO and Amorphous Cores, up to 25 MVA and 66 kV class. It is Asia's largest manufacturer of Energy-Efficient Amorphous Transformers.

Figure 15: Transformer Manufactured at SSEL Kadapa Facility.

The facility is equipped with advanced testing laboratories, automated winding machines, and vacuum drying ovens, ensuring high efficiency and durability of the transformers. Most of the manufacturing processes are highly automated, utilizing cutting-edge technology such as CNC machines, robotic welding and cutting, automated corrugation lines, and semi-automated winding machines.

Transformer Manufacturing Process:

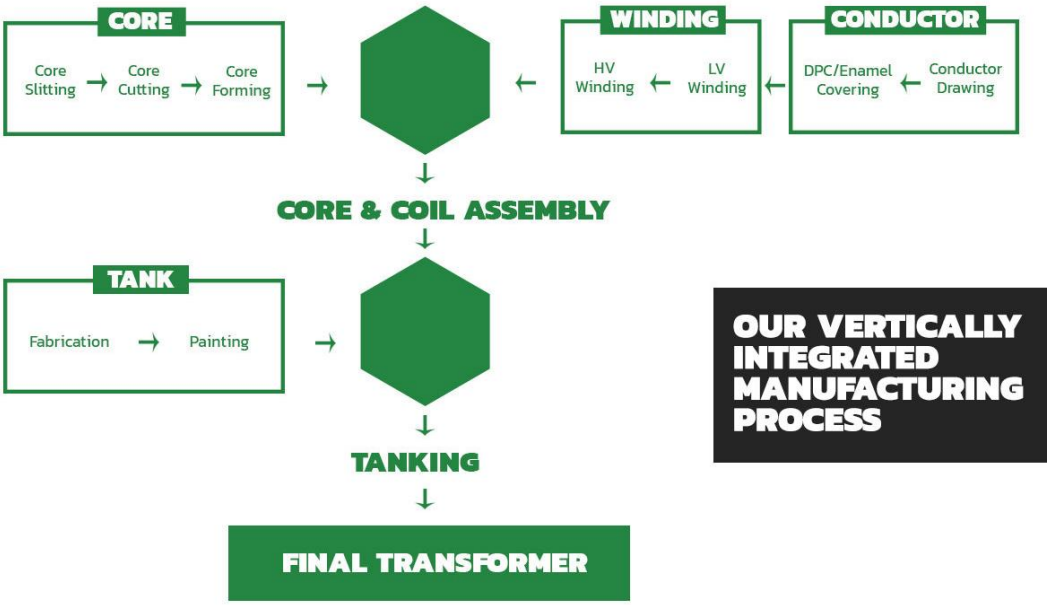


Figure 16: Transformer Manufacturing Process

Products offered:

1. Distribution and Medium Voltage Transformers with CRGO and Amorphous Cores (up to 25 MVA, 66 kV Class)
2. Oil filled Transformers:
    a) Distribution Transformers (Pole & Ground Mounted)
        - Single Phase Transformers upto 33 kV
        - Three Phase Transformers upto 33 kV
    b) Power Transformers
        - Single Phase Transformers till 3333 kVA, 66 kV Class
        - Three Phase Transformers till 25MVA, 132 kV Class
    c) Pad Mount Transformers till 5 MVA, 34.5 kV Class
    d) Inverter Duty Transformers for Solar Applications
    e) Wind Turbine Generator Transformers.

3. SSEL Kadapa also produces energy efficient Amorphous Core Distribution Transformers. Amorphous Metal Distribution Transformer (AMDT) technology meets energy efficiency norms of several counties such as BEE in India, DOE of USA and MEPS of Australia.

Key Features of SSEL, Kadapa:

a) ISO 9001, ISO 14001, & ISO 45001 Certified Facility.
b) And FY23-24 added ISO 14064 also.
c) A fully automated, vertically integrated facility with dedicated units for conductor drawing and transformer tank fabrication ensures enhanced efficiency, precision, and seamless production through advanced robotics and real-time monitoring systems.
d) Facility approved with elite clientele of Power Grid Corporation of India, Engineers India Limited, State Power Utilities.
e) SSEL has a 30-year legacy and now exports products to over 40 countries, including the USA, UK, Australia, Poland, and Finland.

f) Over 700,000 units of transformers are installed across various locations Pan India and globally, which are offered from the Kadapa Unit.
g) All Testing labs are ISO 17025 certified (NABL Accredited)
h) 188 Designs Type Tested, 157 Designs Short Circuit Tested and 3 Designs Type Tested and Short Circuit tested at KEMA (CESI).
i) 264 Types (Classification based on Core/Conductor Material, Sealed/Conservator & Energy Efficiency) of BIS Certified Transformers (Entire range of BIS for 11 KV Class and upto 200 kVA for 33 KV Class)

Figure 17: SSEL Kadapa

2.3 A Brief Introduction to SSEL Naini Manufacturing Facility.

SSEL Naini focuses on manufacturing power transformers and supports the company's expansion into North India. The plant is designed to cater to the increasing demand for power distribution projects in Uttar Pradesh and neighboring states as well as the global demand.

Figure 18: Transformer Manufactured at SSEL Naini Facility

This facility was acquired from GE T&D INDIA Ltd in 2020. It is a state-of-the-art Advanced Manufacturing facility located in Naini, Prayagraj Uttar Pradesh, spread

over 21.5 acres with an installed capacity of 17000 MVA. Within last three years of operation, SSEL Naini has achieved the following milestones

1. Successfully completed six dynamic short-circuit tests of 400 kV transformers on the first attempt.
2. Secured an order book of INR 1000 crore reflecting the trust of customers in the Naini Unit.
3. Passed audits by globally recognized customers such as Acciona, Troyer, Global Hydro, Andritz and Kiwa PI Berlin, strengthening the unit's pathway into export markets.
4. Adding Shunt Reactor to the product portfolio with technical collaboration of Royal SMIT, Netherlands.

This facility holds immense historical significance, as it was originally incorporated as The English Electric Company of India Private Limited in 1957 and was inaugurated by India's first Prime Minister, **Shri Jawaharlal Nehru**. This milestone marks its legacy as a pioneering establishment in the country's industrial and technological growth.

Products offered:

- EHV Transformers up to 500 MVA, 400 kV Class
- Shunt Reactors up to 125 MVAr, 400 kV Class
- Special Application Transformers
  - Station Transformer
  - Furnace Transformer
  - Traction Transformer
  - Regulating Transformer

Key Features of SSEL, Naini:

- ISO 9001, ISO 14001, & ISO 45001 Certified Facility.
- All Testing labs are ISO 17025 certified (NABL Accredited)
- SSEL Naini has already successfully tested 200 MVA, 400 kV Transformer for Short Circuit for a prestigious client in India.

Figure 19: SSEL Naini

3. ENVIRONMENTAL

3.1 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 20 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 21 shows the Impact from human caused climate change.

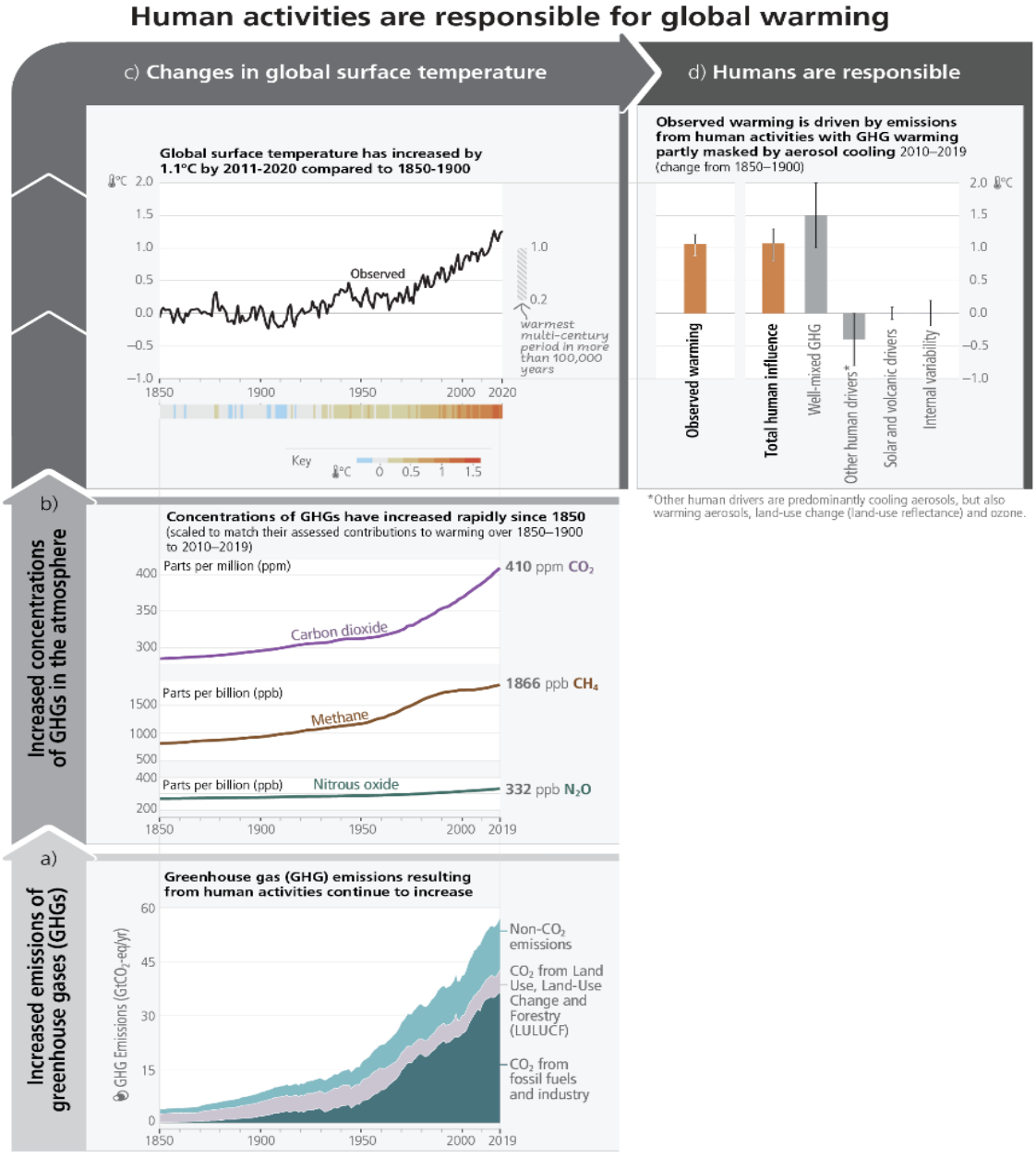


Figure 20: Human activities are responsible for global warming

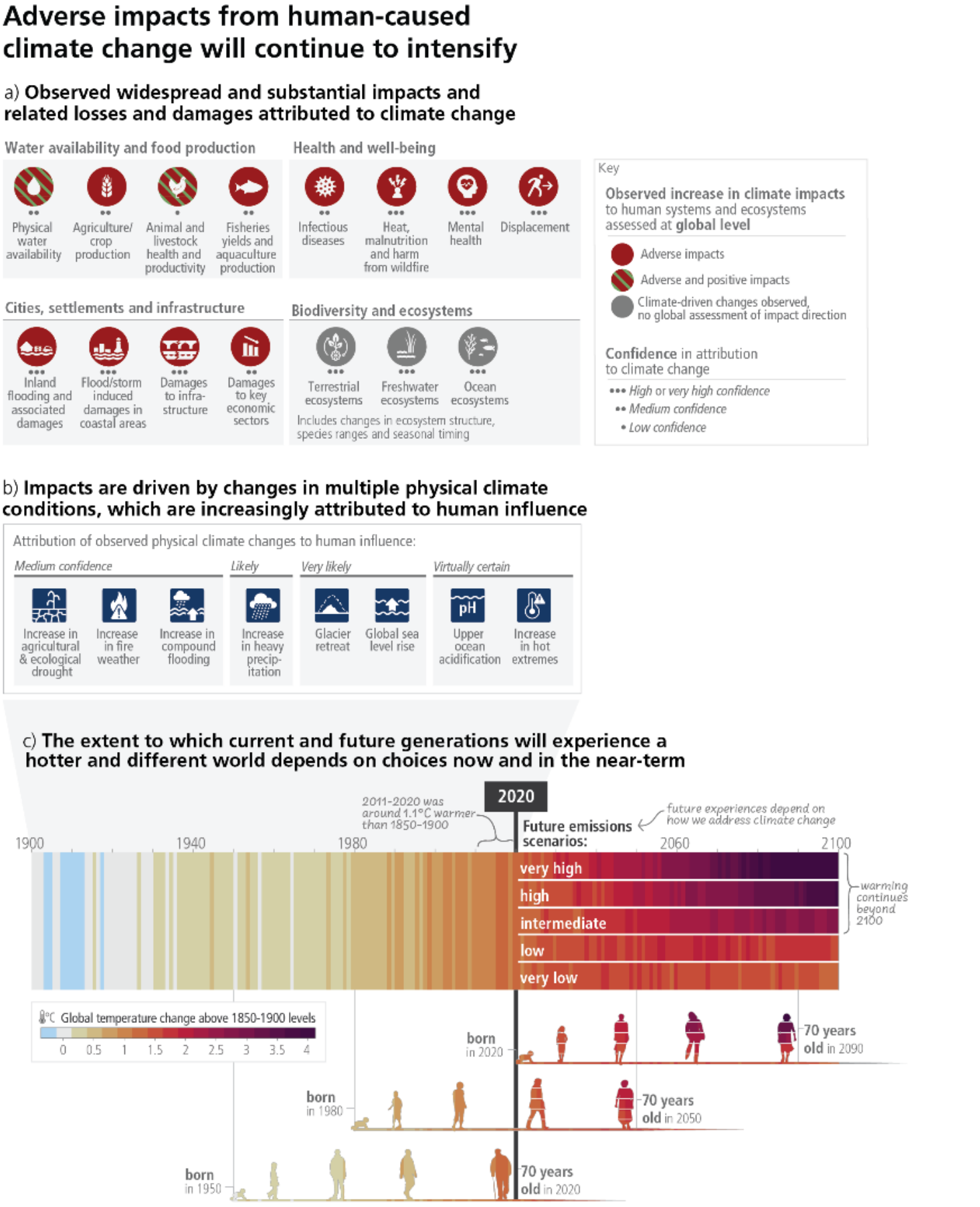


Figure 21: Impact from human caused climate change

3.2 Carbon Footprint - The Calculation of GHG Emissions

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 (SF6) and Nitrogen trifluoride (NF3).

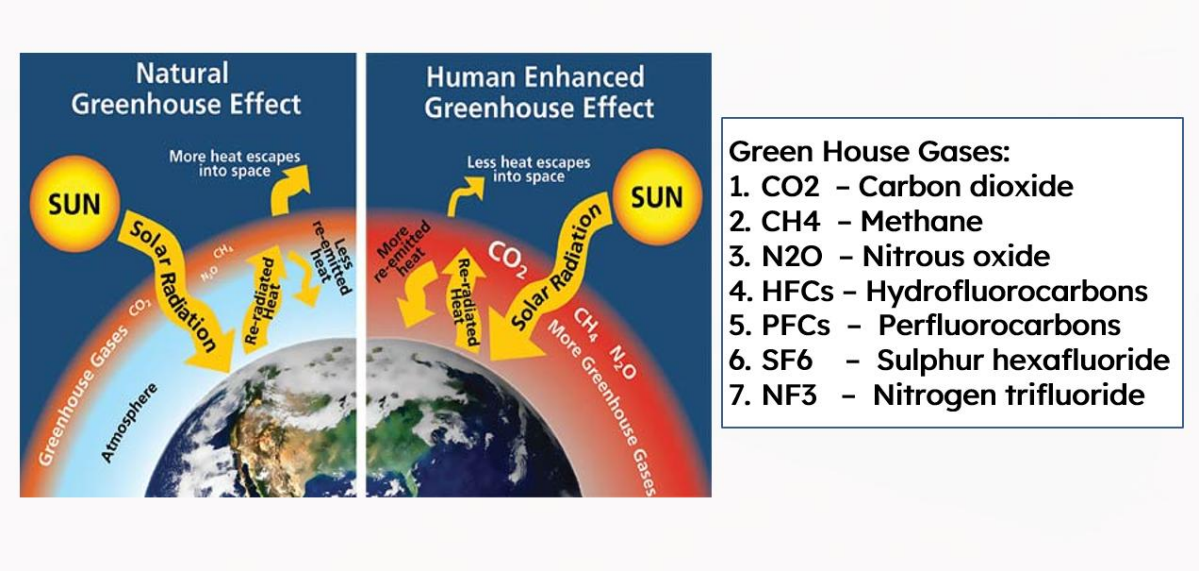


Figure 22: Greenhouse Gases and its Effect

3.2.1 Carbon Footprint Calculation as per GHG Protocol

The Standard used for calculations of Carbon Footprint is GHG Protocol - Corporate Accounting and Reporting Standard.

By following the GHG Accounting and Reporting Principle we ensure:

- **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.

Definition of Scope 1,2 & 3 of GHG Emissions:

As per GHG Protocol the GHG emissions are classified into two types (Direct emissions & Indirect emissions) and three Scopes (Scope 1, Scope 2 & Scope 3).

Emissions type	*Scope*	*Definition*	*Examples*
Direct emissions	Scope 1	Emissions from operations that are owned or controlled by the reporting company	Emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment
Indirect emissions	Scope 2	Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company	Use of purchased electricity, steam, heating, or cooling
	Scope 3	All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions	Production of purchased products, transportation of purchased products, or use of sold products

Table 9: Definition of the Scopes

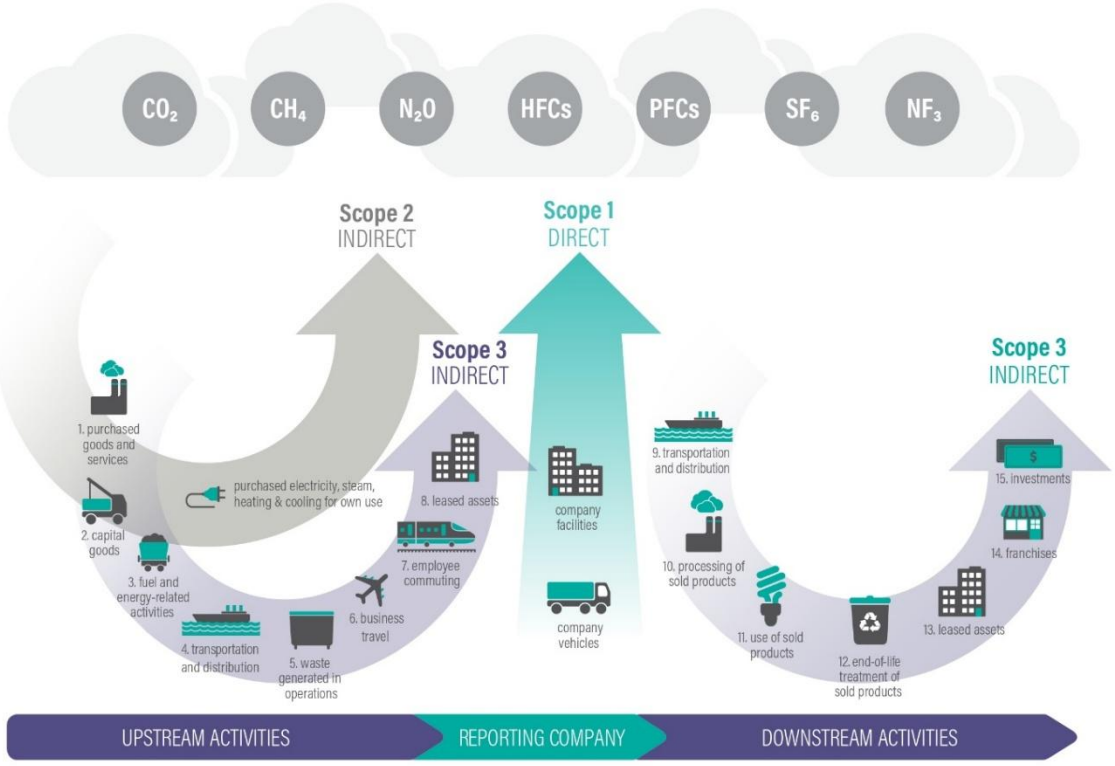


Figure 23: Overview of the Scopes

Scope 3 Emissions: Scope 3 Emissions are further classified into two category which is Upstream Scope 3 Emissions and Downstream Scope 3 Emissions.

Table 10: Upstream Scope 3 Emissions

Upstream scope 3 emissions

Category	Category description	Minimum boundary
1. Purchased goods and services	• Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Categories 2 - 8	• All upstream (cradle-to-gate) emissions of purchased goods and services
2. Capital goods	• Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year	• All upstream (cradle-to-gate) emissions of purchased capital goods
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)	• Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, not already accounted for in scope 1 or scope 2, including: **a.** Upstream emissions of purchased fuels (extraction, production, and transportation of fuels consumed by the reporting company) **b.** Upstream emissions of purchased electricity (extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling consumed by the reporting company) **c.** Transmission and distribution (T&D) losses (generation of electricity, steam, heating and cooling that is consumed (i.e., lost) in a T&D system) – reported by end user **d.** Generation of purchased electricity that is sold to end users (generation of electricity, steam, heating, and cooling that is purchased by the reporting company and sold to end users) – reported by utility company or energy retailer only	**a.** For upstream emissions of purchased fuels: All upstream (cradle-to-gate) emissions of purchased fuels (from raw material extraction up to the point of, but excluding combustion) **b.** For upstream emissions of purchased electricity: All upstream (cradle-to-gate) emissions of purchased fuels (from raw material extraction up to the point of, but excluding, combustion by a power generator) **c.** For T&D losses: All upstream (cradle-to-gate) emissions of energy consumed in a T&D system, including emissions from combustion **d.** For generation of purchased electricity that is sold to end users: Emissions from the generation of purchased energy

Upstream scope 3 emissions

Category	*Category description*	*Minimum boundary*
4. Upstream transportation and distribution	• Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) • Transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company)	• The scope 1 and scope 2 emissions of transportation and distribution providers that occur during use of vehicles and facilities (e.g., from energy use) • *Optional:* The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure
5. Waste generated in operations	• Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company)	• The scope 1 and scope 2 emissions of waste management suppliers that occur during disposal or treatment • *Optional:* Emissions from transportation of waste
6. Business travel	• Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)	• The scope 1 and scope 2 emissions of transportation carriers that occur during use of vehicles (e.g., from energy use) • *Optional:* The life cycle emissions associated with manufacturing vehicles or infrastructure
7. Employee commuting	• Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)	• The scope 1 and scope 2 emissions of employees and transportation providers that occur during use of vehicles (e.g., from energy use) • *Optional:* Emissions from employee teleworking
8. Upstream leased assets	• Operation of assets leased by the reporting company (lessee) in the reporting year and not included in scope 1 and scope 2 – reported by lessee	• The scope 1 and scope 2 emissions of lessors that occur during the reporting company's operation of leased assets (e.g., from energy use) • *Optional:* The life cycle emissions associated with manufacturing or constructing leased assets

Table 11: Downstream Scope 3 Emissions

Downtream scope 3 emissions

Category	*Category description*	*Minimum boundary*
9. Downstream transportation and distribution	• Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)	• The scope 1 and scope 2 emissions of transportation providers, distributors, and retailers that occur during use of vehicles and facilities (e.g., from energy use) • *Optional:* The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure
10. Processing of sold products	• Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)	• The scope 1 and scope 2 emissions of downstream companies that occur during processing (e.g., from energy use)
11. Use of sold products	• End use of goods and services sold by the reporting company in the reporting year	• The direct use-phase emissions of sold products over their expected lifetime (i.e., the scope 1 and scope 2 emissions of end users that occur from the use of: products that directly consume energy (fuels or electricity) during use; fuels and feedstocks; and GHGs and products that contain or form GHGs that are emitted during use) • *Optional:* The indirect use-phase emissions of sold products over their expected lifetime (i.e., emissions from the use of products that indirectly consume energy (fuels or electricity) during use)
12. End-of-life treatment of sold products	• Waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life	• The scope 1 and scope 2 emissions of waste management companies that occur during disposal or treatment of sold products
13. Downstream leased assets	• Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in scope 1 and scope 2 – reported by lessor	• The scope 1 and scope 2 emissions of lessees that occur during operation of leased assets (e.g., from energy use). • *Optional:* The life cycle emissions associated with manufacturing or constructing leased assets

Downtrream scope 3 emissions

Category	Category description	Minimum boundary
14. Franchises	• Operation of franchises in the reporting year, not included in scope 1 and scope 2 – reported by franchisor	• The scope 1 and scope 2 emissions of franchisees that occur during operation of franchises (e.g., from energy use) • *Optional:* The life cycle emissions associated with manufacturing or constructing franchises
15. Investments	• Operation of investments (including equity and debt investments and project finance) in the reporting year, not included in scope 1 or scope 2	• See the description of category 15 (Investments) in section 5.5 for the required and optional boundaries

3.2.2 Methodology Used for Calculation of Carbon Footprint

1. **Organization Boundary:**
   - Approach used: Operational Control Approach
   - Boundary:
     i. SSEL Corporate Office, Begumpet, Hyderabad, Telangana
     ii. SSEL Unit 1 Kadapa, Andhra Pradesh
     iii. SSEL Unit 2&3 Kadapa, Andhra Pradesh
     iv. SSEL Unit 4 Kadapa, Andhra Pradesh
     v. SSEL Naini, Uttar Pradesh
2. **Operational Boundary:**

SSEL Group Companies Carbon Footprint Operational Boundaries						
Sl. No	Description	Site Name				
		SSEL, Corporate Office	SSEL-Unit 1, Kadapa	SSEL-Unit 2 & 3, Kadapa	SSEL-Unit 4, Kadapa	SSEL, Naini
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	✗	✗	✗	✗	✓
11	Fuel used in other process	✗	✗	✗	✗	✗
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 12 : Operational Boundary

3. Reason for Exclusion in Scope 3 Categories at SSEL:

a. Not applicable: Categories 8, 13, 14 & 15.
b. Since we are disclosing Scope 3 voluntarily, we have initially taken only six categories (3, 4, 5, 6, 7, & 9) so, we excluded the remaining five categories (1,2,10,11 & 12)

4. Identify GHG emissions sources:

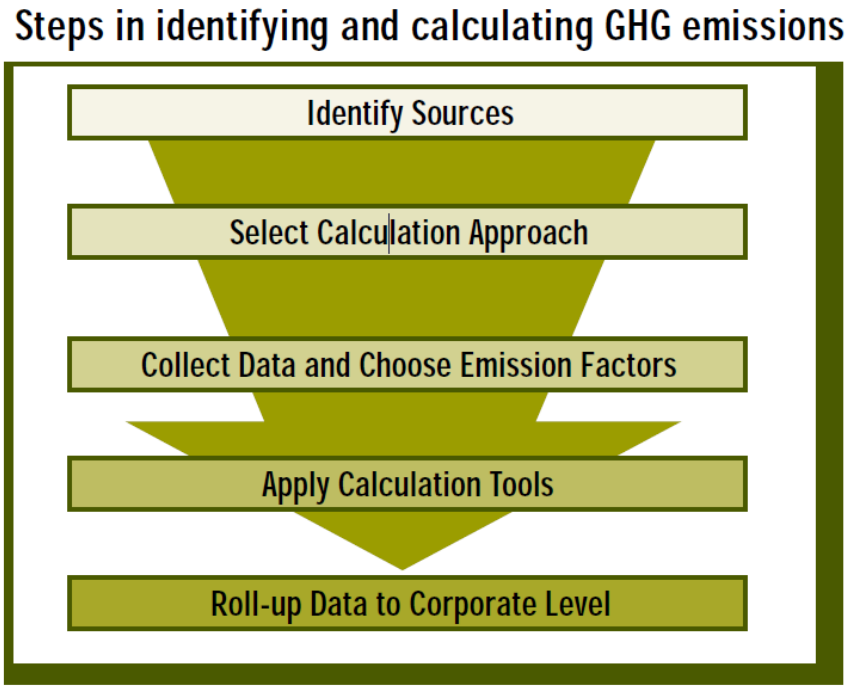


Figure 24: Approach to Calculate GHG Emissions

5. Calculation method used in Scope 3:

Scope 3 Categories	**Calculation Method Used**
Category 3: Fuel & Energy related activities	Average-data Method
Category 4: Upstream Transportation and Distribution	Distance-based Method
Category 5: Waste Generation in Operations	Waste-type-specific method
Category 6: Business Travel	Distance-based method
Category 7: Employee Commute	Distance-based method
Category 9: Downstream Transportation and Distribution	Distance-based method

Table 13: Calculation method used in Scope 3

6. Activity Data Collected:

Scope 1 & 2:

Scope 1 & 2 Activity Data – FY23-24 (Baseline Year)							
S.No	**Emission Source**	**UOM**	**SSEL Corporate office**	**SSEL Kadapa Unit 1**	**SSEL Kadapa Unit 2 & 3**	**SSEL Kadapa Unit 4**	**SSEL Naini**
Scope 1							
1	LPG (used in Brazing, Cutting)	kg	0	133	8645	0	0
2	Acetylene (used in Brazing, Cutting)	kg	0	0	921	0	55
3	Diesel used in DG sets	litres	0	0	71360	0	9910
4	Company Owned Vehicles (Fuel operated forklift, bulldozer, Fire tender, Cars, Buses, Ambulance, Excavators, any vehicles to shuttle employees)						
	Diesel (Car, buses, Ambulances)	litres	0	0	43402	0	2590
	Petrol (Car, buses, Ambulances)	litres	0	0	164	0	0
	Diesel (hydras, tractor cranes, forklifts tractors)	litres	0	0	73056	0	0
	Petrol (hydras, tractor cranes, forklifts tractors)	litres	0	0	0	0	0
5	LPG used in Canteen	kg	114	0	34010	0	0
6	Biomass used in Canteen (Wood)	kg	0	0	124670	0	0
7	Refrigerant used/refilled						
	R 22	kg	36	0	38	0	61
	R 32	kg	0	0	15	0	0
	R 410 A	kg	4	0	25	0	0
	R 134A	kg	0	0	8	0	0
8	CO_2 used for refilling into fire extinguisher	kg	0	23	248	0	45
9	Gas mixture used in welding (Argon + Carbon dioxide)	kg	0	143610	286723	0	0
10	Fuel used in Thermic Fluid heater						
	Furness Oil	litres	0	0	0	0	0
	Biomass	t	0	0	0	0	137
	HSD **(Please note the highlighted cells in FY24-25 data)**	litres	0	0	0	0	53800
Scope 2							
1	Net Power consumed from GRID	kWh	86259	143610	20646808	57760	2028945
2	Renewable energy export to GRID	kWh	0	0	149906	0	0
3	Renewable energy consumption (On Site)	kWh	0	0	1372937	0	0
4	Purchased DG Power Diesel Consumption	litres	0	0	0	0	0
5	Purchased Cooling Electricity Power Consumption	kWh	0	0	0	0	0

Table 14: Scope 1 & 2 Activity Data – FY23-24

Scope 1 & 2 Activity Data (FY24-25)							
S.No	Emission Source	UOM	SSEL Corporate office	SSEL Kadapa Unit 1	SSEL Kadapa Unit 2 & 3	SSEL Kadapa Unit 4	SSEL Naini
Scope 1							
1	LPG (used in Brazing, Cutting)	kg	0	38	8512	0	0
2	Acetylene (used in Brazing, Cutting)	kg	0	0	812	0	363
3	Diesel used in DG sets	litres	0	0	60809	0	6963
4	Company Owned Vehicles (Fuel operated forklift, bulldozer, Fire tender, Cars, Buses, Ambulance, Excavators, any vehicles to shuttle employees)						
	Diesel (Car, buses, Ambulances)	litres	0	0	84458	0	0
	Petrol (Car, buses, Ambulances)	litres	0	0	210	0	0
	Diesel (hydras, tractor cranes, forklifts tractors)	litres	0	0	65700	0	16676
	Petrol (hydras, tractor cranes, forklifts tractors)	litres	0	0	0	0	0
5	LPG used in Canteen	kg	95	0	37278	0	0
6	Biomass used in Canteen (Wood)	kg	0	0	94567	0	0
7	Refrigerant used/refilled						
	R 22	kg	32	0	25	0	32
	R 32	kg	0	0	26	0	0
	R 410 A	kg	35	0	25	0	0
	R 134A	kg	0	0	0	0	90
8	CO_2 used for refilling into fire extinguisher	kg	0	0	333	0	55
9	Gas mixture used in welding (Argon+Carbon dioxide)	kg	0	0	187987	0	0
10	Fuel used in Thermic Fluid heater						
	Furness Oil	litres	0	0	0	0	0
	Biomass	t	0	0	0	0	647.19
	HSD (HSD Replaced with biomass)	litres	0	0	0	0	0
Scope 2							
1	Net Power consumed from GRID	kWh	65234	144350	16996112	69135	3710805
2	Renewable energy export to GRID	kWh	0	0	83103	0	0
3	Renewable energy consumption (On Site)	kWh	0	0	1306265	0	0
4	Purchased DG Power Diesel Consumption	litres	0	0	0	0	0
5	Purchased Cooling Electricity Power Consumption	kWh	0	0	0	0	0

Table 15: Scope 1 & 2 Activity Data – FY 24-25

Scope 3:

Scope 3 activity data is captured in Scope 3 Questionnaire which is an exhaustive document placed in one drive for reference.

7. Emission Factors Used:

Emission Factors FY23-24 (Base Year)				
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.	Acetylene	3.38	kgCO2/kg	IPCC
5.	Biomass (Wood)	0.15	kgCO2e/kg	IPCC
6.	R- 22	1760	kg CO2e/kg	IPCC (AR5)
7.	R- 32	677	kg CO2e/kg	IPCC (AR5)
8.	R- 410	1924	kg CO2e/kg	IPCC (AR5)
9.	R-134a.	1300	kg CO2e/kg	IPCC (AR5)
10.	Grid Electricity	0.716	kg CO2e/kwh	Central Electricity Authority
11.	Petrol	2.28	kgCO2/l	IPCC
12.	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
	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 16: Emission Factors Used for FY 23-24 GHG Emission Calculations

Emission Factors (FY24-25)				
Scope 1 & 2				
S.No	**Emission Source**	**Emission Factors**	**UoM**	**Source**
1.	Diesel/HSD	2.925	kgCO2e/l	IPCC
2.	LPG Consumption	2.992	tCO2e/t	IPCC
3.	Petrol	3.143	kgCO2e/l	IPCC
4.	CNG/Natural Gas	2.303	tCO2e/t	IPCC
5.	Acetylene	2.701	kgCO2/kg	Derived
6.	Biomass (Wood- Non-CO2)	3.380	kgCO2e/kg	IPCC
7.	R- 22	0.143	kg CO2e/kg	IPCC (AR6)
8.	R- 32	1960	kg CO2e/kg	IPCC (AR6)
9.	R- 410	771	kg CO2e/kg	IPCC (AR6)
10.	R-134a	2255.5	kg CO2e/kg	IPCC (AR6)
11.	Grid Electricity 2023-24 (v20)	1530	tCO2/MWh	Central Electricity Authority of India
Scope 3				
Category	**Emission Source**	**Emission Factor**	**UOM**	**Source**
C3	Petrol	0.6066	$kgCO_2e$/Ltr	DEFRA
	Biomass	0.0304	T CO_2e/T	DEFRA
	Diesel	0.6241	$kgCO_2e$/Ltr	DEFRA
	LPG	0.3493	$kgCO_2e$/kg	DEFRA
	Acetylene	4.4334	$kgCO_2e$/kg	IPCC
	Grid electricity WTT	0.1675	TCO_2e/MWh	WRI
	Electricity T&D 2023-24	19.16%	%	India Climate & Energy Dashboard
	Grid Electricity 2023-24 (v20)	0.727	tCO2/MWh	Central Electricity Authority of India
	Refrigerant - R22	4.2600	kgCO2e/kg	MDPI
	Refrigerant - R32	10.0100	kgCO2e/kg	MDPI
	Refrigerant - R410A	10.3500	kgCO2e/kg	MDPI
	Refrigerant - R134A	10.4800	kgCO2e/kg	MDPI
C5	Copper (Recycle)	0.1800	t CO2/ts	EPA 2025
	Aluminium (Recycle)	0.0400	t CO2/ts	EPA 2025
	Food Waste (Landfill)	0.0670	t CO2/ts	EPA 2025
	Mixed Paper (Winding Core Paper) (Recycle)	0.0700	t CO2/ts	EPA 2025
	Mixed Metals (Empty Oil Barrels, MS Scrap etc.,)	0.2300	t CO2/ts	EPA 2025
	Mixed Electronics	0.0200	t CO2/ts	EPA 2025
	Corrugated Containers (Recycle)	0.1100	t CO2/ts	EPA 2025
	CRGO	0.3200	t CO2/ts	EPA 2025
	Structural Steel	0.0400	t CO2/ts	EPA 2025
	Cotton Hand Gloves (Incineration)	0.0047	t CO2/t	DEFRA 2025

	Paint Tins Waste (Incineration)	0.0047	t CO2/t	DEFRA 2025
	Rubber	0.0047	t CO2/t	DEFRA 2025
	Process Waste, Residues and sludge (Landfill)	0.5205	t CO2/t	DEFRA 2025
	Used/Spent Oil (Recycle)	0.0047	t CO2/t	DEFRA 2025
	Repair job - used / Spent oil	0.0047	t CO2/t	DEFRA 2025
	Waste & Residues containing oil	0.0047	t CO2/t	DEFRA 2025
	Spent Solvent	0.0047	t CO2/t	DEFRA 2025
	General Waste	0.0047	t CO2/t	DEFRA 2025
	Wood	0.0047	t CO2/t	DEFRA 2025
	Discarded container	0.0047	t CO2/t	DEFRA 2025
C6	Air	Default	kg CO2/pax-km	ICAO Tool
	Rail	0.0078	kg CO2e/pax-km	India GHG Program
	Road - Car - Petrol Sedan <1600 cc	0.1530	kg CO2e/km	India GHG Program
	Road - Car - Diesel MUV <2500 cc	0.2160	kg CO2e/km	India GHG Program
	Road - bus	0.0152	kg CO2e/pax-km	India GHG Program
	Auto	0.1322	kg CO2e/pax-km	India GHG Program
	Maxi Van	0.226	kg CO2e/pax-km	India GHG Program
C7	Car-Sedan(<1600CC)	0.1410	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
	Rail	0.0078	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
	Road - HDV (>12T)	0.0615	kg CO2e/ton-km	India GHG Program
	Rail	0.0100	kg CO2e/ton-km	India GHG Program
	Air	1.0990	kg CO2e/ton-km	DEFRA 2025
	Sea- Bulk Carrier cargo ship	0.0035	kg CO2e/ton-km	DEFRA 2025

Table 17: Emission Factors used for FY 24-25 GHG Emission Calculations

3.2.3 GHG Emissions Result Overview

Absolute Emissions (All SSEL Locations including Corporate Office):

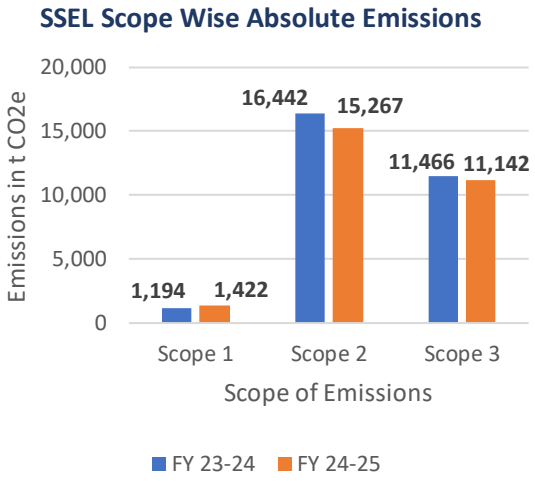


Figure 25: SSEL Scope wise Absolute Emissions

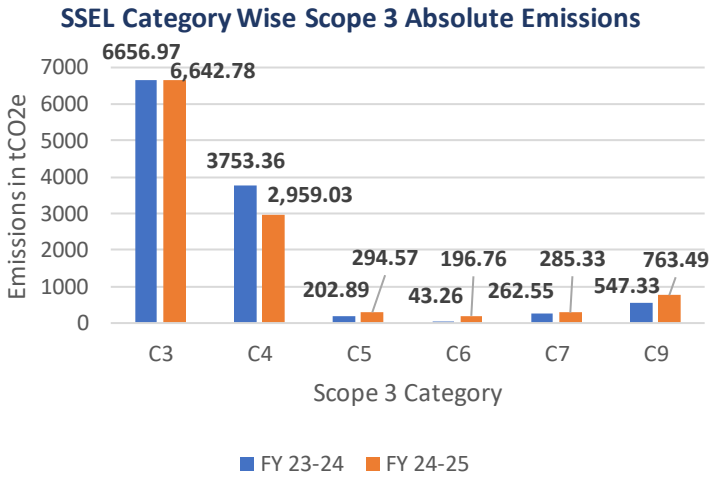


Figure 26: SSEL Category wise Scope 3 Absolute Emissions

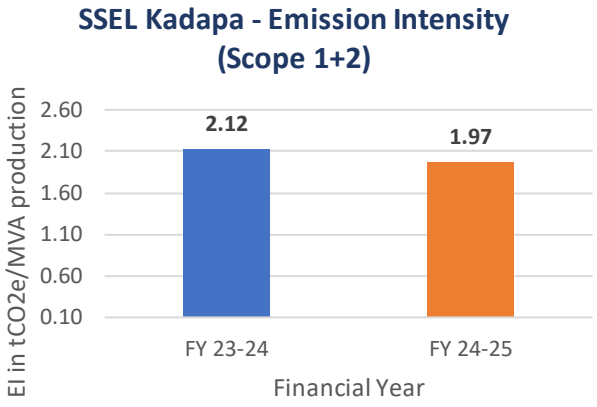
Absolute Emissions in tCO2e – FY 23-24 (Baseline Year)						
Description	**SSEL, Corporate Office**	**SSEL Unit 1, Kadapa**	**SSEL Unit 2 & 3 Kadapa**	**SSEL Unit 4, Kadapa**	**SSEL Naini**	**Total**
Scope 1	71	0.42	817	0	306	1194
Scope 2	62	103	14783	41	1453	16442
Scope 3	72	41	10207	117	1029	11466
Total (Scope 1+2+3)	205	145	25807	158	2788	29103
Category 3	24.8	40.37	5959.86	16.21	615.73	6657
Category 4	-	-	3527.3	39.75	186.31	3753
Category 5	-	0.73	137.32	12.42	52.42	203
Category 6	28.54	-	10.94	-	3.78	43
Category 7	18.65	-	187.25	-	56.65	263
Category 9	-	-	384.44	48.36	114.53	547

Table 18: Absolute Emissions in tCO2e – FY 23-24

Absolute Emissions in tCO2e – FY 24-25						
Description	**SSEL, Corporate Office**	**SSEL Unit 1, Kadapa**	**SSEL Unit 2 & 3 Kadapa**	**SSEL Unit 4, Kadapa**	**SSEL Naini**	**Total**
Scope 1	141.9	0.1	915.8	0.0	364.3	1422.2
Scope 2	47.5	105.0	12364.5	50.3	2699.6	15266.9
Scope 3	127.8	50.2	8610.5	527.2	1826.3	11142.0
Total (Scope 1+2+3)	317.2	155.3	21890.8	577.5	4890.3	27831.1
Category 3	20.5	44.3	5380.8	21.2	1175.9	6643
Category 4	-	-	2343.8	375.2	240.0	2959
Category 5	-	5.9	237.1	12.4	39.1	295
Category 6	68.7	-	107.6	-	20.4	197
Category 7	38.5	-	181.9	-	64.9	285
Category 9	-	-	359.2	118.3	286.0	763

Table 19: Absolute Emissions in tCO2e – FY 24-25

Absolute Emissions & Emissions Intensity of SSEL Transformer Manufacturing Plants- SSEL Kadapa unit 2&3 and SSEL Naini:



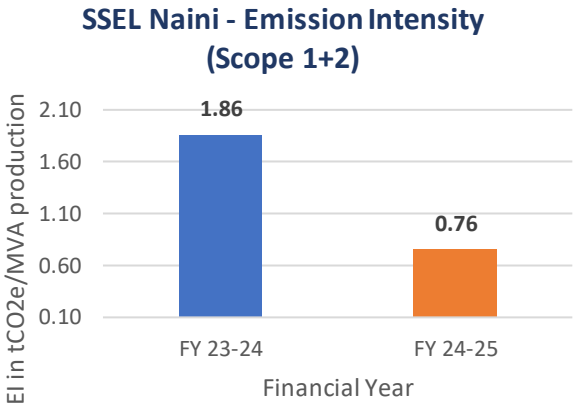
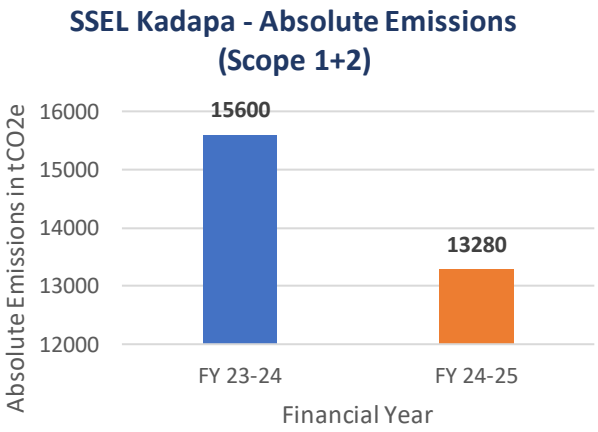


Figure 27: SSEL Kadapa - Emission Intensity (Scope 1+2) *Figure 28: SSEL Naini - Emission Intensity (Scope 1+2)*



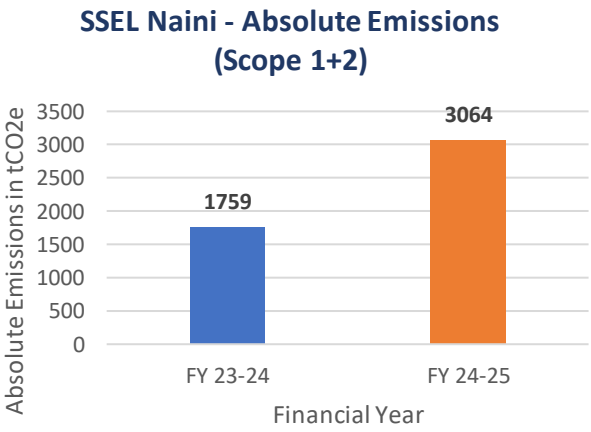
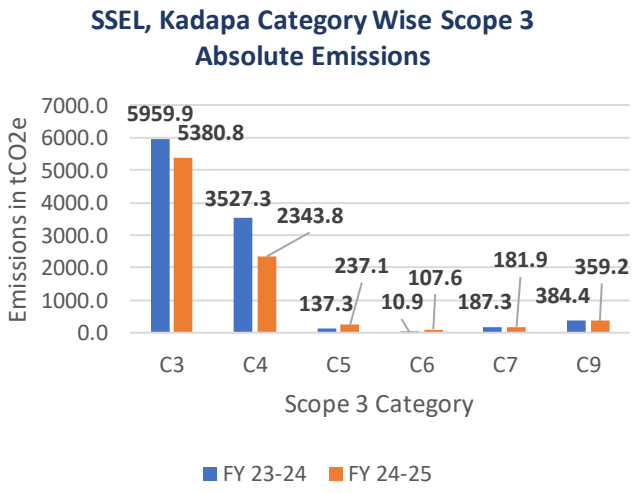


Figure 29: SSEL Kadapa - Absolute Emissions (Scope 1+2) *Figure 30: SSEL Naini - Absolute Emissions (Scope1+2)*



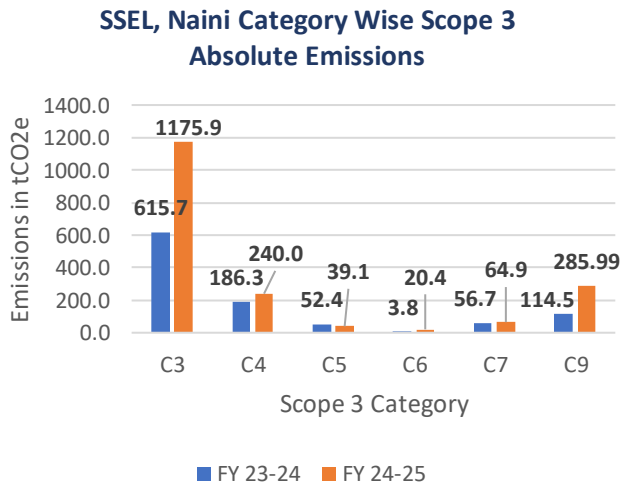


Figure 31: SSEL Kadapa Category Wise Scope 3 Absolute emissions *Figure 32: SSEL Naini Category Wise Scope 3 Absolute emissions*

SSEL Transformer Manufacturing Plant Emission Intensity						
Financial Year	**Description**	**Production**	**Absolute Emissions (Scope 1+2)**	**Absolute Emissions (Scope 1+2+3)**	**Emission Intensity (EI) (Scope 1+2)**	**Emission Intensity (EI) (Scope 1+2+3)**
	UOM	**MVA**	**tCO2e**	**tCO2e**	**tCO2e/MVA**	**tCO2e/MVA**
FY 23-24 (Baseline Year)	SSEL Unit 2&3 Kadapa	7363	15600	25807.11	2.12	3.50
	SSEL Naini	944.2	1759	2788.42	1.86	2.95
	Total SSEL	8307	17359	28596	2.09	3.44
FY 24-25	SSEL Unit 2&3 Kadapa	6745	13280	21890.84	1.97	3.25
	SSEL Naini	4044	3064	4890.27	0.76	1.21
	Total SSEL	10789	16344	26781	1.51	2.48

Table 20: SSEL Transformer Manufacturing Plant Emission Intensity

Comparison of EI with baseline year to show emission reduction

The table 21 below shows the plan given in baseline report for reduction of scope 1, scope 2 and scope 3 emissions for transformer business.

