

**Financing Mitigation and Adaptation Projects
(FMAP) in Indian MSMEs Programme**

**Environmental & Social Impact Assessment [ESIA] and
Environmental & Social Management Plan [ESMP]**

**Direct Financing
Pulp and Paper Sector**

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In consultation with Green Climate Fund (GCF)



Contents

Section 1:	4
1. Environmental and Social Impact Assessment (ESIA)	4
1.1 Executive Summary	4
1.1.1 Overview of the Sector Related to Project Activities and its Objective	4
1.1.2 Process in Pulp & Paper Industry in Indian Setup	6
1.1.3 Purpose of the ESIA and its Scope	7
1.1.4 Objectives of the ESIA	8
1.1.5 Scope of the ESIA	8
1.1.6 Summary of Key Environmental and Social Risks	9
1.1.7 Key Mitigation Measures and Recommendations	9
1.2 Risk Categorization Methodology	10
1.3 Environmental and Social Due Diligence and Assessment	11
1.4 Regulatory compliance analysis (Indian environmental laws + GCF standards)	30
1.5 Stakeholder Engagement & Monitoring	34
1.6 Impact Category & GCF Linkages	34
1.7 Community Health and Safety	34
1.8 Disclosure Requirements & GCF linkages	35
1.9 Pulp and Paper Sector: Environmental Risks, Mitigation, and GCF Classification	36
Section 2:	40
2. Environmental and Social Management Plan (ESMP): Implementation Framework for Category B Sub-projects of Pulp and Paper Sector	40
2.1 Objective of the ESMP	40
2.2 Screening and Categorization of Activities	40
2.3 Risk Identification and Assessment	41
2.4 ESMP Implementation	41
2.5 Mitigation Plan for Category B Subprojects for Stakeholders Understanding to Adopt Process Specific Mitigation Plan	41
2.6 Management and Monitoring Requirements	51
3. Loan Processing Framework for Direct Lending Operations	53
3.1 Loan Screening and Approval Process (for direct loans)	53
3.2 Risk Identification & Mitigation Strategy	54
4. Grievance Redress Mechanism	56
4.1 SIDBI's 3-Tier GRM	57
4.2 Grievance Redressal for Customers & Stakeholders	58

4.3	Gender-Based Violence & SEAH Risk Identification and Management	58
4.4	Conflict Sensitivity Assessment	60
5.	Monitoring, Evaluation & Reporting Requirements	60
5.1	Continuous Monitoring and Reporting Obligations	60
5.2	Integration with GCF's Annual Performance Report (APR).....	61
6.	Conclusion	62
	Annexure 1- Negative / Exclusion List	63
	Annexure 2 - Environmental & Social Due Diligence (ESDD) Checklist.....	64
	Annexure 3- List of Cross Functional Technology.....	68

Section 1:

1. Environmental and Social Impact Assessment (ESIA)

1.1 Executive Summary

1.1.1 Overview of the Sector Related to Project Activities and its Objective

India's pulp and paper industry plays an important role in the global paper landscape, accounting for about 5% of the world's total paper production. It is a major economic contributor with an estimated turnover exceeding INR 1,00,000 crore and contributes over INR 5,000 crore to the national exchequer. The sector also generates substantial employment, offering direct jobs to nearly 500,000 people and indirect employment to around 1.5 million, highlighting its significance in the country's industrial workforce.¹

The industry is characterized by a wide technological spectrum, as many mills have been operational for decades. This results in a mix of older units and highly modernized facilities coexisting within the sector. Indian paper mills also utilize a diverse raw material base comprising wood, bamboo, recovered paper, bagasse, wheat straw, and other agro-residues. In terms of production share, 18–20% of paper is produced from wood, 74–76% from recycled fibre, and 6–8% from agro-residues, making the industry uniquely multi-fiber in nature.

The geographical spread of mills, combined with regional consumption patterns, contributes to a balanced distribution of production and demand across the country. Despite this strong industrial base, India's per capita paper consumption is around 16 kg, far lower than the global average of 57 kg. This gap indicates considerable scope for growth, particularly as the country's economic activities and literacy levels continue to rise.

India is currently the fastest-growing paper market in the world, driven by increasing domestic demand. As noted in the IPMA overview, even a 1 kg increase in per capita paper consumption leads to an additional demand of 1 million tonnes, underscoring the industry's strong potential for expansion. This positions the sector for significant future development in alignment with the nation's economic growth trajectory.

MSME in India stands for Micro, Small, and Medium Enterprises. These are businesses categorized based on their investment in plant and machinery/equipment and annual turnover. The MSME classification applies to both manufacturing and service industries. The classification is based on:

- **Investment in Plant & Machinery** (not land/building)
- **Annual Turnover**

All amount in Indian Rupee (₹)

Category	Investment Limit	Turnover Limit
Micro	Up to ₹2.5 crore	Up to ₹10 crore
Small	Up to ₹25 crore	Up to ₹100 crore
Medium	Up to ₹125 crore	Up to ₹500 crore

The industries under above category enable them to access priority lending, government schemes, and incentives.

¹ <https://ipmaindia.org/overview-2/>

Environmental & Social Impacts of Pulp & Paper Sector

The Indian Paper & Paper sector faces persistent environmental and social challenges due to intensive use of water, energy, chemicals, and fuel across the value chain. Inefficient processes lead to pollution, waste generation, and adverse social outcomes.