UOM: tCO2e

Site Name	**Unit 2&3 Kadapa**		**Naini**		**Total Reduction**
	From	To	From	To	
Scope 1	817	214	306	286	623
Scope 2	14783	11087	1453	1235	3914
Scope 3	10207	9901	1029	998	337
Reduction	25807	21202	2788	2519	
Total Reduction	**4605 (18%)**		**269 (9.6%)**		**4874**

Table 21: Expected Emission Reduction

	UOM	**Unit 2&3 Kadapa**		**Naini**	
		FY23-24	**FY24-25**	FY23-24	**FY24-25**
Production	MVA	7362	6745	1459	4044
Scope 1	tCO2e	817	916	306	364
Scope 2	tCO2e	14783	12365	1453	2700
EI (Scope 1+2)	tCO2e	2.1	1.97	1.21	0.76
Reduction in EI	tCO2e		**0.15**		**0.45**
Reduction in EI	%		7%		37%
Scope 3	tCO2e	10207	8611	1029	1826
EI (Scope 1+2+3)	tCO2e	3.51	3.25	1.91	1.21
Total Reduction in EI	tCO2e		**0.26**		**0.70**
Reduction in EI	%		8%		37%

Table 22: Comparison of FY24-25 emissions and EI with baseline year FY23-24

As shown in Table 21, the total targeted emission reduction for SSEL transformer manufacturing business (SSEL Kadapa unit 2&3 and SSEL Naini) under Scope 1, Scope 2, and Scope 3 is 623 tCO2e, 3914 tCO2e, and 337 tCO2e, respectively, totaling 4874 tCO2e.

Location wise this total of 4874 tCO2e reduction can be broken up as 4605 tCO2e for SSEL Kadapa unit 2&3, 269 tCO2e for SSEL Naini which is 18%, 9.6% respectively.

To compare emissions reduction with baseline year, EI is being compared and not absolute emission numbers as there is an increase/decrease in production MVA.

Location- Target	Scope 1+2 Reduction in EI	Scope 1+2+3 Reduction in EI	Increase in RE
SSEL Kadapa unit 2&3	0.15	0.26	+1% (solar)
SSEL Naini	0.45	0.70	No RE

Table 23: EI Reduction in FY24-25

3.2.4 Emission Reduction Recommendations w.r.t baseline year 23-24 3 Years plan

UOM: tCO2e

Site Name	Unit 2&3 Kadapa			Naini			Total Reduction Proposed
	From	To	Reduction Proposed	From	To	Reduction Proposed	
Scope 1	817	213	**604 (73.93%)**	306	285.64	**20.36 (6.65%)**	**624.36**
Scope 2	14783	6242	**8541 (57.78%)**	1453	0	**1453 (100%)**	**9994**
Scope 3	10207	9901	**306.21 (3%)**	1029	998	**31 (3%)**	**337.21**
Total Reduction	25807	16356	**9451 (36.62%)**	2788	1283.64	**1504.36 (53.96%)**	**10955.57**

Table 24: Expected Emission Reduction

As shown in Table 24, the total expected emission reduction for the SSEL Company transformer manufacturing business under Scope 1, Scope 2, and Scope 3 is **624.36** tCO2e, **9994** tCO2e, and **337.21** tCO2e, respectively, totaling **10955.57** tCO2e.

3.2.5 Emission Reduction Recommendations for SSEL Unit 2&3 Kadapa (Scope 1 & 2)

Scope	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.	**432.19 (52.92%)**
		Forklift	Replace diesel forklift with Electric forklift powered by Renewable Energy.	**134.23 (16.44%)**
		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.	**37.30 (4.57%)**
Total Scope 1 Emission Reduction per annum at base year production output				**603.72 tCO2e (73.93%)**
Scope	**Site Name**	**Focus Area**	**Recommendations**	**Expected emissions reduction in tCO2e**
2	SSEL Unit 2 & 3, Kadapa	Energy Efficiency	Conduct detailed energy audit and machinery efficiency study based on which generally 20 to 30 % energy conservation can be implemented.	**2956.62** (@ **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).	**1149.90** (**7.78%** @1MW Roof top Solar power addition)
		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.	**4434.93** (@**30 %** base year power from Solar PPA)
		Carbon Credits	1. Invest in projects that significantly reduce emissions and 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 base year production output				**8541.45 tCO2e (57.78%)**

Table 25: Emission Reduction Recommendations Under Scope 1 & 2 for SSEL unit 2&3 Kadapa

Note: Outsourcing of non-core activities to 3rd party will only shift the emissions from Scope 1 to Scope 3 and it will not eliminate the emissions completely, but by doing this we can reduce our scope 1 emissions as well as Emission Intensity.

Emission Reduction with Costing for SSEL Kadapa Unit 2&3

Under Scope 1:

1. Replace diesel forklift with Electric forklift powered by Renewable Energy.

SSEL Unit 2&3 Kadapa - Costing - Switch Diesel Fork lift to Electric Fork lift				
Sl.No	**Description**	**UOM**	**FY23-24 Total 14 – 1 Electric, 1x5t Diesel, 12x3t Diesel – (12 Diesel in Regular use)**	**FY24-25 Total 18 – 1 Electric, 1x5t Diesel, 16x3ton Diesel - (13 Diesel in Regular use)**
	Diesel Forklift Details			
1	No of Diesel forklift at the end of each financial year	Nos	12	13
2	No of forklift operators	Nos	10	17
2	No of Working days per annum	Nos	304	304
3	Diesel Consumption per annum*	L	50086	50143
4	Diesel Consumption per annum per forklift	L	4173.83	3857.15
5	Avg Operating hours per annum (Assume 4L/h diesel consumption)	hours	12521.50	12535.75
6	Diesel Cost per annum @Rs.97/L	Rs	4858342	4863871
7	**GHG Emissions per annum @Diesel EF of 2.68 kgCO2e/L**	**tCO2e**	**134.23**	**134.38**
8	**Avg Operating hours per day per forklift****	**hours**	**3.43**	**3.17**
9	**GHG Emissions per annum per forklift**	**tCO2e**	**11.19**	**10.34**
	1. Proposed Conversion - Electric Forklift Powered by Grid Electricity			
1	Equivalent Electric Forklift Power Consumption per annum (Assuming 12 kWh power consumption per hour)	kWh	150258	150429
2	GHG emissions per annum (Electricity EF = 0.716 tCO2e/MWh)	tCO2e	107.58	107.71
3	Electricity Cost per annum @Rs.5.85/kWh	**Rs**	879009.3	880010
4	Cost Savings on Fuel per annum	**Rs**	**3979332.7**	**3983861.35**
5	% Cost Savings on Fuel per annum	**%**	**81.91**	**81.91**

6	Total Investment to replace all Diesel Forklift (CAPEX 3t Electric forklift = Rs11,06,000/unit)	Rs	13272000	14378000
7	**Payback Period**	**Years**	**3.34**	**3.61**
8	**ROI**	**%**	**29.98**	**27.71**
9	**GHG Emission Reduction per annum**	**tCO2e**	**26.65**	**26.68**
10	**GHG Emission Reduction per annum per forklift**	**tCO2e**	**2.22**	**2.05**
	2. Proposed Conversion - Electric Forklift Powered by Renewable Electricity			
1	Capacity of Roof top Solar plant needed	**kW**	94	94
2	No of Panel needed	**Nos**	170	170
3	Space needed to instal Roof top Solar Panel	**Sq ft**	5103	5109
4	Solar Panel Cost (Rs.16000/Panel)	**Rs**	2721757.047	2724854.523
5	Invertor Cost	**Rs**	680439	681214
6	Installation Cost	**Rs**	544351	544971
7	Total Investment including forklift cost	**Rs.**	17218548	18329039
8	Maintenance Cost of solar Panel	**Rs**	136 088	136243
9	**Net annual Saving**	**Rs/year**	**4722254**	**4727628**
10	**GHG Emission Reduction**	**tCO2e**	**134.23**	**134.38**
11	**Payback Period**	**Year**	**3.65**	**3.88**
12	**ROI**	**%**	**27.43**	**25.79**
*Total Diesel Consumption of 12 forklift in FY23-24 and 13 in FY24-25 given in a monthly data sheet				
**Calculating by Diesel Consumption of @4 L/h max for 1 forklift, it is obvious that no forklift is being used for more than 3.4 hours per day.				

Table 26: SSEL Unit 2&3 Kadapa - Costing - Switch Diesel Fork lift to Electric Fork lift

2. Modification of DG set to run on Dual Fuel:

Description	UOM	SSEL Kadapa Unit 2 & 3 (Base year)
Before Modification		
Diesel Consumption	L/year	71360
Diesel Cost @ Rs.97/L for Kadapa,	Rs/year	6921954
GHG Emission	tCO2e	191.25
After Modification		
Diesel (35.8 MJ/L) Consumption	L	21408
CNG (50 MJ/kg) Consumption (70 % of diesel is replaced with CNG)	kg	35766
Diesel Cost @ Rs.97/L for Kadapa,	Rs/year	2076586
CNG Cost @ Rs.79/L for Kadapa,	Rs/year	2825499
Total Fuel Cost	Rs/year	4902085
GHG Emission from Diesel	tCO2e	57.37
GHG Emission from CNG	tCO2e	96.57
Total GHG Emission	tCO2e	153.94
No of DG set	Nos.	9
Cost of Dual Fuel Kit	Rs	5400000
Cost of Dual Fuel Kit installation	Rs	540000
Total Investment	Rs	5940000
Cost Savings	**Rs/year**	**2019869**

Emission Reduction	**tCO2e**	**37.30**
Payback Period	**Year**	**2.94**
ROI	**%**	**34.00**

Table 27: Costing for DG set modification to run on dual fuel – SSEL Unit 2&3 Kadapa

Under Scope 2:

1. Costing for Addition of 1 MW Solar Roof top Power:

Rooftop Solar PV Costing for SSEL Unit 2&3 Kadapa		
MONO PERC Solar PV Module Details		
Description	**Value**	**UOM**
Nominal Power per panel	**550**	**Wp**
Dimension	2279*1134*35	mm
Capacity	0.55	kW
Peak Sun Hours (PSH)	5.5	h
Performance Ratio (PR)	0.8	
Annual Power Gen	883.3	kWh
Panel cost (As per market rate)	**16000**	**Rs**
Area needed/panel (approx.)	30	Sq.ft
Cost Workout		
Rooftop Solar Capacity	**1000**	**kW**
Panel qty needed	1818	Nos
Rooftop Area needed in sq.ft.	54545.45	Sq.ft
Solar Panel Cost	29090909	Rs
Invertor Cost	7272727	Rs
Installation Cost	5818182	Rs
Total Investment	**42181818**	**Rs**
Maintenance Cost	1454545	Rs/annum
Grid Power Tariff	5.85	Rs/kWh
Annual Power Generation from Rooftop Solar	**1606000**	**kWh/annum**
Base year Electricity consumption	20646808	**kWh/annum**
Reduction in Grid Electricity Consumption	**7.78**	**%**
Cost Savings per annum	**9395100**	**Rs/annum**
Net Savings per annum	**7940555**	**Rs/annum**
ROI	**18.82**	**%**
Payback Period	**5.31**	**year**
GHG Emission Reduction	**1149.9**	**tCO2e/annum**

Table 28: Addition of 1MW Rooftop Solar PV Costing for SSEL Unit 2&3 Kadapa

2. Costing for Solar Power Purchase Agreement:

SSEL Unit 2&3 Kadapa		
Solar PPA Costing with GHG Emission Reduction		
Description	**Value**	**UOM**
Solar Power Tariff	3.00	Rs/kWh
Transmission Charges/Wheeling Charges	0.30	Rs/kWh
Cross Subsidy Surcharge	1.00	Rs/kWh
Additional Surcharge	0.50	Rs/kWh

Electricity Duty	0.05	Rs/kWh
SLDC Charges	0.02	Rs/kWh
Losses Cost	0.10	Rs/kWh
Total Landed Cost (Solar)	**4.97**	**Rs/kWh**
Grid Power Tariff	**5.85**	**Rs/kWh**
Base Year Electricity Consumption	20646808.00	kWh/annum
Power Savings through Energy Audit @20%	4129361.60	kWh/annum
Grid Electricity replace with Solar Roof Top @1MW addition	1606000.00	kWh/annum
Remaining Electricity Consumption	14911446.40	kWh/annum
If 30% of base year Electricity purchased through Solar PPA		
Solar PPA @ 30% of base year Electricity Consumption	**6194042.40**	kWh/annum
Power Grid Cost	36235148	Rs/annum
Power Cost from Solar PPA	30784391	Rs/annum
Savings	**5450757**	**Rs/annum**
% Savings	**15.04**	**%**
GHG Emission Reduction	**4434.93**	**tCO2e**
If 100 % of Electricity from Solar power PPA		
Annual Grid Electricity Cost	120783826.80	Rs/annum
Solar Power Cost	102614635.76	Rs/annum
Savings	**18169191.04**	**Rs/annum**
% Savings	**15.04**	**%**
GHG Emission Reduction	**14783.11**	**tCO2e**

Table 29: Solar PPA Costing for SSEL Unit 2&3 Kadapa

3.2.6 Emission Reduction Recommendations for SSEL Naini (Scope 1 & 2)

Scope	Site Name	Focus Area	Recommendations	Expected emissions reduction in tCO2e
1	SSEL, Naini	Forklift	Replace diesel forklift with Electric forklift powered by Renewable Energy.	**6.94 (2.27%)**
		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.	**5.18 (1.69 %)**
		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 (2.69%)** (Assuming @5% reduction in base year emissions)
Total Scope 1 Emission Reduction per annum at current production output				**20.36 (6.65%)**

2	SSEL, Naini	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** (@**10%** reduction)
		Onsite Renewable Energy generation	Explore the rooftop solar power generation or any other kind of solar power farming.	**1150** (**79.15%**) @1MW Roof top Solar power addition
		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.	**158 (10.85%)**
		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				**1453 (100%)**

Table 30: Emission Reduction Recommendations Under Scope 1 & 2 for SSEL Naini

Emission Reduction with Costing for SSEL Naini

Under Scope 1:

1. **Replace diesel forklift with Electric forklift powered by Renewable Energy.**

Cost Reduction - Switch from Diesel Fork lift to Electric Fork lift		
Description	**UOM**	**SSEL Naini (Base year)**
One Diesel Forklift (FY 23-24)		
Operating hour	h/year	648
Diesel consumption	L/year	2590
Diesel Cost@Rs.97/L for Kadapa & Rs.88.51 for Naini	Rs/year	229241
GHG Emission	tCO2e	6.94
Electricity Consumption	kWh/annum	7770
Electric Cost @Rs.5.85 for Kadapa & Rs.7.1 for Naini	Rs/year	55167
Total Investment (CAPEX Electric forklift)	Rs	1106000
GHG Emission	tCO2e	5.56
Annual Net Saving on fuel	**Rs/year**	**174074**
GHG Emission Reduction	**tCO2e**	**1.38**
Payback Period	**Year**	**6.35**
ROI	**%**	**15.74**
Capacity (Capacity = No of Module *550 wp) 9 module / 256 sq.ft for Kadapa & 7 module / 186 sq.ft for Naini	kW	4
Roof top Solar Power (PV Cost + Invertor + Installation)	Rs	158909
Maintenance cost / instead of fuel	Rs/year	1264909
Total Investment (CAPEX Electric forklift + Roof top Solar + Maintenance)	Rs	1264909
Annual Net Saving on fuel	**Rs/year**	**211825**
GHG Emission Reduction	**tCO2e**	**6.94**
Payback Period	**Year**	**5.97**
ROI	**%**	**16.75**

Table 31: Costing for switching from Diesel to Electric forklift + Renewable power for SSEL Naini

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 tCO_2e to zero. Additionally, it will result in fuel savings of Rs. 2,11,825 per year after a payback period of 5.97 years.

2. **Modification of DG set to run on dual fuel for SSEL Naini**

Description	UOM	SSEL Naini (Base Year)
Before Modification		
Diesel Consumption	L/year	9910
Diesel Cost @ Rs.97/L for Kadapa, Rs.88.51/L for Naini and Rs. 93/L for Indo Tech	Rs/year	877134
GHG Emission	tCO2e	26.56
After Modification		
Diesel (35.8 MJ/L) Consumption	L	2973

CNG (50 MJ/kg) Consumption (70 % of diesel is replaced with CNG)	kg	4967
Diesel Cost @ Rs.97/L for Kadapa, Rs.88.51/L for Naini and Rs. 93/L for Indo Tech	Rs/year	288381
CNG Cost @ Rs.79/L for Kadapa, Rs.91.5/L for Naini and Rs. 87.5/L for Indo Tech	Rs/year	454471
Total Fuel Cost	Rs/year	742852
GHG Emission from Diesel	tCO2e	7.97
GHG Emission from CNG	tCO2e	13.41
Total GHG Emission	tCO2e	21.38
No of DG set	Nos.	2
Cost of Dual Fuel Kit	Rs	1200000
Cost of Dual Fuel Kit installation	Rs	120000
Total Investment	Rs	1320000
Cost Savings	**Rs/year**	**134282**
Emission Reduction	**tCO2e**	**5.18**
Payback Period	**Year**	**9.83**
ROI	**%**	**10.17**

Table 32: 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 32, modification of DG set to run on dual fuel can be reduced about Rs.1.34 Lakhs/annum in SSEL Naini as per our current expenditure, while investing approx. Rs.6.6 Lakhs for Dual Fuel Kit per DG set will be resulted in 5.18 tCO2e GHG emission reduction. To further reduce GHG emission, switch to Biogas or Biofuel based on availability for up to 80 to 90 % emission reduction.

Under Scope 2:

1. Costing of 1 MW Solar Rooftop Power Generation

Rooftop Solar PV Costing for SSEL Naini		
MONO PERC Solar PV Module Details		
Description	**Value**	**UOM**
Nominal Power per panel	**550**	**Wp**
Dimension	2279*1134*35	mm
Capacity	0.55	kW
Peak Sun Hours (PSH)	5.5	h
Performance Ratio (PR)	0.8	
Annual Power Gen	883.3	kWh
Panel cost	**16000**	**Rs**
Area needed/panel (approx.)	30	Sq.ft
Cost Workout		
Rooftop Solar Capacity	**1000**	**kW**
Panel qty needed	1818	Nos
Rooftop Area needed in sq.ft	54545.45	Sq.ft
Solar Panel Cost	29090909	Rs

Invertor Cost	7272727	Rs
Installation Cost	5818182	Rs
Total Investment	**42181818**	**Rs**
Maintenance Cost	1454545	Rs/annum
Grid Power Tariff	7.10	Rs/kWh
Annual Power Generation from Rooftop Solar	**1606000**	**kWh/annum**
Base year Electricity consumption	2028945	kWh/annum
Reduction in Grid Electricity Consumption	**79.15**	**%**
Cost Savings per annum	**11402600**	**Rs/annum**
Net Savings per annum	**9948055**	**Rs/annum**
ROI	**23.58**	**%**
Payback Period	**4.24**	**year**
GHG Emission Reduction	**1149.9**	**tCO2e/annum**

Table 33: Costing of 1 MW Solar Rooftop Power Generation for SSEL Naini

2. Solar PPA Costing with GHG Emission Reduction for SSEL Naini

SSEL Naini Solar PPA Costing with GHG Emission Reduction		
Description	**Value**	**UOM**
Solar Power Tariff	3.00	Rs/kWh
Transmission Charges	0.35	Rs/kWh
Wheeling Charges	0.40	Rs/kWh
Cross Subsidy Surcharge	1.50	Rs/kWh
Additional Surcharge	0.60	Rs/kWh
Electricity Duty	0.06	Rs/kWh
SLDC Charges	0.02	Rs/kWh
Losses Cost	0.13	Rs/kWh
Total Landed Cost (Solar)	**6.06**	**Rs/kWh**
Grid Power Tariff	**7.10**	**Rs/kWh**
Base Year Electricity Consumption	2028945.00	kWh/annum
Power Savings through Energy Audit @10%	202894.50	kWh/annum
Grid Electricity replace with 1 MW Solar Roof Top @79.15%	1606000.00	kWh/annum
Remaining Electricity Consumption @10.95%	220050.50	kWh/annum
If 220050.5 kWh of base year Electricity purchased through Solar PPA		
Power Grid Cost	1562359	Rs/annum
Power Cost from Solar PPA	1333506	Rs/annum
Savings	**228853**	**Rs/annum**
% Savings	**14.65**	**%**
GHG Emission Reduction	**157.56**	**tCO2e**

Table 34: Solar PPA Costing with GHG Emission Reduction for SSEL Naini

3.2.7 General Recommendations Under Scope 3 emissions for both SSEL Kadapa & Naini

Sr. 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 35: Emission Reduction Recommendations Under Scope 3

Assuming 3 % reduction in Scope 3 emission will result in **337.21 tCO2e** emission reduction for the SSEL Company 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.

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.

3.2.8 Power Purchase Agreement in India

A Power Purchase Agreement (PPA) in India is a long-term contractual agreement between an electricity generator (seller) and a customer (buyer) for the sale and purchase of electricity. These agreements are crucial for the development and financing of power projects, especially in the renewable energy sector, as they provide a predictable revenue stream for generators and predictable energy costs for buyers.

Key Aspects of PPAs in India:

1. Purpose and Importance:

- **Financial Security:** PPAs provide a stable and predictable income source for power generators, which is essential for securing financing from lenders and investors due to the high upfront capital expenditure involved in power projects.
- **Predictable Energy Costs:** For buyers, PPAs offer long-term price certainty, helping them manage their electricity expenses and hedge against market price volatility.
- **Renewable Energy Promotion:** PPAs are vital instruments for facilitating the expansion of renewable energy projects (solar, wind, etc.) by providing a guaranteed market for the generated power and enabling them to meet their Renewable Purchase Obligations (RPOs).
- **Risk Allocation:** PPAs allocate risks between the generator and the buyer, covering aspects like payment, regulatory changes, technical performance, and market fluctuations.

2. Parties Involved:

- **Seller/Generator:** Typically, an Independent Power Producer (IPP) or a renewable energy developer who builds, owns, and operates the power plant.
- **Buyer/Procurer:**
    - **Distribution Companies (DISCOMs):** State-owned utilities that procure power from generators and supply it to end-consumers. Historically, DISCOMs have been the primary buyers.
    - **Commercial & Industrial (C&I) Consumers:** Large businesses, factories, and commercial establishments increasingly enter into PPAs (especially for renewable energy) to meet their energy demands, achieve sustainability goals, and reduce electricity costs.

- **Government Entities/Public Sector Undertakings (PSUs):** Other government bodies might also act as buyers.
- **Power Traders:** Intermediaries who buy power from generators and sell it to multiple buyers or in the open market.

3. Typical Duration:

- PPAs in India are generally long-term agreements, ranging from **10 to 25 years**, with solar PPAs commonly set at 25 years. This long duration is necessary to recover the significant investments made in power generation infrastructure.

4. Types of PPAs in India:

- **On-site PPA:**
  - The solar or wind energy system is installed directly on the buyer's property (e.g., rooftop solar on a factory).
  - The generated energy is consumed directly by the purchaser, reducing their reliance on grid electricity.
  - The developer (seller) is responsible for installation, operation, and maintenance.
- **Off-site PPA (Physical Delivery PPA):**
  - The power plant is located at a different site from the consumption point.
  - Electricity is generated and then transmitted to the buyer through the existing grid infrastructure.
  - The buyer physically receives the electricity. This is common for large-scale solar or wind farms.
- **Sleeved PPA:**
  - A variation of the off-site PPA where a third-party intermediary (often a utility or power trader) "sleeves" or facilitates the physical delivery of electricity from the generator to the end-user.
  - The intermediary handles transmission, balancing, and other logistical complexities.
- **Virtual PPA (VPPA) / Financial PPA / Synthetic PPA:**
  - This is a financial contract that decouples the physical flow of electricity from the financial transaction.
  - The buyer does not physically receive the electricity directly from the renewable project. Instead, the generator sells power into the wholesale market, and the buyer receives "renewable energy attributes" (like Renewable Energy Certificates - RECs).
  - The buyer and generator agree on a "strike price." If the market price is higher, the generator pays the difference to the buyer; if it's lower, the buyer pays the difference to the generator.
  - VPPAs are popular for companies seeking to meet sustainability goals without directly managing the physical delivery of power.

- **Portfolio PPA:**
    - Allows consumers to procure energy from a portfolio of renewable energy projects rather than a single supplier, offering diversification.
- **Block Delivery PPA:**
    - Enables buyers to purchase energy in predetermined blocks or increments, providing flexibility for fluctuating energy demands.

5. Key Clauses in a PPA:

A well-drafted PPA is comprehensive and covers various aspects to ensure clarity and mitigate risks. Important clauses include:

- **Definitions and Interpretations:** Clearly define all terms used in the agreement to avoid ambiguity.
- **Effectiveness, Term, and Lock-in Period:** Specifies the duration of the agreement, including commencement and termination dates.
- **Conditions Precedent:** Outlines the conditions that must be met before the PPA becomes effective (e.g., obtaining necessary permits, financial closure).
- **Scope of Work & Project Construction:** Details the obligations related to the development, construction, operation, and maintenance of the power project.
- **Sale and Purchase of Delivered Energy:** Specifies the quantity of energy to be supplied (e.g., contracted capacity, minimum/maximum thresholds) and the obligations of both parties.
- **Tariffs and Charges:** Defines the pricing mechanism (fixed, escalating, or indexed tariffs), payment terms, and any additional charges (wheeling charges, cross-subsidy surcharge, banking charges).
- **Invoicing and Payment:** Outlines billing cycles, payment due dates, and mechanisms for late payments or disputes.
- **Delivery Point and Metering System:** Defines where the energy will be delivered and how it will be accurately measured.
- **Performance Standards and Penalties:** Sets performance metrics (e.g., plant availability, generation targets) and specifies penalties for non-compliance.
- **Force Majeure:** Addresses unforeseen events (natural disasters, war) that prevent parties from fulfilling their obligations, outlining procedures for notification and mitigation.
- **Change in Law:** Crucial in long-term contracts, this clause addresses how changes in legislation, regulations, or taxes will impact the PPA, often allowing for tariff adjustments or other compensatory measures.
- **Representations and Warranties:** Assurances made by both parties regarding their legal authority, project status, and ability to perform obligations.
- **Events of Default & Termination:** Defines conditions under which either party can terminate the agreement (e.g., breach of contract, insolvency) and outlines termination compensation.
- **Dispute Resolution:** Specifies mechanisms for resolving disputes, often through arbitration or mediation, to avoid lengthy litigation.

- **Assignment:** Conditions under which the PPA or its obligations can be transferred to another party.

6. Regulatory Framework in India:

The Indian power sector is primarily governed by:

- **Electricity Act, 2003:**
  - The overarching law that governs generation, transmission, distribution, and trading of electricity, promoting competition and private sector participation.

- **Central Electricity Regulatory Commission (CERC):**
  - The central regulator that frames regulations for inter-state transmission, tariff determination for central generating stations, and trading of electricity.

- **State Electricity Regulatory Commissions (SERCs):**
  - State-level regulators responsible for intra-state matters, including tariff fixation for DISCOMs, retail tariffs, and open access regulations.

- **Ministry of Power (MoP) and Ministry of New and Renewable Energy (MNRE):**
  - These ministries issue policy guidelines, schemes, and bidding trajectories to promote power generation, especially from renewable sources.
- **Open Access Regulations:**
  - These regulations, under the Electricity Act, allow large consumers (typically with a connected load of 1 MW or more) to procure power directly from generators, bypassing DISCOMs. This has fuelled the growth of C&I PPAs.
- **Green Energy Open Access Rules, 2022:**
  - These rules further simplify the open access mechanism for green energy, reducing the eligible contract demand limit from 1MW to 100 kW for green energy consumers, promoting renewable energy procurement.
  - However, Central rules are notified, Many State Electricity Regulatory Commissions (SERCs) are still in process of implementing Green Energy Open Access regulations. Some states (e.g., Haryana, Delhi, Goa) have begun implementation or partially allowed <1 MW green Open Access.
  - Uttar Pradesh implemented this regulation but Andhra Pradesh, Telangana, and Tamil Nadu Still the eligibility criteria for PPA are >=1MW.

7. Challenges of PPAs in India:

Despite their importance, PPAs in India face several challenges:

- **DISCOM Financial Health:**
  - Many state-owned DISCOMs suffer from poor financial health, leading to delays in payment to generators, reluctance to sign new long-term PPAs, and making them a significant counterparty risk for developers.

- **Regulatory and Policy Risk:**
    - Frequent changes in state and central policies, including those related to open access charges (wheeling charges, cross-subsidy surcharge, additional surcharge), can impact the economic viability of projects and lead to disputes.
- **PPA Delays:**
    - Bureaucratic hurdles and regulatory delays in finalizing and signing PPAs can stall project development and create uncertainty for investors.
- **Grid Infrastructure Limitations:**
    - Inadequate transmission and distribution infrastructure, especially in renewable energy-rich states, can hinder the integration of new projects and lead to grid curtailment.
- **Tariff Disputes:**
    - Conflicts between central and state regulatory bodies over tariff structures can lead to prolonged negotiations and impact project viability.

- **Oversupply of Bids:**
    - Competitive bidding has driven down tariffs, but sometimes leads to an oversupply of renewable energy bids compared to actual demand from financially constrained DISCOMs, resulting in underutilized capacity.
- **Enforcement of Contracts:**
    - Enforcement of PPA terms and securing timely payments can be a challenge, requiring robust payment security mechanisms.

3.2.9 Tracking Emissions Over Time

Companies often undergo significant structural changes such as acquisitions, divestments, and mergers. These changes will alter a company's historical emission profile, making meaningful comparisons over time difficult. In order to maintain consistency over time, or in other words, to keep comparing "like with like", historic emission data will have to be recalculated.

Companies may need to track emissions over time in response to a variety of business goals, including:

- Public reporting
- Establishing GHG targets
- Managing risks and opportunities
- Addressing the needs of investors and other stakeholders

A meaningful and consistent comparison of emissions over time requires that companies set a performance datum with which to compare current emissions. This performance datum is referred to as the base year emissions. For consistent tracking of emissions over time, the base year emissions may need to be recalculated as companies undergo:

- significant structural changes such as acquisitions, divestments, and mergers.
- Outsourcing and insourcing of emitting activities.

- Changes in calculation methodology or improvements in the accuracy of emission factors or activity data that result in a significant impact on the base year emissions data.
- Discovery of significant errors, or a number of cumulative errors, that are collectively significant.

3.2.10 Target Setting for SSEL Group Companies

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.

3.3 Energy

3.3.1 Introduction

Energy is one of the major inputs for the economic development of any country. In the case of the developing countries, the energy sector assumes critical importance in view of the ever-increasing energy needs, requiring huge investments to meet them.

The consumption of energy is increasing at a fast pace while available resources remain limited. The global need for energy is increasing on an average by about 2.4% every year. Out of the total amount of primary energy, over 85% comes from fossil fuels. The current consumption of fossil fuels, particularly oil, is not sustainable in the long term.

Energy consumption also has a significant impact on our natural environment. There is clear evidence that climate change is caused by human activity, mostly related to the use of energy.

Energy, that we use, can be classified into several types based on the following criteria:

- Primary energy and secondary energy
- Commercial and non-commercial energy
- Renewable and non-renewable energy

Primary Energy and Secondary Energy
Primary energy refers to all types of energy extracted or captured directly from natural resources.

Primary energy can be further divided into two distinctive groups:

- Renewable (solar, wind, geothermal, tidal, biomass, hydel etc.)
- Non-renewable (fossil fuels: crude oil and its products, coal, natural gas, nuclear, etc.)

The primary energy content of all fuels is generally expressed in terms of toe (tonne of oil equivalent) and is based the following conversion factor.

One tonne of oil equivalent(toe)= 1 x 10^7 kcal = 11630 kWh = 41868 MJ

Primary energy sources are mostly converted in industrial utilities into secondary energy sources; for example, coal, oil or gas converted into steam and electricity. Primary energy can also be used directly. Some energy sources have non-energy uses, for example coal or natural gas can be used as a feedstock in fertiliser plants. Primary energy is transformed in energy conversion process to more convenient forms of energy such as electricity, steam etc. These forms of energy are called secondary energy.

Commercial and Non-Commercial Energy:
Commercial Energy:
Energy that is available in the market for a definite price is known as commercial energy. No matter what the method of energy production is, whether it is from fossil fuels, nuclear or renewable sources, any form of energy used for commercial purposes constitutes commercial energy.

By far, the most important forms of commercial energy are electricity, coal, refined petroleum products and natural gas. Commercial energy forms the basis of industrial, agricultural, transport and commercial development in the modern world. In the industrialized countries, commercial fuels are predominant sources of energy not only for industrial use, but also for many household needs.
Examples: Electricity, lignite, coal, oil, natural gas ete.,

Non-Commercial Energy:
Any kind of energy which is sourced within a community and its surrounding area, and which is not normally traded in the commercial market is termed as non-commercial energy.

Non-commercial energy sources include fuels such as firewood, cattle dung and agricultural wastes, which are traditionally gathered, and used mostly in rural households. These are also called as traditional fuels. Non-commercial energy is often ignored in compiling a country's energy statistics.

Examples: Firewood and agro waste in rural areas, solar energy for water heating, electricity generation, and for drying grain, fish and fruits, animal power for transport, threshing, lifting water for irrigation, crushing sugarcane etc.; wind energy for lifting water and electricity generation.

Renewable and Non-Renewable Energy:

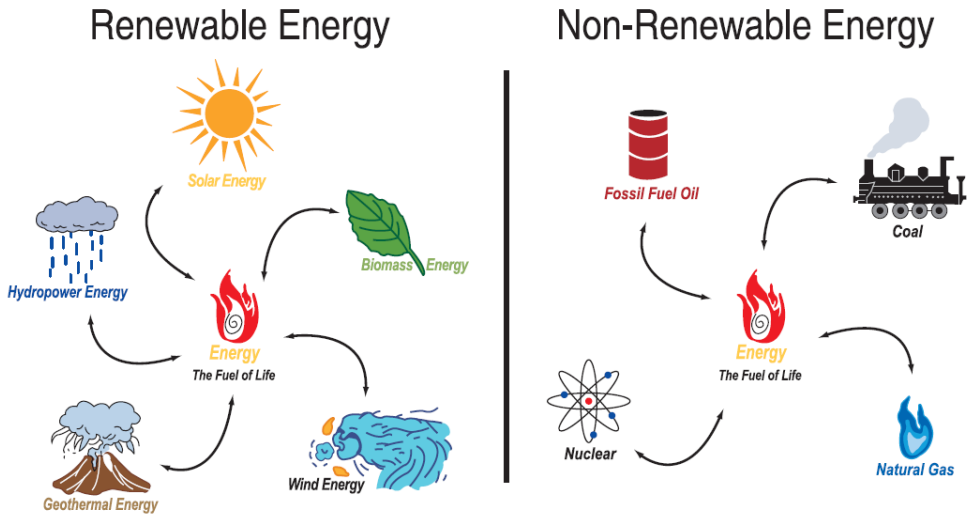


Figure 33: Renewable and Non-Renewable Energy

Renewable energy is the energy obtained from natural sources which are essentially inexhaustible. Examples of renewable resources include wind power, solar power, geothermal energy, tidal power and hydroelectric power (see Figure 33). The most important feature of renewable energy is that it can be harnessed without the release of harmful pollutants.

A non-renewable resource is a natural resource which cannot be produced, grown, replenished, or used on a scale which can sustain its consumption rate. These resources often exist in a fixed amount, or are consumed much faster than nature can create them. Natural resources such as coal, oil and natural gas take millions of years to form and cannot be replaced as fast as they are being consumed now. These resources will deplete with time.

3.3.2 Energy Share of SSEL Company

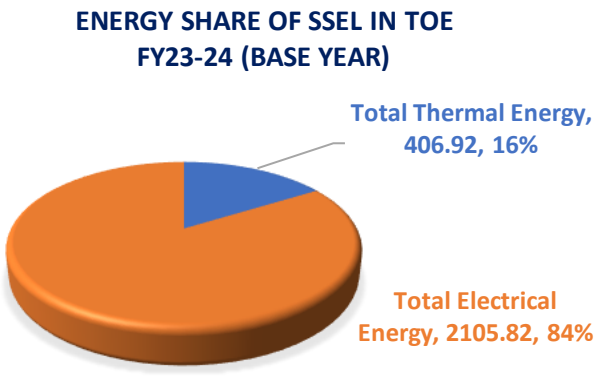


Figure 34: Energy share of SSEL in TOE FY23-24

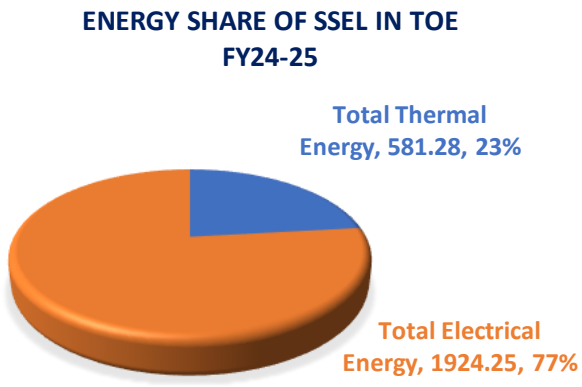


Figure 35: Energy Share of SSEL in TOE FY24-25

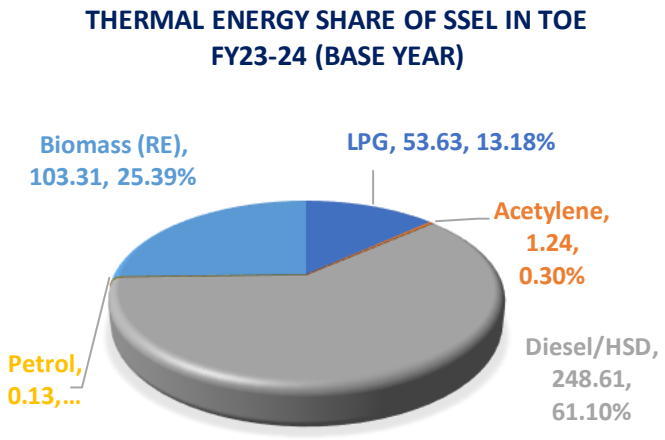


Figure 36: Thermal Energy share of SSEL in TOE FY23-24

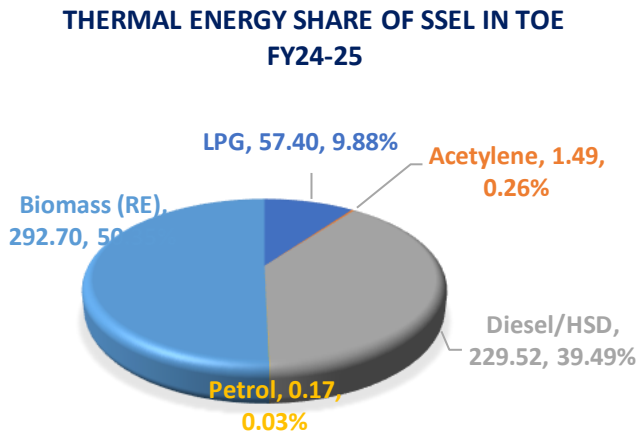


Figure 37: Thermal Energy share of SSEL in TOE FY24-25

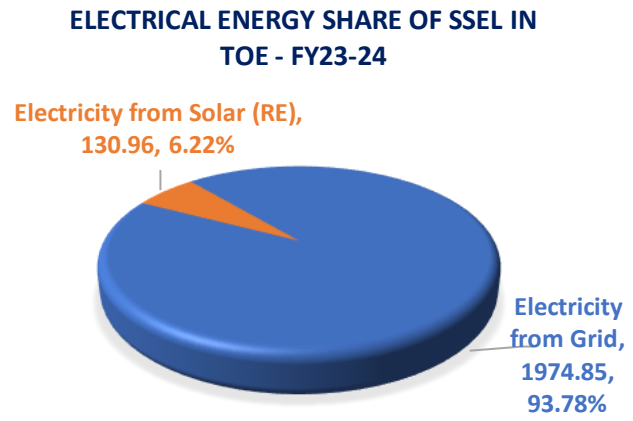


Figure 38: Electrical Energy SHARE of SSEL in TOE FY23-24

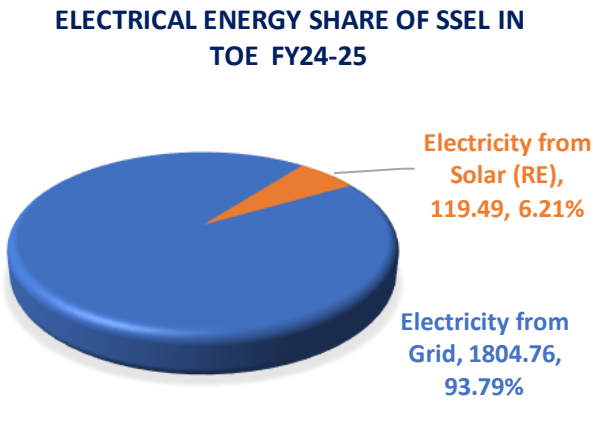


Figure 39: Electrical Energy SHARE of SSEL in TOE FY24-25

Chapter 2.2.3 are explaining about the energy share of the SSEL company. Please note that the Electrical Energy consumed from DG set is indirectly accounted in Thermal Energy as a diesel consumption basis so it is not included in Electrical Energy Consumption.

The boundary of the SSEL Company is shown below:

1. SSEL, Corporate Office, Begumpet
2. SSEL Unit 1, Kadapa
3. SSEL Unit 2&3, Kadapa
4. SSEL Unit 4, Kadapa
5. SSEL, Naini

Energy Share of SSEL Company				
Description	**FY 23-24 (Base year)**		**FY 24-25**	
Thermal Energy				
Fuel Name	**Energy in MTOE**	**% Share**	**Energy in MTOE**	**% Share**
LPG	53.63	13.18%	57.40	9.88%
Acetylene	1.24	0.30%	1.49	0.26%
Diesel/HSD	248.61	61.10%	229.52	39.49%
Petrol	0.13	0.03%	0.17	0.03%
Biomass (RE)	103.31	**25.39%**	292.70	**50.35%**
Total (a)	406.92	100.00%	581.28	100.00%
Electrical Energy				
Electricity	**Energy in MTOE**	**% Share**	**Energy in MTOE**	**% Share**
Electricity from Grid	1974.85	93.78%	1804.76	93.79%
Electricity from Solar (RE)	130.96	**6.22%**	119.49	**6.21%**
Total (b)	2105.82	100.00%	1924.25	100.00%
Total Thermal Energy	**406.92**	**16.19%**	**581.28**	**23.20%**
Total Electrical Energy	**2105.82**	**83.81%**	**1924.25**	**76.80%**
Total Renewable Energy	**234.27**	**9.32%**	**412.18**	**16.45%**
Total Energy (a+b)	**2512.73**	**100.00%**	**2505.53**	**100.00%**
Total Production in MVA	**8307.2**		**10789.3**	
Specific Energy Consumption in TOE/MVA	**0.302**		**0.232**	

Table 36: Energy Share of SSEL Company

Figure 34 & 35 shows the SSEL companies energy share which is **16 %** thermal energy and **84 %** electrical energy during the FY23-24 and **23 %** thermal and **77 %** electrical energy in FY24-25 respectively.

As shown in table 36 the total energy consumption of the SSEL company in FY 23-24 & FY24-25 is **2512.73** Tonne of Oil Equivalent (TOE) and **2505.53** TOE respectively. In this Electrical Energy is contributing more to the total energy consumption. Thermal energy contributing 16.19 % & 23.20 % in FY 23-24 & FY 24-25 respectively. The total Renewable energy consumption is **9.32 %** in FY23-24 & **16.45 %** in FY 24-25. Figure 36 & 37 shows the share of different thermal energy consumption during the base year and reporting year, in this thermal energy from biomass contribute **25.39 %** during FY23-24 and **50.35 %** during FY24-25. Figure 38 & 39 shows the share of different electrical energy consumption during the base year and reporting year, in this electricity generated from roof top solar contribute **6.22 %** in FY23-24 and **6.21 %** in FY24-25.

The Specific Energy Consumption of SSEL Company is **0.302** TOE per MVA production for FY23-24 and **0.232** TOE per MVA production for FY24-25.

3.3.3 Energy Share of SSEL Unit 2&3, Kadapa

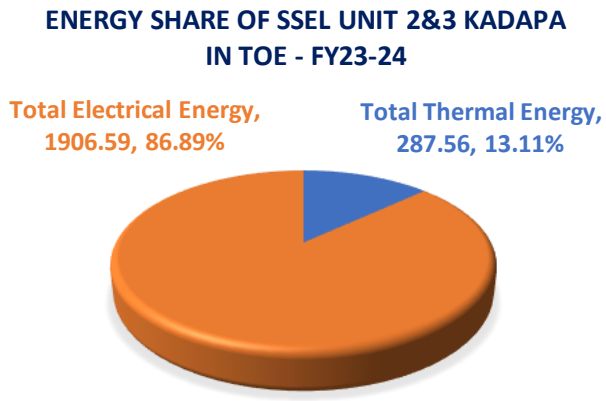


Figure 40: Energy Share of SSEL Unit 2&3 Kadapa – FY 23-24

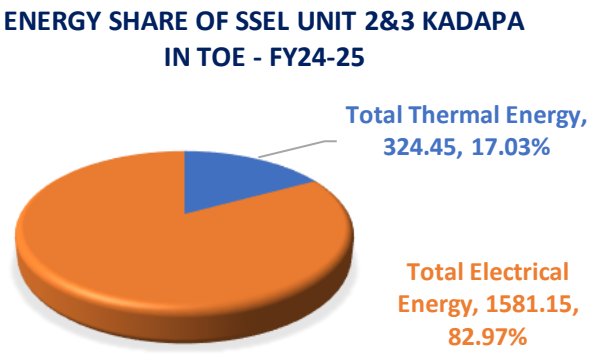


Figure 41: Energy Share of SSEL Unit 2&3 Kadapa – FY 24-25

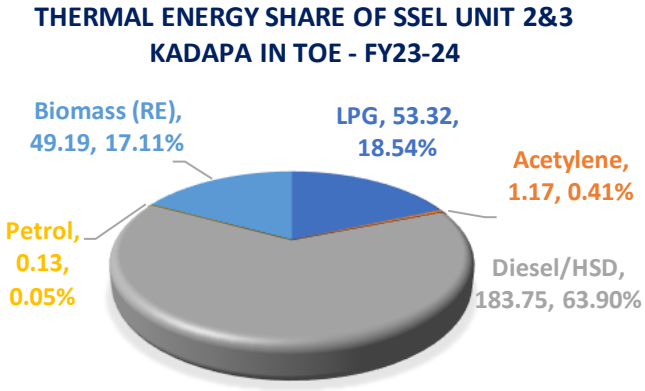


Figure 42: Thermal Energy share of SSEL Unit 2&3 Kadapa – FY23-24

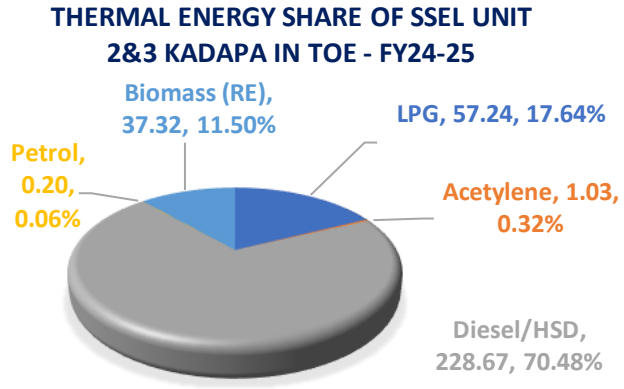


Figure 43: Thermal Energy share of SSEL Unit 2&3 Kadapa – FY24-25

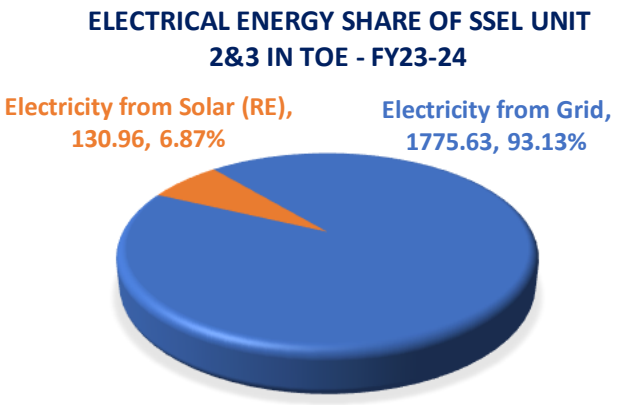


Figure 44: Electrical Energy share of SSEL Unit 2&3 Kadapa – FY23-24

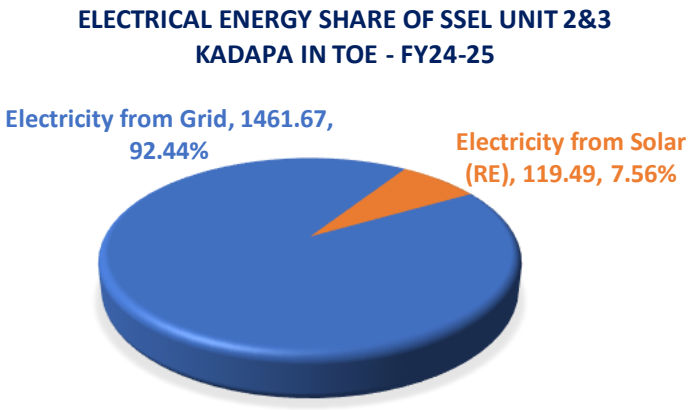


Figure 45: Electrical Energy share of SSEL Unit 2&3 Kadapa – FY24-25

Energy Share of SSEL Unit 2&3 Kadapa				
Description	**FY 23-24 (Base yr)**		**FY 24-25**	
Thermal Energy				
Fuel Name	**Energy in MTOE**	**% Share**	**Energy in MTOE**	**% Share**
LPG	53.32	18.54%	57.24	17.64%
Acetylene	1.17	0.41%	1.03	0.32%
Diesel/HSD	183.75	63.90%	228.67	70.48%
Petrol	0.13	0.05%	0.20	0.06%
Biomass (RE)	49.19	**17.11%**	37.32	**11.50%**
Total (a)	287.56	100.00%	324.45	100.00%
Electrical Energy				
Electricity	**Energy in MTOE**	**% Share**	**Energy in MTOE**	**% Share**
Electricity from Grid	1775.63	93.13%	1461.67	92.44%
Electricity from Solar (RE)	130.96	**6.87%**	119.49	**7.56%**
Total (b)	1906.59	100.00%	1581.15	100.00%
Total Thermal Energy	**287.56**	**13.11%**	**324.45**	**17.03%**
Total Electrical Energy	**1906.59**	**86.89%**	**1581.15**	**82.97%**
Total Renewable Energy	**180.16**	**8.21%**	**156.80**	**8.23%**
Total Energy (a+b)	**2194.15**	**100.00%**	**1905.60**	**100.00%**
Total Production in MVA	**7363**		**6745**	
Specific Energy Consumption in MTOE/MVA	**0.298**		**0.283**	

Table 37: Energy Share of SSEL, Kadapa Plant

Figure 40 & 41 shows the SSEL Unit 2&3 Kadapa energy share which is **13.11 %** thermal energy and **86.89 %** electrical energy during the FY23-24 and **17.03 %** thermal and **82.97 %** electrical energy in FY24-25 respectively.

As shown in table 37 the total energy consumption of the SSEL Unit 2&3 Kadapa in FY 23-24 & FY24-25 is **2194.15** Tonne of Oil Equivalent (TOE) and **1905.60** TOE respectively. In this Electrical Energy is contributing more to the total energy consumption which is 86.89 % in FY 23-24 and 82.97 % in FY 24-25. Thermal energy contributing 13.11 % & 17.03 % in FY 23-24 & FY 24-25 respectively. The total Renewable energy consumption is **8.21 %** in FY23-24 & **8.23 %** in FY 24-25. Figure 42 & 43 shows the share of different thermal energy consumption during the base year and reporting year, in this thermal energy from biomass contribute **17.11 %** during FY23-24 and **11.50 %** during FY24-25. Figure 44 & 45 shows the share of different electrical energy consumption during the base year and reporting year, in this electricity generated from roof top solar contribute **6.87 %** in FY23-24 and **7.56 %** in FY24-25.

The Specific Energy Consumption of SSEL Unit 2&3 Kadapa is **0.298** TOE per MVA production for FY23-24 and **0.283** TOE per MVA production for FY24-25.

3.3.4 Energy Share of SSEL, Naini

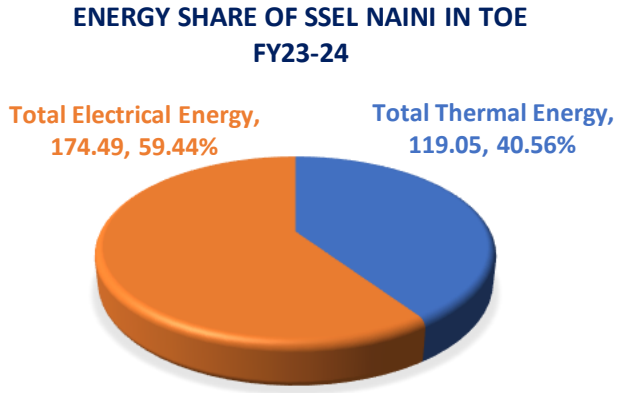


Figure 46: Energy Share of SSEL Naini - FY23-24

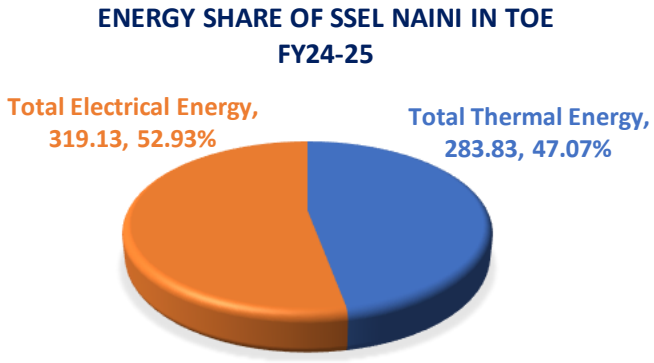


Figure 47: Energy Share of SSEL Naini - FY24-25

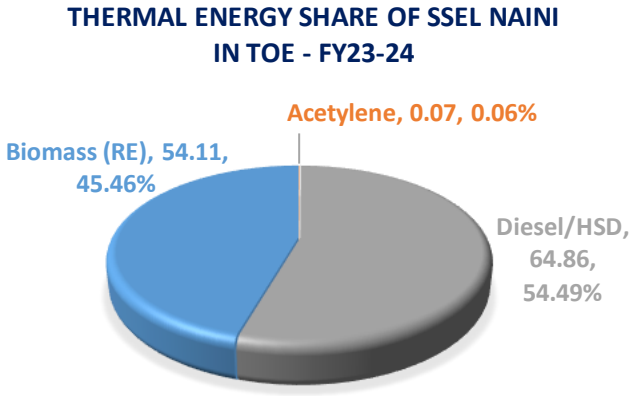


Figure 48: Thermal Energy Share of SSEL Naini - FY23-24

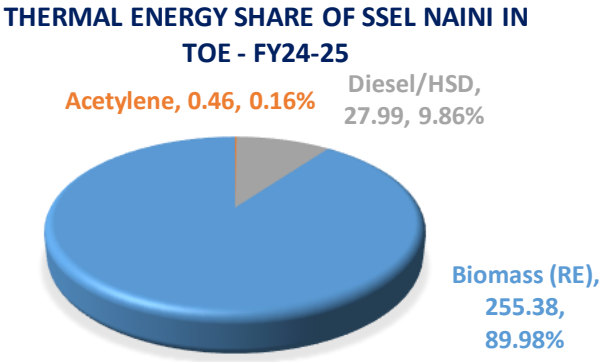


Figure 49: Thermal Energy Share of SSEL Naini - FY23-24

The SSEL Naini plant consume electricity from Grid only, there is no electricity consumption from renewable energy. Figure 46 & 47 shows the SSEL Naini plant's energy share which is **40.56 %** thermal energy and **59.44 %** electrical energy during the FY23-24 and **47.07 %** thermal and **52.93 %** electrical energy in FY24-25 respectively.

As shown in table 38 the total energy consumption of the SSEL Naini plant in FY 23-24 & FY24-25 is **293.54** Tonne of Oil Equivalent (TOE) and **602.96** TOE respectively. The total Renewable energy consumption is **18.43 %** in FY23-24 & **42.35 %** in FY 24-25. Figure 48 & 49 shows the share of different thermal energy consumption during the base year and reporting year, in this the thermal energy from biomass contribute **45.46 %** during FY23-24 and **89.98 %** during FY24-25. The electrical energy consumption is only from GRID electricity and there is no electricity consumption from any renewable energy sources. The fuel switch from Diesel to Biomass in Thermic Fluid Heater is the reason behind the increase in biomass share in thermal energy consumption.

Energy Share of SSEL Naini				
Description	**FY 23-24 (Base yr)**		**FY 24-25**	
Thermal Energy				
Fuel Name	**Energy in TOE**	**% Share**	**Energy in TOE**	**% Share**
LPG	0.00	0.00%	0.00	0.00%
Acetylene	0.07	0.06%	0.46	0.16%
Diesel/HSD	64.86	54.49%	27.99	9.86%
Petrol	0.00	0.00%	0.00	0.00%
Biomass (RE)	54.11	**45.46%**	255.38	**89.98%**
Total (a)	119.05	100.00%	283.83	100.00%
Electrical Energy				
Electricity	**Energy in TOE**	**% Share**	**Energy in TOE**	**% Share**
Electricity from Grid	174.49	100.00%	319.13	100.00%
Electricity from Solar (RE)	0.00	**0.00%**	0.00	**0.00%**
Total (b)	174.49	100.00%	319.13	100.00%
Total Thermal Energy	**119.05**	**40.56%**	**283.83**	**47.07%**
Total Electrical Energy	**174.49**	**59.44%**	**319.13**	**52.93%**
Total Renewable Energy	**54.11**	**18.43%**	**255.38**	**42.35%**
Total Energy (a+b)	**293.54**	**100.00%**	**602.96**	**100.00%**
Total Production in MVA	**944.2**		**4044.3**	
Specific Energy Consumption in MTOE/MVA Production	**0.311**		**0.149**	

Table 38: Energy Share of SSEL, Naini Plant

The Specific Energy Consumption of SSEL Naini plant is **0.311** TOE per MVA production for FY23-24 and **0.149** TOE per MVA production for FY24-25.

3.3.5 Demand Side Management (DMS) Techniques:

Demand-Side Management (DSM) encompasses various techniques designed to influence and optimize how and when electricity is used by consumers. The primary goals of DSM include reducing peak electricity demand, enhancing grid reliability, and promoting energy efficiency and sustainability.

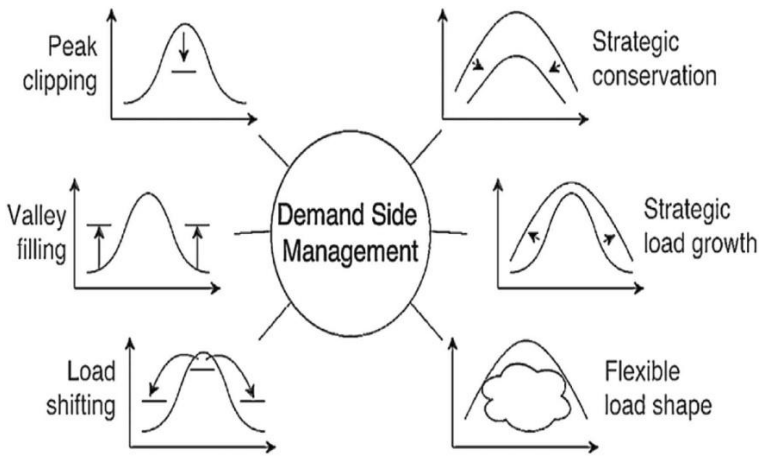


Figure 50: Demand Side Management techniques

Here are some key DSM techniques:

1. Energy efficiency

- Focus: Reducing the amount of energy needed to achieve the same task or service.
- Examples:
  - Switching to energy-saving lighting like LED bulbs.
  - Utilizing energy-efficient appliances (e.g., refrigerators, washing machines).
  - Improving building insulation and sealing drafts to reduce heating and cooling needs.
- Impact: Leads to permanent reductions in overall energy consumption.

2. Demand response (DR)

- Focus: Encouraging consumers to adjust their electricity consumption patterns in response to signals from the grid (e.g., price changes, high demand periods).
- Types of Demand Response:
  - Price-based DR: Utilizes variable electricity tariffs to incentivize consumers to shift their usage to off-peak hours when electricity is cheaper.
    - Examples: Time-of-Use (TOU) pricing, Real-Time Pricing (RTP), Critical Peak Pricing (CPP).
  - Incentive-based DR: Offers monetary incentives to consumers for voluntarily reducing their electricity consumption during periods of high demand or grid stress.
    - Examples: Direct Load Control (DLC) programs, Interruptible Curtailable Service (ICS), Capacity Market Programs (CMP).

Benefits: Enhances grid reliability, reduces the need for expensive peaking power plants, and can help integrate intermittent renewable energy sources.

3. Load shifting

- Focus: Moving energy consumption from peak hours to off-peak hours without necessarily reducing overall energy use.
- Mechanism: Often relies on smart appliances and/or energy storage systems.
- Example: Storing energy in batteries during off-peak hours for use during peak demand periods.

4. Peak clipping

- Focus: Reducing electricity demand specifically during peak hours when the cost of electricity is highest or the grid is under stress.
- Methods: Can be achieved through Demand Response programs or direct control of certain loads.

5. Valley filling

- Focus: Increasing electricity consumption during off-peak hours (e.g., nights, weekends) to improve the overall load factor and efficiency of power plants.
- Incentive: Often achieved through lower off-peak electricity rates.

6. Strategic conservation

- Focus: Reducing energy waste by lowering seasonal energy usage and increasing efficiency through technological and behavioural changes.
- Outcome: A long-term reduction in overall energy consumption.

7. Strategic load growth

- Focus: Intelligently increasing electricity consumption in specific sectors or seasons to utilize excess generation capacity or promote electrification.
- Example: Incentivizing the adoption of electric vehicles and smart charging infrastructure.

8. Flexible load shape

- Focus: Flexible load shape involves adjusting an industrial facility's electricity consumption pattern over time to optimize energy use and reduce costs. The primary focus is to analyse current consumption patterns, integrate with renewable energy sources, and capitalize on variable electricity pricing structures.
- Outcome: The expected outcomes include reduced peak demand, which lowers electricity bills, enhanced grid stability by balancing supply and demand, and improved integration of renewable energy sources into the grid.

9. Distributed energy resources (DER)

- Focus: Integrating localized energy generation and storage systems within the industrial facility or cluster.
- Strategies:
    - Rooftop Solar PV: Installing rooftop solar photovoltaic (PV) systems to generate clean electricity on-site. Kancheepuram has a number of solar energy system manufacturers and suppliers.
    - Energy Storage Systems (ESS): Utilizing battery storage systems to store excess solar energy generated during the day for use during evening peak hours or during grid outages.
    - Combined Heat and Power (CHP): Implementing CHP systems to generate both electricity and useful heat from a single fuel source, maximizing energy efficiency and reducing reliance on the grid.
- Benefits: Reduces reliance on the central grid, enhances energy security, lowers electricity costs, and contributes to a cleaner energy mix.

In addition to these techniques, advancements in communication technologies, such as Advanced Metering Infrastructure (AMI) and smart meters, facilitate the implementation of these DSM strategies by providing real-time data and enabling two-way communication between utilities and consumers.

Overall, DSM techniques aim to create a more efficient, reliable, and sustainable energy system by actively involving consumers in managing their electricity demand.

3.3.6 Demand Side Management at SSEL Company

Contract Demand is the maximum demand (in kVA) agreed upon between the consumer and the utility. If the actual maximum demand exceeds this limit, a penalty is levied—often significantly raising your monthly bill.

Table 39 and Table 40 present the month-wise recorded contract demand, exceeded contract demand values, and the associated penalties for exceeding the contract demand for both FY 2023–24 and FY 2024–25. The following figures show

the month wise maximum demand recorded on the FY23-24 and FY24-25 at SSEL Kadapa Unit 2&3.

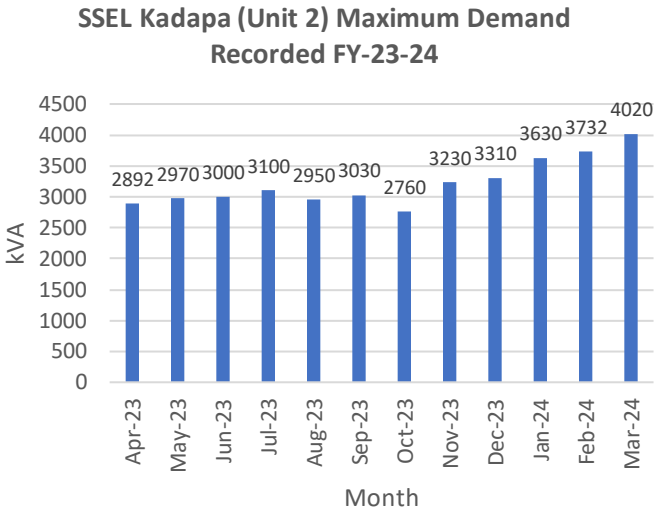


Figure 51: Maximum Demand Recorded SSEL Kadapa (Unit 2) – FY23-24

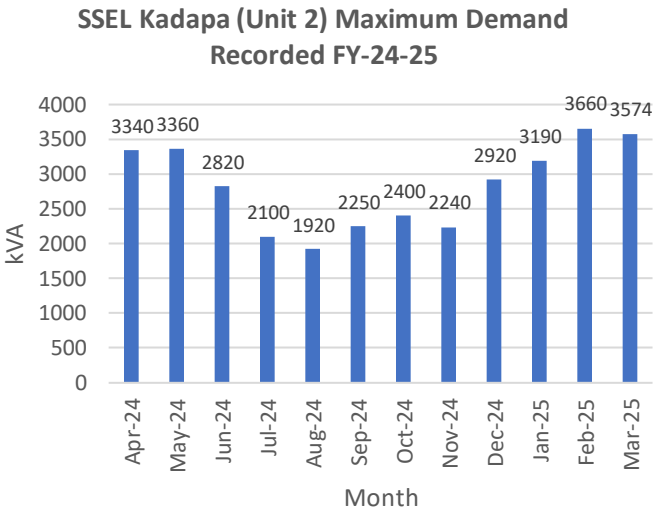


Figure 52: Maximum Demand Recorded SSEL Kadapa (Unit 2) – FY24-25

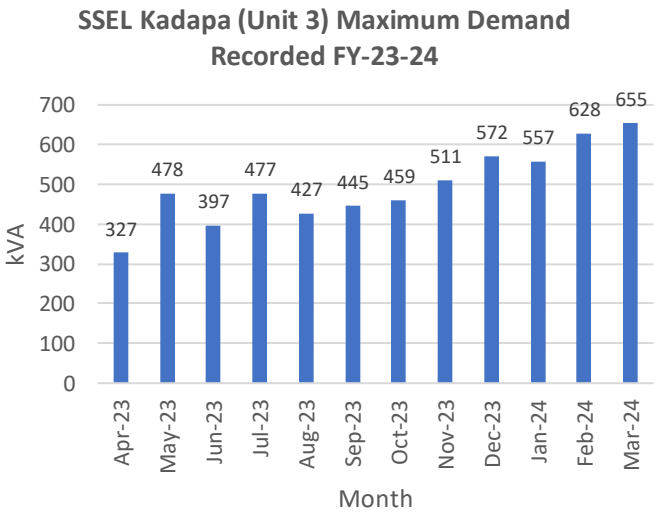


Figure 54: Maximum Demand Recorded SSEL Kadapa (Unit 3) – FY23-24

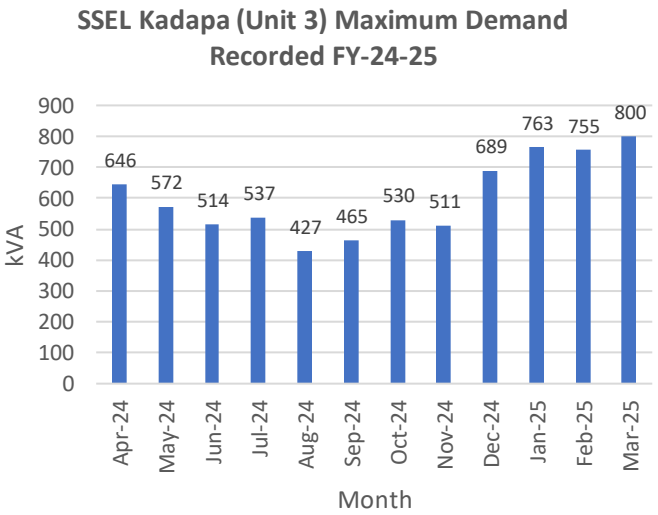


Figure 53: Maximum Demand Recorded SSEL Kadapa (Unit 3) – FY24-25

Penalty Demand Charges of Kadapa (Unit 2)						
Month	**Permitted MD**	**Max Demand Recorded**	**Demand Charges**	**Exceeded con. Demand value**	**Penalty Charges**	**Total Penalty Charges**
FY23-24		**kVA**	**Rs/kVA**	**kVA**	**Rs/kVA**	**Rs**
Apr-23	3000	2892	475	0	950	0
May-23	3000	2970	475	0	950	0
Jun-23	3000	3000	475	0	950	0
Jul-23	3000	3100	475	100	950	95000
Aug-23	3000	2950	475	0	950	0

Sep-23	3000	3030	475	30	950	28500
Oct-23	3000	2760	475	0	950	0
Nov-23	3000	3230	475	230	950	218500
Dec-23	3000	3310	475	310	950	294500
Jan-24	3750	3630	475	0	950	0
Feb-24	3750	3732	475	0	950	0
Mar-24	3750	4020	475	270	950	256500
Total				**940**		**893000**
FY24-25		**kVA**	**Rs/kVA**	**kVA**	**Rs/kVA**	**Rs**
Apr-24	3750	3340	475	0	950	0
May-24	3750	3360	475	0	950	0
Jun-24	3750	2820	475	0	950	0
Jul-24	3750	2100	475	0	950	0
Aug-24	3750	1920	475	0	950	0
Sep-24	2350	2250	475	0	950	0
Oct-24	2350	2400	475	50	950	47500
Nov-24	2350	2240	475	0	950	0
Dec-24	2350	2920	475	570	950	541500
Jan-25	2350	3190	475	840	950	798000
Feb-25	3000	3660	475	659.6	950	626620
Mar-25	3000	3574	475	574.44	950	545718
Total				**2694.04**		**2559338**
Grand Total						**3452338**

Table 39: Maximum Demand Charges of SSEL Kadapa Unit-3

Penalty Demand Charges of Unit 3 Kadapa						
Month	**Permitted MD**	**Max Demand Recorded**	**Demand Charges**	**Exceeded con. Demand value**	**Penalty Charges**	**Total Penalty Charges**
FY23-24	**kVA**	**kVA**	**Rs/kVA**	**kVA**	**Rs/kVA**	**Rs**
Apr-23	500	327	475	0	950	0
May-23	500	478	475	0	950	0
Jun-23	500	397	475	0	950	0
Jul-23	500	477	475	0	950	0
Aug-23	500	427	475	0	950	0
Sep-23	500	445	475	0	950	0
Oct-23	500	459	475	0	950	0
Nov-23	500	511	475	10.84	950	10298
Dec-23	500	572	475	71.68	950	68096
Jan-24	750	557	475	0	950	0
Feb-24	750	628	475	0	950	0
Mar-24	750	655	475	0	950	0
Total				**82.52**		**78394**
FY24-25	**kVA**	**kVA**	**Rs/kVA**	**kVA**	**Rs/kVA**	**Rs**

Apr-24	750	646	475	0	950	0
May-24	750	572	475	0	950	0
Jun-24	750	514	475	0	950	0
Jul-24	750	537	475	0	950	0
Aug-24	750	427	475	0	950	0
Sep-24	750	465	475	0	950	0
Oct-24	750	530	475	0	950	0
Nov-24	750	511	475	0	950	0
Dec-24	750	689	475	0	950	0
Jan-25	750	763	475	13.32	950	12654
Feb-25	750	755	475	5.16	950	4902
Mar-25	750	800	475	49.56	950	47082
Total				**68.04**		**64638**
Grand Total						**143032**

Table 40 Maximum Demand Charges of SSEL Kadapa Unit-3

The total exceeded contract demand for SSEL Kadapa was 1022.52kVA for FY 2023–24 and 2762.08kVA for FY 2024–25. The total penalties incurred due to exceeded contract demand were Rs. 9,71,394 for FY 2023–24 and Rs. 26,23,976 for FY 2024–25.

Similarly, Table 41 presents the month-wise recorded contract demand, exceeded contract demand values, and the associated penalties for exceeding the contract demand for both FY 2023–24 and FY 2024–25. At SSEL Naini, penalty is levied on exceeding the contracted demand by 10%. The following figures show the month-wise maximum demand recorded on the FY23-24 and FY24-25 at SSEL.

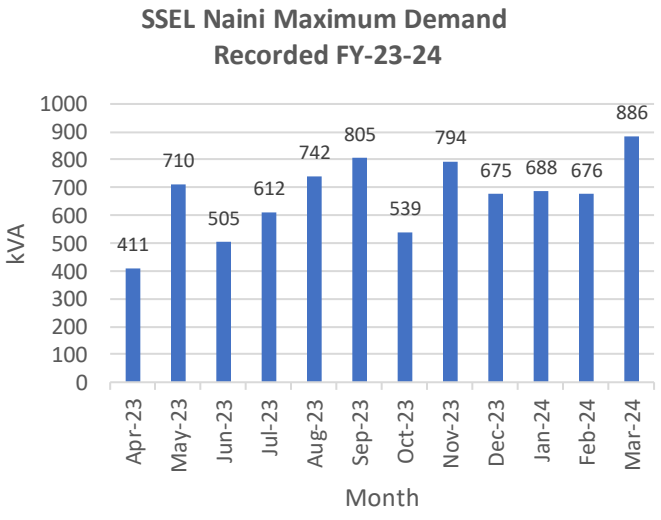


Figure 55:SSEL Naini Maximum Demand Recorded FY-23-24

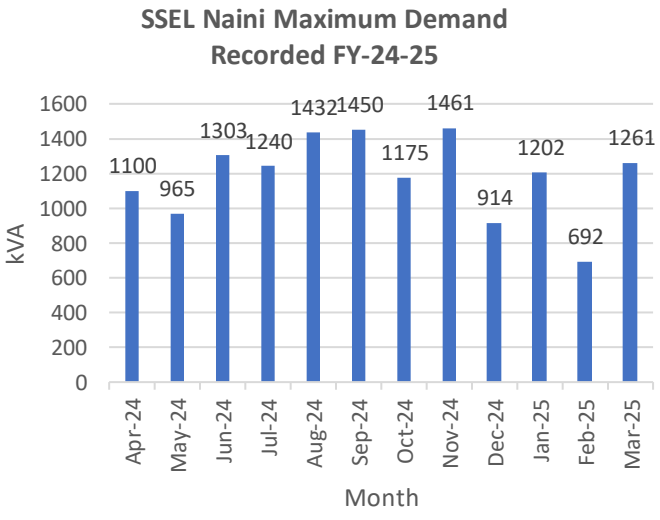


Figure 56:SSEL Naini Maximum Demand Recorded FY-24-25

Penalty Demand Charges of SSEL Naini				
Month	**Permitted MD**	**Max Demand Recorded**	**Exceeded con. Demand value**	**Total Penalty Charges**
FY23-24	**kVA**	**kVA**	**kVA**	**Rs**
Apr-23	500	411	0	0
May-23	500	710	210.4	92904
Jun-23	500	505	0	0
Jul-23	1000	612	0	0
Aug-23	1000	742	0	0
Sep-23	1000	805	0	0
Oct-23	1000	539	0	0
Nov-23	1000	794	0	0
Dec-23	1000	675	0	0
Jan-24	1000	688	0	0
Feb-24	1000	676	0	0
Mar-24	1000	886	0	0
Total			**210.4**	**92904**
FY24-25		**kVA**	**kVA**	**Rs**
Apr-24	1000	1100	0	0
May-24	1000	965	0	0
Jun-24	1000	1303	302.6	114894
Jul-24	1000	1240	240.2	77454
Aug-24	1000	1432	432.2	192654
Sep-24	1000	1450	450.2	203454
Oct-24	1000	1175	174.8	38214
Nov-24	1000	1461	461	0
Dec-24	1000	914	0	0
Jan-25	1000	1202	202.4	54774
Feb-25	1000	692	0	0
Mar-25	1000	1261	260.6	0
Total			**2524**	**681444**
Grand Total				**774348**

Table 41: Maximum Demand Charges of SSEL Naini

The total exceeded contract demand for SSEL Naini was 210kVA for FY 2023–24 and 2524kVA for FY 2024–25. The total penalties incurred due to exceeded contract demand were Rs.92,904 for FY 2023–24 and Rs.6,81,444 for FY 2024–25.

This trend clearly indicates that the current contract demand is insufficient, highlighting the need for either revising the contract demand or improving scheduling and implementing demand-side management techniques.

General Recommendation to avoid the contract demand penalty:

1. **Implement Automatic Load Management (ALM) System:**
   - Use load shedding schemes or load limiting relays to ensure loads are automatically reduced when nearing the contract demand.
   - Integrate with SCADA/EMS systems for real-time alerts and control.

2. **Stagger Load Operations:**
   - Shift non-critical loads (e.g., testing equipment, auxiliary systems) to off-peak times.
   - Use time-of-use (TOU) rates and scheduling to balance demand.

3. **Optimize Transformer Loading:**
   - Avoid overloading individual transformers.
   - Spread the load uniformly across transformers to prevent peak demand spikes.

4. **Power Factor Correction:**
   - Ensure power factor is close to 1 using capacitor banks or APFC panels.
   - A poor power factor increases kVA demand (even when kW is constant), causing unintentional breaches of contract demand.

5. **Energy Audits:**
   - Conduct regular energy audits to identify peak demand causes and rectify inefficiencies.
   - Many industries discover hidden causes like compressed air leaks or simultaneous equipment startups during audits.

6. **Solar Roof Top Power:**
   - Integrating Solar Roof Top power for overcome peak hour consumption during day time. If we install battery backup, we can able to utilize it in night time.
   - Refer chapter 3.2.8 in this report for costing of solar roof top power.

3.3.7 Energy Monitoring and Targeting System

Energy monitoring and targeting (M&T) is primarily a management technique that uses energy information as a basis to eliminate waste, reduce and control current level of energy use and improve the existing operating procedures.

It is based on the principle **"you can't manage what you don't measure"**. It essentially combines the principles of energy use and statistics.

Monitoring and Targeting (M&T) programs have been so effective that they show typical reductions in annual energy costs in various industrial sectors between **5 and 15%**.

Energy Monitoring and Targeting, its relevance to emissions reduction leading to reduction in carbon footprint and improved Specific Energy Consumption thereby reducing Emission Intensity which is an important step in sustainability that gives results both in the areas of operating costs efficiency as well as environmental protection.

The following important definitions are given in the BEE – Book 1, General Aspects of Energy management & Energy Audit.

Definition of Monitoring & Targeting:

Monitoring is the process of establishing the existing pattern of energy consumption and explaining deviations from existing pattern. Its primary goal is to maintain existing pattern by providing all the necessary data on energy consumption and key related data such as production.

Targeting is the identification of desirable energy consumption level and working towards achieving them. Targets are based on the historical (average or best) data acquired during the monitoring as well as benchmarking with energy performance of similar organizations.

Setting up Monitoring & Targeting

It is important that any proposed M&T program be designed to suit the needs of the particular organization. From an energy point of view, organization can be characterized in various ways. Typical classifications are by the number of sites covered and the level of metering adopted as follows:

- Single site with central utility metering
- Single site with sub-metering
- Multi-site with central utility metering
- Multiple-site with sub-metering

Implementation in SSEL Group of companies

Implementation in SSEL Group of companies can be provided after each site/location study. And, ESG Department will provide the Energy Block Diagram for Energy mapping which will indicate specific meter laying points.

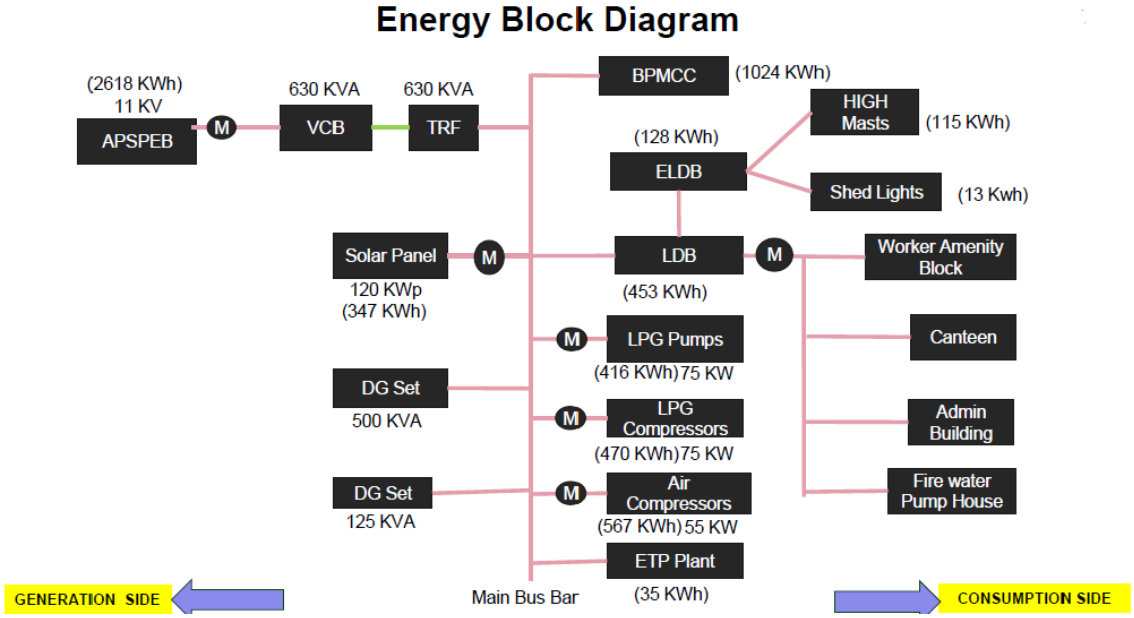


Figure 57: Example of Energy Block Diagram with Meter Laying Points

Figure 58: Typical Energy meter

Key Elements of M&T

- Recording
- Analysing & Comparing
- Setting Targets
- Monitoring
- Reporting
- Controlling

Particularly M&T system will Involve the following:

- Checking the accuracy of energy invoices
- Allocating energy cost
- Determining energy performance
- Recording energy use
- Highlighting performance problem in equipment or systems

Benefits of M&T

- Identify and explain an increase or decrease in energy use
- Draw energy consumption trends (weekly, seasonal, operational)
- Improve energy budgeting corresponding to production plans
- Observe how the organization reacted to changes in the past
- Determine future energy use when planning changes in operations
- Diagnose specific areas of wasted energy
- Develop performance targets for energy management programs/energy action plans
- Manage energy consumption rather than accept it as a fixed cost that cannot be controlled.

One unit saved = Two units generated

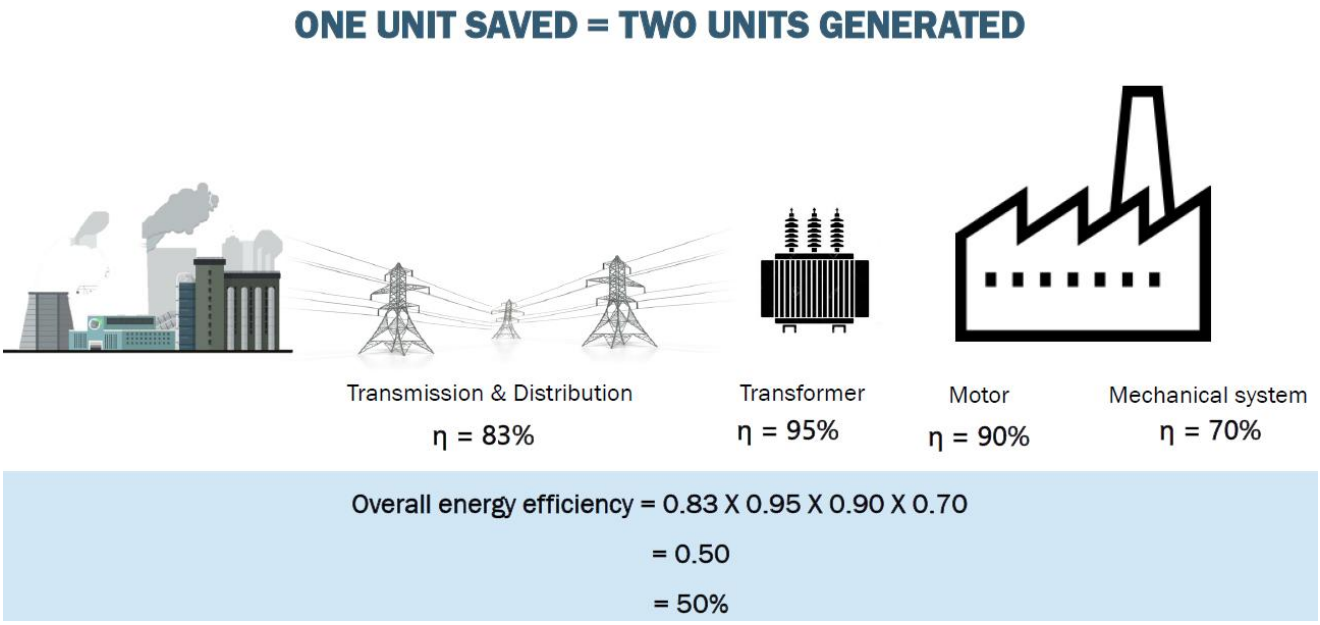


Figure 59: One unit Saved = Two Units Generated

When the power reaches the industry, it meets the transformer. The energy efficiency of the transformer is generally very high. Next, it goes to the motor through internal plant distribution network. A typical distribution network efficiency including transformer is 95% and motor efficiency is about 90%.