Key Environmental Issues

- **Water Pollution & High Consumption:** The pulp and paper industry is one of the most water-intensive manufacturing sectors. Indian units typically consume 100 to 250 m³ of water per tonne of paper, significantly higher than global best-practice mills that operate with closed-loop and water-efficient systems. Many small and medium mills still struggle with inadequate effluent treatment, leading to discharge of high BOD/COD wastewater containing suspended solids, and bleaching residues into nearby drains or water bodies.
- **Excessive Chemical Use:** Pulping and bleaching operations rely on a wide range of chemicals such as caustic soda, sulphur compounds, chlorine-based agents, peroxides, and other additives. MSMEs often use older chlorine-based bleaching technologies, resulting in higher usage of hazardous chemicals and generation of toxic by-products, with limited adoption of elemental-chlorine-free (ECF) or totally-chlorine-free (TCF) processes.
- **High Energy Use:** Paper manufacturing is energy-intensive, with significant dependence on coal, , and grid electricity for pulping, drying, and finishing processes. While larger mills are gradually shifting toward biomass cogeneration and waste-to-energy systems, MSMEs face financial and technological barriers that slow adoption of energy-efficient machinery and renewable energy solutions.

Waste Generation: The sector generates large volumes of solid waste, including pulp sludge, lime mud, boiler ash, and rejected fibers. Limited recycling and recovery infrastructure means much of this waste is landfilled or inadequately disposed of, leading to land and soil contamination. Though opportunities exist for composting, adoption among MSMEs remains uneven.

Key Social Issues

- **Working Conditions:** Workers in pulp and paper sector often face long working hours, relatively low wages, and weak enforcement of occupational standards, particularly in older or family-run units. Formal grievance redressal mechanisms are frequently absent, and compliance with labour laws is inconsistent in the unorganized segment of the sector.
- **Child Labour Risks:** While child labour has been largely eliminated from mainstream pulp and paper operations, residual risks persist in informal activities such as wastepaper sorting, manual loading/unloading, and ancillary services. These risks are linked to weak local oversight and subcontracting practices, especially in rural and peri-urban areas.
- **Informal Sector Vulnerability:** A significant share of the workforce, especially contract labour, temporary helpers, and wastepaper handlers - operates in the informal economy. These workers often lack written contracts, job security, health insurance, provident fund coverage, or access to social protection schemes, making them highly vulnerable to exploitation and income volatility.

- **Health & Safety Hazards:** Pulp and paper manufacturing exposes workers to chemical hazards (alkalis, bleaching agents), paper dust, high noise levels, heat, and heavy machinery. Ergonomic issues from repetitive manual handling are common. Although personal protective equipment (PPE) is mandated, actual usage remains low in many MSMEs due to limited training, cost pressures, and weak safety cultures.

Addressing these challenges requires coordinated action by the statutory bodies, industry, civil society, and consumers. A combined focus on environmental sustainability and social responsibility is essential for a resilient and equitable pulp and paper sector in India.

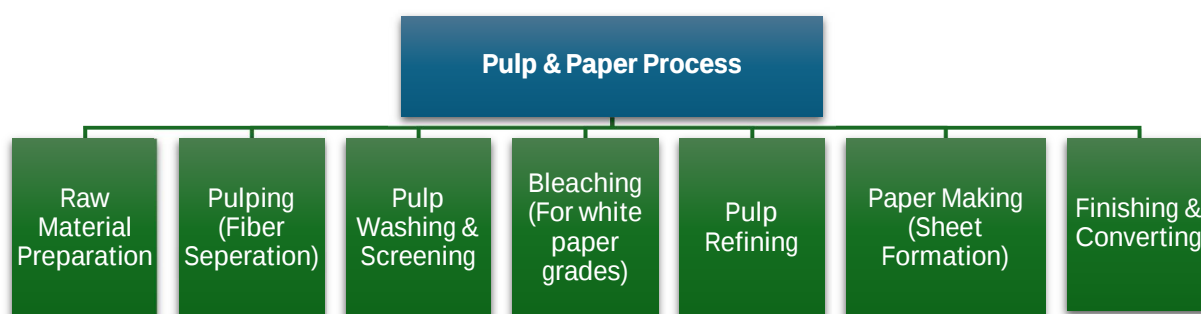
Pulp & Paper Clusters in India

The Indian Pulp & Paper industry thrives on several prominent regional clusters that drive domestic supply and global exports; a few of these key clusters are highlighted below:

1. **North India:** In North India, significant pulp and paper clusters are located in Uttar Pradesh—notably Muzaffarnagar, Saharanpur, and Meerut—where a wide range of kraft paper, special paper, writing/printing paper and newsprint is produced. Uttarakhand's Kashipur is another important hub, manufacturing writing/printing paper, kraft paper, and newsprint paper.
2. **West India:** West India hosts some of the country's largest paper clusters, particularly in Gujarat, with regions like Vapi, Morbi, and Ahmedabad producing kraft paper, special paper, newsprint, and writing/printing paper. Maharashtra also has multiple clusters across Mumbai, Aurangabad, Nashik, Pune, and Thane, known for producing kraft paper, along with newsprint, special paper, and writing/printing paper in several locations.
3. **South India:** In the southern region, Tamil Nadu's Erode–Coimbatore belt is a major center for kraft paper, newsprint paper, and writing/printing paper. Andhra Pradesh, with clusters in East and West Godavari, manufactures kraft paper and newsprint paper, and additionally writing/printing paper in the West Godavari area. Telangana's Hyderabad and Medak clusters produce kraft paper and special paper, with Hyderabad also contributing newsprint and writing/printing paper. Karnataka's Bengaluru cluster specializes in kraft paper and special paper.
4. **East India:** In the eastern region, West Bengal's Howrah and Kolkata clusters primarily produce kraft paper, while Kolkata also manufactures writing paper, contributing to the region's supply.

Note: The above cluster list is indicative and not exhaustive; additional clusters could be added by the Accredited Entity (AE) for funding under FMAP Programme.

1.1.2 Process in Pulp & Paper Industry in Indian Setup



1.1.3 Purpose of the ESIA and its Scope

The Environmental and Social Impact Assessment (ESIA) has been developed as a programme - level assessment to evaluate and disclose potential environmental and social risks associated with MSME sub-projects financed under the ***Financing Mitigation and Adaptation Projects (FMAP) in Indian MSMEs Programme***. It complements SIDBI's screening and due diligence process under its Environmental and Social Management System (ESMS) [approved by GCF Board] and ensures consistency with the Green Climate Fund (GCF) Environmental and Social Standards (ESS).

In line with ESMS procedures, all proposed sub-projects are first screened against the Exclusion List (Annexure 1) to confirm eligibility. Eligible projects are then assessed for compliance with SIDBI's Environmental and Social Management Policy which is in alignment with IFC Performance Standards. Applicants are required to submit the Environmental and Social Due Diligence (ESDD) form (Annexure 2), followed by project appraisal. During project appraisal, financial ratings of the MSME borrowers are carried out using the respective credit rating model / tool adopted by the organization alongside the Environmental Social and Governance (ESG) rating/ ESDD format. The project appraisal is carried out after carrying out project site assessments to confirm risk categorization and safeguard requirements under FMAP Programme. ESIA/ESMP shall only be applicable for **Category B projects**. The definitions of **Category B** and **Category C** projects are mentioned below.

- **Category B projects** involve technology or process changes that may result in moderate, site-specific, and reversible impacts, such as effluent/ wastewater discharge, air emissions, chemical and waste handling, energy use, and occupational health and safety concerns. These impacts must be carefully assessed and managed through structured mitigation planning or involve technology or process where risks and impacts are considered limited, and the magnitude is expected to be low to moderate. The risks and impacts are few in number, contained within the footprint of the activities, largely reversible, and readily mitigated through generally accepted mitigation measures and good international industry practices.
- **Category C projects** involve low-risk efficiency improvements or equipment upgrades that do not alter manufacturing chemistry or increase pollution loads and therefore present minimal potential for adverse environmental or social effects or Category C activities are typically those that have no physical elements or defined footprints. However, in certain contexts, activities that have physical elements or a footprint may also be considered as low risk, particularly where the activities are small-scale, undertaken within an already built environment, do not involve physical and economic displacement of people or have minimal or no adverse impacts on indigenous peoples.

By providing a structured assessment framework, this ESIA enables the FMAP Programme to evaluate Category B interventions - identifying, analyzing, and mitigating potential environmental and social impacts - while also validating the low-risk nature of Category C projects. This ensures full alignment with SIDBI's ESMS (aligned with IFC Performance Standards), and the GCF Environmental and Social standards.

This ESIA and ESMP are applicable across diverse industrial activities and processes within the **pulp & paper sector, covering various MSME clusters in India**. These frameworks define pathways for classifying risks, evaluating the implications of mitigation technologies and adaptation investments, and

establishing a transparent, standardized basis for environmental and social risk management under the FMAP.

Linkage with GCF

The **FMAP Programme** supports projects that reduce greenhouse gas emissions and enhance climate resilience. MSMEs in the pulp & paper industry can avail assistance under GCF-FMAP Programme for any of the following project types:

A. Mitigation

- **Energy Efficiency Projects:** Example- Retrofitting / replacing / upgrading EE machinery / interventions / process optimization, and waste heat recovery to reduce energy consumption.
- **Renewable Energy Integration:** Example- Installation of solar panels / solar water heater in manufacturing units for captive use / Renewable Energy Service sector enterprises that sell solar / wind power to the manufacturing enterprises.
- **Green Mobility & Logistics:** Example- Purchasing of electric vehicles: 2 Wheelers, 3 Wheelers, 4 Wheelers, buses, trucks, development & upgradation of charging infrastructure and battery swap.
- **Waste to Energy:** Example- Setting up Waste to Energy projects for generation of Biogas/ BioCNG/ Power/ producer or syngas from urban, industrial and agricultural wastes/residues.

B. Adaptation:

- **Water-efficient technologies:** Example- Fresh water reduction, Wastewater treatment / Effluent treatment, ZLD, IoT based surface water storage units, Rainwater Harvesting (Reuse and Recharge) and Stormwater Management equipment
- **Climate-resilient materials:** Example-Green Buildings using locally suited, durable materials for housing and infrastructure to withstand extreme weather.
- **Manufacturing Climate innovation related products:** Example- Innovative and locally suited technologies aimed at increasing climate adaptation.
- **Supplying alternative raw materials for those that are at risk from climate change:** Example- Aiding MSMEs who are the suppliers to bigger industries manufacturing technologies to enhance adaptive capacity of end beneficiaries.

1.1.4 Objectives of the ESIA

The key objectives of this ESIA are to:

- Provide a programme-level framework for environmental and social risk assessment of MSME sub-projects under FMAP Programme.
- Ensure compliance with SIDBI's ESMS, IFC Performance Standards, and GCF Environmental and Social Standards.
- Identify and categorize potential risks associated with Category B and Category C projects.
- Establish mitigation measures and safeguard requirements for Category B interventions.
- Validate the low-risk nature of Category C projects to streamline approval and implementation.
- Promote transparency and accountability in environmental and social risk management across MSME sectors.