Another 30% (Efficiency 70%) is lost in the mechanical system which includes coupling/drive train, a driven equipment such as pump and flow control valves/throttling etc. Thus, the overall energy efficiency becomes 50% (0.83 x 0.95x 0.9 x 0.70 = 0.50, i.e., 50% efficiency)

Hence one unit saved in the end user is equivalent to two units generated in the power plant. (1Unit/0.5Eff-2 Units)

Data, Information Sources & Analysis

- Plant Level
- Plant Department Level
- System Level
- Equipment Level

Analysis

- Annual Energy Consumption
  - Thermal Energy
  - Electrical Energy

Energy Management Information System – EMIS

The use of specially designed information system software is advisable when operating an M&T programme. EMIS software can be developed or purchased.

Generic features:

- A database facility, which is capable of storing and organizing large quantities of data collected over a long period of time.
- The ability to record energy data for all utility types, including data taken from both meters and invoices.
- The ability to handle complex utility tariffs. Tariffs vary from place to place, and are becoming increasingly complex as competition is introduced into the utilities sector.
- The ability to handle other related variables such as degree days and production data.
- A data analysis facility. This is achieved by incorporating statistical analysis software into the energy management software.
- A reporting facility, which is capable of quickly producing energy management reports.
- With the more sophisticated energy management packages it is possible to interface the software with Building Management Systems (BMS), so that energy data can be automatically recorded on a regular basis (e.g., hourly).

Figure 60: Typical Energy Dashboard Lookalike

Energy M&T is an important part of CII GreenCo Rating

About CII GreenCo Rating:

- GreenCo Rating is a Performance based standard.
- It's Define and assess "How Green is your Unit" and highlight the way forward to facilitate world class competitiveness through green strategies.
- It is the "first-of-its-kind in the world"

- The GreenCo Rating System Act as a tool for the company for facilitating excellence in environmental and resource conservation activities that helps to improve towards world class standards.
- It's Helps to implement low hanging measures, identify areas for further advancement and plan for future improvement.
- The Unit will be evaluated for a total of 1000 Points and rated on Five different levels.
- It was launched in 2011
- 900+ Companies working on GreenCo Ratings.
- 590+ Companies are GreenCo rated.

Figure 61: Rating Level

Parameter	Points
Management System	75
Energy Management	150
Carbon Management	150
Water Management	125
Material Resource Management	125
Green Supply Chain	100
Product Stewardship and Life Cycle Approach	125
Innovation for Environment	50
Green Built Environment and Others	100
Total	1000

Figure 62: Credit Points

Table 42: Credit Requirements under Energy Management

Energy Management			
Credit Number	**Credit**	**Maximum Credit**	
EM Mandatory Requirement 1	**Energy Mapping**	***NA***	
EM Mandatory Requirement 2	**Energy Management Cell *(only for energy intensive industries)***	***NA***	
EM Credit 1	**Leadership & Strategy**	**10**	
EM Credit 1.1	Target setting		5
EM Credit 1.2	Action plan		5
EM Credit 2	**Energy Monitoring System**	**15**	
EM Credit 2.1	Equipment-wise energy monitoring		5
EM Credit 2.2	Variance analysis and corrective actions		5
EM Credit 2.3	Energy monitoring dashboard		5
EM Credit 3	**Reduction in Specific Energy Consumption**	**50**	
EM Credit 3.1	Reduction in specific energy consumption		30
EM Credit 3.2	Projects implemented to achieve the reduction in SEC		10

EM Credit 3.3	Tools and techniques used in energy management		10
EM Credit 4	**Efficiency Improvement**	**15**	
EM Credit 4.1	Equipment Wise Efficiency Improvement		10
EM Credit 4.2	Process Wise Efficiency Improvement		5
EM Credit 5	**Benchmarking**	**25**	
EM Credit 5.1	Internal benchmarking		15
EM Credit 5.2	External benchmarking		
EM Credit 5.2.1	National benchmarking		5
EM Credit 5.2.2	International benchmarking		5
EM Credit 6	**Renewable Energy**	**35**	
EM Credit 6.1	Renewable energy potential mapping		5
EM Credit 6.2	% of renewable energy in electrical energy		25
EM Credit 6.2	% of on-site renewable energy in thermal energy		5
Total		**150**	

Stage 1 – 25 Points Out of 150 Points
Stage 2 – 100 Points Out of 150 Points
Stage 3 – 25 Points Out of 150 Points

25 points out of 150 points under Energy Management which can be achieved through Energy Monitoring System and Leadership & Strategy which are the First Stage. In the next stage we can address 100/150 points which are Reduction in Specific Energy Consumption, Renewable Energy & Equipment-wise efficiency improvement. The third stage is benchmarking.

Strategy

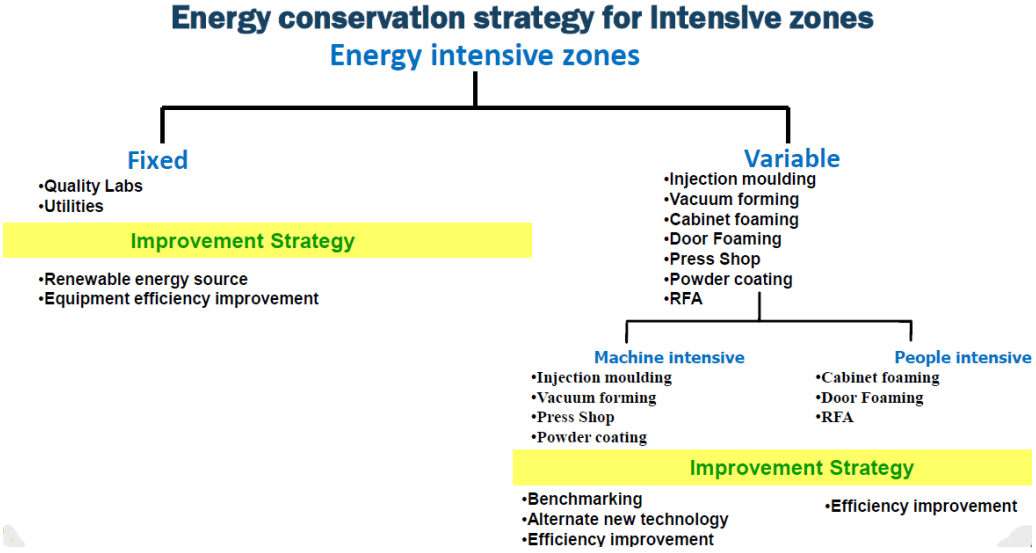


Figure 63: Typical Example of Energy Conservation Strategy

Teasers for Stage 2

EXAMPLE- SPECIFIC ENERGY CONSUMPTION REDUCTION

Specific Electrical Energy -Last 3 Years			
Description	2017-18	2018-19	2019-20
Total production	2,18,360	6,05,952	7,74,941
Energy consumption (Kwh)	1,24,96,710	2,66,36,302	2,90,47,521
Specific Energy (Kwh /Ton)	57.23	43.96	37.48
% Reduction	34.50%		

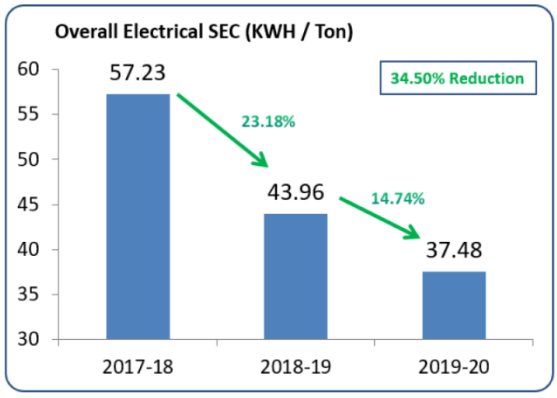


Figure 64: Example of Reduction on Specific Energy Consumption (SEC)

ENERGY SAVING OPPORTUNITIES

❑ **Compressor**

- Monitor Volumetric efficiency (kW/CFM)
- Monitor % leakages and take corrective action
- Segregation of pressure lines
- Aluminum piping for compressed air network
- Installation of VFDs
- Use of transvector nozzles
  - ➢ Saving potential 50%

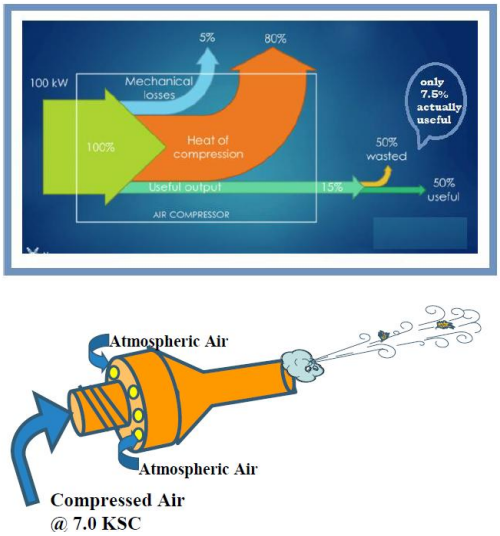


Figure 65: Energy Saving Opportunities in Compressor

ENERGY SAVING OPPORTUNITIES

❑ **Pumps, Fans and Blowers**

- Arresting leakages in water pipelines and air ducts
- Monitoring of efficiencies
- Installation of VFDs
- Use of coatings to reduce friction in pumps and increase efficiency

Pump Power Calculator

$$\text{Pump Hydraulic Power (kW)} = \frac{\text{Pump Flowrate } \left(\frac{m^3}{h}\right) \times \text{Fluid Density } \left(\frac{kg}{m^3}\right) \times g\left(\frac{m}{s^2}\right) \times \text{Pump Head (m)}}{3.6 \times 10^6}$$

$$g = \text{gravitational acceleration} = 9.81 m/s^2$$

$$\text{Shaft Power (kW)} = \frac{\text{Pump Hydraulic Power (kW)}}{\text{Pump Efficiency}}$$

$$\text{Motor Power (kW)} = \frac{\text{Shaft Power (kW)}}{\text{Motor Efficiency}}$$

$$\text{Motor Power (kW)} = \frac{\text{Pump Flowrate } \left(\frac{m^3}{h}\right) \times 1000\left(\frac{kg}{m^3}\right) \times 9.81\left(\frac{m}{s^2}\right) \times \text{Pump Head (m)}}{3.6 \times 10^6 \times \text{Pump Efficiency} \times \text{Motor Efficiency}}$$

Figure 66: Energy Saving Opportunities in Pumps, Fans and Blowers

ENERGY SAVING OPPORTUNITIES

❑ Lightings and Electrical Systems

- Maintaining power factor close to unity or unity
- Measuring efficiencies of motor and replacement of old inefficient motors
- Maximum usage of daylight (transparent sheets / sky lights)
- Lux mapping across the plant level and provide exact lighting as per requirement
- Lowering the heights of luminaires wherever possible

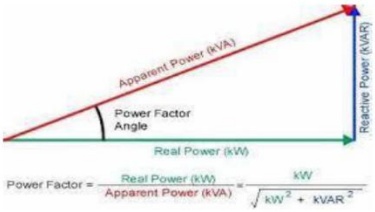


Figure 67: Energy Saving Opportunities in Lightings and Electrical Systems

Equipment Wise Efficiency Improvements:

- List of the most energy consuming equipment to be made - this equipment put together should contribute to at least 80% of the overall energy consumption.
- Performance evaluation of the energy intensive equipment need to be carried out and recorded. For example, kW/CFM for compressors, kW/TR for chillers, efficiency for fans, pumps, blowers, etc.
- For the listed equipment, the following aspects must be monitored -
    - Rated efficiency versus operating efficiency
    - Operating efficiency versus market efficiency
    - From the efficiency analysis, a deviation chart can be derived. Activities initiated or action plan developed to address the deviation must be specified in this credit.

3.4 ISO 50001 – EnMS – Preparedness and Planning

ISO 50001 specifies requirements for establishing, implementing, maintaining and improving an energy management system (EnMS). The intended outcome is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance and the EnMS.

Applicability:

- It is applicable to any organization regardless of its type, size, complexity, geographical location, organizational culture or the products and services it provides.
- It is applicable to activities affecting energy performance that are managed and controlled by the organization.
- It is applicable irrespective of the quantity, use, or types of energy consumed.
- Requires demonstration of continual energy performance improvement, but does not define levels of energy performance improvement to be achieved.
- Can be used independently, or be aligned or integrated with other management systems.

Benefits:

- **Cost Reduction**: By implementing energy management systems, organizations can identify areas for improvement and reduce energy consumption, leading to significant cost savings.
- **Improved Energy Efficiency**: ISO 50001 provides a framework for systematically managing energy use, leading to better efficiency and resource optimization.
- **Reduced Carbon Footprint**: By reducing energy consumption, organizations can lower their greenhouse gas emissions, contributing to environmental sustainability and global efforts to combat climate change.
- **Enhanced Reputation**: Certification demonstrates a commitment to energy efficiency and sustainability, enhancing an organization's reputation and building trust with customers, investors, and stakeholders.
- **Compliance with Regulations**: ISO 50001 helps organizations understand and comply with energy-related legal and regulatory requirements, reducing the risk of fines and penalties.
- **Competitive Advantage**: Certification sets organizations apart from competitors, demonstrating a commitment to sustainable practices and attracting environmentally conscious customers and partners.
- **Operational Efficiency**: By improving energy management, organizations can also enhance overall operational efficiency, leading to better resource utilization, reduced waste, and increased productivity.
- **Continual Improvement**: The standard encourages a culture of continuous improvement in energy management, fostering innovation and long-term sustainability.

- **Employee Engagement**: ISO 50001 can also increase employee awareness and engagement in energy management initiatives, leading to more effective implementation and improved results.
- **Risk Management**: By identifying and mitigating energy-related risks, ISO 50001 helps organizations enhance their resilience and adaptability to market changes.

Documentation Required as per ISO 50001:

Document Name	Requirement Clause	Mandatory/ Optional
Energy Policy	5.2	Yes
Scope and Boundaries of the EnMS	4.3	Yes
Energy Review	6.3	Yes
Identified Significant Energy Uses (SEUs)	6.3	Yes
Energy Baseline(s)	6.4	Yes
Energy Performance Indicators (EnPIs)	6.4	Yes
Energy Objectives, Targets, and Action Plans	6.2	Yes
Criteria for Effective Operation & Maintenance	8.1	Yes
Monitoring & Measurement Plan	9.1.1	Yes
Competence Records (Training, Qualifications)	7.2	Yes
Internal Audit Procedure & Reports	9.2	Yes
Management Review Meeting Records	9.3	Yes
Nonconformities & Corrective Action Records	10.1	Yes
Legal & Other Compliance Register	6.1.3	Yes
Communication Records (Internal/External)	7.4	Optional
Energy Data (Utility bills, Meter logs, etc.)	6.3 / 9.1	Recommended
Equipment List and Maintenance Records	8.1	Recommended
Organizational Chart & Roles	5.3	Recommended
Procurement Procedures (Energy-efficient products)	8.2	Recommended
Change Management Procedures	8.1	Optional
Risk & Opportunity Assessment (energy-related)	6.1	Optional

Table 43:Documentation required for ISO 50001

3.5 ISO 14064 GHG Accounting

ISO 14064 is a series of international standards developed by the International Organization for Standardization (ISO) that provides guidelines and requirements for the quantification, monitoring, reporting, and verification of greenhouse gas (GHG) emissions and removals. It is part of the ISO 14000 family of standards focused on environmental management.

Key aspects of ISO 14064:

- **Purpose:** To help organizations transparently measure, manage, and report their GHG emissions and removals.
- **Scope:** ISO 14064 applies to organizations, projects, and products.
- **Standards:**

There are three main parts:

  - **ISO 14064-1:** Focuses on quantifying and reporting GHG emissions and removals at the organizational level.
  - **ISO 14064-2:** Provides guidance on quantifying, monitoring, and reporting emission reductions and removal enhancements from specific projects.
  - **ISO 14064-3:** Deals with the verification and validation of GHG statements.

- **Benefits:**
  - Accurate and reliable measurement of GHG emissions.
  - Enhanced transparency and accountability.
  - Improved credibility through independent verification.
  - Facilitates comparison of GHG data across different organizations.

- **Applications:**
  - **Organizational level:** Helps companies develop and manage their GHG inventories.
  - **Project level:** Provides guidance for quantifying and reporting emissions from specific projects, such as afforestation or renewable energy projects.
  - **Product level:** Can be used to assess the carbon footprint of products across their life cycle.

In essence, ISO 14064 provides a standardized and globally recognized framework for organizations to understand, manage, and report on their GHG emissions, contributing to efforts to combat climate change.

Base Year (FY23-24) Carbon footprint data of SSEL Unit 2&3 Kadapa is verified by 3rd party assurance provider (TUV) and the certificate given on 3rd Feb'2025.

The assurance statement is given below.

TÜVINDIA

Independent Assurance Statement

The inventory of Greenhouse Gas emissions attributable to
Shirdi Sai Electricals Ltd,
Plot no.: 50-55, 58-60, 45A, 45B, 137A, 137B, 137C, 138A, 138B,
1-2, Industrial Development Area, KADAPA-516002, Y.S.R District,
Andhra Pradesh, India
www.ssel.in

SHIRDI SAI ELECTRICALS LTD

Shirdi Sai Electricals Ltd, has been verified with reference to ISAE 3410 (GHGs) as meeting the requirement of ISO 14064-1:2018 *(hereafter referred as ISO 14064-1)* and GHG protocol. With application of the mentioned standard the GHG emissions was examined by TUV India Pvt. Ltd. regarding its correctness and completeness and conforms below results for the period 01st April 2023 to 31st March 2024.

Direct emissions (Scope 1) from stationary (HSD), mobile combustion (HSD and Petrol), canteen (LPG & Wood), brazing and cutting (Acetylene, LPG) and fugitive emissions (leaks in installed ACs, fire extinguishers); indirect emissions (Scope 2) emissions on account of grid electricity import; indirect emissions (Scope 3 (limited)) on account of Fuel and energy related activities (not included in scope 1 or scope 2), upstream transportation & distribution, waste generated in operations, transportation of waste for disposal, business travel, employee commute and downstream transportation. Detailed exclusion list is part of Annexure-1 of this assurance statement.

Scope - 1 Emissions (tCO_2e)	Scope - 2 Emissions (tCO_2e)	Scope - 3 Emissions (tCO_2e)	Total
817.83	15010.23	10075.96	25904.02
Application of Materiality of 5 % (" /0.95) (Rounded up Values)			
861	**15,801**	**10,607**	**27269**

For and on behalf of TUV India Private Limited

TUV INDIA PRIVATE LIMITED TÜVINDIA

Manojkumar Borekar
Product Head – Sustainability Assurance Service
TUV India Private Limited

Date: 03-02-2025
Place: Mumbai, India
Assurance Statement no: 8122308403
www.tuv-nord.com/in
Revision:02

This assurance statement is invalid without annexure 1 of this statement.

www.tuv-nord.com/in

TÜV®

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Likewise, we are planning for SSEL Naini to get external assurance for Carbon footprint data.

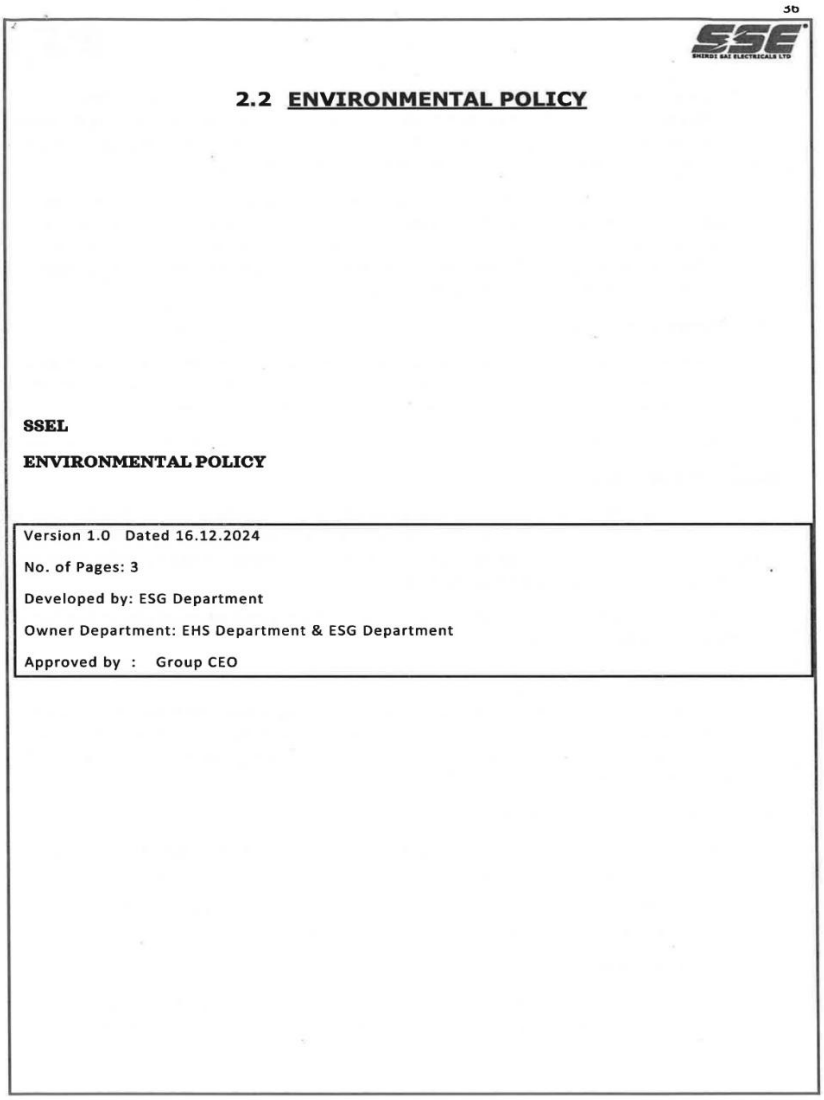
3.6 Environmental Policy

SSEL is in the process of constituting an ESG Working Group, who will be resposible for implementation and compliance of the Environmental Policy which came into effect on 16.12.2024.

The ESG Working Group endevours to treat policy with a 360 degree perspective of ideation, implementation, documentation and reporting with the following focus.

P - Principles and pillars on which the policy is based.
O - Operational aspects of the policy including training, documentation etc.,
L - Legal Framework and Regulatory aspects.
I - Influencer status of SSEL with Stakeholder Groups.
C - Champions of the policy, and designated custodians within SSEL.
Y - Yardstick to measure year on year impact and reporting.

The ESG Working Group members will be chosen across locations, employee levels and other factors, which ensure diverse representation.



2.2 ENVIRONMENTAL POLICY

SSEL

ENVIRONMENTAL POLICY

Version 1.0 Dated 16.12.2024
No. of Pages: 3
Developed by: ESG Department
Owner Department: EHS Department & ESG Department
Approved by : Group CEO

At SSEL, we seek excellence in business, while being committed to the triple bottom line of Planet People and Profit, and we strive to be a responsible corporate by ensuring to comply with all relevant and applicable compliances, environmental laws and regulations as obligated under the law of the land where we have our operations.

We endeavor to reduce the impact of our operations and business activities on the environment while influencing the people in our value chain as well as our social interactions to follow the path of continuous improvement towards an environmentally sustainable living. And, in the process also endeavor to align with global environmental frameworks and sustainable development goals

Our Commitment:

We are committed to mitigation of climate change, protection of biodiversity and related ecosystems, and adoption of sustainable resource use. We understand the global concerns and commit to work towards the regulatory norms of clients and partners.

Our commitment to the environment, while not limited to, is actively in the following areas:

Climate Change Action:

We undertake a commitment of reduction of our Carbon Footprint across all our emissions for our operations through the practice of RRR; Reduce - consumption, Review - source of energy and switch to green energy and restore - the CO2 balance in the atmosphere through carbon offset and carbon-capture technology.

Becoming Carbon Neutral and Net Zero Emissions company is the ultimate goal of our carbon and emissions reduction strategy.

Energy Consumption:

Innovation and use of clean and green technologies in our operations to minimize our carbon footprint is part of our commitment to the environment, to innovate and stay ahead of the technology curve to reduce energy consumption by services, equipment use, and office premises is our endeavor.

Office Space and Production Units:

Efficient use of office space and production units, with energy efficient devices and pro-active approach to replace conventional sourced energy with green energy

Consciously embrace the acknowledged green building certifications while leasing a premises and work to achieve the same for our own premises

Water Consumption:

Introduce water efficiency management programs that continuously identify opportunities for water efficiency improvement and formulate actions reduce water consumption and improve waste water quality.

Waste Management:

Manage the waste generated from our business offices according to the principles of reduce, re-use and recycle.

Pledge to eliminate single use plastic and reduce non-bio-degradable waste generation.

Follow immaculate e waste disposal processes to reduce the harm to environment.

Completely eliminate waste to landfill, including food waste in our existing locations.

Employee Alignment:

Communicating the importance of environmental issues to our employees and motivating them to embed environmental responsibility in our work culture.

Training and Communication:

All employees would receive a mandatory training regarding the implementation and adherence to the policy as a part of their new-hire induction program as well as annual refresher trainings as part of ESG awareness to understand the impact of their activities on the environment.

Environment Champions:

Every vertical shall select Environment Champions from amongst the employees based on their passion and willingness to take up environmental causes both within the strategy and company as well as voluntary activities in the community. The Environment Champions will work to deliver goals in their chalked-out path and will be rewarded and recognized.

Influence Across Value Chain:

To be a strong influence through our Supplier Code of Conduct (SCoC) wherein we encourage our vendors and partners to embed environmental sustainability in their businesses.

Ensure to optimize logistics processes to minimize distribution losses through efficient supply chain systems.

Responsibilities:

We prioritize our commitment towards the adherence of this policy and create a sustainable ecosystem where we strive to leave a low bearing impact through our business operations.

The Company shall constitute an ESG Working Group who would be responsible to oversee the implementation and compliance of the policy and report any discrepancies to the ESG Committee of the Board while also providing an annual status update on the achievement of commitment.

Review:

There will be an Annual Review and make any necessary modifications to this Policy.

* * *

3.7 ISO 14001 certification for SSEL Kadapa and SSEL Naini

TÜVINDIA

Certificate

TÜVINDIA
TUV INDIA PVT. LTD.
ISO 14001:2015
www.tuv-nord.com/in

Management system as per

ISO 14001:2015

The Certification Body TUV INDIA PVT. LTD. hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

SHIRDI SAI ELECTRICALS LIMITED
Plot No.S: 50-55, 58-60, 45A, 45B, 137A, 137B, 137C, 138A, 138B, 1-2 & 13/82, Industrial Development Area,
Kadapa – 516 002, YSR District,
Andhra Pradesh,
India

SSE
SHIRDI SAI ELECTRICALS LTD

operates a management system in accordance with the requirements of ISO 14001 : 2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope

Design and Development, Manufacture, Testing, Supply and Service of Distribution, Power Transformers, Dry type and Special Transformers and Including Processing, Testing & Supply of Transformers Parts Like CRGO Silicon Steel & Amorphous Metals Cores, Core Assemblies, Winding Coils, Core Coil Assemblies, Tanks Fabrication, Aluminium, Copper Wires & Conductors.

Certificate Registration No. **IND 104 24394100**
Audit Report No. **Q 13701/2024**

Valid from **26.11.2024**
Valid until **11.11.2027**
Initial certification **08.07.2024**
Certified by another CB Since **12.11.2021**

Visit our database to verify the validity of this certificate.

Mumbai, **26.11.2024**

Certification Body at TUV INDIA PVT. LTD.

To verify the validity of this certificate, please visit **https://www.iafcertsearch.org**

TUV INDIA PVT. LTD.
801, Raheja Plaza 1, L.B.S Marg,
Ghatkopar (W) Mumbai – 400 086,
India
www.tuv-nord.com/in

NABCB
EM 002

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT
IAF

TÜV®

TÜVNORDGROUP

Bureau Veritas Certification

SHIRDI SAI ELECTRICALS LIMITED

4/3, CHAK DAUD NAGAR, INDUSTRIAL AREA, MIRZAPUR ROAD, NAINI,
PRAYAGRAJ – 211 008, UTTAR PRADESH, INDIA.

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above Organisation has been audited and found to be in accordance with the requirements of the Management System Standards detailed below.

Standards

ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018

Scope of certification

DESIGN, MANUFACTURING, SUPPLY, ERECTION, COMMISIONING, SERVICING & REPAIR OF:

- **TRANSFORMERS UPTO 400KV CLASS 500 MVA SINGLE PHASE BANK & THREE PHASE, POWER AND AUTO TRANSFORMERS.**
- **SHUNT & SERIES REACTORS UPTO 400 KV CLASS 125 MVAR IN SINGLE PHASE & THREE PHASE.**
- **SPECIAL TRANSFORMERS INCLUDING TRACKSIDE, FURNACE, FREIGHT LOCO TRACTION, SCOTT AND V CONNECTED, EARTHING TRANSFORMER.**

Original cycle start date:	**13 July 2023**
Expiry date of previous cycle:	**Not Applicable**
Certification Audit date:	**17 June 2023**
Certification cycle start date:	**13 July 2023**

Subject to the continued satisfactory operation of the Organisation's Management System, this certificate is valid until: **12 July 2026**

Certificate No. **IND.23.5178/IM/U** Version: **1** Issue date: **13 July 2023**

Signed on behalf of BVCH SAS UK Branch
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

For certificate authenticity, click here
https://certcheck.ukas.com/

ISO 9001	**IN044175**
ISO 14001	**IN044174**
ISO 45001	**IN044176**

UKAS MANAGEMENT SYSTEMS
0008

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.

Local office: Bureau Veritas (India) Private Limited (Certification Business)
72 Business Park, Marol Industrial Area, MIDC Cross Road "C",
Andheri (East), Mumbai – 400 093, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call **+ 91 22 6274 2000.**

4. SOCIAL

4.1 Occupational Health and Safety

Occupational Health and Safety (OHS) is a discipline with a broad scope involving many specialized fields. In its broadest sense, it aims at:

- Promotion and maintenance of the highest level of physical, mental and social well-being of workers in all occupations in the organization;
- Prevention among workers of adverse effects on health caused by their working conditions;
- Protection of workers in their employment from risks resulting from factors adverse to health;
- Placing and maintenance of workers in an occupational environment adapted to physical and mental needs;

In other words, OHS encompasses the social, mental and physical well-being of workers in all aspects.

Successful OHS practice requires the collaboration and participation of both employers and workers in health and safety programmes, and involves the consideration of issues relating to occupational medicine, industrial hygiene, toxicology, education, engineering safety, ergonomics, psychology, etc.

Occupational health issues are often given less attention than occupational safety issues because the former are generally more difficult to confront. However, when health is addressed, so is safety, because a healthy workplace is by definition also a safe workplace. The converse, though, may not be true - a so-called safe workplace is not necessarily also a healthy workplace. The important point is that issues of both health and safety must be addressed in every workplace. By and large, the definition of OHS given above encompasses both health and safety in their broadest contexts.

Poor working conditions of any type have the potential to affect a worker's health and safety.

Unhealthy or unsafe working conditions are not limited to factories — they can be found anywhere, whether the workplace is indoors or outdoors. For many workers, such as agricultural workers or miners, the workplace is “outdoors” and can pose many health and safety hazards.

Poor working conditions can also affect the environment workers live in, since the working and living environments are the same for many workers. This means that occupational hazards can have harmful effects on workers, their families, and other people in the community, as well as on the physical environment around the workplace. A classic example is the use of pesticides in agricultural work. Workers can be exposed to toxic chemicals in a number of ways when spraying pesticides: they can inhale the chemicals during and after spraying, the chemicals can be absorbed through the skin, and the workers can ingest the chemicals if they eat, drink, or smoke without first washing their hands, or if drinking water has become contaminated with the chemicals.

The workers' families can also be exposed in a number of ways: they can inhale the pesticides which may linger in the air, they can drink contaminated water, or they can be exposed to residues which may be on the worker's clothes. Other people in the community can all be exposed in the same ways as well. When the chemicals get absorbed into the soil or leach into groundwater supplies, the adverse effects on the natural environment can be permanent.

Overall, efforts in occupational health and safety must aim to prevent industrial accidents and diseases, and at the same time recognize the connection between worker health and safety, the workplace, and the environment outside the workplace.

4.1.1 Importance of OHS

Work plays a central role in people's lives, since most workers spend at least eight hours a day in the workplace, whether it is on a plantation, in an office, factory, etc. Therefore, work environments should be safe and healthy. Yet this is not the case for many workers. Every day workers all over the world are faced with a multitude of health hazards, such as:

- dusts
- gases
- noise
- vibration
- extreme temperatures.

Unfortunately, some employers assume little responsibility for the protection of workers' health and safety. In fact, some employers do not even know that they have the moral and often legal responsibility to protect workers. As a result of the hazards and a lack of attention given to health and safety, work-related accidents and diseases are common in all parts of the world.

Figure 68: Occupational Injury

4.1.2 Costs of occupational injury/disease

In India, the cost of injury or illness to an employee that must be borne by an employer depends on various factors, including the severity of the injury, the industry, and compliance with labour laws. Below are the key costs that an employer may have to bear:

1. Direct Costs

These are legally mandated costs that an employer must pay under various labour laws:

a. Compensation under the Employees' Compensation Act, 1923

- Applicable to workers in factories, mines, plantations, and hazardous occupations.
- Employers must compensate workers for injury or death due to workplace accidents.
- Compensation formula for permanent disability or death:
- Death: 50% of monthly wages × relevant age factor (minimum ₹1,40,000).
- Permanent Total Disablement: 60% of monthly wages × relevant age factor (minimum ₹1,20,000).
- Temporary Disablement: 25% of monthly wages, paid every two weeks.

b. Contribution to Employees' State Insurance (ESI)

- Applicable to establishments with 10+ employees.
- Covers medical care, disability, sickness, maternity, and death benefits.
- Employer's contribution: 3.25% of the worker's wages.
- c. Gratuity (if applicable)
- If the injury results in termination of service and the employee has completed five years, gratuity may be payable under the Payment of Gratuity Act, 1972.
- Formula: (15/26) × Last drawn salary × No. of years of service.

2. Indirect Costs

These are additional costs not mandated by law but still impact the employer.

a. Productivity Loss
- Absence from work affects production and efficiency.
- Other employees may have to take over the injured worker’s tasks, reducing efficiency.

b. Hiring & Training Costs
- If an employee is unable to return to work, the employer may have to recruit and train a replacement.

c. Legal & Compliance Costs
- Non-compliance with labour laws may result in penalties, fines, or lawsuits.
- The employer may have to defend claims in labour courts or tribunals.

d. Reputation Damage
- Workplace injuries can lead to bad publicity and lower employee morale, affecting retention and hiring.

Key Differences in Risk Levels based on workplace:

Factor	Manufacturing Sector	Service Sector
Risk Level	High (heavy machinery, chemicals, hazardous work)	Low (mostly office work, customer service)
Common Injuries	Burns, fractures, amputations, respiratory diseases	Repetitive strain injuries, stress-related illness
Fatal Accidents	More frequent due to industrial hazards	Rare
Regulatory Compliance	Stringent safety laws (Factories Act, ESI, Employees' Compensation Act)	Fewer regulations for non-hazardous work

Table 44: Key Difference in Risk Levels

Comparative Cost of Injury/Illness

Cost Factor	Manufacturing	Service Sector
Medical Expenses	High due to severity of injuries (₹50,000–₹5,00,000+)	Low to moderate (₹10,000–₹1,00,000)
Compensation under Employees' Compensation Act	Higher payouts due to disability/death risks	Lower as injuries are often non-disabling
ESI Contribution (if applicable)	Employer pays 3.25% of wages	Same (3.25% of wages)
Loss of Productivity	High due to specialized workforce	Low as roles are easily replaceable
Hiring & Training Replacement Cost	High, especially for skilled labor	Low, as replacements are easier to find
\egal & Compliance Costs	Can be significant if safety laws are violated	Minimal unless there's workplace harassment or mental health issues
Insurance Premiums	Higher due to occupational hazards	Lower, as workplace injuries are rare
Reputation Impact	Severe (safety violations can impact operations)	Moderate (employee dissatisfaction, stress issues)

Table 45: Cost of Injury/Illness Comparison

4.1.3 Key Hazards in Transformer Manufacturing

- Electrical Hazards: The industry inherently involves working with high-voltage electricity, posing risks of electrical shocks and burns.

- Musculoskeletal Disorders (MSDs): Handling heavy components, repetitive tasks, and awkward postures contribute to MSDs.

- Chemical Exposure: Exposure to solvents, insulating oils, and other chemicals used in transformer manufacturing can lead to respiratory problems and skin conditions.

- Noise and Vibration: Machinery used in transformer manufacturing can generate high noise levels and vibrations, causing hearing damage and other health issues.

- Thermal Hazards: Working with welding and soldering equipment, and also working with heated materials, poses burn risks.

Figure 69: Hazards in Transformer Manufacturing Industry

4.1.4 Additional Insights on injury in Manufacturing Sector

MSD Prevalence:

Studies indicate a high prevalence of MSDs in manufacturing industries in India. Research available shows that a large percentage of workers report Musculoskeletal discomfort.

For example, research papers such as "Ergonomic Risk Identification and Postural Analysis in Electrical Transformers Manufacturing Company located in Southern *1* India" highlight the high risk of MSDs within the transformer manufacturing work environment.

General Manufacturing Injury Rates:

Reports from sources like the Directorate General Factory Advice Service & Labor Institutes (DGFASLI), Ministry of Labor and Employment, Govt of India provide

data on industrial injuries in the broader manufacturing sector. While not transformer-specific, they indicate the general risks present.

Studies have shown that manufacturing sectors that deal with metal work, and heavy machinery, have higher rates of workplace injury. Transformer manufacture falls within this risk category.

Chemical Exposure Risks:

The use of chemicals in the transformer industry raises concerns about occupational diseases. Reports on chemical industry hazards in India provide insights into the potential risks.

Preventive Measures and Recommendations:

Enhanced Safety Protocols: Implementing stringent safety measures, regular equipment maintenance, and employee training can reduce the risk of accidents.

Quality Assurance: Ensuring the use of high-quality materials, like certified CRGO steel, can prevent equipment failures leading to accidents.

Regulatory Compliance: Adhering to national safety standards and conducting regular audits can mitigate legal risks and promote a safer work environment.

Extract from DGFASLI Reports:

The DGFASLI collects and compiles data from state-level Chief Inspectors of Factories, providing a national overview.

However, the limitations of data collection, particularly within the informal sector, must be considered.

The reporting of occupational disease is extremely low, and therefore is not a good metric for the actual amount of work-related disease that occurs.

Based on the information available from DGFASLI and related sources, these are the key points on deaths and disabilities within the Indian manufacturing sector:

Fatalities: Reports indicate that, on average, over 1,000 people die annually in factories registered under the Factories Act, 1948, between 2012 and 2022. This highlights the persistent risk of fatal accidents within the manufacturing sector.

It is important to understand that this figure represents the deaths that are reported from registered factories, and that the true number of deaths may be significantly higher, due to the large informal work sector in India.

Non-Fatal Injuries: While fatal injuries are a serious concern, non-fatal injuries also have a significant impact. Data indicates a trend of declining non-fatal injuries in registered factories in recent years. Where the number of fatal injuries is around 1000 per year, the number of non-fatal injuries has been recorded in the thousands.

Sectoral Risks: Sectors like construction and those involving heavy machinery and chemical processing consistently exhibit higher risks of accidents and disabilities. The manufacturing sector as a whole, contains many industries that contain these risks.

Data Limitations: It's crucial to acknowledge that these figures primarily reflect data from registered factories. The informal sector, which employs a substantial portion of India's workforce, often lacks adequate reporting mechanisms.

Therefore, the actual number of occupational injuries and disabilities is likely significantly higher.

Challenges in Reporting Occupational Diseases: Occupational diseases are often underreported due to difficulties in diagnosis and attribution. This makes it challenging to accurately assess the prevalence of work-related illnesses.

4.1.5 Health and Safety Programmes

For all of the reasons given above, it is crucial that employers, workers and unions are committed to health and safety and that:

- workplace hazards are controlled - at the source whenever possible;
- records of any exposure are maintained for many years;
- both workers and employers are informed about health and safety risks in the workplace;
- there is an active and effective health and safety committee that includes both workers and management;
- worker health and safety efforts are ongoing.

Effective workplace health and safety programmes can help to save the lives of workers by reducing hazards and their consequences. Health and safety programmes also have positive effects on both worker morale and productivity, which are important benefits. At the same time, effective programmes can save employers a great deal of money.

4.1.6 Importance of management commitment

In order to develop a successful health and safety programme, it is essential that there be strong management commitment and strong worker participation in the effort to create and maintain a safe and healthy workplace. An effective management addresses all work-related hazards, not only those covered by government standards.

All levels of management must make health and safety a priority. They must communicate this by going out into the worksite to talk with workers about their concerns and to observe work procedures and equipment. In each workplace, the lines of responsibility from top to bottom need to be clear, and workers should know who is responsible for different health and safety issues.

4.1.7 The importance of training

Workers often experience work-related health problems and do not realize that the problems are related to their work, particularly when an occupational disease, for example, is in the early stages. Besides the other more obvious benefits of training, such as skills development, hazard recognition, etc., a comprehensive training programme in each workplace will help workers to:

- recognize early signs/symptoms of any potential occupational diseases before they become permanent conditions;
- assess their work environment;
- insist that management make changes before hazardous conditions can develop.

4.1.8 Role of the health and safety representative

As health and safety representative your role is to work proactively (this means taking action before hazards become a problem) to prevent workers from being exposed to occupational hazards. You can do this by making sure management eliminates hazards or keeps them under control when they cannot be eliminated.

Steps to help you reach your goals are:

1. Be well informed about the various hazards in your workplace and the possible solutions for controlling those hazards.
2. Work together with your union and the employer to identify and control hazards.
3. Although these Modules have been developed for the protection of workers, you may occasionally need to share some of this information with your supervisors and employer in the process of working towards a safe and healthy workplace.

Being a health and safety representative is not always easy, but helping to protect the lives of your fellow workers is worth all the time and effort you put into the job.

Workers in every occupation can be faced with a multitude of hazards in the workplace. Occupational health and safety address the broad range of workplace hazards from accident prevention to the more insidious hazards including toxic fumes, dust, noise, heat, stress, etc. Preventing work-related diseases and accidents must be the goal of occupational health and safety programmes, rather than attempting to solve problems after they have already developed.

Hazards in the workplace can be found in a variety of forms, including chemical, physical, biological, psychological, non-application of ergonomic principles, etc. Because of the multitude of hazards in most workplaces and the overall lack of attention given to health and safety by many employers, work-related accidents and diseases continue to be serious problems in all parts of the world. Therefore, trade unions must insist that employers control hazards at the source and not force workers to adapt to unsafe conditions.

Management commitment to health and safety and strong worker participation are two essential elements of any successful workplace health and safety program. The most effective accident and disease prevention begins when work processes are still in the design stage.