1.1.5 Scope of the ESIA

The scope of this ESIA covers:

- MSME sub-projects financed under the FMAP Programme in India viz., (i) Brownfield projects set up by an existing enterprise within its existing industrial premises, (ii) Brownfield enterprises going for expansion and modernization of their existing operations in a new location / premises; and (iii) Greenfield projects i.e., setting up of new enterprises.
- Environmental risks such as emission, effluent, waste management, energy use, and resource efficiency.
- Social risks including occupational health and safety, community impacts, and labor practices.
- Screening, categorization, and appraisal processes consistent with SIDBI's ESMS and GCF ESS requirements.
- Programme-level analysis to guide project-specific assessments and safeguard planning.

1.1.6 Summary of Key Environmental and Social Risks

The pulp and paper sector in India, plays an important role in manufacturing, employment generation, and livelihoods. At the same time, the sector faces significant environmental and social challenges.

From an environmental perspective, pulp and paper sector is highly resource-intensive, particularly during processes such as pulping, bleaching, washing, and paper forming. These operations require substantial quantities of water and energy. The industry generates wastewater with high loadings of organic matter, suspended solids, bleaching chemicals, and sometimes chlorinated compounds, which can contaminate surface and groundwater if not adequately treated. Energy consumption for steam generation, drying, and mechanical operations contributes to greenhouse gas emissions, especially in MSMEs that rely on coal- or biomass-based boilers with lower efficiencies. Additionally, the sector produces significant solid waste, including sludge from effluent treatment plants, wastepaper rejects, and ash from boilers, posing challenges related to safe disposal and resource recovery.

Socially, pulp & paper sector often operate with limited access to capital, modern technology, and skilled manpower, making compliance with environmental standards more difficult. Poor environmental management can also affect local communities, particularly through impacts on water quality and availability. Addressing these challenges requires improved process efficiency, cleaner production practices, adoption of water recycling, and supportive policy and financial mechanisms tailored to the MSME context.

1.1.7 Key Mitigation Measures and Recommendations

To address these challenges, the pulp & paper sector can adopt a more balanced and forward-looking approach that safeguards both the environment and people:

- **Water & Effluent Management:** Establish effluent treatment plants (ETPs), adopt Zero Liquid Discharge (ZLD) systems, and promote water recycling and reuse to minimize pollution.
- **Energy Efficiency & Renewables:** Upgrade to energy-efficient machinery and integrate renewable energy solutions such as solar PV to reduce emissions and operating costs.
- **Cleaner Production & Safer Chemistry:** Transition to less hazardous chemicals, optimize wet processes, and ensure proper neutralization of effluents to reduce toxicity.
- **Worker Health & Safety:** Provide personal protective equipment (PPE), ergonomic workstations, dust extraction systems, and regular training on safe handling of chemicals and machinery.

- **Community Safeguards:** Monitor and control noise, dust, and emissions, while maintaining emergency preparedness systems to protect surrounding populations.
- **Technology Upgradation:** Encourage adoption of automation, - and modern wastewater treatment technologies to improve compliance and reduce risks.

Note: (larger list is described in the process wise section 1.3)

1.2 Risk Categorization Methodology

The methodology adopted for the ESIA is based on a systematic and participatory approach, ensuring the involvement of all relevant stakeholders and partners associated with the FMAP Programme. With the support of administrative bodies, local authorities, industry associations, and MSME representatives, the study was conducted in a consultative manner to promote transparency and broad dissemination of information regarding the programme's objectives and potential impacts.

Risk categorization methodology tailored for SIDBI–GCF ESIA/ESMP screening of pulp & paper MSMEs in India.

- **Low Risk:** There are limited site-specific impacts; can be mitigated through environmental sound management and could be categorized as C.
- **Moderate Risk:** Risk can be manageable with standard measures; no significant legacy issues are categorized as B.
- **High:** Significant, diverse, or irreversible impacts; cumulative cluster impacts; resettlement/ land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance: major legal non-compliance; sensitive receptors affected is categorized as A. **Under the programme, Category A projects are not covered.**

Key steps in the methodology include:

- **Stakeholder Consultations:** Structured discussions were held with MSME owners, workers, local communities, and sectoral experts to capture diverse perspectives on environmental and social risks, benefits, and concerns.
- **Documentary Review:** Existing policies, regulatory frameworks, sectoral studies, and SIDBI's ESMS procedures were reviewed to ensure alignment with national standards, IFC Performance Standards, and GCF Environmental and Social Standards.
- **Portfolio Data Review:** Technical, financial, and environmental data from SIDBI's previous portfolio assets (earlier loan cases) were analyzed to identify patterns of risk, performance outcomes, and mitigation effectiveness. This evidence base provided valuable insights into sector-specific challenges, compliance trends, and the practical feasibility of proposed interventions.
- **Site Assessments:** Field visits and site-level assessments were conducted to validate information provided in the Environmental and Social Due Diligence (ESDD) forms, ensuring accurate categorization and safeguard planning.
- **Risk Analysis and Mitigation Planning:** Environmental and social risks were analyzed for Category B interventions, focusing on emissions, effluents, waste management, energy use, and occupational health and safety. Mitigation measures were identified to ensure impacts remain moderate, site-specific, and reversible.

- **Screening and Categorization:** Sub-projects were systematically screened against the ESMS Exclusion List, followed by categorization into Category B or Category C based on potential risk pathways. Screening of sub-projects follows a joint interpretation framework, where SIDBI applies its internal ESMS processes while ensuring full alignment with GCF's safeguards
- **Validation of Low-Risk Projects:** Category C projects were reviewed to confirm their low-risk nature, particularly efficiency improvements and equipment upgrade that do not alter manufacturing chemistry or increase pollution loads.

This participatory and evidence-based methodology ensures a common understanding of the issues, benefits, and concerns associated with MSME sub-projects under FMAP Programme. By integrating historical portfolio data with forward-looking risk analysis, the ESIA provides a transparent and standardized framework for environmental and social risk management, strengthening compliance with SIDBI's ESMS and the GCF Environmental and Social Policy.

1.3 Environmental and Social Due Diligence and Assessment

As the Accredited Entity (AE), SIDBI is responsible for ensuring that all subprojects under the Program adhere to the GCF Environmental and Social Safeguards (ESS) and follow a proportionate, risk-based due diligence process.

Fit-for-Purpose ESIA (Environmental and Social Impact Assessment): For subprojects categorized as Moderate risk (B) and Low Risk (C). sector-specific ESIA that:

- Identifies environmental impacts such as high-water demand, high BOD/COD effluent generation, sludge management, air emissions, and hazardous chemical handling—critical in wet-processing.
- Assesses social risks such as labour conditions, OHS (chemical exposure, boilers, confined-space risks), migrant worker conditions, and community-level impacts, especially in pulp & paper clusters.
- Evaluates contextual sensitivities (e.g., proximity to drainage channels, rivers, or groundwater sources).
- GCF guidelines state that the ESIA must be proportional to the risk category and designed to address the specific impacts of the activity.
- For sub-projects where (i) Brownfield enterprises going for expansion and modernization of their existing operations in a new location / premises; and (ii) Greenfield projects i.e., setting up of new enterprises, the scope of land is limited to industrial area, industrial estate, notified industrial zone, special economic zones, Land parcels already designated by the Government for non-agricultural use, solar / wind farms etc. where all the necessary statutory permission / infrastructure are available.
- Such projects are eligible under this ESIA only where Environmental and Social Due Diligence (ESDD) and legal/site screening confirm that there is no compulsory land acquisition with physical or economic displacement, no impacts on Indigenous Peoples, no impacts on critical habitat/protected ecosystem, no impact on cultural heritage, and no other material PS5–PS8 consequence in line with SIDBI's ESMS and GCF Environmental and Social Standards.
- Any sub-project for which screening identifies impacts falling under exclusion criteria or PS5–PS8 requirements shall be deemed ineligible and excluded from financing under the GCF-FMAP Programme.

Following are the detailed E&S Risk Assessment associated with Pulp and Paper Process & Technologies

1.3.1 Raw Material

It is the set of processes used to procure and source the wood from verified and registered third party from govt bodies like forest department, then later sort, clean, and condition the fibrous materials - primarily wood (logs, chips), or recycled paper and before raw material enter the pulping stage. It ensures that all raw materials meet the required size, quality, cleanliness, and chemical composition for efficient pulping and consistent paper quality.

(a) Key Environmental Risks:

- **Air Emissions:** Debarking and chipping operations generate wood dust, which contributes to particulate matter emissions and respiratory irritation.
- **Solid Waste Generation:** Bark residues, wood rejects, and fines are produced in large quantities during debarking and chipping. Large quantities of solid waste and pulp sludges are major outputs of pulp and paper processes.
- **Water Pollution from Log Storage Runoff:** Water used in log storage yards or log sprinkling may carry dirt, mud and suspended solids, affecting receiving waters. Raw material preparation is a documented first step contributing to downstream pollution load in pulp and paper mills.
- **Noise Pollution:** Chipping machines, conveyors, and truck generate high noise levels, impacting workers and nearby communities. Although noise is not associated directly and it is commonly associated with high-decibel mechanical vibration used in timber and processing industries.
- **Fire & Safety Hazards:** Large volumes of dry wood, bark, organic pulp and wood dust can create fire and explosion risks. There is a safety risk in wood-handling and milling operations.

(b) Key Social Risks:

- **Worker Health & Safety:** Workers are exposed to:
 - o Wood dust causes respiratory irritation and long-term lung impacts.
 - o Noise from chippers and debarkers.
 - o Accidents, including cuts, limb injuries, and slips due to heavy mechanical operations. Labour & Community Impacts from wood harvesting. Upstream procurement can involve poor working conditions
- **Community Nuisances:** These issues arise around woodyards and raw material transport corridors. Dust, noise, and heavy truck movement can create:
 - o Traffic congestion
 - o Increased road accidents
 - o Noise disturbance

Categorization of activities in Raw Material process - Category: C (Medium Risk)

Risks are moderate and can be managed with sustainable procurement of timber, proper planning and worker safety measures.

Rationale for the categorization of Raw Material Preparation

Raw material preparation produces dust, noise, bark waste, and runoff with dust and dirt, which are localized, reversible, and manageable through standard mitigation measures. Worker safety risks (dust

exposure, noise, mechanical hazards) are controllable with standard OHS practices. labour and safety risks, are remain addressable. No high-hazard chemicals are used at this stage; wastes are non-hazardous (bark, wood residues).

Applicable IFC Performance Standards in Raw Material Preparation

- **PS1- Assessment and Management of Environmental and Social Risks and Impact** is a foundational standard that applies when a project has significant environmental or social risks requiring a structured management system.
- **PS2- Labor and Working Conditions:** Addresses occupational health and safety (OHS) risks such as wood dust exposure, noise from debarking and chipping operations, manual handling injuries, and machine-related hazards.
- **PS3- Resource Efficiency & Pollution Prevention:** Relevant for reducing energy consumption and minimizing airborne dust emissions through efficient machinery and ventilation systems.
- **PS4- Community Health & Safety:** Ensures that dust and noise emissions do not adversely affect surrounding people and that emergency preparedness measures are in place.
- **PS5 to PS8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities or cultural heritage without regulatory compliance.