4.2 OHS in SSEL Sites at Kadapa & Naini

4.2.1 OHS/EHS Site Team

Sr. No.	Name	Designation
SSEL Kadapa		
1.	C. Reddaiah Reddy	Assistant manager
2.	Shaik Allishair	Engineer
3.	B.Rajesh	Safety Officer
4.	P.Prakash Reddy	Safety Officer
5.	D.Divya	GET
SSEL Naini		
1.	Shishupal Sharma	Officer-EHS

Table 46: OHS/EHS site team

4.2.2 Emergency Team Details

SSEL Kadapa:

Emergency Contact Number:

Sr. No.	Name	Department	Contact Number
01	Police	-	100
02	Ambulance	-	108
03	Fire	-	101
04	Occupational Health Centre	-	+91 6301228258
05	Tie up Hospital (Shaymala Hospital)	-	+91 9052919530
06	Mr. Sudhakar Reddy	Plant Head	+91 9948081850
07	Mr. Reddaiah Reddy	Safety	+91 7799993068
08	Mr. Narasimaha Reddy	HR & Admin	+91 7799885826
09	Mr. Naga Raju	Transportation	+91 7799771002
10	Mr. Vasudeva Reddy	Security	+91 9885195180

Table 47: Emergency Contact Number – SSEL Kadapa

Emergency Response Team:

S.no	Name	Department	Roles In Emergency Time	Contact Number
1.	Mr. N. Sudhakar Reddy	Plant Head	Incident Controller	+91 9948081850
2.	Mr. Suraiah	Quality	Deputy Incident Controller -1	+91 9866003999
3.	Mr. M. Narsimha Reddy	HR	Statutory Team Member-1	+91 7799885826
4.	Mr. C. Reddaiah Reddy	Safety	Statutory Team Member-2	+91 7799993068
5.	Mr. SVS Satya Narayana	HR	Statutory Team Member-3	+91 9100424676

6.	Mr. Naga Raju	Transport	Vehicle Transport Coordinator	+91 7799771002
7.	Mr. Shankar Reddy	Welfare Officer	Welfare Coordinator	+91 7337331548
8.	Mr. S. Ali Shair	Safety	First Aid Team Member-1	+91 8179135910
9.	Mr. P. Akhil	Maintenance	Electrical Team Member-1	+91 9642242713
10.	Mr. Adi Narayana	Maintenance	Electrical Team Member-2	+91 7702995343
11.	Mr. Venkata Siva Reddy	Conductor Plant	Electrical Team Member-1	+91 7799684885
12.	Mr. Sudhakar Reddy	Conductor Plant	Mechanical Team Member-1	+91 8500523679
13.	Mr. Lalith Singh	Conductor Plant	Rescue Team Member-1	+91 9305224401
14.	Mr. Nagaraju	Conductor Plant	Rescue Team Member-2	
15.	Mr. Rammohan	Conductor Plant	Rescue Team Member-3	
16.	Mr. Prakash	Conductor Plant	Rescue Team Member-4	
17.	Mr. Ramnadh Reddy	Tanking	Rescue Team Member-1	+91 9121928771
18.	Mr. Sanoj Kumar	Tanking	Rescue Team Member-2	
19.	Mr. Anil	Tanking	Rescue Team Member-3	
20.	Mrs. Seema	Tanking	Rescue Team Member-4	
21.	Mr. Chandra Mohan	CCA	Rescue Team Member-1	+91 6301370347
22.	Mr. Raksh hazra	CCA	Rescue Team Member-2	
23.	Mr. Munna Das	CCA	Rescue Team Member-3	
24.	Mr. Obulesu	CCA	Rescue Team Member-4	
25.	Mr. Siva Prakash Reddy	Winding	Rescue Team Member-1	

26.	Mr. YV Sudhakar	Winding	Rescue Team Member-2	+91 7093440218
27.	Mr. Venkata Subbaiah	Winding	Rescue Team Member-3	
28.	Mr. B. Ravi	Winding	Rescue Team Member-4	
29.	Mr. Lokesh	Export	Rescue Team Member-1	
30.	Mr. R. Veeranjaneyulu	Export	Rescue Team Member-2	
31.	Mr.GB. Ashok Kumar	Export	Rescue Team Member-3	+91 7702999613
32.	Mr. C. Murali	Export	Rescue Team Member-4	
33.	Mr. V. Naga muniaiah	Export	Rescue Team Member-5	
34.	Mr. P. Mahesh Babu	Amorphous	Rescue Team Member-1	
35.	Mr. B. Satish Kumar Reddy	Amorphous	Rescue Team Member-2	
36.	Mrs.J . Sunitha	Amorphous	Rescue Team Member-3	+91 7396935424
37.	Mrs. Nagasailaja	Amorphous	Rescue Team Member-4	
38.	Mr. Immam Kasim	Dispatch	Rescue Team Member-1	
39.	Mr. K. Siva Sankar	Dispatch	Rescue Team Member-2	
40.	Mr. D. Subbarayudu	Dispatch	Rescue Team Member-3	+91 7799888149
41.	Mr. B. Yellappa	Dispatch	Rescue Team Member-4	
42.	Mr. T. Srinivasulu	PTR	Rescue Team Member-1	
43.	Mr. B. Ramanjenulu	PTR	Rescue Team Member-2	
44.	Mr. C. Sai kumar	PTR	Rescue Team Member-3	+91 9908202775

45.	Mr. B. Ravindra Prasad	PTR	Rescue Team Member-4	
46.	Mr. P. Prashanth	Stores	Rescue Team Member-1	+91 7799560067
47.	Mr. Siva Kumar	Stores	Rescue Team Member-2	
48.	Mr. C. Chandra Raju	Stores	Rescue Team Member-3	
49.	Mr. Vikas	Stores	Rescue Team Member-4	
50.	Mr. G. Subbi Reddy	Insulation	Rescue Team Member-1	+91 7337432028
51.	Mrs. Prameela	Insulation	Rescue Team Member-2	
52.	Mr. K. Vamsi Krishna	Insulation	Rescue Team Member-3	
53.	Mrs. Rajeswari	Insulation	Rescue Team Member-4	
54.	Mr. Ghouse	Conductor Plant	Fire Fighting Team Member-1	+91 7416283948
55.	Mr. Chandra Mouli	Conductor Plant	Fire Fighting Team Member-2	
56.	Mr. Peeraiah	Conductor Plant	Fire Fighting Team Member-3	
57.	Mr. Kiran	Conductor Plant	Fire Fighting Team Member-4	
58.	Mr. P. Janardhan	Tanking	Fire Fighting Team Member-1	+91 9390858287
59.	Mrs. Reddy Devi	Tanking	Fire Fighting Team Member-2	
60.	Mr. Gangadhar	Tanking	Fire Fighting Team Member-3	
61.	Mr. P. Siva Shankar	Tanking	Fire Fighting Team Member-4	
62.	Mr. Surendra	CCA	Fire Fighting Team Member-1	
63.	Mr. Raghunadh Reddy	CCA	Fire Fighting Team Member-2	

64.	Mr. R. Prasath	CCA	Fire Fighting Team Member-3	+91 7993344367 +91 7995600990
65.	Mr. Manish Kumar	CCA	Fire Fighting Team Member-4	
66.	Mr. Abdul Rehman	Winding	Fire Fighting Team Member-1	
67.	Mr. M. Anil Kumar	Winding	Fire Fighting Team Member-2	
68.	Mr. Ameer Basha	Winding	Fire Fighting Team Member-3	+91 9966622111
69.	Mr. C. Srinivasulu	Winding	Fire Fighting Team Member-4	
70.	Mr. Narasimha	Export	Fire Fighting Team Member-1	
71.	Mr. Shiva	Export	Fire Fighting Team Member-2	
72.	Mr. Khadhar	Export	Fire Fighting Team Member-3	+91 7995557399
73.	Mr. G. Mohan	Export	Fire Fighting Team Member-4	
74.	Mr. Sunil tiwari	Export	Fire Fighting Team Member-5	
75.	Mr. Y.V. Manoj Reddy	Amorphous	Fire Fighting Team Member-1	
76.	Mr. Ravindra Khila	Amorphous	Fire Fighting Team Member-2	
77.	Mr. V. Giridhar	Amorphous	Fire Fighting Team Member-3	+91 9550219833
78.	Mr. B. Manjunadh Reddy	Amorphous	Fire Fighting Team Member-4	
79.	Mr. Farook Khan	Dispatch	Fire Fighting Team Member-1	
80.	Mr. Darsaratha Reddy	Dispatch	Fire Fighting Team Member-2	
81.	Mrs. Subbamma	Dispatch	Fire Fighting Team Member-3	

82.	Mrs. Rama Subbamma	Dispatch	Fire Fighting Team Member-4	+91 7036608254
83.	Mr. BR .Shiva Raj	PTR	Fire Fighting Team Member-1	
84.	Mr. B. Vijay	PTR	Fire Fighting Team Member-2	
85.	Mr. Subodh	PTR	Fire Fighting Team Member-3	+91 9901248118
86.	Mr. Y. Maheswara	PTR	Fire Fighting Team Member-4	
87.	Mr. G. Ramesh	Stores	Fire Fighting Team Member-1	
88.	Mr. G. Prabhakar	Stores	Fire Fighting Team Member-2	
89.	Mr. Soma Sekhar Reddy	Stores	Fire Fighting Team Member-3	+91 8897916054
90.	Mr. Chakradhar	Stores	Fire Fighting Team Member-4	
91.	Mr. Mahesh Babu	Insulation	Fire Fighting Team Member-1	
92.	Mrs. Rupali Yadav	Insulation	Fire Fighting Team Member-2	
93.	Mrs. K. Mounika	Insulation	Fire Fighting Team Member-3	+91 9505331824
94.	Mr. Gouranga Kumar	Insulation	Fire Fighting Team Member-4	
95.	Mr. M. Sathyam	Conductor Plant	First Aid Team Member-1	+91 855508945
96.	Mr. Kanth Kumar	Conductor Plant	First Aid Team Member-2	
97.	Mr. Sravan	Tanking	First Aid Team Member-1	+91 6302523449
98.	Mr. Harish	CCA	First Aid Team Member-1	+91 8008204720
99.	Mr. S. Naresh Kumar	Winding	First Aid Team Member-1	+91 9666142168
100.	Mr. G. Laxman Sai Kumar	Export	First Aid Team Member-1	+91 7893085527

101.	Mr. K. Nagaraju	Export	First Aid Team Member-2	
102.	Mr. Prem Sagar	Amorphous	First Aid Team Member-1	+91 9885246507
103.	Mr. D. Sudharshan	Amorphous	First Aid Team Member-2	+91 7799888402
104.	Mr. Muni	Dispatch	First Aid Team Member-1	+91 7799888149
105.	Mr. Venkatesh	Dispatch	First Aid Team Member-2	
106.	Mr. K. Srinivasulu	PTR	First Aid Team Member-1	+91 9502555080
107.	Mr. A. Venkata Sai Dinesh Reddy	PTR	First Aid Team Member-2	
108.	Mr. K.N.R Achary	Stores	First Aid Team Member-1	+91 7799993062
109.	Mr. P. Raj Kumar	Stores	First Aid Team Member-2	+91 8523810530
110.	Mr. S. Mahaboob Basha	Insulation	First Aid Team Member-1	+91 9908095237
111.	Mrs. S.V. Rajeswari	Insulation	First Aid Team Member-2	+91 7416064466

Table 48: Emergency Response Team – SSEL Kadapa

SSEL Naini:

Emergency Command Structure:

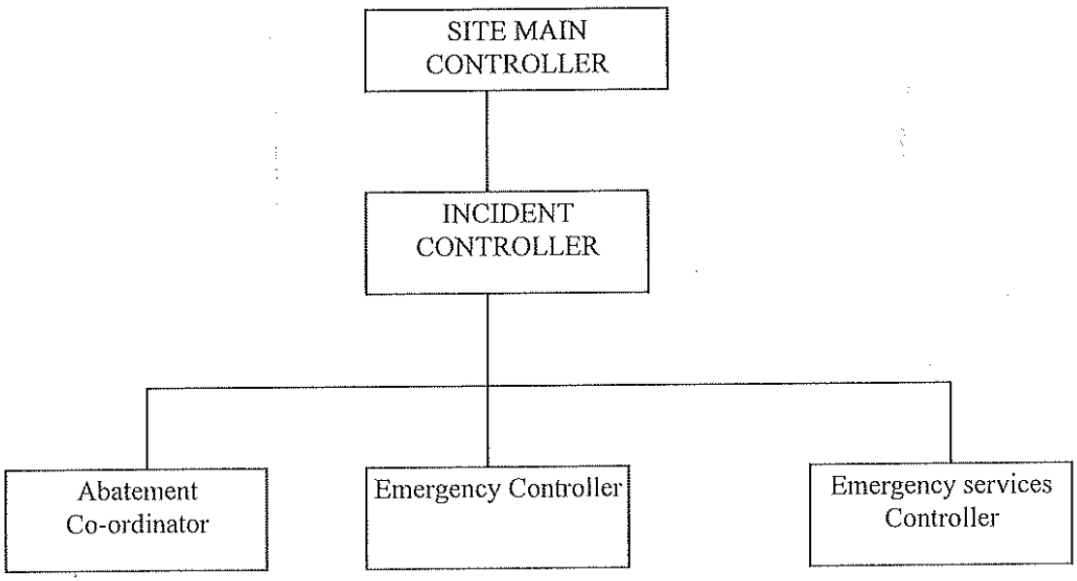


Figure 70: Emergency Command Structure – SSEL Naini

Emergency Commend Team Personnel:

Sr. No.	Role	Designated Personnel	Alternate Personnel
1	Site Main Controller	Factory Manager	Next Senior Person
2	Incident Controller	HR	Next Senior Person (HR)
3	Emergency Controller	Security Officer	Next Senior most Person of security department.
4	Emergency Service Controller	Executive (HR)	Next Senior most Person of P&A.
5	Abatement Co-Ordinator	EHS Manager	Next Senior Person of Deptt.

Table 49: Emergency Commend Team Personnel – SSEL Naini

4.2.3 Safety Committee Members Details

SSEL Kadapa:

SSEL Kadapa – Safety Committee Members			
Sr. No.	**Name**	**Designation / Department**	**Position**
1.	Mr. N Sudhakar Reddy	Plant Head	Safety Committee Chairman
2.	Mr. Reddaiah Reddy	EHS	Safety Committee Secretary
3.	Mr. Laharika	Doctor – OHC	Member

4.	Mr. M.Siva Prasad	Amorphous – Production	Member
5.	Mr. Praveen Prasad	Quality	Member
6.	Mr. Peter Vas	PTR Section – In charge	Member
7.	Mr. N Muralidhar Reddy	Head – Maintenance(Mech)	Member
8.	Mr. Naresh Kumar.M	Assistant Manager – Stores	Member
9.	Mr. SVS Satanayana	Manager – HR & Admin	Member
10.	Mr. Bharath Kumar G	Head – Fabrication Unit	Member
11.	Mr. BM Imran	Sr Engineer – Fabrication	Member
12.	Mr. K.Vinod Kumar Reddy	Asst Manager-Purchase	Member
13.	Mr. Ch.Koteshwara Rao	Manager-Electrical	Member
14.	Mr. Sanjib Murah	Head Guard – Security	Member – Representing Workmen
15.	Mr. CV Subba Reddy	Sr Supervisor - Power job	Member – Representing Workmen
16.	Mr. U. Praveen Kumar	Corrugation Operator - Fabrication	Member – Representing Workmen
17.	Mr. Subrata Gav	Fitter -MDTR Fabrication	Member – Representing Workmen
18.	Ms. S Venkata Rajeshwari	Operator - Insulation	Member – Representing Workmen
19.	Mr. L Prakash Reddy	Operator - Amorphous	Member – Representing Workmen
20.	Mr. Suman Mandal	Senior Operator - CCA	Member – Representing Workmen
21.	Mr. Nithya Pujaiah	Sr Operator-Testing	Member – Representing Workmen
22.	Mr. P Raju Kumar	Sr Operator- Exports	Member – Representing Workmen
23.	Mr. Prabhu Prajapathi	Sr Operator-Conductor Plant	Member – Representing Workmen
24.	Mr. K Gangadhar	Sr Operator-Tanking	Member – Representing Workmen
25.	Mr. YV Sudhakar	Sr. Operator-Winding	Member – Representing Workmen
26.	Mr. N Shiva Shankar	Sr.Operator-Maintenance	Member – Representing Workmen
27.	Mr. Narasimha Reddy	Sr. Manager – HR & Admin	Co-Opted Member
28.	Mr. V Vasudeva Reddy	Security Officer	Co-Opted Member
29.	Mr. Ranjit Gogoi	Compounder - OHC	Co-Opted Member

Table 50: Safety Committee Members – SSEL Kadapa

SSEL Naini:

SSEL Naini – Safety Committee Members			
Sr. No.	**Name**	**Designation**	**Position**
1.	Arun Kumar Yadav	Factory Manager	Management Representative
2.	Shishupal Sharma	Officer – EHS	Management Representative
3.	Brij Gopal Singh	Production In-Charge	Management Representative
4.	Shilpi Ray Das	Admin	Management Representative
5.	Shubham Ghosh	Maintenance	Management Representative
6.	Shiv Kumar Sharma	Security	Management Representative
7.	Smriti Shrivastava	Purchase	Management Representative
8.	Nagendra Kr. Singh	HR	Management Representative
9.	Pavan Kumar Yadav	Store	Management Representative
10.	Mithlesh Singh	DCA	Workers' Representatives
11.	Ravi Shekhar Verma	Winding	Workers' Representatives
12.	Sant Lal Yadav	CCA	Workers' Representatives
13.	Amrit Lal Tiwari	Tanking	Workers' Representatives
14.	Ratan Kumar	Testing	Workers' Representatives
15.	Manjay Kumar Singh	Maintenance	Workers' Representatives
16.	Vimlesh Kumar Tripathi	Project	Workers' Representatives
17.	Raj Kumar Yadav	Store	Workers' Representatives
18.	Vijay Kr. Pandey	Insulation	Workers' Representatives

Table 51: Safety Committee Members – SSEL Naini

4.2.4 Statutory Licenses/ Approvals

Sr. No.	**Description**	**Corresponding Legislation**	**Validity**	
			SSEL Kadapa	**SSEL Naini**
1.	Factory License	Factories Act, 1948	01.01.2025 to 31.12.2025	01.01.2023 to 31.12.2027
2.	CTO – Air	The Air Act, 1981	19.09.2022 to 31.07.2027	06.09.2022 to 31.07.2027
	CTO – Water	The Water Act, 1974	19.09.2022 to 31.07.2027	06.09.2022 to 31.07.2027
3.	HWA	Hazardous Waste Rules, 2016	19.09.2024 to 31.07.2027	17.10.2022 to 31.07.2027
4.	Fire Safety NOC	Factories Act, 1948	11-06-2025 – Valid for 1 year	13.05.2023 to 12.05.2026

Table 52: Statutory Licenses / Approvals

4.2.5 Compliance Documents Availability

Document Name/Description	Corresponding Legislation	Availability Status (Y/N/NA)	
		SSEL Kadapa	SSEL Naini
Organizational OHS Policy	OSH Code, 2020	Y	Y
Standard Operating Procedures (SOPs)	OSH Code, 2020	Y	Y
Risk Assessment Reports (HIRA)	OSH Code, 2020	Y	Y
Emergency Response Plan	OSH Code, 2020	Y	Y
OHS Audit Reports (Internal/External)	OSH Code, 2020	Y	Y
Training Calendar and Logs	OSH Code, 2020	Y	Y
Equipment Testing Certificates (Lifts, Boilers, etc.)	Factories Act, 1948	Y	Y
Register of Adult Workers (Form 11 - Factories Act)	Factories Act, 1948	Y	Y
Health Check-up Records	Factories Act, 1948	Y	Y
Accident/Incident Register	Factories Act, 1948	Y	Y
Records of Occupational Diseases	Factories Act, 1948	Y	Y
Inspection Reports (Electrical, Mechanical)	Factories Act, 1948	Y	Y
Safety Equipment Maintenance Logs	Factories Act, 1948	Y	Y
PPE Distribution Records	Factories Act, 1948	Y	Y
Inventory of Hazardous Substances	Environment Protection Act, 1986	Y	Y
Material Safety Data Sheets (MSDS)	Environment Protection Act, 1986	Y	Y
Spill Response Logs	Environment Protection Act, 1986	**N**	**N**
Fire Extinguisher Inspection Logs	OSH Code, 2020	Y	Y
Evacuation Drill Reports	OSH Code, 2020	Y	Y
Emergency Contact List	OSH Code, 2020	Y	
Contractor Pre-qualification Records	OSH Code, 2020	**N**	**N**
Safety Training Records for Contractors	OSH Code, 2020	Y	Y
Workplace Air Quality Reports	OSH Code, 2020	Y	Y
Noise Level Monitoring Records	OSH Code, 2020	Y	Y
Inspection Notices from Authorities	OSH Code, 2020	Not Received	Not Received
Response to Notices	OSH Code, 2020	NA	NA
Annual Compliance Reports	OSH Code, 2020	Y	Y
Pre-audit Questionnaire	OSH Code, 2020	Y	Y
Previous Audit Findings	OSH Code, 2020	Y	Y
Corrective and Preventive Action (CAPA) Status	OSH Code, 2020	Y	Y

Table 53: Compliance Documents Availability

As per the Factories Act, 1948, and the OSH Code, 2020, the above-mentioned document should be maintained at the site. However, Both SSEL Kadapa & Naini plant has missed some records, which are highlighted in red in Table 51. Please ensure these records are maintained to avoid any non-compliance implications.

4.2.6 Master Document List (List of the documents being maintained in the site)

SSEL Kadapa:

SSEL Kadapa – Master Document List – EHS/OHS			
Sr. No.	**File/Register title**	**Document/Record/ Format Name**	**Document/Record/ Format Number**
1.	EHS Documents	Organization Roles and Responsibilities	SSEOCP/EHS/ORR
2.	EHS Documents	House Keeping	SSEOCP/EHS/HK
3.	EHS Documents	First Aid Procedure	SSEOCP/EHS/FAP
4.	EHS Documents	Safety Procedure for Lifting	SSEOCP/EHS/SPFL
5.	EHS Documents	Noise Control Management	SSEOCP/EHS/NCM
6.	EHS Documents	Consultation And Participation	SSEOCP/EHS/C&P
7.	EHS Documents	Crane And Hoist Operations	SSEOCP/EHS/CHO
8.	EHS Documents	Work Permit Management	SSEOCP/EHS/WPM
9.	EHS Documents	Lock Out and Tag Out	SSEOCP/EHS/LOTO
10.	EHS Documents	Fire Safety Procedure	SSEOCP/EHS/FSP
11.	EHS Documents	Risk Management	SSEOCP/EHS/RM
12.	EHS Documents	Health And Site Safety Plan	SSEOCP/EHS/HSSP
13.	EHS Documents	Chemical Management	SSEOCP/EHS/CM
14.	EHS Documents	Incident/Accident Investigation	SSEOCP/EHS/II-AI
15.	EHS Documents	Waste Management	SSEOCP/EHS/WM
16.	EHS Documents	Emergency Preparation & Response	SSEOCP/EHS/EP&R
17.	EHS Documents	Safety Committee Meeting	SSEOCP/EHS/SCM
18.	EHS Documents	Safety Manual	SSEOCP/EHS/SM
19.	EHS Documents	Motor Vehicle Control Procedure	SSEOCP/EHS/MVCP
20.	EHS Documents	Glass Breakage Procedure	SSEOCP/EHS/GBP
21.	EHS Documents	Welding, Cutting &Grinding Work Procedure	SSEOCP/EHS/WCGWP
22.	First Aid Procedure	First Aid Box List Wise Record	SSEOCP/EHS/FAP
23.	First Aid Procedure	First Aid Material	SSEOCP/EHS/FAM

24.	First Aid Procedure	List Of First aider	SSEOCP/EHS/FAM
25.	Noise Control Management	Noise Record	SSEOCP/EHS/NR
26.	Crane and Hoist Operations	Authorized Persons to Operate the Cranes/Lifting Tools and Tackles.	SSEOCP/EHS/APOCLTT
27.	Work Permit Management	Cold Work Permit	SSEOCP/EHS/CWP
28.	Work Permit Management	Hot Work Permit	SSEOCP/EHS/HWP
29.	Work Permit Management	Electrical Isolation Permit	SSEOCP/EHS/EIP
30.	Work Permit Management	Confined Space Work Permit	SSEOCP/EHS/CSWP
31.	Work Permit Management	Work At Height Permit	SSEOCP/EHS/WAHP
32.	Work Permit Management	General Work Permit	SSEOCP/EHS/GWP
33.	Health and Site Safety Plan	-	-
34.	Chemical Management	List of Chemicals	SSEOCP/EHS/LOC
35.	Incident/Accident Investigation	Detailed Accident Investigation Report	SSEOCP/EHS/DAIR
36.	Incident/Accident Investigation	First Aid	SSEOCP/EHS/FA
37.	Incident/Accident Investigation	Near Miss Investigation	SSEOCP/EHS/NMI
38.	Waste Management	E-Waste Record	SSEOCP/EHS/EWR
39.	Waste Management	Hazardous Waste Record	SSEOCP/EHS/HWDR
40.	Waste Management	Solid Waste Record	SSEOCP/EHS/SWR
41.	Waste Management	Scrap Record	SSEOCP/EHS/SR
42.	Emergency Preparation & Response	Emergency Response Team	SSEOCP/EHS/EP&R
43.	Safety Committee Meeting	Safety Committee Meeting Minutes	SSEOCP/EHS/SCMM

Table 54: EHS/OHS Master Document List – SSEL Kadapa

SSEL Naini:

SSEL Naini – Master Document List – EHS/OHS			
Sr. No.	**Document Category**	**Document Name**	**Document Number**
1.	Work Instruction	Work Instruction of Fire Hydrant System	WI-Naini-EHS-001
2.	SOP	On Site Emergency Plan	SOP-Naini-EHS-001
3.	OCP	Environmental, Health & Safety Operational Control Procedure	OCP-Naini-EHS-001
4.	OCP	OCP for Nylon Polyester Slings	OCP-Naini-EHS-002
5.	Format	Fire Hydrant System and Locations	F-Naini-EHS-001
6.	Format	Environment Display Board Data	F-Naini-EHS-002
7.	Format	Environmental Aspects & Impact Register	F-Naini-EHS-003
8.	Format	Fire Hydrant, Water Consumption & STP Inspection Checklist Format	F-Naini-EHS-004
9.	Format	Fire Fighter Team List	F-Naini-EHS-005
10.	Format	First- Aider Team List	F-Naini-EHS-006
11.	Format	Hira Format	F-Naini-EHS-007
12.	Format	Objectives And Targets 2023	F-Naini-EHS-008
13.	Format	Moc-Drill-21-02-2025-Report	F-Naini-EHS-009
14.	Format	Safety Committee Meeting Format	F-Naini-EHS-010
15.	Format	Fire Extinguisher Point No	F-Naini-EHS-011
16.	Format	Near-Miss & Incident-Register	F-Naini-EHS-012
17.	Format	Safety Committee Register	F-Naini-EHS-013
18.	Format	Incident Report Format	F-Naini-EHS-014
19.	Format	Mock-Drill Record Plan	F-Naini-EHS-015
20.	Format	Drinking Water Test Plan	F-Naini-EHS-016
21.	Legal Documents	LEGAL Register	LEG-01

Table 55: EHS/OHS Master Document List – SSEL Naini

4.2.7 FY (24-25) OHS Consolidated Data

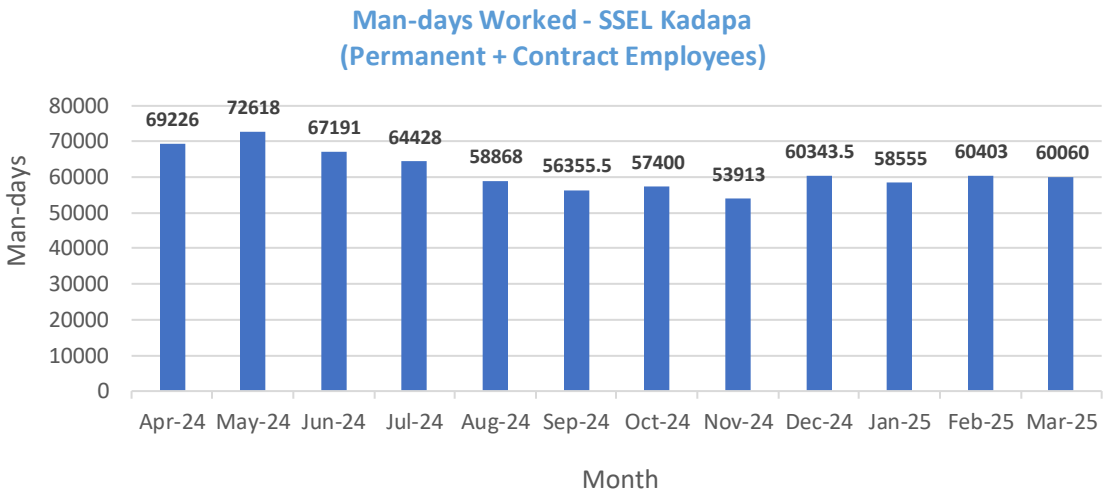


Figure 71: Man-days Worked - SSEL Kadapa

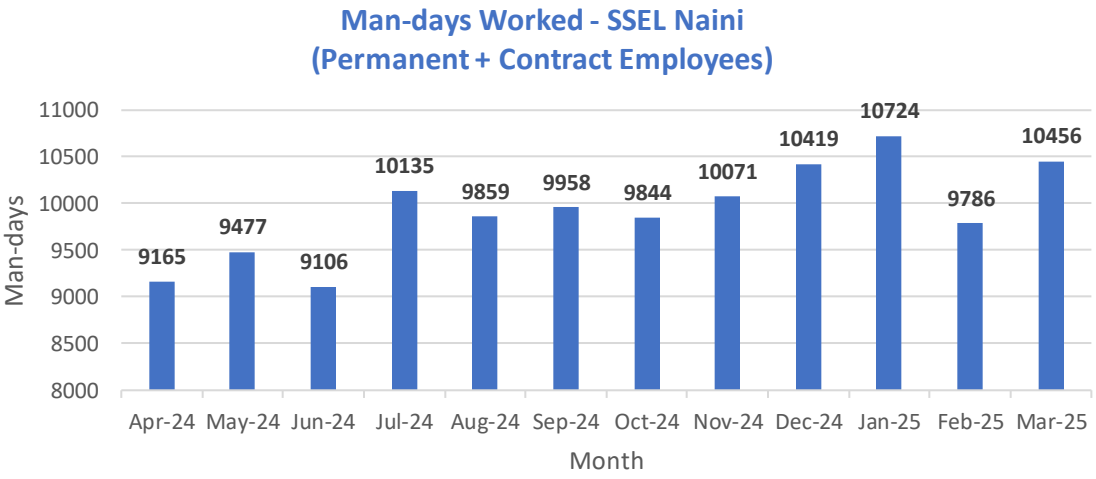


Figure 72: Man-days Worked – SSEL Naini

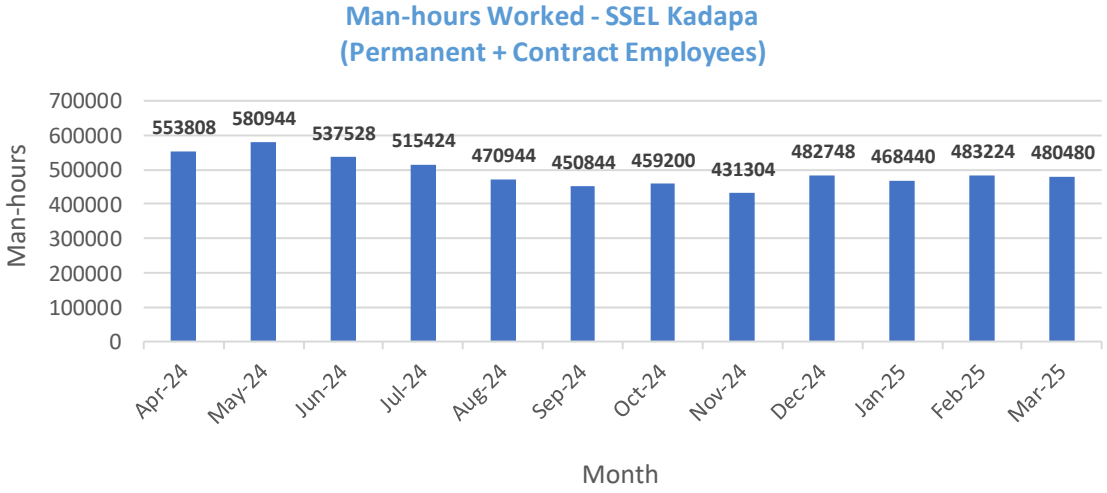


Figure 73: Man-hours Worked – SSEL Kadapa

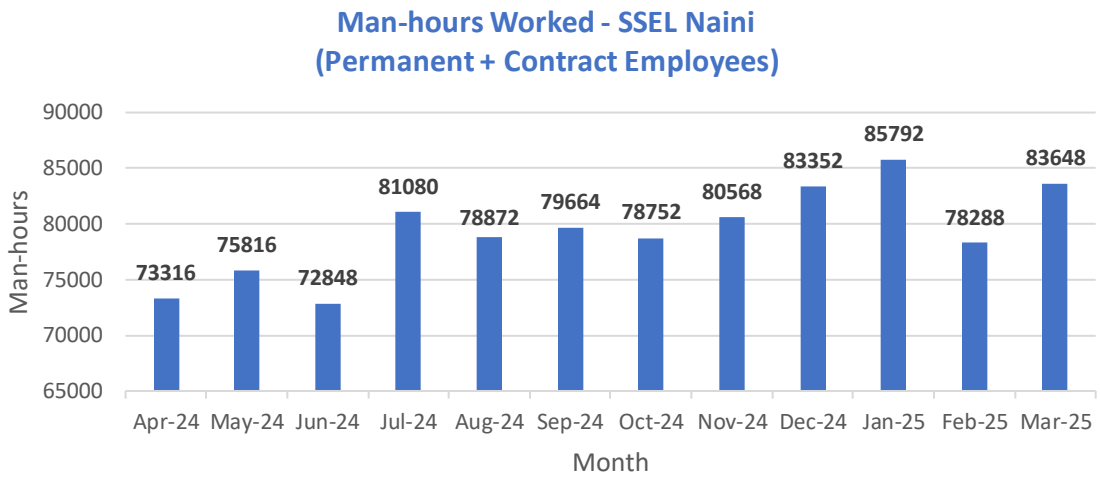


Figure 74: Man-hours Worked – SSEL Naini

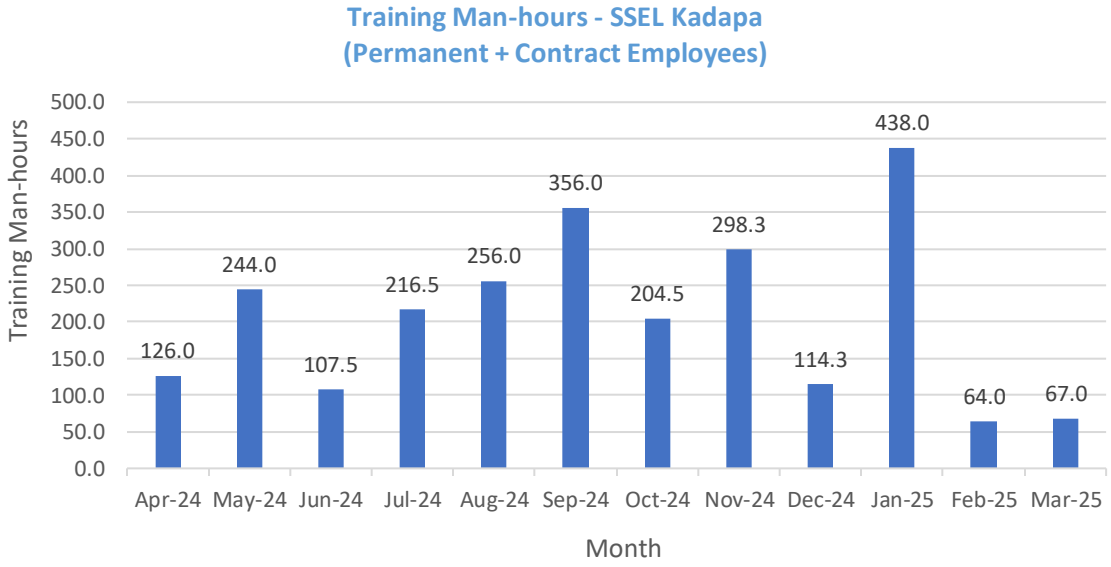


Figure 75: Training Man-hours – SSEL Kadapa

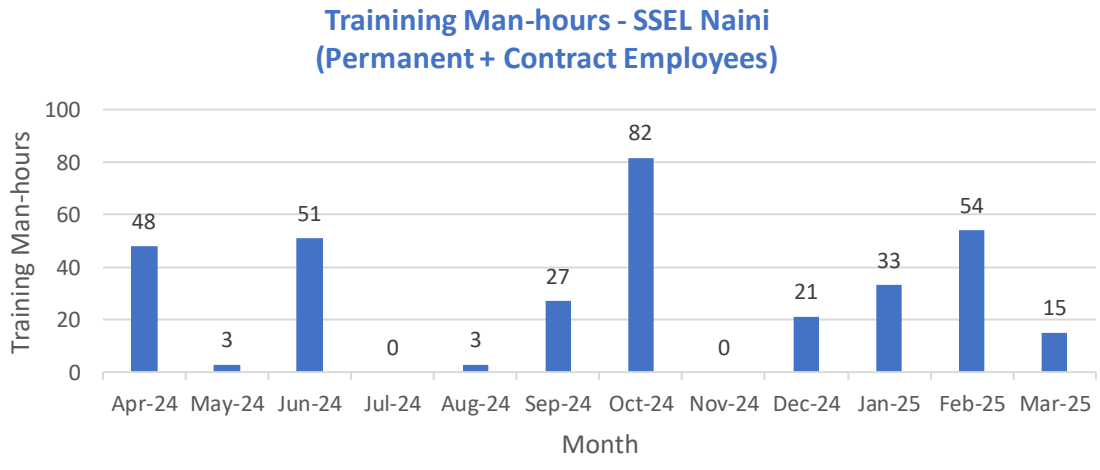


Figure 76: Training Man-hours – SSEL Naini

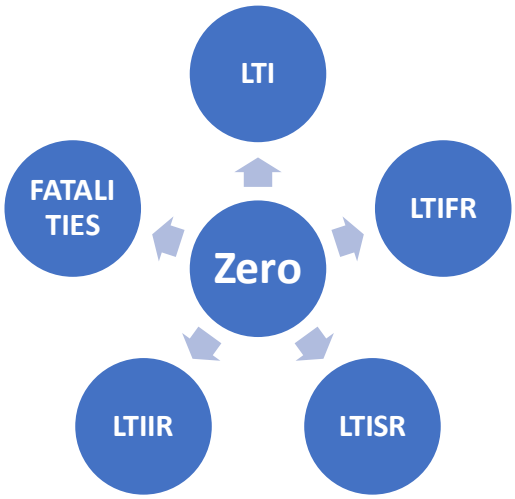


Figure 77: OHS Essential Indicators – SSEL Kadapa

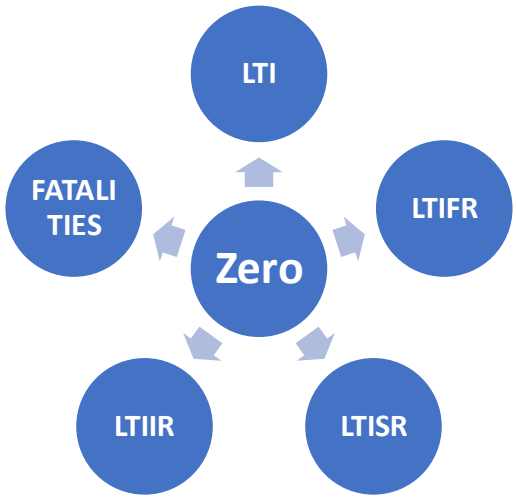


Figure 78: OHS Essential Indicators – SSEL Naini

Annual OHS Consolidated Data 2024-25				
Sr.No.	**Descriptions**	**UOM**	**SSEL, Kadapa**	**SSEL, Naini**
1.	Total Man-days (Permanent + Contractual)	Man-days	739361	118999.5
2.	Total Man-hours worked (Permanent + Contractual)	Man-hours	5914888	951996
3.	Total Safe Man-hours worked	Man-hours	5914888	951996
4.	Man-days lost due to lost time injury	Man-days	0	0
5.	Total Number of Lost Time Injury (LTI)	Nos	0	0
6.	Lost Time Injury Frequency Rate (LTIFR)	Number of LTI per million hours worked	0	0
7.	Lost Time Injury Severity Rate (LTISR)	Lost day per million hours worked	0	0
8.	Lost Time Injury Incident Rate (LTIIR)	Number of LTI per 100 employees	0	0
9.	Fatalities	Nos	0	0
10.	Total Number of Incident	Nos	43	48
11.	Total Number of Observations	Nos	56	122
12.	Total Number of Observation points open	Nos	20	40
13.	Total Training Man-hours	Man-hours	2492.2	336.5
14.	Total Number of Mock drills conducted	Nos	2	2

Table 56 OHS Consolidated Data – FY 24-25

Both SSEL Kadapa and Naini need to increase their training man-hours, especially the Naini plant, which has significantly lower training hours compared to the Kadapa plant.