1.3.2 Pulping (Fiber Separation) Process

Pulping is the industrial process of separating cellulose fibers from raw materials such as wood, agricultural residues, or recycled paper by breaking down the lignin and other binding components that hold the fibers together. This process converts the raw material into a fibrous slurry called pulp, which is then used to make paper.

Types of Pulping:

1. **Mechanical Pulping:** Mechanical pulping is a process in which wood is physically ground, crushed, or refined to separate cellulose fibers without dissolving lignin, producing pulp with high yield but lower fiber strength. This method relies mainly on mechanical energy to liberate fibers rather than chemicals. During the process, wood is crushed mechanically to extract fibers for papermaking.

(a) Key Environmental Risks:

- **High Energy Consumption:** Mechanical pulping requires significant electrical energy for grinding/refining operations, making it energy-intensive.
- **Air Emissions (Dust & Particulates):** Mechanical processing of logs and chips produces wood dust, which contributes to particulate emissions, a well-known environmental impact in pulp and paper operations.
- **Waste Generation:** Mechanical pulping yields Bark residues, Fiber fines, Rejects. Large quantities of wood waste are common across pulp processes.
- **Water Pollution:** Runoff and process water may carry organic matter, Lignin residues, Suspended solids. Improperly managed wastewater from pulp operations can contribute to high BOD/COD loads.
- **Noise Pollution:** Grinding and refining machinery generate high noise levels affecting occupational and community environments.

(b) Key Social Risks:

- **Worker Health & Safety Risks**

- o Exposure to wood dust (respiratory irritation)
- o Noise-induced hearing loss from grinders
- o Mechanical hazards (rotating equipment, log handling)
- o highlight worker safety and labour-related concerns.
- **Community Impacts**
 - o Noise and dust from wood-handling operations
 - o Traffic risks from log trucks serving the mill

2. Chemical Pulping: Chemical pulping is a process in which wood chips are prepared in chemical solutions (such as sodium hydroxide and sodium sulfide in the Kraft process) to dissolve lignin i.e., the natural binder in wood, thereby releasing individual cellulose fibres for papermaking. In the Kraft pulping process, NaOH and Na₂S are used.

(a) Key Environmental Risk:

- **Air Emissions:** Chemical pulping and related processes release sulphur compounds and nitrogen oxides, which contribute to air pollution and odour issues.
- **Water Pollution:** Effluents from pulping and bleaching may contain: Chlorinated organics, Lignin residues, High BOD and COD levels. These pollutants degrade water quality and may threaten aquatic life.
- **Chemical-Containing Wastewater:** Chemical pulping results in black effluents and other chemical-laden waste streams. Alkaline and sulphite processes can generate highly contaminating black effluents, requiring treatment and chemical recovery before discharge.
- **Solid Waste & Sludge:** Pulp mills generate significant amounts of solid waste and sludge containing fibers, chemicals, and other residues.
- **High Energy & Water Consumption:** Paper production requires high water and energy use. This increases the environmental footprint of chemical pulping operations.

(b) Key Social Risks:

- **Worker Health & Safety Risks:** Workers may be exposed to:
 - o Hazardous chemicals (e.g., caustic soda, sulfides)
 - o Toxic fumes from pulping/bleaching
 - o Risk of skin burns, chemical spills, or inhalation hazards
- **Community Health & Nuisance Impacts:** Communities near pulp mills may be affected by:
 - o Odour from sulfur emissions
 - o Air pollution, including NO_x and sulfur compounds
 - o Contamination of local water sources if effluents are not treated adequately
 - o These pollutants can degrade local air and water quality.
- **Labour & Human Rights Risks**
 - o Hidden forced labour
 - o Excessive working hours
 - o Unsafe labour practices in pulp and paper

3. Recycled Pulping: Recycled pulping (repulping) is the process of breaking down used paper into individual fibers by mixing it with warm water, sometimes with chemicals to separate the fibers, remove contaminants (plastics, metals, adhesives), and produce pulp that can be reused to manufacture new paper products.

During repulping, the wastepaper is shredded, mixed with water, screened to remove non-paper components, and may undergo cleaning and deinking before reuse.

(a) Key Environmental Risk:

- **Wastewater Pollution:** Recycled pulping and deinking generate wastewater containing:
 - o Inks, dyes, adhesives
 - o Suspended solids
 - o Organic pollutants
 - o Untreated pulp-and-paper wastewater poses major risks to water quality and aquatic life.
- **Solid Waste & Rejects**
 - o Repulping generates coarse and fine rejects, including:
 - o Plastics
 - o Metals
 - o Non-paper components; these require additional disposal or treatment.
- **Energy & Water Use:** Recycled pulping still consumes water and energy, especially during:
 - o Pulping
 - o Screening
 - o Deinking
- **Sludge Generation:** Deinking produces ink-rich sludge that can be difficult to manage, contributing to solid waste burdens.

(b) Key Social Risks:

- **Worker Health & Safety Risks**
 - o Dust from shredded paper
 - o Chemicals used in deinking or cleaning
 - o Mechanical hazards from pulpers, shredders, and conveyors. These risks are consistent with broader pulp-and-paper industry safety concerns.
- **Community Health & Nuisances**
 - o Odour and emissions from wastewater handling
 - o Noise from pulping machinery
 - o If wastewater is improperly treated, surrounding communities may face water contamination risks.
- **Supply-Chain Social Risks**
 - o Informal sector waste collection (poor labour conditions)
 - o Small-scale sorting operations with inadequate worker protections.