4.2.8 Accident/Incident Details

Table 57: Accident/Incident Details – SSEL, Kadapa

Accident/Incident Details – SSEL, Kadapa				
Sr. No.	**Date**	**Incident Details**	**Root cause/Description**	**Corrective action taken**
1.	5.06.2024	Fire broke out inside the heat treatment oven and 34 no of Coil were damaged.	Short circuit happened at Y phase of the heater caused the fire.	Ensure to maintain the distance from one coil to another coil. Ensure to check the cable connection frequently. Damaged cables were replaced.
2.	19.04.2024	First aid incident	Injured left Hand Middle Finger	Sensitization and awareness done
3.	25.04.2024	First aid incident	Abrasion on Left Hand	Sensitization and awareness done
4.	14.05.2024	First aid incident	Injured to left hand ring finger	Sensitization and awareness done
5.	18.05.2024	First aid incident	Accidentally hit over the forehead.	Sensitization and awareness done
6.	28.05.2024	First aid incident	Injured to right hand thumb.	Sensitization and awareness done
7.	15.06.2024	First aid incident	Accidentally hit over the forehead.	Sensitization and awareness done
8.	20.06.2024	First aid incident	Injured to right hand thumb.	Sensitization and awareness done
9.	02.07.2024	First aid incident	Laceration to right hand fourth finger.	Sensitization and awareness done
10.	05.07.2024	First aid incident	Injured to right hand fourth finger	Sensitization and awareness done
11.	06.07.2024	First aid incident	Laceration on fore Head	Sensitization and awareness done
12.	10.08.2024	First aid incident	Leg abrasion	Sensitization and awareness done
13.	19.08.2024	First aid incident	Injured to Right hand index finger	Sensitization and awareness done
14.	28.08.2024	First aid incident	Accidentally hit over the forehead.	Sensitization and awareness done
15.	12.09.2024	First aid incident	Accidentally diluted acid drop falls on the right eye	Sensitization and awareness done

16.	13.09.2024	First aid incident	Injured to right hand little finger	Sensitization and awareness done
17.	26.09.2024	First aid incident	Injured to right hand little finger	Sensitization and awareness done
18.	18.10.2024	First aid incident	injured to left knee joint	Sensitization and awareness done
19.	21.10.2024	First aid incident	injured to right hand middle finger	Sensitization and awareness done
20.	26.10.2024	First aid incident	Injured to right hand thumb.	Sensitization and awareness done
21.	26.10.2024	First aid incident	injured to left hand little finger and ring, middle finger	Sensitization and awareness done
22.	26.10.2024	First aid incident	injured to left hand middle finger	Sensitization and awareness done
23.	04.11.2024	First aid incident	injured to over right leg knee leg	Sensitization and awareness done
24.	06.11.2024	First aid incident	Injured to Right hand index finger	Sensitization and awareness done
25.	07.11.2024	First aid incident	injured to left hand middle finger	Sensitization and awareness done
26.	28.11.2024	First aid incident	injured to left hand thumb	Sensitization and awareness done
27.	04.12.2024	First aid incident	injured to right hand ring finger	Sensitization and awareness done
28.	06.12.2024	First aid incident	injured to right hand finger	Sensitization and awareness done
29.	10.12.2024	First aid incident	injured to right hand side fore arm	Sensitization and awareness done
30.	18.12.2024	First aid incident	swelling of left-hand knee	Sensitization and awareness done
31.	11.01.2025	First aid incident	Accidentally hit by hammer right eyebrow	Sensitization and awareness done
32.	24.01.2025	First aid incident	accidentally grinding machine operated left thigh was injured	Sensitization and awareness done
33.	06.02.2025	First aid incident	Foreign body sensation in the left eye	Sensitization and awareness done
34.	08.02.2025	First aid incident	Injury over right hand middle finger while machine operated	Sensitization and awareness done
35.	14.02.2025	First aid incident	Accidentally hit over left thumb by hammer	Sensitization and awareness done

36.	17.02.2025	First aid incident	Injured over right toe due to weight material falling	Sensitization and awareness done
37.	22.02.2025	First aid incident	Injured right hand middle finger due to weight material falling	Sensitization and awareness done
38.	01.03.2025	First aid incident	injured over right thumb nail region due to saw blade touch the finger	Sensitization and awareness done
39.	07.03.2025	First aid incident	Accidentally hit over right wrist by hammer	Sensitization and awareness done
40.	07.03.2025	First aid incident	Injured to right middle finger injury	Sensitization and awareness done
41.	11.03.2025	First aid incident	Injured to left hand middle finger due to grinding machine operation	Sensitization and awareness done
42.	19.03.2025	First aid incident	Injured over upper lip accidental to the cut upper 2nd (Right) Canine	Sensitization and awareness done
43.	25.03.2025	First aid incident	Injured to middle finger laceration	Sensitization and awareness done

Table 58: Accident/Incident Details – SSEL, Naini

Accident/Incident Details – SSEL, Naini				
Sr. No.	**Date**	**Incident Details**	**Root cause/Description**	**Corrective action taken**
1.	03.04.2024	First aid incident	Cut injury in left middle finger.	Sensitization and awareness done
2.	06.04.2024	First aid incident	Burn injury in all right-hand fingers.	Sensitization and awareness done
3.	07.04.2024	First aid incident	Cut injury in upper side of the lips.	Sensitization and awareness done
4.	09.04.2024	First aid incident	Cut injury in right hand thumb.	Sensitization and awareness done
5.	12.04.2024	First aid incident	Cut injury in left leg.	Sensitization and awareness done
6.	02.05.2024	First aid incident	Cut injury in right hand thumb.	Sensitization and awareness done
7.	03.05.2024	First aid incident	Cut injury in left index finger.	Sensitization and awareness done

8.	16.05.2024	First aid incident	Cut injury in right index and thumb finger.	Sensitization and awareness done
9.	20.05.2024	First aid incident	Cut injury in left thumb.	Sensitization and awareness done
10.	21.05.2024	First aid incident	Cut injury in right hand little & ring finger.	Sensitization and awareness done
11.	22.05.2024	First aid incident	Minor cut injury in right middle finger.	Sensitization and awareness done
12.	03.06.2024	First aid incident	Minor cut injury in left hand.	Sensitization and awareness done
13.	12.06.2024	First aid incident	Minor cut injury in right hand wrist joint.	Sensitization and awareness done
14.	14.06.2024	First aid incident	Cut injury in right thumb.	Sensitization and awareness done
15.	01.07.2024	First aid incident	Cut injury in right index finger.	Sensitization and awareness done
16.	02.07.2024	First aid incident	Minor cut injury in right leg.	Sensitization and awareness done
17.	02.07.2024	First aid incident	Minor cut injury in right hand long finger.	Sensitization and awareness done
18.	13.07.2024	First aid incident	Minor cut injury in left leg	Sensitization and awareness done
19.	19.07.2024	First aid incident	Minor cut injury in index finger.	Sensitization and awareness done
20.	22.07.2024	First aid incident	Minor Cut injury in right thumb.	Sensitization and awareness done
21.	27.07.2024	First aid incident	Cut injury in right hand index finger.	Sensitization and awareness done
22.	30.07.2024	First aid incident	Cut injury in forehead.	Sensitization and awareness done
23.	08.08.2024	First aid incident	Cut injury in right hand ring finger.	Sensitization and awareness done
24.	17.08.2024	First aid incident	Cut injury in left hand index finger.	Sensitization and awareness done
25.	16.09.2024	First aid incident	Cut injury in left hand thumb.	Sensitization and awareness done
26.	20.09.2024	First aid incident	Cut injury in right hand index finger.	Sensitization and awareness done
27.	30.09.2024	First aid incident	Cut injury in right hand.	Sensitization and awareness done
28.	01-10-2024	First aid incident	Cut injury on left index finger	Sensitization and awareness done
29.	07-10-2024	First aid incident	Cut injury on right middle finger	Sensitization and awareness done

30.	16-10-2024	First aid incident	Cut injury on left ring finger	Sensitization and awareness done
31.	29-10-2024	First aid incident	Minor cut injury on face left side by eye	Sensitization and awareness done
32.	01-11-2024	First aid incident	Minor injury on right hand forearm	Sensitization and awareness done
33.	06-11-2024	First aid incident	Minor cut injury on left hand ring finger	Sensitization and awareness done
34.	27-11-2024	First aid incident	Minor cut injury on right index finger	Sensitization and awareness done
35.	11-12-2024	First aid incident	Minor cut injury on left hand	Sensitization and awareness done
36.	11-12-2024	First aid incident	Minor cut injury on left middle finger	Sensitization and awareness done
37.	11-12-2024	First aid incident	minor cut injury on left hand thumb	Sensitization and awareness done
38.	17-12-2024	First aid incident	minor cut injury on right hand ring finger	Sensitization and awareness done
39.	18-12-2024	First aid incident	Minor cut injury on left index finger	Sensitization and awareness done
40.	21-12-2024	First aid incident	minor cut injury on right thumb	Sensitization and awareness done
41.	09-01-2025	First aid incident	minor cut injury on left hand thumb	Sensitization and awareness done
42.	21-01-2025	First aid incident	multiple minor cuts on left hand and fingers	Sensitization and awareness done
43.	02-02-2025	First aid incident	Minor cut injury on right index finger	Sensitization and awareness done
44.	09-02-2025	First aid incident	Minor cut injury on nose	Sensitization and awareness done
45.	11-02-2025	First aid incident	iron nail minor cut injury in left leg	Sensitization and awareness done
46.	05-03-2025	First aid incident	minor cut injury in left hand	Sensitization and awareness done
47.	08-03-2025	First aid incident	minor cut injury on right thumb	Sensitization and awareness done
48.	21-03-2025	First aid incident	minor cut injury on left leg	Sensitization and awareness done

In SSEL Kadapa plant 43 first aid incident happened whereas in SSEL Naini plant 48 first aid incident happened, most of which were the cut injuries. To prevent these injuries, it is important to provide proper training and ensure the proper usage of PPEs.

Both SSEL Kadapa & Naini plant should deliberate on the observations and ensure elimination/reduction of incidents smaller injury not considered report-worthy.

4.2.9 Site Observation Details

Figure 79: Caution & Warning Sign Symbol

The SSEL Kadapa plant has recorded 56 observations during the period from April 2024 to March 2025 (Observations Report - SSEL Kadapa), out of which 36 observation points have been successfully closed. SSEL Naini plant has recorded total of 122 observations during Apr'24 to Mar'25 (Observation Report - SSEL Naini) and 40 observations are still pending, of which 38 are unsafe conditions and 2 are unsafe acts. These observations include improper earthing, unsafe/damaged tools and equipment, unattended tools, machine guarding, and housekeeping. It is recommended to close the open points within the specified time frame to avoid process interruption.

We appreciate the efforts of the site team in actively identifying and reporting safety observations. We encourage the team to continue capturing as many observations as possible, and to motivate all employees to report unsafe conditions, near misses, and unsafe acts to the concerned person promptly. It is equally important to ensure timely closure of reported observations to strengthen our safety culture and maintain a proactive approach to risk management.

4.3 Training Details

4.3.1 Training Calendar followed by site team

Table 59: Training Calendar for the Year 2025 – SSEL Kadapa

SSEL Kadapa – Training Calendar - 2025			
Sr. No.	**Month**	**Planed Week**	**Topics**
1.	Jan-25	2nd Week	Basic Fire Safety
2.	Feb-25	3rd Week	Behavior Based Safety Training
3.	Mar-25	2nd Week	Environmental Aspects and Impacts Training
4.	Apr-25	3rd Week	Manual Material Handling Safety Training
5.	May-25	3rd Week	Ladder Safety Training
6.	Jun-25	2nd Week	Work at Height Training
7.	Jul-25	1st Week	Work Permit System
8.	Aug-25	2nd Week	Portable Power Tools Safety
9.	Sep-25	3rd Week	PPE Training
10.	Oct-25	4th Week	Electrical Safety Training
11.	Nov-25	4th Week	Fire and Safety Training
12.	Dec-25	1st Week	General Safety Training

Table 60: Training Calendar for FY25-26 – SSEL Naini

SSEL Naini – Training Calendar – FY25-26				
Sr. No.	**Internal/ External**	**Frequency**	**Topics**	**Tentative Schedule**
1.	Internal	Half yearly	Mock-Drill Training	1st Week of Apr'25 & 3rd Week of Oct'25
2.	Internal	Quarterly	Firefighting Training	2nd Week of May'25, 4th Week of Aug'25, 1st Week of Nov'25, & 3rd Week of Feb'26
3.	Internal	Quarterly	Electrical Training	3rd Week of Jun'25, 1st Week of Sep'25, 2nd Week of Dec'25, & 4th Week of Mar'26
4.	Internal	Half yearly	Confined Space Training	2nd Week of Jul'25 & 1st Week of Jan'26
5.	Internal	Quarterly	Material Handling	4th Week of May'25, 1st Week of Aug'25, 2nd Week of Nov'25, & 3rd Week of Feb'26
6.	Internal	Half yearly	5 S Training	4th Week of Jun'25, & 4th Week of Dec'25
7.	Internal	Quarterly	Work at Height	4th Week of Apr'25, 1st Week of Jul'25, 2nd Week of Oct'25, &

				3rd Week of Jan'26
8.	Internal	Yearly	Ergonomics posture training	3rd Week of Sep'25
9.	Internal	Quarterly	Emergency Management	2nd Week of May'25, 4th Week of Aug'25, 1st Week of Nov'25, & 3rd Week of Feb'26
10.	External	Yearly	Firefighting	1st Week of Mar'26
11.	External	Yearly	First AID Training	4th Week of Nov'25
12.	External	Yearly	Crane Operation Training	3rd Week of May'25

4.3.2 SHINE - Voluntary Themed Events Initiated by ESG Department

In order to standardize, streamline and **SHINE (Safety and Health Innovations Nurturing Excellence)** we have instituted a Special Quarterly OHS Themed Event. These are voluntary events which will enable SSEL to reach the Leadership Indicators as listed in the BRSR – Business Responsibility and Sustainability Reporting – a disclosure document required under SEBI reporting. Similar standards of activity and disclosure is expected under global ESG reporting standards and frameworks.

The aim of this themed event is to also make OHS more interesting and creative, so that there is an enthusiastic participation and recall of the activities. The research and content document for the activities is being done by ESG team and shared with site teams every quarter to bring about a uniformity of OHS voluntary events at all locations, just as the regulatory observances are uniformly done.

This themed event is based on the 4 elements – Water, Air, Earth and Fire as a theme. Please refer to the below table 61.

January - March	Earth
April - June	Fire
July - September	Water
October - December	Air

Table 61: Elements of Themed Events

2. July to September 2024: Water Theme

Figure 80: Water Themed Event Activities

ACTIVITIES OF SPECIAL EVENT :

Sl.No	Date & Day	Activities to Conduct	Note	Impact
1.	Day 1: 22.07.24, Monday	Awareness Session	• OHS/EHS head will present the PPT and invite the top management to speak at this event– Location person to fill it.	1. Emphasize the H&S focus of the organization. 2. Make H&S more creative & interesting.
2.	Day 2: 23.07.24, Tuesday	Training Sessions 1. Preparedness for flood hazards for H & S 2. Costal zone plant to include preparedness on Tsunami/Cyclone.	• Location OHS can select any one training and execute –Location person to fill it.	Improve awareness and preparedness for water based disaster.
3.	Day 3: 24.07.24, Wednesday	Mock Drill of any one scenario based on day 2 training section.	• Location OHS can select and execute- Location person to fill it.	Improve awareness and preparedness for water based disaster.
4.	Day 4: 25.07.24, Thursday	Public Interactive- with family, school, general public, specific organizations. Drawing competition, Slogan Writing Competition & quiz.	• Location OHS can select any one option and execute– Location person to fill it.	1. Emphasize the H&S focus of the public. 2. Make H&S more creative & interesting.
5	26.07.24 Friday	Closing Ceremony	1.Location OHS to invite external guest only after consulting with location head 2. Location OHS to take approval for budgets from location head well in advance 3. Prize distribution and closing ceremony festivities – Location person to fill it.	1. Reward & Recognize enthusiasm and pro-active safety behavior. 2. Enable pleasant recall of the event

Snapshot of the water themed event:

Figure 81: Pictures of the Water Themed Event at SSEL Kadapa & Naini

SSEL Kadapa:

SSEL Naini:

3. October to December 2024: Air

Figure 82: Air Themed Event Activities

ACTIVITIES OF SPECIAL EVENT

Sl.No	Date & Day	Activities to Conduct	Note	Impact
1.	Day 01 21.10. 2024, Monday	Awareness Session	OHS/EHS head will present the PPT and invite the top management to speak at h event (location person to fill as per plan note in ppt)	Emphasize Health & Safety initiatives, ma it more creative and engaging
2.	Day 02 22.10.24, Tuesday	Training Sessions 1.Preparedness for Toxic gases release hazards for H & S 2.Preparedness on smoke Emission due fire accident	Location OHS can select any one training and execute (location person select one the two options and write a brief note h before presenting)	Improve awareness and preparedness fo pollution at workplace
3.	Day 03 23.10.24, Wednesday	Mock Drill of any one scenario based or day 2 training section.	Location OHS can select and exeeute (Location person to fill here as per mock drill)	Improve awareness and preparedness fo pollution at workplace
4.	Day 04 24.10.24, Thursday	Public Interactivewith family, school, general public, specific organizations. Drawing competition, Slogan Writing Competition Quiz, & Air pollution awareness rally	(Location person to fill selected option before presenting this ppt)	Improve awareness of air pollution amor public
5	Day 05 25.10.24, Friday	Closing Ceremony	1.Location OHS to invite external guest o after consulting with location head 2. Location OHS to take approval for budg from location head well in advance 3. Prize distribution and closing ceremon festivities (Location person to fill this notpeersplan)	Provide positive feedback and recognize proactive efforts Enable pleasant recall of the event

Snapshot of the air themed event:

Figure 83: Pictures of the Air Themed Event at SSEL Kadapa & Naini

SSEL Kadapa:

SSEL Naini:

4. January to March 2025: Earth

Figure 84: Earth Themed Event Activities

ACTIVITIES OF THEMED EVENT :

Sl. No	Date & Day	Activities to Conduct	Note	Impact
1.	Day 1: 17.01.25, Saturday	Awareness Session with Special Mention of Road Safety.	OHS/EHS Head will present the PPT and invite the top management to speak at this event – Location person to fill	1. Emphasize the H&S focus of the organization. 2. Make H&S more creative & interesting. 3. Special reference to Road Safety for drivers and pedestrians
2.	Day 2: 18.01.25 Friday	Public Interactive Session – i) Road safety awareness rally with employees and local community/school/ college students. ii)Drawing/Slogan Writing/quiz Competition.	Location OHS can select any one competition and execute – Location person to fill it.	1. Emphasize the H&S focus of the public. 2. Make H&S more creative & interesting.
3.	Day 3: 20.01.25, Monday	Training Sessions 1. Preparedness for Earthquakes. 2. Preparedness for Landslides.	Location OHS can select any one training and execute – Location person to fill it.	Improve awareness and preparedness for earth based disaster.
4.	Day 4: 21.01.25, Tuesday	i)Mock Drill of any one scenario based on day 3 training section. ii) Participation/Suggestions during training session – Recognition/prize	Location OHS can select and execute – Location person to fill it.	Improve awareness and preparedness for earth based disaster.
5	Day 5: 22.01.25 Wednesday	Closing Ceremony & Prize Distributions.	1.Location OHS to invite external guest only after consulting with location head 2. Location OHS to take approval for budgets from location head well in advance 3. Prize distribution and closing ceremony festivities – Location person to fill it.	1. Reward & Recognize enthusiasm and pro-active safety behavior. 2. Enable pleasant recall of the event

Snapshot of the Earth themed event:

Figure 85: Pictures of the Earth Themed Event at SSEL Kadapa & Naini

SSEL Kadapa:

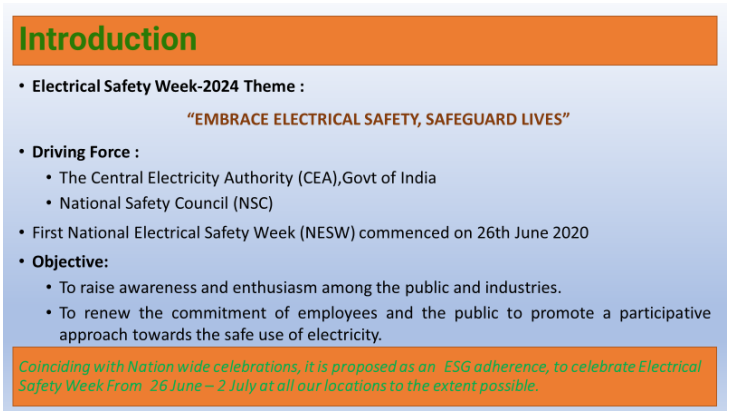
SSEL Naini:

4.3.3 Other Events

June 2024: National Electrical Safety Week

National Electrical Safety Week was celebrated on 26th June to 2nd July 2024.

Figure 86: National Electrical Safety Week Activities



Activities List Proposed

Sl.No	Date & Day	Activities to Conduct	Note	Impact
1.	26.06.24, Wednesday	Opening Ceremony	• Plant leaders will speak about the importance of Electrical safety at work place , home and public places. • Ensure sufficient promotional banners, standees, placards and danglers are placed to create awareness and atmosphere of celebrations • Pledge	showcase commitment to safety
2.	27.06.24, Thursday	Electrical Safety awareness & training to staff & workmen.	• Training should include Mock drill on electrical shock, recognizing electrical dangers and reporting mechanism.	Improve awareness and preparedness in case of accidents
3.	28.06.24, Friday	Awareness training program for selected neighborhood school children	• One plant team can take these initiative do training session on electrical safety at nearby school. • Pledge	Extend the awareness to public
4.	29.06.24, Saturday	Drawing Competitions for Employees children.	• Organize employee children drawings done at their houses and submitted by employees on 29 June in plant. Those drawing will be displayed at Plant locations and also winners will be selected	Include entire family in the safety drives
5	01.07.24 Monday	Conduct various completions like slogans, Quiz, awareness drawings	• Among the staff & workmen.	Reward & Recognize enthusiasm and pro-active safety behavior
6.	02.07.24	Closing Ceremony	• Prize distribution and closing ceremony festivities	Enable pleasant recall of the event

Snapshot of the event:

Figure 87: Pictures of the National Electrical Safety Week Celebration at SSEL Kadapa & Naini

SSEL Kadapa:

SSEL Naini:

4.4 OHS Policy

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2.3 OCCUPATIONAL HEALTH & SAFETY POLICY

SSEL

OCCUPATIONAL HEALTH & SAFETY POLICY

Version 1.0 Dated 16.12.2024
No. of Pages 2
Developed by: ESG Department
Owner Department: EHS Department & HR Department
Approved by : Group CEO

SSEL is committed to providing a safe and healthy work environment for all employees, contractors, and visitors.

Our aim is to achieve zero work related injuries and illnesses. We believe that all incidents are preventable through proactive risk management and continuous improvements.

This policy applies to all employees, contractors, and visitors across all SSEL facilities.

Commitment to Occupational Health and Safety:

- We are dedicated to maintaining a safe workplace by preventing accidents, promoting health and safety awareness, and complying with all relevant safety laws and regulations.
- We will implement and maintain **ISO 45001** international standards at all our facilities.
- Our commitment to OHS is based on national and global leadership indicators reflected in various global frame work and standards.
- In addition, regular risk assessments and emergency preparedness plans to address & mitigate potential health and safety hazards, will be taken up.

OHS Projects & Activities:

- Our quarterly OHS calendar includes activities like internal training, external third-party training, regular health checkup of employees.
- It also includes several voluntary activities which emphasize building a Safety-First culture.
- These activities are aligned to our ESG goals. Examples are wellness related activities, cross department audit and safety walk.
- Several events which include family, children and community also be conducted to create heightened awareness of safety.

Training & Awareness:

- Regular OHS awareness will be done to ensure all employees understand and adhere to our health and safety protocols.
- All employees will receive mandatory safety training, and to constantly remind them of safe practices, communication through posters, banners and the like will be displayed.
- We will support employee well-being through health screenings, wellness programs, and mental health resources.

Documentation and Reporting:

- Data, photographs, case studies, suggestions, interactive dialogue capture and much more go into creating a transparent report.
- Based on the above reports, achievement of long-term and short-term targets can be measured and reported.

Champion and Responsibilities:

- Every employee is the safety champion. The more senior the designation the higher is the safety responsibility to an employee. Influencing not just colleagues and subordinates but also vendors, suppliers and all other stakeholders is every employee's responsibility.
- All employees must follow OHS guidelines, reporting hazards, unsafe acts, unsafe conditions near misses, and participate in safety training.
- Employees should follow safety procedures, including the use of PPE and adherence to emergency response plans, with regular drills conducted.
- Employees should ensure that all tasks are performed in a manner that minimize risk to health and safety

- The site EHS/OHS team will report all incidents, including near-misses, immediately, and a thorough investigation will be conducted to identify root causes, implement corrective actions and preventive actions.

Influencer in the Value Chain:

- SSEL will take up the mantle of being an influencer in the value chain by ensuring that all value chain partners observe in their respective location/plant/factory/, stringent safety parameters and will be open to visit and audit by SSEL of their safety compliance. This clause will be included in all work/ purchase order released to vendor.
- SSEL will proactively carry message and awareness of Safety First in difference scenarios to members of public, community, students and families through various activities conducted by its employees

Legal and Regulatory Compliance:

- We will adhere to all relevant OHS regulations and standards, as per Indian laws and enactment and global standards wherein India is signatory

Continuous Improvement:

- Our OHS performance will be monitored regularly, with progress reported to senior management quarterly and shared with stakeholders regularly.
- This policy will be reviewed and updated annually to incorporate new safety standards to ensure its ongoing effectiveness.

* * *

4.5 Supplier Code of Conduct

A Supplier Code of Conduct is essential for ensuring ethical, sustainable, and high-quality production. It sets clear expectations for suppliers, promoting responsible business practices across the supply chain.

1. Ensures Ethical Sourcing & Labor Practices
   - Prevents forced labor, child labor, and unfair wages within the supply chain.
   - Upholds fair working conditions, worker rights, and safe labor environments in accordance with ILO conventions.
   - Promotes diversity, inclusion, and non-discrimination among suppliers.
2. Promotes Environmental Responsibility
   - Regulates raw material sourcing, chemical usage, and waste management to minimize environmental harm.
   - Encourages sustainable extraction of key materials such as silicon, silver, and rare earth metals.
   - Supports energy-efficient and low-emission manufacturing to reduce the carbon footprint.
3. Enhances Product Quality & Safety
   - Ensures suppliers meet strict quality control and safety regulations to maintain high industry standards.
   - Reduces the risk of defective or substandard solar panels entering the market.
   - Supports the development of durable, reliable, and high-performance solar PV products.
4. Strengthens Compliance & Legal Adherence
   - Aligns with international trade regulations (e.g., EU Green Deal, US Uyghur Forced Labor Prevention Act).
   - Helps companies avoid legal risks, financial penalties, and reputational damage.
   - Ensures compliance with ISO standards (e.g., ISO 14001 for environmental management and SA8000 for social accountability).
5. Boosts Brand Reputation & Market Acceptance
   - Builds trust with consumers, investors, and businesses that prioritize ethical sourcing and sustainability.
   - Strengthens Environmental, Social, and Governance (ESG) performance, attracting responsible investors.
   - Enhances eligibility for government incentives, partnerships, and corporate procurement programs.
6. Encourages Transparency & Accountability
   - Implements supplier audits, reporting mechanisms, and third-party verifications to uphold ethical standards.
   - Establishes a whistleblower system for reporting violations or unethical practices.
   - Provides a structured framework for continuous improvement in sustainability and corporate responsibility.

The Supplier Code of Conduct came into effect as a Policy on 16th Dec 2024. The plan is to inspire and influence vendors and suppliers on ESG adherences, and over a period of time classification of vendors based on ESG adherences.

4.6 Supplier Code of Conduct Policy

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2.8 SUPPLIER CODE OF CONDUCT POLICY

SSEL

SUPPLIER CODE OF CONDUCT POLICY

Version 1.0 Dated 16.12.2024
No. of Pages 5
Developed by: ESG Department
Owner Department: PROCUREMENT DEPARTMENT
Approved by : Group CEO

Background:

Shirdi Sai Electricals Limited (SSEL) believes in conducting business with honesty and integrity, treating all people with dignity and respect, supporting our communities, and abiding by the laws, regulations and treaties of the countries in which we operate.

Purpose:

In selecting its suppliers, SSEL endeavors to choose reputable business partners who conduct their business in a manner that shows commitment to high ethical standards, safe and healthy working environments, protection of human rights and dignity, protection of the environment and compliance with the law.

The thread of Sustainability runs through the entire value chain and binds us to a common goal of sustainable development. We believe that our ESG practices make us resilient, better equipped for a tomorrow – risk ready and innovation advanced. And, moving forward as a value chain with common principles, beliefs and aspirations!

Scope: This Supplier Code of Conduct (SCoC) outlines our expectations regarding the workplace standards and business practices of our suppliers, along with their parent entities, subsidiaries, affiliates, subcontractors and others who are within their supply chain ("supplier").

The expectations contained in this code are factors essential to our decision whether to enter into or extend existing business relationships. Each supplier is responsible for ensuring that its employees, representatives, and subcontractors understand and comply with this code.

This code is focused on principles that uphold consistent compliance obligations throughout our operations. Suppliers are also expected to comply with all laws and treaties of the territories in which they operate. Transparency at all stages is a non-negotiable mark of business responsibility, which we expect from our suppliers.

Workplace, Labor and Human Rights

Business partners/suppliers must respect, protect and endorse all internationally recognized Human Rights Standards like the UN Universal Declaration of Human Rights, UN Guiding Principles on Business and Human Rights among others. Business partner/suppliers must also commit to fair employment practices.

Prevention of Forced Labor: Bonded labor, involuntary labor including human trafficking. Employees must have the freedom to terminate their employment with reasonable notice.

Prohibition of Child Labor: Business partners/suppliers must categorically abstain from directly or indirectly employing children below the legal minimum age for employment.

Respect and Dignity: Suppliers are expected to keep their workplaces free of harassment, harsh treatment, violence, intimidation, corporal punishment, mental or physical coercion, verbal abuse, or discrimination.

Fair remuneration & Decent Working Hours: Suppliers must follow all laws governing wages and working hours including compensation, benefits, and overtime.

Freedom of Association and Collective Bargaining: Suppliers must respect the right of their employees to join or not to join any lawful association without fear of retaliation.

Employment Eligibility & Voluntary Labor: Supplier shall only employ workers with a legal right to work. Suppliers must refrain from any conduct – and require their contractors to refrain from any conduct – that user threats, force or any form of coercion, abduction, intimidation, retaliation or abuse of power for the purpose of exploitation, forced labor or slavery of any individual, suppliers must comply with all laws governing human trafficking and slavery.

Occupational Health & Safety

Safeguards to prevent incidents: We expect suppliers to promote and provide secure, safe and healthy work sites. Suppliers should have everything in place that is needed to reduce the risk of accidents, injuries and exposure - especially where hazardous materials are present.

Processes that ensure safety adherence: They must have well-established safety procedures, preventative maintenance and protective equipment in compliance with the law.

Regular Training & Awareness Drives: Regular training must be provided to the employees to foster a culture of safety and encourage behavior that respects safe practices

Business Conduct and Ethics:

Anti-corruption & Bribery: Suppliers must not engage in illegal payments, bribes or corruption and other unethical practices as it erodes trust, distorts competition and poses significant legal and reputational risks. A supplier must use every effort to legally understand and determine while dealing with a government official, when a payment may be legitimate and not a bribe.

Gifts and Hospitality: Any hospitality or gift provided should be for genuine purposes of goodwill and fall within the boundaries of what is generally considered normal, reasonable, and appropriate. Offer of gifts, favors or entertainment where they are intended – or appear intended to obligate the receiver are strictly discouraged.

Antitrust and Competition Laws: Suppliers must avoid agreements or actions that illegally limit trade or competition. They should avoid cartelization tactics that are detrimental to SSEL and the fair play principles. They may not offer our employees any confidential information about SSEL competitor.

General Contracting Ethics and Fiscal Integrity: When providing goods and services, suppliers must meet their contractual obligations and follow the law. Any representation must be accurate and truthful. Suppliers must not indulge in any corrupt, fraudulent, collusive or coercive practices which can attract termination. Furthermore, suppliers must keep accurate records that comply with the law.

Conflicts of Interest: Suppliers shall disclose to SSEL any potential conflict of interest, such as when one of their employees (or someone close to the employee) has a relationship with SSEL employee who can make decisions that will affect the supplier's business- or when a SSEL employee has any kind of interest in the supplier's business

Securities and Insider Trading: If a supplier learns of any material non-public information while working for SSEL they must not share that information with others or use it for market trading.

Intellectual Property and Data Privacy: Suppliers must protect all of SSEL intellectual property rights, trade secrets and proprietary information. They must also protect personally identifiable information that they keep for SSEL from unauthorized access, destruction, changes, use and disclosure.

Responsibility to the Earth & Communities:

Adherence to Environmental Laws: Suppliers must comply with all environment laws, including those relating to hazardous materials, wastewater, solid waste and air emissions.

Demonstrate commitment to environmental sustainability: We encourage our suppliers to reduce the environmental impact of their operations and safeguard the natural resources on which we all depend, especially through responsible efforts to reduce or eliminate waste of all types. Such efforts include source reduction, recycling, reusing materials and conserving water and energy.

Transparency of Impact Achieved: The impact thus achieved would be crucial as regulatory oversight on environmental impact, carbon footprint, circularity are now important to determine vendors and pricing. Hence, suppliers must be transparent and open to audit when the same is necessary for the value chain to clinch business.

Communities: We expect Suppliers to have an understanding of how their activities impact their local area and wider community. We encourage them to make positive contributions and investments including local employment opportunities, workforce volunteering, and charitable activities as well as minimizing disruption to communities.

Implementation: Suppliers must comply with this code and the law. They shall be responsible for any monitoring of their compliance and their efforts to promote compliance within their supply chains.

SSEL reserves the right to investigate any instances of a supplier's non-compliance of which it becomes aware. Non - Compliance may be grounds for SSEL to void or terminate contractual obligations with a supplier.

SUPPLIER ACKNOWLEDGEMENT: We here by acknowledge the receipt of the Supplier Code of Conduct (SCoC) of SSEL and agree to abide by the SCoC as an integral and obligatory covenant in the agreement between us and SSEL

For

[Industry Name]

Signature: _____ Date: _____

Name of Signatory: _____

Designation of Signatory: _____

***

4.7 ISO 45001 Certificates for SSEL Kadapa and SSEL Naini

TÜVINDIA

Certificate

TÜVINDIA
TUV INDIA PVT. LTD.
ISO 45001:2018
www.tuv-nord.com/in

Management system as per

ISO 45001:2018

The Certification Body TUV INDIA PVT. LTD. hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

SHIRDI SAI ELECTRICALS LIMITED
Plot No.S: 50-55, 58-60, 45A, 45B, 137A, 137B, 137C, 138A, 138B, 1-2 & 13/82, Industrial Development Area,
Kadapa – 516 002, YSR District,
Andhra Pradesh,
India

SSE
SHIRDI SAI ELECTRICALS LTD

operates a management system in accordance with the requirements of ISO 45001 : 2018 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope

Design and Development, Manufacture, Testing, Supply and Service of Distribution, Power Transformers, Dry type and Special Transformers and Including Processing, Testing & Supply of Transformers Parts Like CRGO Silicon Steel & Amorphous Metals Cores, Core Assemblies, Winding Coils, Core Coil Assemblies, Tanks Fabrication, Aluminium, Copper Wires & Conductors.

Certificate Registration No. **IND 126 24394100**
Audit Report No. **Q 13701/2024**

Valid from **26.11.2024**
Valid until **11.11.2027**
Initial certification **08.07.2024**
Certified by another CB Since **12.11.2021**

Visit our database to verify the validity of this certificate.

Mumbai, **26.11.2024**

Certification Body at TUV INDIA PVT. LTD.

To verify the validity of this certificate, please visit **https://www.iafcertsearch.org**

TUV INDIA PVT. LTD.
801, Raheja Plaza 1, L.B.S Marg,
Ghatkopar (W) Mumbai – 400 086,
India
www.tuv-nord.com/in

NABCB
OH 006

IAF
MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

TÜV ®

TÜVNORDGROUP

4.8 ISO 45001 Certification for SSEL Naini

BUREAU VERITAS

Bureau Veritas Certification

SHIRDI SAI ELECTRICALS LIMITED

SSE Transformation Through Innovation

4/3, CHAK DAUD NAGAR, INDUSTRIAL AREA, MIRZAPUR ROAD, NAINI,
PRAYAGRAJ – 211 008, UTTAR PRADESH, INDIA.

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above Organisation has been audited and found to be in accordance with the requirements of the Management System Standards detailed below.

Standards

ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018

Scope of certification

DESIGN, MANUFACTURING, SUPPLY, ERECTION, COMMISIONING, SERVICING & REPAIR OF:

- **TRANSFORMERS UPTO 400KV CLASS 500 MVA SINGLE PHASE BANK & THREE PHASE, POWER AND AUTO TRANSFORMERS.**
- **SHUNT & SERIES REACTORS UPTO 400 KV CLASS 125 MVAR IN SINGLE PHASE & THREE PHASE.**
- **SPECIAL TRANSFORMERS INCLUDING TRACKSIDE, FURNACE, FREIGHT LOCO TRACTION, SCOTT AND V CONNECTED, EARTHING TRANSFORMER.**

Original cycle start date:	**13 July 2023**
Expiry date of previous cycle:	**Not Applicable**
Certification Audit date:	**17 June 2023**
Certification cycle start date:	**13 July 2023**

Subject to the continued satisfactory operation of the Organisation's Management System, this certificate is valid until: **12 July 2026**

Certificate No. **IND.23.5178/IM/U** Version: **1** Issue date: **13 July 2023**

Signed on behalf of BVCH SAS UK Branch
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

For certificate authenticity, click here
https://certcheck.ukas.com/

ISO 9001	**IN044175**
ISO 14001	**IN044174**
ISO 45001	**IN044176**

UKAS MANAGEMENT SYSTEMS
0008

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.

Local office: Bureau Veritas (India) Private Limited (Certification Business)
72 Business Park, Marol Industrial Area, MIDC Cross Road "C",
Andheri (East), Mumbai – 400 093, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call **+ 91 22 6274 2000.**

5. GOVERNANCE

5.1 Overview of the Policies

All policies of SSEL are documented in SSEL Policies Manual and they are divided into three categories:

1. **Workplace Conduct & Culture Policies** *(Affecting Inter-Employee Relations & Organizational Culture)*
2. **Operational & Compliance Policies** *(Ensuring Legal & Industry Standards Compliance)*
3. **Employee Management Policies** *(Focusing on Effective Talent Recruitment & Management)*

5.2 Prelude of the policy categories

5.2.1 Workplace Conduct & Culture Policies (Affecting Inter-Employee Relations & Organizational Culture)

Importance of Workplace Conduct & Culture Policies

Workplace conduct and culture policies are fundamental to fostering a healthy, productive, and inclusive work environment.

These policies help in:

- Promoting Fairness & Respect: They ensure that all employees are treated with dignity and respect, which leads to a positive workplace culture.
- Preventing Harassment & Discrimination: These policies are designed to eliminate discriminatory behaviors and ensure compliance with legal and ethical standards.
- Enhancing Employee Engagement: Clear guidelines on behavior, ethics, and workplace culture can drive higher morale, motivation, and retention rates.
- Risk Mitigation: By proactively addressing potential issues like harassment or unethical behavior, organizations can avoid costly lawsuits, reputational damage, and regulatory sanctions.
- Attracting Talent: A clear and inclusive culture fosters a sense of belonging, which helps attract diverse talent, particularly in competitive markets.

Importance as per the UNSDGs

The United Nations Sustainable Development Goals (UNSDGs) emphasize the role of businesses in contributing to global sustainability, including social equality and ethical workplace practices. Several UNSDGs align with these policies:

- Goal 5: Gender Equality - Anti-harassment policies and promoting equal opportunities for all employees support gender equality in the workplace.
- Goal 8: Decent Work and Economic Growth - A focus on fair and respectful working conditions, non-discrimination, and diversity within workplace culture enhances economic participation for all employees.

- Goal 10: Reduced Inequality - These policies are central to promoting equality in the workplace, helping to reduce social and economic disparities, especially in terms of gender, race, and disability.
- Goal 16: Peace, Justice, and Strong Institutions - Policies such as whistleblower protection and codes of conduct reinforce ethical behavior, ensuring that organizational practices align with rule of law and justice principles.

Frameworks that Assess the Implementation of These Policies

Several frameworks assess the implementation and effectiveness of workplace conduct and culture policies:

- ISO 26000 (Social Responsibility) - Provides guidelines on how organizations can operate in a socially responsible manner, which includes promoting fairness and equity in the workplace.
- Global Reporting Initiative (GRI) - Standards for sustainability reporting, including social and workplace issues like employee treatment and diversity.
- UN Global Compact Principles - Encourages businesses to adopt sustainable and socially responsible policies that focus on human rights, labor, environment, and anti-corruption.
- Great Place to Work Certification - This recognizes organizations that foster an excellent workplace culture and prioritize employee well-being, inclusivity, and fair treatment.
- B Corp Certification - Measures a company's social and environmental impact, including workplace culture and policies on employee rights and satisfaction.

Role of General Counsel in Ensuring Policy Implementation

As the custodian of workplace conduct and culture policies, the General Counsel (GC) plays a critical role in ensuring their proper implementation, monitoring, and enforcement. Here's why the GC's involvement is crucial:

- Ensuring Legal Compliance: The General Counsel ensures that the workplace policies align with local, national, and international legal requirements (e.g., anti-discrimination laws, labor laws, harassment regulations). The GC's oversight ensures that the organization remains compliant with evolving legal frameworks, reducing legal risk.
- Guiding Ethical Standards: The GC is responsible for embedding ethical standards into organizational practices, ensuring that policies like the Code of Conduct, Anti-Harassment, and Whistleblower policies align with the organization's core values and foster trust both within and outside the company.
- Training & Awareness: The General Counsel often leads the creation of training materials and awareness campaigns to promote understanding of these policies across the organization. By ensuring proper communication, the GC helps in maintaining a culture of transparency and respect.

- Conflict Resolution & Risk Management: In case of disputes or grievances, the General Counsel oversees investigations, ensuring fairness, confidentiality, and compliance with internal procedures. Effective conflict resolution reduces reputational damage and legal liabilities.
- Embedding Culture into Governance: The GC ensures that workplace culture and ethical policies are incorporated into governance practices. This involvement reinforces the organization's commitment to building an inclusive and respectful workplace, which is critical to long-term success and sustainability.

In conclusion, the General Counsel's role in driving these policies forward ensures not only legal compliance but also promotes a culture of fairness, integrity, and respect, aligning with global standards and safeguarding the company's reputation.

5.2.2 Operational & Compliance Policies (Ensuring Legal & Industry Standards Compliance)

Importance of Operational & Compliance Policies to an Organization

Operational and compliance policies are crucial for organizations as they provide the structure and guidelines needed to ensure adherence to legal, regulatory, and industry standards. The importance of these policies includes:

- Risk Mitigation: These policies help organizations identify, assess, and mitigate operational, legal, and financial risks, ensuring smooth operations and avoiding costly fines or legal penalties.
- Consistency & Efficiency: They promote consistency in decision-making, operations, and employee conduct, ensuring that all actions align with organizational goals, legal requirements, and industry standards.
- Reputation Management: By adhering to operational and compliance policies, organizations can protect their reputation and credibility, which is crucial for retaining customers, investors, and business partners.
- Regulatory Compliance: These policies ensure that organizations comply with relevant laws and industry regulations, avoiding legal consequences and protecting the interests of stakeholders.
- Operational Continuity: Well-defined policies ensure that key operational functions, such as supply chain management, quality control, and financial reporting, continue seamlessly, minimizing disruptions and increasing organizational resilience.

Importance as per the UNSDGs

Operational and compliance policies align closely with several United Nations Sustainable Development Goals (UNSDGs):

- Goal 8: Decent Work and Economic Growth - Ensuring that operational and compliance policies align with labor laws and industry standards fosters economic growth and provides decent working conditions for employees.
- Goal 9: Industry, Innovation, and Infrastructure - Operational policies related to innovation, technology management, and infrastructure ensure

compliance with international standards, fostering sustainable industrial growth.

- Goal 12: Responsible Consumption and Production - Policies related to environmental compliance and sustainable business practices contribute to reducing waste, improving resource efficiency, and minimizing negative environmental impacts.
- Goal 16: Peace, Justice, and Strong Institutions - These policies ensure that businesses adhere to the rule of law, anti-corruption measures, and transparency standards, which contribute to stronger institutions and ethical governance.
- Goal 17: Partnerships for the Goals - By maintaining compliance with industry standards and regulatory frameworks, companies promote transparency and trust, which is critical for forming partnerships that contribute to broader sustainability goals.

Frameworks that Assess the Implementation of These Policies

Several established frameworks can assess the implementation and effectiveness of operational and compliance policies:

- ISO Standards (e.g., ISO 9001, ISO 14001, ISO 45001) - These certifications provide frameworks for quality management, environmental management, and occupational health and safety, which organizations can adopt to ensure they meet regulatory and industry standards.
- COSO Framework (Committee of Sponsoring Organizations of the Treadway Commission) - This widely accepted framework provides guidelines for enterprise risk management (ERM) and internal controls, helping organizations align their policies with global standards.
- SOX Compliance (Sarbanes-Oxley Act) - For publicly traded companies, the SOX Act establishes requirements for financial reporting, corporate governance, and internal controls to ensure transparency and accountability.
- Global Reporting Initiative (GRI) Standards - The GRI standards guide businesses in reporting their environmental, social, and governance performance, aligning with sustainability and regulatory compliance goals.
- OECD Guidelines for Multinational Enterprises - These guidelines help businesses adhere to international standards, ensuring responsible business conduct in areas like anti-corruption, supply chain management, and environmental protection.
- Anti-Corruption and Compliance Frameworks (e.g., FCPA, UK Bribery Act) - Frameworks addressing anti-corruption laws ensure that businesses adhere to ethical standards and regulatory requirements in their global operations.

Role of the General Counsel & CSO in Ensuring Policy Implementation

As the custodian of operational and compliance policies, the General Counsel (GC) is critical to ensuring the effective implementation, monitoring, and enforcement of these policies within the organization. Here's why the General Counsel's role is indispensable:

- Legal Oversight & Compliance Management: The General Counsel ensures that the organization's operational policies align with evolving local, national, and international laws. This involves staying informed about changes in the legal landscape, regulatory shifts, and industry standards, ensuring that policies remain relevant and compliant. By doing so, the GC minimizes legal and financial risks, ensuring the company avoids penalties, lawsuits, and regulatory sanctions.
- Governance & Ethical Leadership: As a key member of the leadership team, the GC provides guidance on ethical issues, corporate governance, and risk management. The GC helps shape policies that reflect the organization's commitment to transparency, fairness, and ethical business practices. This leadership strengthens the organizational culture, reinforces compliance at all levels, and builds stakeholder trust.
- Policy Communication & Training: The GC ensures that operational and compliance policies are clearly communicated throughout the organization. This includes overseeing training programs and awareness campaigns, ensuring that employees understand the importance of compliance and the consequences of non-adherence.
- Crisis Management & Internal Investigations: In cases where policies are violated or non-compliance occurs, the GC plays a crucial role in investigating the matter, guiding corrective actions, and managing legal or reputational crises. By proactively managing these issues, the GC helps the company navigate challenges and maintain its reputation.
- Alignment with Business Strategy: The GC works closely with other executives to align operational and compliance policies with the company's overall business strategy. This ensures that compliance doesn't just meet regulatory requirements, but also supports sustainable growth, innovation, and ethical operations across the organization.

By ensuring the consistent application and evolution of operational and compliance policies, the General Counsel serves as a strategic advisor and protector of the organization, ensuring long-term success, risk mitigation, and regulatory adherence.

5.2.3 Employee Management Policies (Focusing on Effective Talent Recruitment & Management)

Importance of Employee Management Policies to an Organization

Employee management policies are crucial for creating a structured, fair, and supportive workplace that fosters employee well-being, productivity, and retention. Their importance includes:

- Employee Satisfaction & Engagement: Clear, fair policies ensure that employees know what to expect in terms of compensation, benefits, work expectations, and performance standards. This contributes to job satisfaction and engagement, which boosts productivity.
- Legal & Regulatory Compliance: These policies ensure that the organization is in compliance with labor laws, health and safety regulations, and anti-

discrimination laws, protecting the organization from legal risks and penalties.

- Consistency & Fairness: Well-defined policies ensure that all employees are treated equally and consistently, reducing biases and promoting fairness in recruitment, promotions, compensation, and other key areas.
- Retention & Talent Attraction: Competitive compensation and benefits policies, along with clear pathways for growth, help attract top talent and reduce turnover. Effective management of employee performance and development supports long-term employee retention.
- Conflict Resolution & Grievance Handling: Employee management policies provide a clear process for resolving disputes or grievances, promoting a harmonious and productive workplace.