It may be noted that among the three kinds of pulping, Chemical pulping has the most E&S risk, followed by mechanical pulping and recycled pulping having the least E&S risk.

Categorization of activities in Pulping process - Category: B (Moderate Risk)

Risks are significant but manageable with proper interventions and environmental protection measures like energy-efficient technologies, effluent treatment, and worker safety measures.

Rationale for the categorization of Pulping process

The Pulping process in the Pulp & Paper industry is categorized as Category B due to environmental and social impacts. However, these risks are site-specific and reversible. The activity involves small-scale

chemical use like NaOH, Na₂S, generates wastewater, and produces air emissions (SO_x, NO_x). These processes also pose occupational safety risks due to digesters, chemical handling, and steam systems.

Applicable IFC Performance Standards in the Pulping process

- PS1: Fully applicable due to significant environmental risks (effluent, chemical discharge) requiring structured management systems and ESMP implementation.
- PS2: Critical for worker safety during handling of acids, alkalis, and hot baths.
- PS3: Applies for water and energy efficiency, effluent treatment, and pollution prevention.
- PS4: Ensures community health protection from untreated effluent and boiler emissions.
- **PS5 to PS8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance.

1.3.3 Pulp Washing and Screening

Pulp washing is the process of removing spent chemicals and dissolving organic material from the prepared pulp after the pulping stage. Its purpose is to separate clean pulp fibers from black liquor, recover chemicals for reuse (in chemical pulping), reduce the organic load going into the bleaching process, improve pulp quality and reduce chemical consumption.

Pulp screening is the process of removing non-fibrous contaminants and oversized or improperly cooked particles (known as shives) from the pulp slurry. It is used to ensure uniform fiber quality, remove impurities such as bark, knots, plastics, wire, sand, grit, and uncooked chips, protect downstream equipment like refiners and cleaners, produce a cleaner, stronger sheet of paper.

Key Environmental Risks

- **Water Pollution:** High-load wastewater generation, pulp washing discharges filtrates containing:
 - o Dissolved lignin
 - o Organic matter load (high BOD/COD)
 - o Residual cooking chemicals (NaOH, Na₂S)
 - o Colour and suspended solids

If improperly managed, these filtrates contribute to:

- o Oxygen depletion in receiving water bodies
- o Colouration of rivers
- o Toxicity to aquatic life
- **Carryover of black liquor:** Incomplete washing could increase chemical oxygen demand (COD) in subsequent stages (bleaching, ETP), raising:
 - o Sludge generation
 - o Treatment cost of the wastewater
 - o Risk of Environmental non-compliance with discharge.
- **Sand, grit, and fibre-laden rejects from screening:** Screening produces reject streams containing:
 - o Shives
 - o Bark fragments
 - o Plastics, ropes, knots

- o Dirt and grit
- **Solid Waste Management Risks:** Screening rejects are often contaminated and may include:
 - o Plastics
 - o Polymers from recovered paper
 - o Metals
 - o Sand/grit

Risks:

- o Improper disposal leads to soil contamination
- o Mixed waste complicates recycling
- o Potential for illegal dumping
- o Secondary fibre loss
- o Fibre-rich rejects increase:
 - Sludge volume
 - BOD in ETP
 - Risk of odour generation upon decomposition
- **Air Emission Risks:** While washing/screening themselves do not emit major air pollutants, indirect emissions arise from:
 - o Odour (from unwashed black liquor)
 - o Fugitive emissions from storage tanks
 - o Fine fibre aerosols

These can cause worker discomfort and community nuisance.

- **Chemical Handling Risks:** Residual chemicals in pulp washing liquor pose:
 - o High pH (alkaline) risk
 - o Corrosion of equipment
 - o Potential chemical exposure to workers (skin/eye irritation)
 - o Spill risks into nearby drains

If chemical dosing is improper, pulp washing efficiency drops, increasing environmental load.

- **Energy Consumption**

- o Pulp washing uses
 - High volumes of water
 - Energy for pumping, dilution, and vacuum systems
- o Higher energy means
 - Indirect GHG emissions
 - Increased operational carbon footprint

- **Key Social Risks**

Occupational Health & Safety (OHS) Risks: Worker exposure to chemicals, residual pulping chemicals can cause Skin burns, Eye irritation and Respiratory issues from alkaline fumes or aerosols.

- o **Mechanical hazards:** Screening systems include Rotors, Vibrating screens and Pressurized screen baskets. Risk of Entanglement, Crushing injuries and Finger/hand injuries during cleaning

Noise: Screens and pumps generate noise levels may reach upto 85–100 dB, potentially harming hearing without PPE at workplace.

High-temperature process areas: Hot filtrates and steam lines pose risks of Burns and Scalding

Community Health Risks: Though minor for washing/screening compared to pulping:

- o Odour from black liquor carryover
- o Increased truck movement transporting rejects
- o Potential for wastewater leaks affecting local water bodies

Labour and Supply Chain Issues: Although washing/screening occur onsite, social risks include:

- o Contract workers involved in housekeeping around screens
- o Higher exposure to contaminants and chemical residues
- o Inadequate PPE for unskilled labour

Categorization of activities in Pulp Washing and Screening process - Category: B (Moderate Risk)

These risks are sizable and manageable with proper interventions like energy-efficient technologies, effluent treatment, and worker safety measures.