Importance as per the UNSDGs

Employee management policies play a significant role in achieving several United Nations Sustainable Development Goals (UNSDGs):

- Goal 5: Gender Equality - Policies related to equal pay, anti-discrimination, and opportunities for career advancement ensure gender equality in the workplace. Policies like the Equal Employment Opportunity (EEO) and Anti-Sexual Harassment promote a diverse and inclusive workforce.
- Goal 8: Decent Work and Economic Growth - Fair labor practices, performance management, and career development policies contribute to economic growth by creating decent work conditions for employees. These policies help improve employee welfare, which drives greater productivity and sustainable economic growth.
- Goal 10: Reduced Inequality - Employee management policies aimed at diversity and inclusion promote equality in the workplace by supporting underrepresented groups and eliminating discrimination. This helps reduce workplace inequality.
- Goal 3: Good Health and Well-Being - Policies that support work-life balance, employee well-being, and mental health ensure that employees are physically and mentally healthy, which is essential for productivity and overall organizational success.
- Goal 4: Quality Education - Training and development policies ensure employees have opportunities for continuous learning and growth, improving their skills and increasing their potential for career advancement.

Frameworks that Assess the Implementation of These Policies

Several frameworks can assess the implementation and effectiveness of employee management policies:

- ISO 30414 (Human Resource Management – Guidelines for Internal and External Human Capital Reporting) - This standard provides guidelines for measuring and reporting on human capital, assessing how well employee management policies are supporting organizational goals and employee well-being.

- Great Place to Work Certification - This framework assesses organizational culture, including employee satisfaction and trust in leadership, which is influenced by the company's employee management policies.
- Human Capital Management (HCM) Frameworks - These frameworks assess how effectively an organization is managing its workforce, ensuring that policies related to recruitment, training, compensation, and performance management align with business needs.
- Gallup Q12 Engagement Survey - This survey assesses employee engagement and satisfaction, providing insights into how well employee management policies are driving positive outcomes.
- SHRM Competency Model (Society for Human Resource Management) - This model outlines key competencies for HR professionals and provides a framework for assessing the effectiveness of employee management policies in fostering a positive work environment and organizational success.

Role of the CHRO in Ensuring Policy Implementation

As the Chief Human Resources Officer (CHRO) is the custodian of employee management policies, their involvement in ensuring the successful implementation and ongoing evaluation of these policies is critical for the organization’s success. Here's why the CHRO's role is indispensable:

- Leadership in People Strategy: The CHRO is responsible for aligning employee management policies with the organization’s broader goals and vision. This involves ensuring that recruitment, development, compensation, and performance management systems are not only compliant with legal standards but also drive employee engagement, productivity, and retention. By championing these policies, the CHRO contributes to building a motivated, skilled, and diverse workforce that drives organizational success.
- Promoting an Inclusive & Fair Work Culture: The CHRO ensures that the organization’s employee management policies promote fairness, transparency, and inclusivity. By implementing policies like equal opportunity, diversity & inclusion, and anti-harassment, the CHRO fosters a work environment where all employees feel valued and supported. This enhances employee satisfaction and loyalty while also helping to prevent workplace conflicts and legal challenges.
- Employee Development & Performance Management: A key part of the CHRO’s role is ensuring that employees are supported in their growth and development. The CHRO ensures that training, appraisal, and succession planning policies are in place to help employees advance in their careers. By establishing clear paths for growth, the CHRO helps retain top talent and maximizes workforce potential.
- Risk Mitigation & Compliance: The CHRO is responsible for ensuring that employee management policies comply with local, national, and international labor laws. By staying up to date with legislative changes and

ensuring that policies are reviewed regularly, the CHRO helps mitigate legal risks and ensures that the organization avoids penalties for non-compliance.

Overall, the CHRO plays a critical role in fostering a positive organizational culture, ensuring legal and regulatory compliance, and enhancing employee engagement and retention. Their leadership ensures that employee management policies not only align with legal requirements but also support the organization's strategic objectives, making them an essential driver of both short-term success and long-term organizational sustainability.

Figure 88: Pillars of Corporate Governance

Refer the link for the SSEL Policies Manual: [SSEL Policies]

5.3 ESG Training

The ESG Department conducted an in-person training session on "Introduction to ESG" at Kadapa on 9th and 10th April 2025, and at Naini the training was conducted on 22 April 2025 and 23 April 2025. A total of **106** employees were invited at Kadapa, of which **96** employees (90.6%) attended. Similarly, at Naini, a total of 106 employees were invited of which **64** employees (83%) attended the training. During this training, three different PowerPoint presentations were delivered based on the employees' levels and responsibilities: one for the Senior Leadership Team, another for employees involved in data recording/gathering, and a third for general employees.

The total training man-hours for this session amounted to **196** man-hours.

SSEL Kadapa						
ESG Training Details – 10th & 11th April 2025						
Sl.No	**Date**	**Topics/PPT**	**Time**	**Invited**	**Attended**	**Man-hours**
1.	10.06.2025	Establishing The Culture of ESG - A Preface	3.30 PM to 5.30 PM	29	28	56
2.	11.06.2025	ESG Intro, E of ESG & S of ESG	10.30 PM to 12.30 PM	26	25	56
3.	11.06.2025	ESG Intro E & S of ESG	2.30 PM to 3.30 PM	26	21	42
4.	11.06.2025	ESG Intro E & S of ESG	3.30 PM to 5.00 PM	25	22	42
			Total	**106**	**96**	**196**

Table 62: ESG Training Details

SSEL Naini						
ESG Training Details – 10th & 11th April 2025						
Sl.No	**Date**	**Topics/PPT**	**Time**	**Invited**	**Attended**	**Man-hours**
1.	10.06.2025	Establishing The Culture of ESG - A Preface	3.30 PM to 5.30 PM	14	14	28
2.	11.06.2025	ESG Intro, E of ESG & S of ESG	10.30 PM to 12.30 PM	27	26	52
3.	11.06.2025	ESG Intro E & S of ESG	2.30 PM to 3.30 PM	26	17	34
4.	11.06.2025	ESG Intro E & S of ESG	3.30 PM to 5.00 PM	10	7	14
			Total	**77**	**64**	**128**

Figure 89: Training by ESG Department

PPT 1: ESTABLISHING THE CULTURE OF ESG - A PREFACE

This presentation, followed by a Q&A session, was designed for the CEO, CFO, Company Secretary, and other senior leaders. It focused on introducing the what and why of ESG, outlining the starting point of our ESG journey, and explaining the guiding principles behind ESG ratings.

Key topics covered included:

- Global risk perceptions and peer ESG score comparisons
- Global assessment frameworks vs. BRSR requirements
- Measurement of GHG emissions
- ESG-related publications by ESG Department
- The roadmap to carbon neutrality
- The planning and development of Indo Tech's first ESG report.

List of Participants:

Sr. No.	Name	Designation
1.	N. Sudhakar Reddy	Plant Head and Head of Corporate Governance
2.	Sudhir Parida	DGM-Safety
3.	M. Bharath Kumar	DGM-Production
4.	A. Avinash	AGM-Designs & Production
5.	K. Suraiah	AGM-QA&PPC
6.	Raghuveerasarma	AGM-Costing
7.	Peter vas	AGM-Production
8.	P. Siva prasad	AGM-Production
9.	M. Narasimha Reddy	Senior Manager-HR & Admin

10.	B. Sreedhar rao	Senior Manager-Designs
11.	P. Srinivasulu	Senior Manager-Accounts
12.	P. Ravi kumar reddy	Senior Manager-Planning
13.	K. Kiran Kumar	Senior Manager-Sales
14.	G.Venkata rao	Senior Manager-Designs
15.	T. Naresh kumar	Senior Manager-Civil
16.	Bharat kayande	Senior Manager-Conductors
17.	B. Amaranatha Reddy	Senior Manager-Civil
18.	Y. Raghavendra Reddy	Senior Manager-Designs
19.	V. Vishunuvardhan Reddy	Senior Manager-IT
20.	B V Subba Rao	Senior Manager-Production
21.	N. Muralidhar Reddy	Senior Manager-Maintenance
22.	D. Rajesh Babu	Senior Manager-Designs
23.	Deepak Kumar Biswal	Senior Manager-Maintenance
24.	A Ramesh Babu	Senior Manager-Production
25.	SVS Satyanarayana	Manager-HR & Admin
26.	Sudheer Dande	Manager-HR & Admin

Table 63: Participants List of Senior Leaders from SSEL Kadapa

Sr. No.	**Name**	**Designation**
1.	Brijgopal Singh	General Manager - Production
2.	Arun Yadav	General Manager - Admin
3.	Tanvi Srivastava	General Manager - Design
4.	Narendra Sharma	General Manager – Quality and testing
5.	Ashish Pandey	Assistant General Manager – Project and Maintenance
6.	Vishal Boga	Assistant General Manager - Operations
7.	Praveen Kumar	Senior Manager - Manufacturing
8.	Kuldeep Sharma	Senior Manager - Sourcing
9.	Arunendra Singh	Senior Manager - Testing
10.	Kamlesh Yadav	Senior Manager – Testing
11.	Parag Varshnay	Senior Manager - Marketing
12.	Sudhir Dwivedi	Manager - Production
13.	Ashish Kumar Singh	Manager – Design
14.	Mahesh Kumar Raju	Manager - Production
15.	Ravindra Gupta	Manager -HR
16.	Anil Kumar	Manager - Design

Table 64: Participants List of Senior Leaders from SSEL Naini

PPT 2: ESG Intro & E of ESG

This presentation, followed by a Q&A session, was designed for employees who directly involved in data gathering and documentation. It is focused on Introduction to ESG and Environmental aspects of ESG.

Key topics covered included:

- Carbon footprint, Global Warming, Green House Effect and Paris Agreement
- Global GHG Emission Trends
- GHG Protocol Standards and Scopes overview
- Data Collection and Documentation
- GHG Emission Calculation Methods
- Internal & External Verification

PPT 3: ESG Intro & S of ESG

This presentation, followed by a Q&A session, was designed for all employees. This session briefly introduces ESG and moves into the Social PPT which explains the Human Rights Due Diligence and Survey questions.

5.4 Materiality & Peer comparison

Materiality is the study of sustainability factors that are relevant for long-term value creation, considering the interrelation between external impact on society or the environment on the one hand and internal impact on enterprise value on the other hand. It therefore considers the dual nature of materiality, also referred to as double materiality.

Investors are increasingly interested in both sides of this equation. The same holds for regulations across the world, who are requiring reporting on this broader and integrated understanding of materiality.

A sustainability issue is seen as material if it presents a significant impact on society or the environment and might have a significant impact on a company's value drivers, competitive position, and long-term shareholder value creation. Material ESG issues can significantly affect an entity's business operations, cash flows, legal or regulatory liabilities, and access to capital. They can also significantly improve or undermine an entity's reputation and relationships with key stakeholders, society and the environment. Over time external impacts on society and environment translate into internal impact on a company itself, including its financial value drivers.

Materiality Peer Comparison	
Schneider	**Hitachi**
Environment	
Being a role model in the effective reduction of our own CO2 emissions	Decarbonization
Aiming for environmental excellence at our sites	Resource circulation
Social	
Guaranteeing optimal working health and safety conditions for our employees	Employee happiness
Promoting diversity and inclusion in all our professions, countries and operations	Maintaining social infrastructure
Decarbonizing our supply chain	Strengthening supply chains

Governance and Ethics	
Aiming for zero corruption at all levels, in the whole value chain	Business ethics and compliance
Guaranteeing quality and safety of products	Safe and secure products and services

Table 65: Materiality Peer Comparison

5.5 Risk and crisis management – CRO – IRC – Risk Governance process – Board approval

A key factor for a Company's capacity to create sustainable value is the risks that the Company is willing to take and its ability to manage them effectively. Ability to identify and manage risks promptly is also a critical aspect of corporate governance at any Company. Many risks exist in a Company's operating environment and continuously emerge on a day-to-day basis. Risk management does not aim at eliminating them, as that would simultaneously eliminate all chances of rewards/ opportunities. Risk Management is instead focused at ensuring that these risks are known and addressed through a pragmatic and effective risk management process.

The Securities and Exchange Board of India (SEBI) has included Risk Management as part of Securities & Exchange Board of India. (Listing Obligations and Disclosure Requirements) Regulations 2015 (LODR) requirement as amended time to time. As per Regulation 17 of the SEBI LODR, disclosures to the Board are to be made by the listed entity on whether the risk assessment and its minimization procedures are in place. As per the Companies Act 2013, there are specific requirements for Risk Management that a Company needs to comply with. In addition, the Board of Directors and Audit Committee have been vested with specific responsibilities in assessing the robustness of risk management policy, process and systems.

Definition of Risk:

Risk is any event/non-event, the occurrence/non-occurrence of which can adversely affect the objectives of the Company. These threats may be internal/ external to the Company, may/may not be directly influenced by the Company and may arise out of routine/non-routine actions of the Company.

Definition of Risk Management:

Risk Management is a structured, consistent, and continuous process across the whole organization for identifying, assessing, deciding on responses to and reporting on the opportunities and threats that may affect the achievement of its objectives.

Objectives of Risk Management:

- Better understand the Company's risk profile.
- Ensure that the Senior Management is in a position to make informed business decisions based on risk assessment.
- Sound business opportunities are identified and pursued without exposing the business to an unacceptable level of risk.

- Contribute to safeguard Company value and interest of shareholders; and
- Improve compliance with good corporate governance guidelines and practices as well as laws & regulations.

Risk Management Framework:

The Risk Management Framework comprises essentially of 2 elements:

- **Risk management process** i.e., the process to identify, prioritize and manage risks in the Company; and
- **Risk management structure** i.e., the enablers that are created to operationalize the process. These take the form of roles & responsibilities, reporting calendars etc.

Below is a diagrammatic representation of the Risk Management Framework.

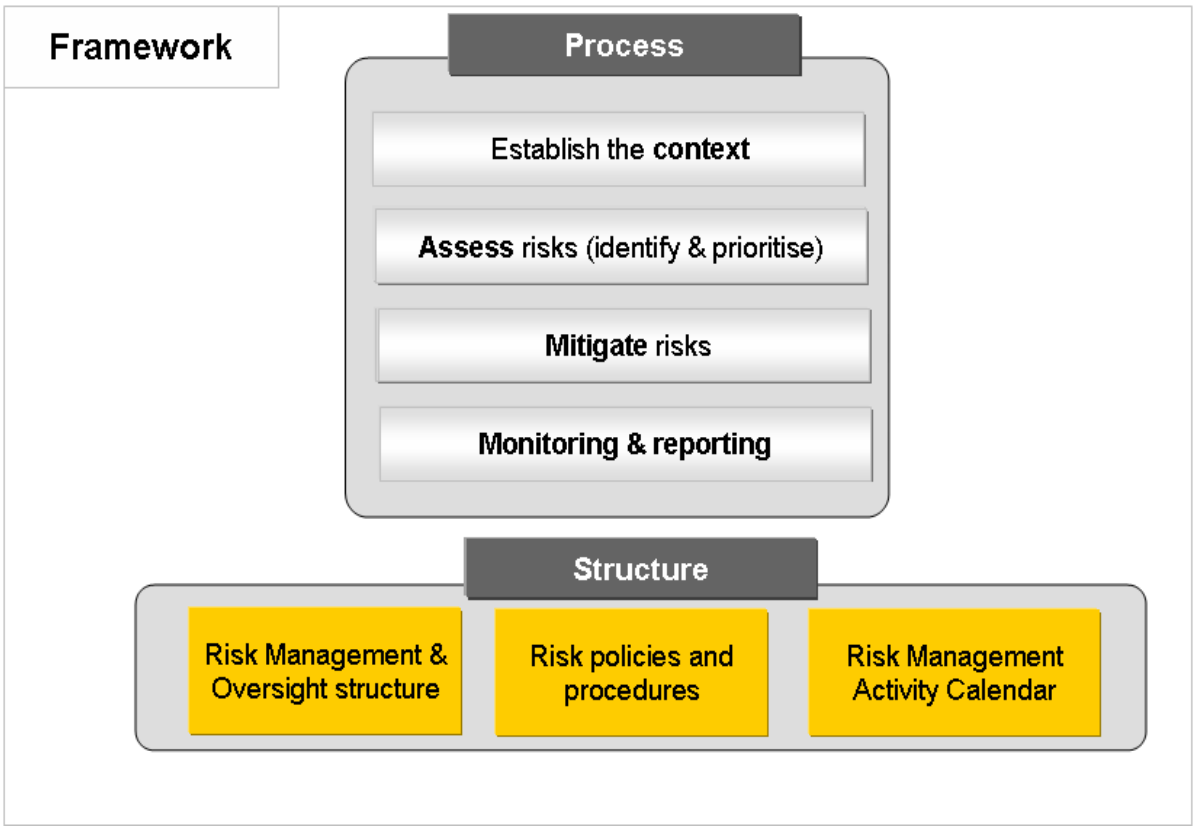

Figure 90: Risk Management Framework

Risk Management Flow:

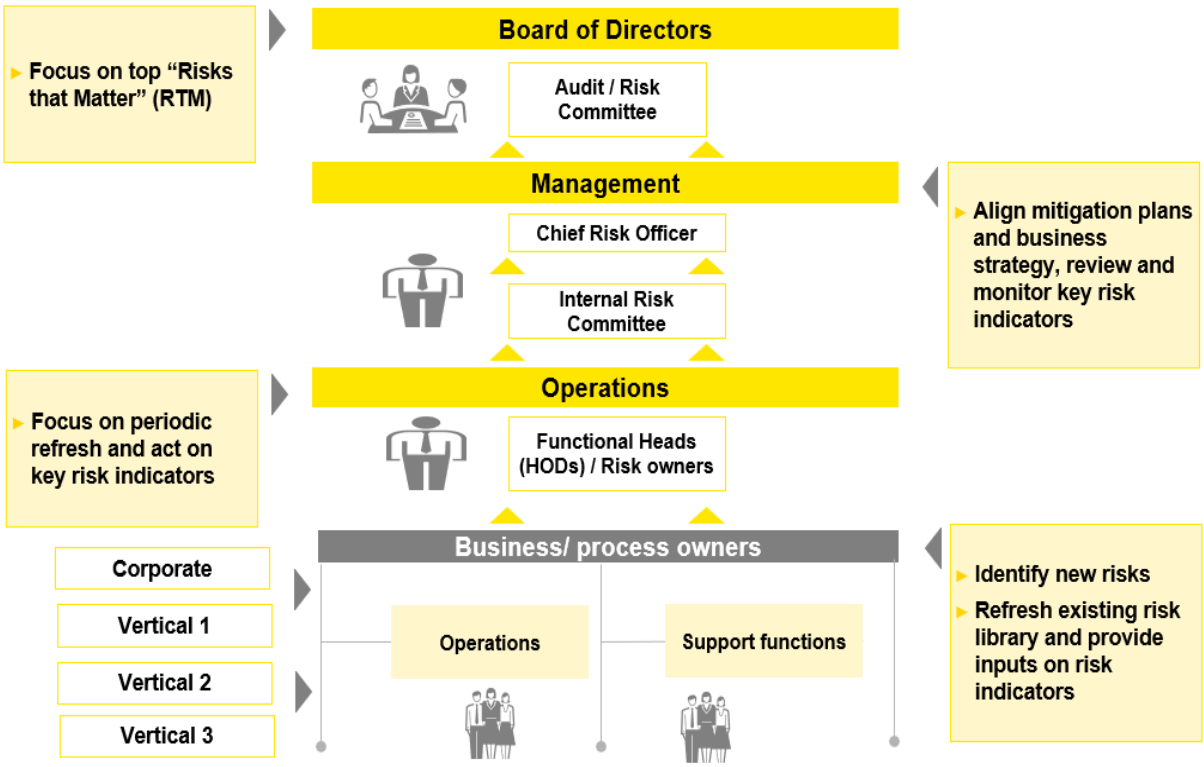

Figure 91: Risk management Flow

The roles and structure for risk management and oversight:

Governance:

The Board of Directors is responsible for defining and approving the Risk Management framework. The Board of Directors has delegated direct oversight responsibility for Risk Management to the Risk Management Committee. The Risk Management Committee is thus responsible for monitoring the risks and risk management process by reviewing: (i) periodic risk reporting produced by the CRO and internal risk committee; and (ii) reports from the various Assurance functions.

Execution:

CRO and internal risk committee is responsible for operationalizing the risk management framework at the Company. This includes identifying & prioritizing risks, operationalizing mitigation strategies and reporting on risk mitigation. Internal Risk committee shall be constituted by Management which shall be headed by CRO and approved by the Risk Management committee of the board.

- **For routine business activities:**
  - Business Unit ('BU') head/Function heads are required to implement the risk management framework within their respective area. While they are responsible for performance on risks, they may designate specific risk

owners to assist them in managing risks. Each business unit/function has a risk coordinator who oversees & coordinates the deployment of risk management activities within the BU/function.

- **For non-routine business activities:**
  - Certain activities/decisions are non-routine and represent one-off transactions. These include activities such as mergers & acquisitions, divestments, entering new lines of business, ERP implementation etc. The Executive-in-charge of such a transaction has the responsibility for operationalizing risk management for such activities.

Monitoring:

CRO is entrusted with the responsibility to review and provide independent assurance on overall effectiveness and efficiency of the risk management process. While all risks cannot be audited, the CRO, External Audit, or any other function(s) entrusted by the Risk Committee may provide independent assurance on the effectiveness of defined risk mitigation strategies for certain areas. As part of their annual audit planning exercise, these functions shall take specific inputs from the Risk Committee on the level and extent of assurance required on specific risks. In addition, these functions through their regular audit/ fieldwork at various levels might identify additional risks, which will serve as an input for the subsequent risk identification and definition process.

Risk Management Structure:

The Risk Management Organization comprises of the following:

Primary role

A. Board of Directors (BoD).
B. Risk Committee
C. BU Heads / Function Heads
D. Executive-in-Charge (for non-routine transactions)
E. Risk Owners
F. Mitigation Plan Owners ('MPO')

Support role

G. Risk Management Coordinator ('RMCO')
H. Assurance

5.6 Human Rights Due Diligence Survey

Companies must have an active commitment to respect Human Rights in their business relationships in line with the UN Guiding Principles or any other internationally accepted standards. There must also be a company-specific policy with a company-wide commitment and not just for a single site, business unit, or project.

Following the most recent international developments in the field of corporate non-financial disclosures, we have conducted Human Rights Due Diligence Survey to assess policy awareness among employees and identify any violations of Human Rights, safety, and inclusivity. We are committed to keeping our organization fair for everyone and complying with internationally recognized frameworks such as the UN Guiding Principles on Business and Human Rights and the UN Global Compact, as well as relevant national and international laws pertaining to human rights.

We have conducted separate surveys for Permanent employees, permanent women employees, contract/ employees to ensure all relevant points are covered.

5.6.1 Human Rights Due Diligence Survey at SSEL Kadapa

Analysis of survey results conducted for Permanent Employees for SSEL Kadapa

The survey conducted among permanent employees to understand if they are aware of company policies and if their rights are being respected. We also enquired whether the employees had previously used the grievance redressal mechanism, whether their concerns were addressed, and if they were satisfied with the working conditions.

Human Due Diligence Survey (Permanent Employees)				
Sr. No.	**Questions**	**yes**	**No**	**Maybe**
1	Do you understand your employment terms like pay and other compensation terms?	**73%**	**17%***	**10%***
2	Does our company have proper policies and procedures in place to ensure the protection of data related to employees?	**80%**	**12%**	**8%**
3	Are you aware of your rights & responsibilities and company policies on fair treatment?	**76%**	**13%**	**11%**
4	Does our company have a non-discrimination policy that covers race, language, gender, marital status, disability, religion, and personal opinions?	**66%**	**8%***	**26%***
5	Does our company have procedures in place to address grievance related to any workplace violation, sexual harassment or discrimination?	**79%**	**18%**	**3%**
6	Does our company have a confidential and zero retaliation complaint mechanism to report issues concerning threats and discrimination in the workplace?	**72%**	**16%***	**12%***

7	Does our company encourage its employees to report threats and discrimination in the workplace?	**62%**	**31%***	**7%***
8	Have you experienced discrimination or unfair treatment at work?	**29%***	**65%**	**6%***
9	Do you feel comfortable reporting workplace issues?	**76%**	**22%**	**2%**
10	Do you know how to access grievance mechanisms?	**58%**	**31%***	**11%***
11	Have you ever been pressured to work overtime without fair compensation?	**30%***	**62%**	**8%***
12	Does our company have a transparent appraisal procedure in place that ensures no discrimination?	**62%**	**29%***	**9%***
13	Do you feel the company provides equal opportunities regardless of gender and other factors for career growth?	**79%**	**15%**	**6%**
14	Does our company provide adequate training and development opportunities to employees?	**70%**	**19%***	**11%***
15	Does our company provide health and safety related training?	**92%**	**7%**	**1%**
***16**	Does our company provide paternity leave?	**71%**	**16%**	**13%**
***17**	Does our company provide maternity benefits?	**75%**	**9%**	**16%**
18	Does our company have a no child labor policy?	**95%**	**4%**	**1%**
19	Do employees have the ability to access areas such as canteen or restroom without restrictions?	**83%**	**13%**	**4%**
***20**	Does our company encourage the recruitment of differently abled people and provide adequate facilities for their ease of access and work?	**66%**	**19%***	**15%***
21	Does our company provide safe working conditions to all its employees, including women?	**93%**	**7%**	**0%**
22	What improvement would you suggest for fair workplace policies	**7% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
26%	**10%**	**12%**	**52%**

Have you used the grievance mechanism before? (If Yes, was your concern addressed?)		
No	Yes, but my concern was not addressed	Yes, my concern was addressed
73%	**10%**	**17%**

How satisfied are you with your working conditions?				
Very satisfied	Very dissatisfied	Somewhat satisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied
38%	**3%**	**42%**	**6%**	**11%**

Table 66: Permanent Employees Survey Responses

Detailed interpretation of analysis

The survey responses are shown in table 66. Out of 626 permanent employees at SSEL Kadapa, 89 employees responded to the survey form, which is about 14% responses. The interpretation on low response would be as follows

- 70% and above is generally considered strong.
- 60–70% is acceptable but should be interpreted with caution.
- Below 60% may be too low for high-confidence organizational decisions.

The next step when low responses is recorded would be as follows;

- Look into why employees didn't participate (e.g., via anonymous pulse checks).
- Communicate action plans transparently based on feedback.
- Improve future participation through trust-building and better survey design.

On conducting discrete enquiry, it was understood that there was a communication gap on the reason for the survey and the impact of responses, due to which responses were low.

Hence, the mitigation strategy has been planned for all responses where a negative response plus the doubtful response percentages exceeded 25%. On a perusal, it can be seen that fair treatment, non-discrimination, zero retaliation, confidentiality, confidence to report, access to grievance redressal mechanism, have all shown consistent lack of either sufficient information on process, knowledge of existence of redressal forum or confidence in outcomes post complaints.

In order to strengthen the information, accessibility and trust, ESG department has planned to take up via multiple platforms, both verbal and visual communication on the availability of such forum, while bringing in leadership teams to instil assurance and trust.

The leadership team is also looking into avenues for increasing differently abled persons in the workforce, a paternity leave, training and development, transparent appraisal process as these questions also received response which translate to employees seeking higher expectations from the company.

Maternity leave is a legal compliance under Indian law, and hence need to be complied with. The HR department will undertake an exercise to educate the employees on the this.

A similar survey will be conducted again in March 2026 and the results will speak on successful implementation of the mitigation strategy based on May 2025 survey results.

For Permanent Women Employees

A separate survey was conducted specifically keeping permanent women employees in mind. It included questions about separate hygiene and sanitation facilities, procedures for addressing discrimination and sexual harassment, ensuring safe working conditions, and providing health and safety training. We

also checked if SSEL Kadapa encouraged women to report threats and discrimination, offered equal opportunities regardless of gender, and had a confidential sexual harassment mechanism that assures zero retaliation. Additionally, we looked at maternity benefits, training, resting rooms for women employees, and transparency.

The survey responses shown in table 67.

Women have raised concern regarding flexible working hours. This concern is being addressed by the HR department

59% response has been received from women permanent employees.

Human Rights Due Diligence survey (Women Employees)				
Sr. No.	**Questions**	**Yes**	**No**	**Maybe**
1	Do you feel safe and respected in your workplace?	**100%**	**0%**	**0%**
2	Have you ever faced or witnessed gender discrimination at work?	**4%**	**96%**	**0%**
3	Does the company have a mechanism to report sexual harassment?	**100%**	**0%**	**0%**
4	Is the mechanism to report sexual harassment confidential and assure zero retaliation?	**92%**	**4%**	**4%**
5	Does our company encourage women to report threats and discrimination?	**100%**	**0%**	**0%**
6	Do you have equal access to training, promotions, and leadership opportunities?	**100%**	**0%**	**0%**
7	Do you believe women have equal growth opportunities?	**96%**	**4%**	**0%**
8	Does our company provide gender specific basic hygiene and sanitation facilities?	**96%**	**0%**	**4%**
9	Does our company provide maternity benefits?	**100%**	**0%**	**0%**
10	Are maternity benefits and parental leave policies clear?	**100%**	**0%**	**0%**
11	Does our company provide any additional benefits to women employees, including training, childcare facilities, resting rooms, and wellbeing measures?	**92%**	**8%**	**0%**
12	Does your workplace support flexible working arrangements?	**12%**	**88% ***	**0%**
13	Do you feel comfortable discussing workplace challenges with HR?	**100%**	**0%**	**0%**
14	What challenges do women face in your workplace?	**1% Answered**		
15	What policies or initiatives could improve gender inclusion?	**1% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
62%	**27%**	**8%**	**4%**

Have you used the sexual harassment reporting mechanism? (If yes, was your issue addressed?)		
Yes, my issue was addressed	Yes, but my issue was not resolved	No
0%	**0%**	**100%**

Table 67: Permanent Women Employees Survey Responses

For Contract/Consultant Employees

The survey for Contract employees encompassed questions about their employment and working conditions. We assessed whether employees understood their pay and compensation terms, if they had a written employment contract and comprehended its terms and regulations, if they were compensated for overtime or compensatory work, and if they received company benefits. Additionally, it evaluated whether the company provided safe working conditions, ensured fair and non-discriminatory treatment, granted unrestricted access to facilities like canteens and toilets, and had a grievance mechanism to address workplace violations, sexual harassment, or discrimination.

Human Rights Due Diligence survey (Contract/Consultant Employees)				
Sr. No.	**Questions**	**Yes**	**No**	**Maybe**
1	Do you understand your engagement terms like pay and other compensation terms?	**100%**	**0%**	**0%**
2	Do you receive wages and benefits as per the contract?	**9%**	**91%***	**0%**
3	Are you paid for overtime or compensatory payment?	**88%**	**9%**	**3%**
4	Does the company have any grievance mechanism to report and remediate any workplace violation, sexual harassment or discrimination?	**100%**	**0%**	**0%**
5	Have you experienced unfair treatment or discrimination as a contract worker or consultant?	**100%***	**0%**	**0%**
6	Are you aware of whom to contact in case of a workplace issue?	**3%**	**97%***	**0%**
7	Does our company provide safe working conditions to all its employees?	**100%**	**0%**	**0%**
8	Do you receive safety training and protective equipment?	**100%**	**0%**	**0%**
9	Does our company treat all its employees fairly, equally without any discrimination?	**97%**	**3%**	**0%**
10	Do the employees get benefits as per the terms of engagement from the company?	**97%**	**3%**	**0%**
11	Are you provided with the necessary health and safety measures at work?	**100%**	**0%**	**0%**
12	Do you have equal access to workplace facilities and support as permanent employees?	**0%**	**100%***	**0%**
13	Are you provided rest breaks and reasonable working hours?	**16%**	**84%***	**0%**
14	Do you know how to report workplace grievances?	**100%**	**0%**	**0%**
15	Have you raised any concerns that have not been addressed?	**91%***	**9%**	**0%**
16	Any additional comments regarding your engagement with the company?	**0% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
25%	**31%**	**22%**	**22%**

Table 68: Contract/Consultant Employees Responses

The survey responses shown in table 68. Out of 2256 contract employees at SSEL Kadapa, 32 employees responded to the survey form, which is about 1% responses.

The area of concerns in the feedback includes unfair treatment, lack of equal access, discrimination, or unresolved concerns. This points to the need for strengthening communication around grievance redressal systems and ensuring accessibility and responsiveness, which will be taken up by the ESG department across all employees -permanent and contract.

Employees have raised concern regarding receipt wages and rest breaks and reasonable working hours. These concerns are being addressed by the HR department.

5.6.2 Human Rights Due Diligence Survey at SSEL Naini

Analysis of survey results conducted for Permanent Employees

The survey conducted among permanent employees to understand if they are aware of company policies and if their rights are being respected. We also enquired whether the employees had previously used the grievance redressal mechanism, whether their concerns were addressed, and if they were satisfied with the working conditions.

Human Due Diligence Survey (Permanent Employees)				
Sr. No.	**Questions**	**yes**	**No**	**Maybe**
1	Do you understand your employment terms like pay and other compensation terms?	**81%**	**8%**	**11%**
2	Does our company have proper policies and procedures in place to ensure the protection of data related to employees?	**71%**	**10%***	**19%***
3	Are you aware of your rights & responsibilities and company policies on fair treatment?	**80%**	**10%**	**10%**
4	Does our company have a non-discrimination policy that covers race, language, gender, marital status, disability, religion, and personal opinions?	**48%**	**33%***	**19%***
5	Does our company have procedures in place to address grievance related to any workplace violation, sexual harassment or discrimination?	**75%**	**16%***	**9%***
6	Does our company have a confidential and zero retaliation complaint mechanism to report issues concerning threats and discrimination in the workplace?	**50%**	**33%***	**17%***
7	Does our company encourage its employees to report threats and discrimination in the workplace?	**41%**	**44%***	**15%***
8	Have you experienced discrimination or unfair treatment at work?	**32%***	**63%**	**5%***
9	Do you feel comfortable reporting workplace issues?	**76%**	**18%**	**6%**
10	Do you know how to access grievance mechanisms?	**56%**	**40%***	**4%***

11	Have you ever been pressured to work overtime without fair compensation?	**10%**	**82%**	**8%**
12	Does our company have a transparent appraisal procedure in place that ensures no discrimination?	**48%**	**32%***	**20%***
13	Do you feel the company provides equal opportunities regardless of gender and other factors for career growth?	**71%**	**20%***	**9%***
14	Does our company provide adequate training and development opportunities to employees?	**70%**	**17%***	**13%***
15	Does our company provide health and safety related training?	**90%**	**6%**	**4%**
***16**	Does our company provide paternity leave?	**40%**	**48%**	**12%**
***17**	Does our company provide maternity benefits?	**56%**	**24%**	**21%**
18	Does our company have a no child labor policy?	**91%**	**7%**	**2%**
19	Do employees have the ability to access areas such as canteen or restroom without restrictions?	**84%**	**10%**	**6%**
***20**	Does our company encourage the recruitment of differently abled people and provide adequate facilities for their ease of access and work?	**32%**	**40%***	**28%***
21	Does our company provide safe working conditions to all its employees, including women?	**92%**	**3%**	**5%**
22	What improvement would you suggest for fair workplace policies	**24% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
43%	**8%**	**9%**	**40%**

Have you used the grievance mechanism before? (If Yes, was your concern addressed?)		
No	Yes, but my concern was not addressed	Yes, my concern was addressed
82%	**5%**	**13%**

How satisfied are you with your working conditions?				
Very satisfied	Very dissatisfied	Somewhat satisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied
42%	**2%**	**31%**	**12%**	**13%**

Table 69: Permanent Employees Survey Responses

Detailed interpretation of analysis

The survey responses shown in table 69. Out of 267 permanent employees at SSEL Naini, 126 employees responded to the survey form, which is about 47% responses. The interpretation on low response would be as follows

- 70% and above is generally considered strong.
- 60–70% is acceptable but should be interpreted with caution.
- Below 60% may be too low for high-confidence organizational decisions.

The next step when low responses is recorded would be as follows;

- Look into why employees didn't participate (e.g., via anonymous pulse checks).
- Communicate action plans transparently based on feedback.
- Improve future participation through trust-building and better survey design.

In the case of SSEL Naini, survey response would have been higher if a manual/paper survey had been conducted. This feedback was received on conducting an enquiry on the survey not reaching a targeted above 60% response.

Hence, the mitigation strategy has been planned for all responses where a negative response plus the doubtful response percentages exceeded 25%. On a perusal, it can be seen that fair treatment, non-discrimination, zero retaliation, confidentiality, confidence to report, access to grievance redressal mechanism, have all shown consistent lack of either sufficient information on process, knowledge of existence of redressal forum or confidence in outcomes post complaints.

In order to strengthen the information, accessibility and trust, ESG department has planned to take up multiple platforms of communication on availability of forum, while bringing in leadership teams to instil assurance and trust.

The leadership team is also looking into avenues for increasing differently abled persons in the workforce, paternity leave, transparent appraisal process as these questions also received response which translate to employees seeking higher expectations from the company.

Maternity leave and employee data protection, both are legal compliances under Indian law, and hence need to be complied with. The HR department will undertake an exercise to educate the employees on the same.

A similar survey will be conducted again in March 2026 and the results will speak on successful implementation of the mitigation strategy based on May 2025 survey results.

For Permanent Women Employees

A separate survey was conducted specifically keeping permanent women employees in mind. It included questions about separate hygiene and sanitation facilities, procedures for addressing discrimination and sexual harassment, ensuring safe working conditions, and providing health and safety training. We also checked if SSEL Naini encouraged women to report threats and discrimination, offered equal opportunities regardless of gender, and had a confidential sexual harassment mechanism that assures zero retaliation. Additionally, we looked at maternity benefits, training, resting rooms for women employees, and transparency.

The survey responses shown in table 70. Based on the responses, an analysis of which you can see below, women have raised dissatisfaction on the issue of gender discrimination, reporting threats and discrimination. This issue is planned to be taken up by the ESG department and educate women employees on the processes in place to address these issues.

Women have also raised a flag with respect to equal access to training, promotion and leadership, equal growth opportunities, flexible working hours, increased child cares facilities and skill development training. These issues are being addressed by the HR department.

100% response has been received from the total 6 women permanent employees.

Human Rights Due Diligence survey (Women Employees)				
Sr. No.	**Questions**	**Yes**	**No**	**Maybe**
1	Do you feel safe and respected in your workplace?	**100%**	**0%**	**0%**
2	Have you ever faced or witnessed gender discrimination at work?	**33%***	**67%**	**0%**
3	Does the company have a mechanism to report sexual harassment?	**100%**	**0%**	**0%**
4	Is the mechanism to report sexual harassment confidential and assure zero retaliation?	**83%**	**17%**	**0%**
5	Does our company encourage women to report threats and discrimination?	**50%**	**50%***	**0%**
6	Do you have equal access to training, promotions, and leadership opportunities?	**50%**	**50%***	**0%**
7	Do you believe women have equal growth opportunities?	**50%**	**33%***	**17%***
8	Does our company provide gender specific basic hygiene and sanitation facilities?	**100%**	**0%**	**0%**
9	Does our company provide maternity benefits?	**83%**	**17%**	**0%**
10	Are maternity benefits and parental leave policies clear?	**83%**	**17%**	**0%**
11	Does our company provide any additional benefits to women employees, including training, childcare facilities, resting rooms, and wellbeing measures?	**17%**	**67%***	**16%***
12	Does your workplace support flexible working arrangements?	**17%**	**83%***	**0%**
13	Do you feel comfortable discussing workplace challenges with HR?	**67%**	**33%***	**0%**
14	What challenges do women face in your workplace?	**50% Answered**		
15	What policies or initiatives could improve gender inclusion?	**83% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
34%	**33%**	**0%**	**33%**

Have you used the sexual harassment reporting mechanism? (If yes, was your issue addressed?)		
Yes, my issue was addressed	Yes, but my issue was not resolved	No
0%	**0%**	**100%**

Table 70: Permanent Women Employees Survey Responses

For Contract/Consultant Employees

The survey for Contract employees encompassed questions about their employment and working conditions. We assessed whether employees understood their pay and compensation terms, if they had a written employment contract and

comprehended its terms and regulations, if they were compensated for overtime or compensatory work, and if they received company benefits. Additionally, it evaluated whether the company provided safe working conditions, ensured fair and non-discriminatory treatment, granted unrestricted access to facilities like canteens and toilets, and had a grievance mechanism to address workplace violations, sexual harassment, or discrimination.

Human Rights Due Diligence survey (Contract/Consultant Employees)				
Sr. No.	**Questions**	**Yes**	**No**	**Maybe**
1	Do you understand your engagement terms like pay and other compensation terms?	**89%**	**8%**	**3%**
2	Do you receive wages and benefits as per the contract?	**89%**	**10%**	**1%**
3	Are you paid for overtime or compensatory payment?	**84%**	**15%**	**1%**
4	Does the company have any grievance mechanism to report and remediate any workplace violation, sexual harassment or discrimination?	**75%**	**23%***	**2%***
5	Have you experienced unfair treatment or discrimination as a contract worker or consultant?	**18%**	**79%**	**3%**
6	Are you aware of whom to contact in case of a workplace issue?	**93%**	**4%**	**3%**
7	Does our company provide safe working conditions to all its employees?	**96%**	**2%**	**2%**
8	Do you receive safety training and protective equipment?	**94%**	**6%**	**0%**
9	Does our company treat all its employees fairly, equally without any discrimination?	**83%**	**13%**	**4%**
10	Do the employees get benefits as per the terms of engagement from the company?	**87%**	**8%**	**5%**
11	Are you provided with the necessary health and safety measures at work?	**95%**	**4%**	**1%**
12	Do you have equal access to workplace facilities and support as permanent employees?	**81%**	**17%**	**2%**
13	Are you provided rest breaks and reasonable working hours?	**96%**	**4%**	**0%**
14	Do you know how to report workplace grievances?	**89%**	**10%**	**1%**
15	Have you raised any concerns that have not been addressed?	**23%***	**75%**	**3%***
16	Any additional comments regarding your engagement with the company?	**9% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
60%	**4%**	**21%**	**15%**

Table 71: Contract/Consultant Employees Responses

The survey responses shown in table 71. Out of 187 contract employees at SSEL Naini, 106 employees responded to the survey form, which is about 56% responses.

The only area of concern in the feedback pertains to the grievance mechanism. 25% of respondents indicated either lack of awareness or limited confidence in the process for reporting workplace issues such as harassment, discrimination, or unresolved concerns. This points to the need for strengthening communication around grievance redressal systems and ensuring accessibility and responsiveness, which will be taken up by the ESG department across all employees -permanent and contract.

5.6.3 Human Rights Due Diligence Survey at SSEL Corporate Office

Companies must have an active commitment to respect human rights in their business relationships in line with the UN Guiding Principles or any other internationally accepted standards. There must also be a company-specific policy with a company-wide commitment and not just for a single site, business unit, or project.

Following the most recent international developments in the field of corporate non-financial disclosures, we have conducted Human Rights Due Diligence survey to assess policy awareness among employees and identify any violations of human rights, safety, and inclusivity. We are committed to keeping our organization fair for everyone and complying with internationally recognized frameworks such as the UN Guiding Principles on Business and Human Rights and the UN Global Compact, as well as relevant national and international laws pertaining to human rights.

We have conducted separate surveys for Permanent employees, permanent women employees, contract/ employees to ensure all relevant points are covered.

Analysis of survey results conducted for Permanent Employees

The survey conducted among permanent employees to understand if they are aware of company policies and if their rights are being respected. We also enquired whether the employees had previously used the grievance redressal mechanism, whether their concerns were addressed, and if they were satisfied with the working conditions.

Human Due Diligence Survey (Permanent Employees)				
Sr. No.	**Questions**	**yes**	**No**	**Maybe**
1	Do you understand your employment terms like pay and other compensation terms?	**90%**	**0%**	**10%**
2	Does our company have proper policies and procedures in place to ensure the protection of data related to employees?	**70%**	**10%**	**20%**
3	Are you aware of your rights & responsibilities and company policies on fair treatment?	**80%**	**10%**	**10%**
4	Does our company have a non-discrimination policy that covers race, language, gender, marital status, disability, religion, and personal opinions?	**70%**	**30%***	**0%**

5	Does our company have procedures in place to address grievance related to any workplace violation, sexual harassment or discrimination?	**70%**	**30%***	**0%**
6	Does our company have a confidential and zero retaliation complaint mechanism to report issues concerning threats and discrimination in the workplace?	**90%**	**10%**	**0%**
7	Does our company encourage its employees to report threats and discrimination in the workplace?	**90%**	**10%**	**0%**
8	Have you experienced discrimination or unfair treatment at work?	**0%**	**100%**	**0%**
9	Do you feel comfortable reporting workplace issues?	**100 %**	**0%**	**0%**
10	Do you know how to access grievance mechanisms?	**60%**	**40%***	**0%**
11	Have you ever been pressured to work overtime without fair compensation?	**0%**	**100%**	**0%**
12	Does our company have a transparent appraisal procedure in place that ensures no discrimination?	**80%**	**10%**	**10%**
13	Do you feel the company provides equal opportunities regardless of gender and other factors for career growth?	**90%**	**10%**	**0%**
14	Does our company provide adequate training and development opportunities to employees?	**70%**	**20%***	**10%***
15	Does our company provide health and safety related training?	**90%**	**10%**	**0%**
*16	Does our company provide paternity leave?	**60%**	**20%***	**20%***
*17	Does our company provide maternity benefits?	**80%**	**0%**	**20%**
18	Does our company have a no child labor policy?	**100 %**	**0%**	**0%**
19	Do employees have the ability to access areas such as canteen or restroom without restrictions?	**100 %**	**0%**	**0%**
20	Does our company encourage the recruitment of differently abled people and provide adequate facilities for their ease of access and work?	**60%**	**10%***	**30%***
21	Does our company provide safe working conditions to all its employees, including women?	**100 %**	**0%**	**0%**
22	What improvement would you suggest for fair workplace policies	**4% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
50%	**10%**	**10%**	**30%**

Have you used the grievance mechanism before? (If Yes, was your concern addressed?)		
No	Yes, but my concern was not addressed	Yes, my concern was addressed
80%	**0%**	**20%**

How satisfied are you with your working conditions?				
Very satisfied	Very dissatisfied	Somewhat satisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied
70%	**0%**	**20%**	**0%**	**10%**

Table 72: Permanent Employees Survey Responses

Detailed interpretation of analysis
The survey responses shown in table 72. Out of 68 permanent employees at SSEL Corporate Office, 10 employees responded to the survey form, which is about 15% responses. The interpretation on low response would be as follows

- 70% and above is generally considered strong.
- 60–70% is acceptable but should be interpreted with caution.
- Below 60% may be too low for high-confidence organizational decisions.

The next step when low responses is recorded would be as follows;

- Look into why employees didn't participate (e.g., via anonymous pulse checks).
- Communicate action plans transparently based on feedback.
- Improve future participation through trust-building and better survey design.

On conducting discrete enquiry, it was understood that there was a communication gap on the reason for the survey and the impact of responses, due to which responses were low.

Hence, the mitigation strategy has been planned for all responses where a negative response plus the doubtful response percentages exceeded 25%. On a perusal, it can be seen that access to grievance redressal mechanism, non-discrimination, have all shown consistent lack of either sufficient information on process, knowledge of existence of redressal forum or confidence in outcomes post complaints.

In order to strengthen the information, accessibility and trust, ESG department has planned to take up multiple platforms of communication on availability of forum, while bringing in leadership teams to instil assurance and trust.

The leadership team is also looking into avenues for increasing differently abled persons in the workforce, paternity leave, training and development, as these questions also received response which translate to employees seeking higher expectations from the company.

A similar survey will be conducted again in March 2026 and the results will speak on successful implementation of the mitigation strategy based on May 2025 survey results.

For Permanent Women Employees
A separate survey was conducted specifically keeping permanent women employees in mind. It included questions about separate hygiene and sanitation facilities, procedures for addressing discrimination and sexual harassment, ensuring safe working conditions, and providing health and safety training. We also checked if Indosol encouraged women to report threats and discrimination, offered equal opportunities regardless of gender, and had a confidential sexual harassment mechanism that assures zero retaliation. Additionally, we looked at maternity benefits, training, resting rooms for women employees, and transparency.

The survey responses shown in table 73. Based on the responses, an analysis of which you can see below, women have raised dissatisfaction on the issue of

flexible working hours, maternity benefits, child cares facilities and skill development training. These issues are being addressed by the HR department.

25% response has been received from women permanent employees.

Human Rights Due Diligence survey (Women Employees)				
Sr. No.	**Questions**	**Yes**	**No**	**Maybe**
1	Do you feel safe and respected in your workplace?	**100 %**	**0%**	**0%**
2	Have you ever faced or witnessed gender discrimination at work?	**0%**	**100%**	**0%**
3	Does the company have a mechanism to report sexual harassment?	**100 %**	**0%**	**0%**
4	Is the mechanism to report sexual harassment confidential and assure zero retaliation?	**100 %**	**0%**	**0%**
5	Does our company encourage women to report threats and discrimination?	**100 %**	**0%**	**0%**
6	Do you have equal access to training, promotions, and leadership opportunities?	**100 %**	**0%**	**0%**
7	Do you believe women have equal growth opportunities?	**100 %**	**0%**	**0%**
8	Does our company provide gender specific basic hygiene and sanitation facilities?	**100 %**	**0%**	**0%**
9	Does our company provide maternity benefits?	**0%**	**0%**	**100%***
10	Are maternity benefits and parental leave policies clear?	**0%**	**0%**	**100%***
11	Does our company provide any additional benefits to women employees, including training, childcare facilities, resting rooms, and wellbeing measures?	**0%**	**0%**	**100%***
12	Does your workplace support flexible working arrangements?	**0%**	**0%**	**100%***
13	Do you feel comfortable discussing workplace challenges with HR?	**100 %**	**0%**	**0%**
14	What challenges do women face in your workplace?	**25% Answered**		
15	What policies or initiatives could improve gender inclusion?	**25% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
100%	**0%**	**0%**	**0%**

Have you used the sexual harassment reporting mechanism? (If yes, was your issue addressed?)		
Yes, my issue was addressed	Yes, but my issue was not resolved	No
0%	**0%**	**100%**

Table 73: Permanent Women Employees Survey Responses

For Contract/Consultant Employees

The survey for Contract employees encompassed questions about their employment and working conditions. We assessed whether employees understood their pay and compensation terms, if they had a written employment contract and comprehended its terms and regulations, if they were compensated for overtime or compensatory work, and if they received company benefits. Additionally, it evaluated whether the company provided safe working conditions, ensured fair and non-discriminatory treatment, granted unrestricted access to facilities like canteens and toilets, and had a grievance mechanism to address workplace violations, sexual harassment, or discrimination.

Human Rights Due Diligence survey (Contract/Consultant Employees)				
Sr. No.	**Questions**	**Yes**	**No**	**Maybe**
1	Do you understand your engagement terms like pay and other compensation terms?	**100%**	**0%**	**0%**
2	Do you receive wages and benefits as per the contract?	**100%**	**0%**	**0%**
3	Are you paid for overtime or compensatory payment?	**0%**	**50%***	**50%***
4	Does the company have any grievance mechanism to report and remediate any workplace violation, sexual harassment or discrimination?	**50%**	**0%**	**50%***
5	Have you experienced unfair treatment or discrimination as a contract worker or consultant?	**0%**	**100%**	**0%**
6	Are you aware of whom to contact in case of a workplace issue?	**100%**	**0%**	**0%**
7	Does our company provide safe working conditions to all its employees?	**100%**	**0%**	**0%**
8	Do you receive safety training and protective equipment?	**0%**	**0%**	**100%**
9	Does our company treat all its employees fairly, equally without any discrimination?	**100%**	**0%**	**0%**
10	Do the employees get benefits as per the terms of engagement from the company?	**100%**	**0%**	**0%**
11	Are you provided with the necessary health and safety measures at work?	**100%**	**0%**	**0%**
12	Do you have equal access to workplace facilities and support as permanent employees?	**100%**	**0%**	**0%**
13	Are you provided rest breaks and reasonable working hours?	**100%**	**0%**	**0%**
14	Do you know how to report workplace grievances?	**100%**	**0%**	**0%**
15	Have you raised any concerns that have not been addressed?	**0%**	**100%**	**0%**
16	Any additional comments regarding your engagement with the company?	**0% Answered**		

How long have you been associated with the company?			
1-3 years	3-5 years	Less than 1 year	More than 5 years
0%	**0%**	**0%**	**100%**

Table 74: Contract/Consultant Employees Responses

The survey responses shown in table 74. Out of 4 contract employees at SSEL Corporate Office, 2 employees responded to the survey form, which is about 50% responses.

The area of concern in the feedback pertains to the grievance mechanism, which will be taken up by the ESG department across all employees -permanent and contract.

The Contract/Consultant employees have also raised concerns regarding the overtime or compensatory pay.

5.7 ISO 9001 certificates at SSEL Kadapa

TÜV NORD

CERTIFICATE

Management system as per

ISO 9001 : 2015

The Certification Body TÜV INDIA hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

SHIRDI SAI ELECTRICALS LTD.
Plot Nos: 50-55, 58-60, 1&2, 13/82,
Industrial Development Area, Kadapa - 516 002,
YSR District, Andhra Pradesh,
India

operates a management system in accordance with the requirements of ISO 9001:2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope -

1. Design and Development, Manufacturing, Testing, Supply and Servicing of Distribution, Power Transformers, Dry Type and Special Transformers.
2. Processing, Testing and Supply of Cores, Core Assemblies, Winding Coils and Core Coil Assemblies (CRGO Silicon Steel & Amorphous Metals) of Distribution, Power Transformers, Dry Type and Special Transformers.
3.Processing, Testing and Supply of Aluminium and Copper Conductors

Certificate Registration No. **IND 100 23394349**
Audit Report No. **Q 12846/2023**

Valid from **27.11.2023**
Valid until **11.11.2026**
Initial certification **06.12.2012**

Certification Body
at TÜV INDIA PVT. LTD.

Mumbai, **27.11.2023**

TUV India Pvt. Ltd., 801, Raheja Plaza – 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India cert.helpdesk@tuvindia.co.in

5.8 ISO 9001 certificates at SSEL Naini

BUREAU VERITAS

Bureau Veritas Certification

SHIRDI SAI ELECTRICALS LIMITED

SSE Transformation Through Innovation

4/3, CHAK DAUD NAGAR, INDUSTRIAL AREA, MIRZAPUR ROAD, NAINI,
PRAYAGRAJ – 211 008, UTTAR PRADESH, INDIA.

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above Organisation has been audited and found to be in accordance with the requirements of the Management System Standards detailed below.

Standards

ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018

Scope of certification

DESIGN, MANUFACTURING, SUPPLY, ERECTION, COMMISIONING, SERVICING & REPAIR OF:

- **TRANSFORMERS UPTO 400KV CLASS 500 MVA SINGLE PHASE BANK & THREE PHASE, POWER AND AUTO TRANSFORMERS.**
- **SHUNT & SERIES REACTORS UPTO 400 KV CLASS 125 MVAR IN SINGLE PHASE & THREE PHASE.**
- **SPECIAL TRANSFORMERS INCLUDING TRACKSIDE, FURNACE, FREIGHT LOCO TRACTION, SCOTT AND V CONNECTED, EARTHING TRANSFORMER.**

Original cycle start date:	**13 July 2023**
Expiry date of previous cycle:	**Not Applicable**
Certification Audit date:	**17 June 2023**
Certification cycle start date:	**13 July 2023**

Subject to the continued satisfactory operation of the Organisation's Management System, this certificate is valid until: **12 July 2026**

Certificate No. **IND.23.5178/IM/U** Version: **1** Issue date: **13 July 2023**

For certificate authenticity, click here
https://certcheck.ukas.com/

ISO 9001	IN044175
ISO 14001	IN044174
ISO 45001	IN044176

UKAS MANAGEMENT SYSTEMS
0008

Signed on behalf of BVCH SAS UK Branch
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
Commodities, Industry & Facilities Division

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.

Local office: Bureau Veritas (India) Private Limited (Certification Business)
72 Business Park, Marol Industrial Area, MIDC Cross Road "C",
Andheri (East), Mumbai – 400 093, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call **+ 91 22 6274 2000.**

6. ESG ROADMAP

6.1 Charting the ESG Journey

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.

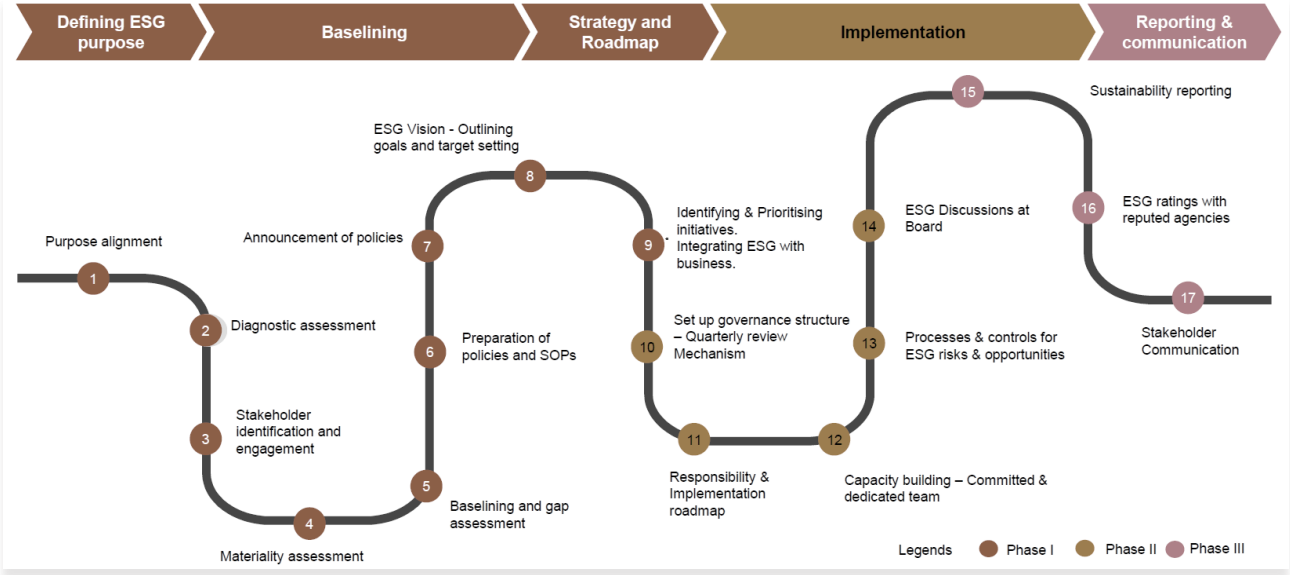

Figure 92: Typical phases of the ESG journey of a company

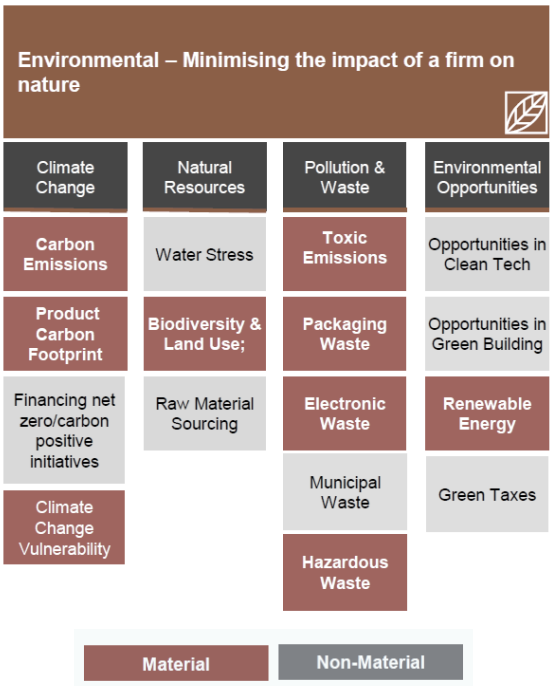

Figure 93: Key focus areas under Environment, E of ESG, for manufacturing companies

6.2 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 94.

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 94: 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.

6.3 Climbing the ESG Ladder Through ISOs

Figure 95: Climbing the ESG Ladder

The International Organization for Standardization (ISO) announced the launch of the IWA 48:2024 in Nov 2024 in COP29 which provides guidance on environment, social, and governance principles - a new set of guidance aimed at enabling companies globally to improve ESG integration, performance, measurement and reporting.

IWA stands for International Workshop Agreement, which is a type of ISO standard. It is developed through a workshop process that is faster than the normal ISO committee process. An IWA is used for the sector to develop clear rules on an issue. It enables a more rapid response to requirements for standardization.

The new principles are being released, according to ISO, as companies face increasing ESG scrutiny and a substantial increase in ESG regulations, including the EU's CSRD, the UK's Modern Slavery Act, and the ISSB's IFRS S1 and S2 disclosure requirements, while sustainability reporting continues to suffer from inconsistencies and variations across different jurisdictions, company sizes and sectors, with the guidance aimed at enabling more consistent reporting. ISO said that the principles are applicable to organizations ranging from small businesses to multinational corporations, as well as ESG consultants, academia, research institutions, and NGOs.

According to ISO, the new principles are designed to support management of ESG performance, improve measurement and reporting under existing disclosure frameworks to enable consistency, comparability, and reliability of ESG reporting and practices globally, facilitate interoperability by aligning with existing reporting standards, and promote global consistency, to enable clear communication of sustainability efforts. ISO said that the guidance will provide a structure to help organizations integrate existing ESG requirements, establish KPIs, and assess maturity in their ESG practices.

To achieve global sustainability standards under E, S, & G there are several ISO certifications already developed and used, by following which over the period of 3 to 5 years an organization can claim advanced inroads as per the UN Sustainable Development Goals. Below are given the 17 UN SDGs:

Figure 96: UN Sustainable Development Goals

In order to release a Sustainability Report based on GRI principles and submit data to global assessment agencies, like the DJSI assessment done by S&P Global, we need to ensure all 17 UN SDG are ticked by our activities.

E,S,G	Sustainability Report (GRI Based)	Sustainability reporting has no set format, but broadly involves disclosure of a company's environmental, social, and governance (ESG) goals and communicating the company's progress and efforts to reach those goals.	
E,S,G	ESG Assessment (S&P Global - DJSI)	1. The S&P Global Corporate Sustainability Assessment (CSA) is a questionnaire-based process that evaluates a company's sustainability performance. 2. The CSA score is measured on a scale of 0–100, with 100 representing the maximum score.	

Table 75: ESG Reporting and Assessment

And the following three tables 64, 65 & 66 give the ESG Road Map through ISOs and other global certifications so that once we enter this journey, we will be at constantly incremental stages of ESG adherence.

Table 76: Environment Related ISOs & Other Global Certifications

ESG Road Map			
ESG	**Description of the Certificates**	**Requirements**	**UN SDG linkage**
E	ISO 14001: Environmental Management Systems	1. Environment Policy, Objectives and Targets. 2. Environmental Performance Monitoring and Documentations. 3. Environmental Impact Assessment. 4. Compliance obligations record. 5. Emergency preparedness and response. 6. Operational control. 7. Review Commite and Continuous Improvement.	
E	ISO 14064: Greenhouse Gases	1. GHG Inventory. 2. Accurate measurements, Record keeping and Reporting. 3. Emission reduction projects. 4. Third party audit/verification.	
E	ISO 14067:2018 :Greenhouse gases — Carbon footprint of products	1. Define the scope 2. Gather data 3. Calculate the carbon footprint of the product 4. Verify the results and communicate the results.	
E	ISO 14040/14044: Life Cycle Assessment (LCA)	1. Goal and Scope definition. 2. Life Cycle Inventory Analysis (LCI) 3. Life Cycle Impact Assessment (LCIA) 4. Life Cycle Interpretation Note : LCA done for 2 products - Name & Date	
E	ISO 50001: Energy Management Systems	1. Develop an Energy Management Plan(After energy audit completion). 2. Document and Implement the plan. 3. Perform an internal audit. 4. Undergo an external audit.	
E	ISO 14046: Water Footprint	1. Identify the scope 2. Develop a water footprint assessment 3. Conduct a third-party audit	
E	ISO 14068-1:2023 (Known as PAS 2060 untill 2025) : Climate change management — Transition to net zero	1. Commitment to achive Carbon Neutrality. 2. Select subject and boundary 3. Quantify GHG emissions and removals 4. Create a carbon neutrality management plan 5. Reduce and remove GHG emissions 6. Offset 7. Report 8. Claim	
E	ISO 14015:2022 : Environmental management — Guidelines for environmental due diligence assessment	1. Define the Scope 2. Environmental Aspects 3. Environmental Issues 4. Risk Assessments 5. Reccommendations 6. Documentation 7. Verification	

Table 77: Social Related ISOs & Other Global Certifications

ESG Road Map			
ESG	**Description of the Certificates**	**Requirements**	**UN SDG linkage**
S	ISO 45001: Occupational Health and Safety	1. Plam for implementation. 2. Plan for emergency 3. Ensure compliance 4. Conduct a gap analysis 5. Investigate Incidents 6. Maintain training records 7. Undergo regular audits 8. Continuously improve.	
S	ISO 26000:2010 Guidance on Social Responsibility	ISO 26000 is not a certification standard. It is a guidance standard that provides principles and frameworks for organizations to integrate social responsibility into their operations, policies, and practices. This can help demonstrate their commitment to social responsibility and sustainability, but it does not provide a formal certification.	
S	ISO 30415:2021 Human Resource Management – Diversity and Inclusion	1. Implementation of a diversity management model and measurement of the level of integration of gender equality principles in procedures 2. Demonstration of a commitment to valuing diversity and promoting inclusion in the workplace 3. Compliance with the ISO 30415 standard, including documentation and commentary 4. Evidence of ongoing commitment to diversity, equity, and inclusion.	
S	ISO 20400:2017 Sustainable Procurement	1. Develop a sustainable procurement policy and strategy aligned with the standard. 2. Implement sustainable procurement practices throughout the organization and supply chain. 3. Establish metrics and targets to measure and improve sustainable procurement performance. 4. Conduct internal audits and assessments to ensure conformance to the standard.	
S	SA 8000	1. Companies must provide a safe and healthy work environmen 2. Companies must pay employees a living wage that meets all minimum legal standards 3. Companies must not discriminate against employees based on race, caste, national origin, religion, disability, gender, sexual orientation, union membership, or political affiliation 4. Companies must protect the rights of workers to form and join trade unions and to bargain collectively 5. Companies must not engage in corporal punishment, mental or physical coercion, or verbal abuse of workers.	

Table 78: Governance Related ISOs & Other Global Certifications

ESG Road Map			
ESG	**Description of the Certificates**	**Requirements**	**UN SDG linkage**
G	CII GreenCo Rating	1. Employee welfare initiatives 2. Supply chain associates' welfare initiatives 3. Community welfare initiatives 4. Workplace Safety 5. Environmental Sustainability Efforts Beyond the Fence. 6. Innovation	
G	ISO 9001: Quality Management Systems	1. Top Management Commitment 2. Adequate resources 3. Employee Competence 4. Process Management 5. Quality planning 6. Product Service and Design 7. Customer complaint resolutions 8. Corrective actions 9. Documentation and Internal audits 10. Continuous Improvement	
G	ISO 31000:2018 Risk Management	1. ISO 31000 certification is not available, but organizations can demonstrate their competence in risk management by implementing a risk management process based on ISO 31000 principles and integrating it into their key business processes. Individuals can pursue certification through alternative standards or organizations offering risk management certifications. 2. The PECB (Professional Evaluation and Certification Board) offers certification in ISO 31000 risk management, which demonstrates an individual's competence in establishing and implementing a risk management framework based on ISO 31000.	
G	ISO 27001:2022 Information Security Management	1. Establish an Information Security Management System (ISMS) 2. Conduct a risk assessment 3. Develop security policies and procedures 4. Implement risk management processes 5. Review the ISMS's effectiveness 6. Communicate and train employees on the ISMS 7. Perform internal audits	
G	United Nations Global Compact (UNGC)	1. Commit to meeting fundamental responsibilities in the areas of: Human rights, Labor, Environment and Anti-corruption. 2. Publicly express support for the UNGC and its principles. 3. Implement the principles in our operations and business practices. 4. Report annually on our progress and actions taken to implement the principles.	
G	ISO 37001: Anti-Bribery Management Systems	1. Anti-Corruption policy 2. Appoint Compliance Manager 3. Employee training 4. Due diligence 5. Financial controls	
G	ISO 37301:2021 Compliance Management Systems	1. Compliance policy 2. Compliance culture 3. Competence, communication, and awareness 4. Policies, procedures, and controls 5. Due diligence	

6.4 Commonality of Core Issues – BRSR, UNSDG's & S&P CSA

THE S&P GLOBAL CSA STORY OF ESG SCORES VS BRSR REQUIREMENTS

	Topic	Topic weight	SEBI BRSR Principle
Environmental Dimension 35/100marks	Environment Policy & Mngt	4	P2, P6
	Energy	3	P2, P6
	Waste & Pollutants	3	P2, P6
	Water	1	P2, P6
	Climate Strategy	10	P2, P6
	Bio-Diversity	3	P2, P6
	Product Stewardship	8	P2, P6, P9
	Sustainable Raw Materials	3	P2, P6, P9
Social Dimension 30/100marks	Labor Practices	5	P1, P3, P5, P7, P8
	Human Rights	4	P5
	Human Capital Management	11	P3, P4
	Occupational Health & Safety	7	P3, P5, P8
	Customer Relations	3	P1. P2, P4, P9
Governance & Economic Dimension 35/100marks	Transparency & Reporting	1	P1
	Corporate Governance	8	P1, P8, P9
	Materiality	3	P7, P8,
	Risk & Crisis Management	3	P1, P2, P4
	Business Ethics	7	P1
	Policy Influence	2	P7
	Supply Chain Management	7	P3
	Information Security/ Cybersecurity	2	P9
	Product Quality & Recall Mgmt.	2	P9

MINISTRY OF CORPORATE AFFAIRS

Principle 1: Businesses should conduct and govern themselves with integrity and in a manner that is ethical, transparent and accountable.

Principle 2: Businesses should provide goods and services in a manner that is sustainable and safe.

Principle 3: Businesses should respect and promote the well-being of all employees, including those in their value chains.

Principle 4: Businesses should respect the interests of and be responsive to all its stakeholders.

Principle 5: Businesses should respect and promote human rights.

Principle 6: Businesses should respect and make efforts to protect and restore the environment.

Principle 7: Businesses, when engaging in influencing public and regulatory policy, should do so in a manner that is responsible and transparent.

Principle 8: Businesses should promote inclusive growth and equitable development.

Principle 9: Businesses should engage with and provide value to their consumers in a responsible manner.

TO TARGET FROM START

7

6.5 Environmental activities - ESG Matrix – Low hanging fruit

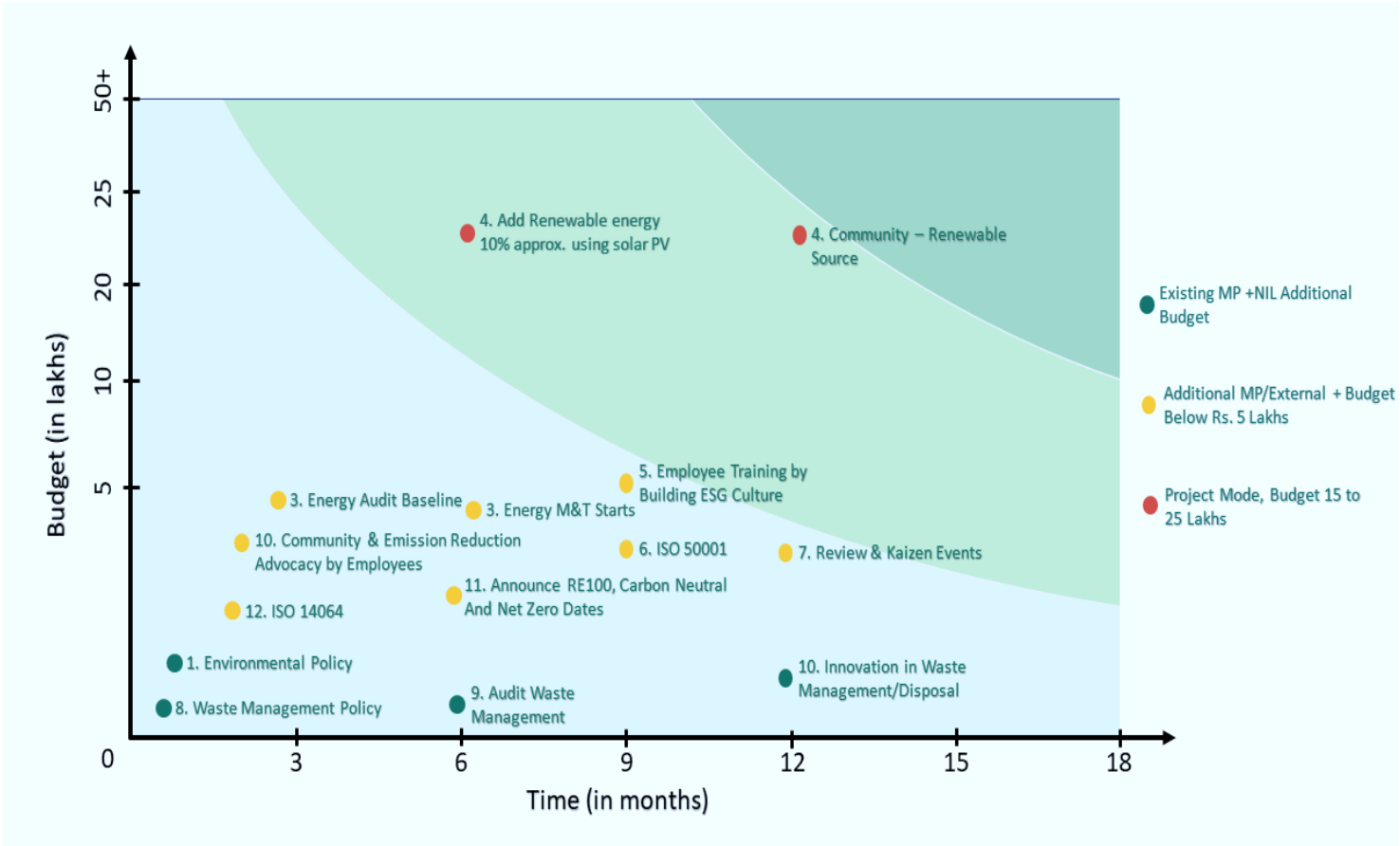

Figure 97: E of ESG Matrix

Table 79: E of ESG Activities

Sl.No	Topic	Activity
1	Environmental Policy	Public Disclosure & Reporting of Policy & Targets
2	Internal Energy Audit	Establish Energy Baseline) post installation of Smart Meters)
3	M& T - Compliance**	EnMS - ISO50001
		Process Efficiency Optimization
		Equipment Efficiency Optimization
4	Renewable Energy Integration**	Rooftop Solar PV- Rs 25L for Rooftop Solar PV to be installed by 6 months & increase renewable energy share by 5% (100MWh/year approx. of total of 2030MWh/year). Exact budget & capacity configurations pending
		PPA to be entered into after discussion for green energy from grid
		Wind being taken up from Indo Tech already
5	Training & Awareness**	Build energy culture - Awareness of energy conservation for all employees. Train & Test and give awards to best ideas from employees on energy saving - Incentivize new ideas from floor
6	Low Carbon Products**	To discuss with technical/Design/R&D teams - not included in the matrix
7	Continuous Improvement	Review
		Kaizen Events
8	Waste Management Policy	Policy to assure Public Disclosure & Reporting the goal of Zero Waste to Landfill
9	Waste Management Programs	Audit - Check Baseline vis-à-vis policy document
		Innovation to reduce waste - Zero Waste To Landfill
		Disposal of waste
10	Community Projects**	Emissions Reduction Advocacy in Schools & Colleges - Volunteering by Employees @ 8 hours per year per employee (approx 200 employees -1600hours)
11	Climate Governance - Emissions Reduction Announcements**	Board Level Committee - Emission Reduction Targets - Announce RE100, EV100, Carbon Neutral, Net Zero
12	Carbon Footprint Study**	ISO14064

6.6 Peers & Their ESG Scores (S&P Global)

Peers have shown the way in Environment Stewardship by implementing and showing excellent results in this area. A few examples from globally acclaimed Environment related activities are shown in table 81 and the peer ESG scores are shown in table 80.

Table 80: Peer ESG Scores (S&P Global)

Peer	Country	2023 Score	2024 Score
Schneider Electric S.E / ELQ	France	88	83
ABB Ltd / ELQ	Swiss Confed	65	65
Toshiba Corp / IDD	Japan	48	48
Hitachi Corp / IDD	Japan	38	53

ELQ - Electrical Components & Equipment
IDD - Industrial Conglomerates

6.7 Peer Strategy

Table 81: Peer Strategy

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.**	• 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

	• Since 2019, has reduced **GHG emissions** by **76 percent**	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.**

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ANNEXURES

GHG Emission Calculations:

SSEL Corporate Office, Begumpet

SSEL, Corporate Office - Carbon Emission Calculations - FY 23-24 (Base Year)							
Sr. 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 , Corporate Office - Carbon Emission - FY 24-25							
Sl. No	**Description**	**Activity data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2 e**
Scope 1 Emissions							
1	Refrigerant top up						
	R-22	32	kg	1960	t CO2e/t	IPCC (AR6)	62.72
	R-32	0	kg	771	t CO2e/t	IPCC (AR6)	0.00
	R-410A	35	kg	2255.5	t CO2e/t	IPCC (AR6)	78.94
2	LPG used in Canteen	95	kg	2.992	tCO2e/t	IPCC	0.28
						Total Scope 1	**141.95**
Scope 2 Emissions							
1	Power obtained from GRID	65234	kWh	0.727	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.20	47.46
						Total Scope 2	**47.46**
Scope 3 Emissions							
1	Business Travel						
	Air	941564	Pass-km	ICAO		ICAO	68.03
	Car - Diesel (MUV <2500 cc)	2437.4	km	0.216	kg CO2/km	India GHG Program	0.526
	Car - Petrol (Sedan <1400 cc)	1096	km	0.153	kg CO2/km	India GHG Program	0.167688
2	Employee Commute	568844	km	Refer Survey Spreadsheet		India GHG Program	38.49
3	C3 - Fuel & Energy related Activities	Refer C3 calculation sheet					21
						Total Scope 3	**125.66**
						Total Scope 1+2	**189.40**
						Total Scope 1+2+3	**317.17**

SSEL Unit 1, Kadapa

SSEL-Unit 1, Kadapa - Carbon Emission Calculations - FY 23-24 (Base Year)							
Sr. 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 1, Kadapa - Carbon Emission - FY 24-25							
Sl. No	**Description**	**Activity data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2 e**
Scope 1 Emissions							
1	Refrigerant top up						
	R-22	0	kg	1960	t CO2e/t	IPCC (AR6)	0
	R-32	0	kg	771	t CO2e/t	IPCC (AR6)	0
	R-410A	0	kg	2255.5	t CO2e/t	IPCC (AR6)	0
2	CO2 used for refilling into fire extinguisher	0	kg	1	t CO2e/t	IPCC (AR6)	0
3	LPG (used in Brazing, Cutting)	38	kg	2.992	t CO2e/t	IPCC	0.113733
		0					
						Total Scope 1	**0.11**
Scope 2 Emissions							
1	Power obtained from GRID	144349.50	kWh	0.727	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.20	105.01
						Total Scope 2	**105.01**
Scope 3 Emissions							
1	C5 Waste Generation (Cotton Waste)	1050	kg	0.00468568	kg CO2/kg	DEFRA	0.0049
	C5 Waste Generation (Rubber Gloves)	337.5	kg	0.00468568	kg CO2/kg	DEFRA	0.0016
	Copper	14340	kg	0.18	t CO2/ts	EPA	2.85
	Aluminium	44930	kg	0.04	t CO2/ts	EPA	1.98
	Waste Transport	17129.03	t-km	Refer C5 calculations sheet in Scope 3 questionnaire			1.05
2	C3 Fuel & Energy related Activities	Refer C3 calculation sheet					44.31
						Total Scope 3	**50.19**
						Total Scope 1+2	**105.13**
						Total Scope 1+2+3	**155.32**

SSEL Unit 2&3, Kadapa

SSEL Unit 2&3 Kadapa - Carbon Emission Calculations - FY 23-24 (Base Year)							
Sr. 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	38	kg	1760	t CO2e/t	IPCC (AR5)	66.88
	R-32	15	kg	677	t CO2e/t	IPCC (AR5)	10.16
	R-410A	25	kg	1924	t CO2e/t	IPCC (AR5)	48.09
	R 134A	8	kg	1300	t CO2e/t	IPCC (AR5)	10.40
3	CO2 used for refilling into fire extinguisher	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	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	71360.35	L	2.68	kgCO2/l	IPCC	191.25
9	Biomass used in Canteen (Wood) (Other than CO2)	124670	kg	0.15	tCO2e/t	IPCC (2006)	18.70
						Total	**816.67**
Scope 2 Emissions							
1	Net Power Consumed from GRID	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							

Sr. 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**

SSEL , Kadapa Unt 2&3 - Carbon Emission - FY 24-25							
Sl. No	**Description**	**Activity data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in t CO2 e**
Scope 1 Emissions							
1	Company Owned Vehicles						
	Diesel (Car, buses, Ambulances)	84457.66	L	2.925	kgCO2e/l	IPCC	247.06
	Petrol (Car, buses, Ambulances)	210.32	L	2.303	kgCO2e/l	IPCC	0.48
	Diesel (hydras, tractor cranes, forklifts tractors)	65700.00	L	2.925	kgCO2e/l	IPCC	192.1953
	Petrol (hydras, tractor cranes, forklifts tractors)	0.00	L	2.303	kgCO2e/l	IPCC	0.00
2	Refrigerant top up	0.00					0.00
	R-22	25.33	kg	1960	t CO2e/t	IPCC (AR6)	49.65
	R-32	25.50	kg	771	t CO2e/t	IPCC (AR6)	19.66
	R-410A	25.00	kg	2255.5	t CO2e/t	IPCC (AR6)	56.39
	R 134A	0.00	kg	1530	t CO2e/t	IPCC (AR6)	0.00
3	CO2 used for refilling into fire extinguisher	332.50	kg	1	t CO2/t	IPCC	0.33
4	Gas mixture used in welding (Argon+Carbon dioxide)	187986.84	kg	0.1	t CO2/t	IPCC	18.80
5	Acetylene (used in Brazing, Cutting)	811.50	kg	3.38	t CO2/t	IPCC	2.75
6	LPG used in Brazing, Cutting	8512.00	kg	2.992	tCO2e/t	IPCC	25.47
7	LPG used in Canteen	37278.00	kg	2.992	tCO2e/t	IPCC	111.54
8	Diesel used in DG sets	60809.00	L	2.925	kgCO2e/l	IPCC	177.88
9	Biomass used in Canteen (Wood) (Other than CO2)	94567.00	kg	0.143	t CO2e/t	IPCC (2006)	13.56
						Total Scope 1	**915.78**
Scope 2 Emissions							
1	Net Power Consumed from GRID	16996112	kWh	0.727	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.20	12364.55
2	Solar Power Consumed by plant	1306265	kWh	0	tCO2/MWh		0.00
3	Solar Power Export to Grid	83103	kWh	0	tCO2/MWh		0.00
						Total Scope 2	**12364.55**

Scope 3 Emissions							
Sl. No	**Description**	**Activity Data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in t CO2 e**
1	C4 - Upstream T&D	103016333	t-km	India GHG Program			2343.85
2	C9 - Downstream T&D	5326401	t-km	India GHG Program			359.18
3	C5 - Waste Disposal						
	Copper	85851	kg	0.18	t CO2/ts	EPA	17.034
	Aluminium	172150	kg	0.04	t CO2/ts	EPA	7.590
	Food Waste	47215	kg	0.067	t CO2/ts	EPA	3.487
	CRGO	67140	kg	0.32	t CO2/t	EPA	23.683
	Mixed Paper (Winding Core Paper)	310632	kg	0.07	t CO2/ts	EPA	23.969
	Parma Wood	24880	kg	0.00468568	t CO2/t	DEFRA	0.129
	Mixed Metals (MS Scrap)	539921	kg	0.23	t CO2/ts	EPA	136.885
	Mixed Metals (Transformer scrap)	22000	kg	0.23	t CO2/ts	EPA	5.578
	Amorphous Scrap	46100	kg	0.23	t CO2/t	EPA	11.688
	Waste Oil Barrel (empty)	42075	kg	0.00468568	t CO2/t	DEFRA	0.197
	Waste Oil	528	l	0.00468568	t CO2/t	DEFRA	0.002
	Mixed Electronics	720	kg	0.02	t CO2/ts	EPA	0.016
	Waste Transport	112047	t-km	Refer C5 calculations sheet in Scope 3 questionnaire			6.888
4	C6 - Business Travel						
	Air	1226810	Pass - km	ICAO		ICAO	97.36
	Train	277612	Pass - km	0.0078	kg CO2/ Pass – km	India GHG Program	2.17
	Road - Bus	214424	Pass - km	0.0152	kg CO2/ Pass – km	India GHG Program	3.26
	Road - Car	42306	Pass - km	0.153	kg CO2/ Pass – km	India GHG Program	6.47
5	C7-Employee Commute						
	Car	67120	Pass - km	0.141	kg CO2/km	India GHG Program	9.46
	Bike	4800702	Pass - km	0.0356	kg CO2/km	India GHG Program	170.90
	Auto	11550	km	0.1322	kg CO2/km	India GHG Program	1.53
6	C3 Fuel & Energy related Activities	Refer C3 calculation sheet					5380.81
						Total Scope 3	**8610.5**
						Total Scope 1+2	**13280.33**
						Total Scope 1+2+3	**21890.84**

SSEL Unit 4, Kadapa

SSEL-Unit 4, Kadapa - Carbon Emission Calculations - FY 23-24 (Base Year)							
Sr. 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 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-Unit 4, Kadapa - Carbon Emission - FY 24-25							
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	0.00
						Total Scope 1	0.00
Scope 2 Emissions							
1	Power obtained from GRID	69135.00	kWh	0.727	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.20	50.30
						Total Scope 2	**50.30**
Scope 3							
1	C4 - Upstream Transportation & Distribution	6099909.85	t-km	India GHG Program			375.18
2	C9 - Downstream T&D	1596727.349	t-km	India GHG Program			118.32
3	Waste Disposal						
	Mixed Metals	49105	kg	0.23	t CO2/ts	EPA	12.449
4	C3 Fuel & Energy related Activities	Refer C3 calculation sheet					21.215
						Total Scope 3	**527.16**
						Total Scope 1+2	**50.30**
						Total Scope 1+2+3	**577.45**

SSEL, Naini

SSEL, Naini - Carbon Emission Calculations - FY 23-24 (Base Year)							
Sr. 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	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	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**

SSEL , Naini - Carbon Emission - FY 24-25							
Sl. No	**Description**	**Activity data**	**Unit**	**Emission Factor**	**Unit**	**Reference**	**Carbon Emission in tCO2e**
Scope 1 Emissions							
1	Company Owned Vehicles						
	Diesel (Forklift, Hydra etc.,)	16676	L	2.925	kgCO2e/l	IPCC	48.78
2	Refrigerant top up						0.00
	R-22	32	kg	1960	t CO2e/t	IPCC (AR6)	62.72
	R-32	0	kg	771	t CO2e/t	IPCC (AR6)	0.00
	R-410A	0	kg	2255.5	t CO2e/t	IPCC (AR6)	0.00
	R 134A	90.45	kg	1530	t CO2e/t	IPCC (AR6)	138.39
3	CO2 used for refilling into fire extinguisher	55	kg	1	t CO2/t	IPCC (AR6)	0.06
4	Acetylene (used in Brazing, Cutting)	363.32	kg	3.38	t CO2/t	Derived	1.23
5	Diesel used in DG sets	6963	L	2.925	kgCO2e/l	IPCC	20.37
6	Wood Briquette used in Thermic Fluid heater	647.19	t	0.143	t CO2/t	IPCC	92.80
7	HSD used in Thermic Fluid Heater	0	L	2.925	kgCO2e/l	IPCC	0.00
						Total Scope 1	**364.35**
Scope 2 Emissions							

1	Power obtained from GRID	3710805	kWh	0.727	tCO2/MWh	CO2 Baseline Database for the Indian Power Sector V.20	2699.58
						Total Scope 2	**2699.58**
Scope 3							
1	C4 - Upstream Transportation & Distribution	3802296.71	t-km	Refer Calculation Sheet		India GHG Program	240.013
2	C9 - Downstream T&D	4650272	t-km	Refer Calculation Sheet		India GHG Program	285.992
3	Waste Disposal						
	Copper (PICC/CTC/PI Cable Scrap)	69103.34	kg	0.18	t CO2/ts	EPA	13.711
	MS Scrap	77822.00	kg	0.23	t CO2/ts	EPA	17.116
	CRGO	10312.00	kg	0.32	t CO2/ts		3.637
	Wood Waste	79045.00	kg	0.00468568	t CO2/ts	DEFRA	0.370
	Press Board	6850.00	kg	0.07	t CO2/ts	EPA	0.529
	Press Board scrap Oil soaked	12150.00	kg	0.00468568	t CO2/t	DEFRA	0.057
	Transformer Oil with impurity	8390.00	kg	0.00468568	t CO2/t	DEFRA	0.039
	Waste Transport Emissions	52481.77	t-km	Refer calculation sheet			3.496
4	Business Travel						
	Air	173200	Pass - km			ICAO	12.73
	Rail	211546.90	Pass - km	0.00780	kg CO2/ Pass – km	India GHG Program	1.65
	Road	39286.70	km	0.1530	kg CO2e/km	India GHG Program	6.01
5	Employee Commute						
	Car	125664	Pass - km	0.141	kg CO2e/km	India GHG Program	17.72
	Bike	1326402	Pass - km	0.0356	kg CO2e/km	India GHG Program	47.22
6	C3 Fuel & Energy related Activities	Refer calculation sheet					1175.90
						Total Scope 3	**1826.34**
						Total Scope 1+2	**3064.84**
						Total Scope 1+2+3	**4890.27**


BIO
ECO
O_2
CO_2
H_2O
ESG
H_2O
O_2
ESG