Rationale for the categorization of Pulp Washing and Screening process

The pulp washing and screening processes are categorized as GCF Category B due to their association with generation of wastewater and production of solid rejects containing shives, grit and contaminants. These processes have OHS risks from wet and slippery surfaces, mechanical hazards from rotating screens.

Applicable IFC Performance Standards in Pulp Washing and Screening process

- **PS1:** Applicable for risk assessment and ESMP due to water use, heat exposure, and VOC emissions.
- **PS2:** Addresses OHS risks like heat stress and chemical handling.
- **PS3:** Focus on energy-efficient technologies and water reuse systems.
- **PS4:** Community safeguards for air emissions and wastewater discharge.
- **PS5 to PS8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance.

1.3.4 Bleaching

Bleaching is the process of removing residual lignin and color-causing compounds from pulp using chemical oxidation and extraction stages to produce high-brightness, white pulp suitable for white writing, printing, copier, and specialty papers. Bleaching does not significantly remove more fiber but instead brightens and purifies the pulp by destroying chromophores (light-absorbing groups) remaining after pulping.

(a) Key Environmental Risk

- **Water Pollution:** Bleaching generates effluents that may contain:
 - o Adsorbable organic halides (AOX) (in ECF/chlorine dioxide systems)
 - o Chlorinated organic compounds (if chlorine-based chemicals used)
 - o High COD/BOD levels
 - o Colour and dissolved lignin
 - o Residual bleaching chemicals: Cl_2 , H_2O_2 , NaOH , O_3
 - o Suspended solids, fibers, and fines

Impacts:

- o Toxicity to aquatic organisms

- o Bioaccumulation of chlorinated organics
- o Oxygen depletion in receiving water bodies
- o Long-term sediment contamination
- o Risk of failing pollution control norms (CPCB/IFC standards)
- **Air Emission:** Bleaching can release:
 - o Chlorine dioxide fumes (irritant, green-yellow toxic gas)
 - o Chlorine (Cl_2) traces (if used in multi-chemical mills)
 - o Volatile organic compounds (VOCs)
 - o Odorous compounds from reaction stages
- **Impacts:**
 - o Worker health hazards
 - o Local community odour and respiratory irritation
 - o Corrosion of surrounding equipment and structures
- **Chemical Handling & Spill:** Bleaching requires large volumes of hazardous chemicals:
 - o Chlorine dioxide (unstable oxidizer)
 - o Hydrogen peroxide (strong oxidant)
 - o Sodium hydroxide (corrosive)
 - o Oxygen, ozone (reactive gases)
 - o Acid and alkaline solutions
- **Risks:**
 - o Chemical spills affecting soil/water
 - o Corrosive damage to floors, drains, and containment systems
 - o Explosion risk (especially ClO_2 , O_3 concentration zones)
- **Solid Waste:** Bleaching produces:
 - o Chemical sludge
 - o Precipitated lignin residues
 - o Filter cake
 - o Spent filters and contaminated packaging
- **Without proper disposal it may lead to:**
 - o Soil contamination
 - o Leachate entering groundwater
 - o Hazardous waste mismanagement
- **High Water and Energy Use:** Bleaching consumes:
 - o Large quantities of processed water
 - o Significant energy for heating, mixing, and chemical generation
 - o Steam and electrical power for reactors, washers, and mixers

(b) Key Social Risks

- **Worker Exposure to Bleaching Chemicals:** Workers face hazards from:
 - o ClO_2 gas exposure leads to respiratory issues, headaches, pulmonary irritation
 - o Hydrogen peroxide (burns, eye injury)
 - o Ozone (lung irritation)
 - o Caustic soda (skin and eye burns)
 - o Acid/alkali splashes during handling
 - o Poor ventilation increases exposure risk.

Process Safety Risks: Bleaching towers, mixers, and reactors operate under controlled conditions but pose:

- o Pressure increases risks
- o Temperature fluctuations
- o Potential for ClO₂ decomposition (explosive)
- o Chemical mixing accidents

- **Noise and Vibration:** Bleaching chemical preparation rooms have:

- o High-speed mixers
- o Pumps
- o Compressors (for ozone and oxygen systems)

Risk:

- o Hearing loss without proper PPE.

- **Slips, Trips, and Falls:** Bleaching areas are typically:

- o Wet
- o High humidity
- o Contaminated with chemical splash residues

Which may increase accident probability for workers and contractors.

- **Contractor Safety Risks:** Maintenance work nearby:

- o Pipelines
- o Chemical storage
- o Reactors
- o Dosing systems

May lead to higher exposure to chemical burns, inhalation hazards, confined space risks.

- **Community Health & Safety Risks:**

- o Accidental release of chlorine dioxide or chlorine
- o Wastewater leaks into natural water bodies
- o Odour or gas leaks affecting nearby settlements
- o Increased truck movement for chemical delivery

- **Biodiversity Risks:** Bleaching effluent discharged into rivers or streams may:

- o Reduce dissolved oxygen (DO)
- o Harm fish and aquatic life
- o Interfere with photosynthesis (due to colour)
- o Contaminate sediments with chlorinated organics

Categorization of activities in Bleaching processes - Category: B (Moderate Risk)

Moderate environment and social impact, both impacts can be manageable with proper planning, treatment and worker health & safety measures.

Rationale for the categorization of Bleaching processes

Bleaching in pulp and paper mills (for white paper grades) is categorized as GCF Category B due to the use chemicals (ClO₂, H₂O₂, NaOH), air emissions, wastewater containing chlorinated organics and occupational safety hazards. The process has environmental and social risk, but it is site specific and reversible with proper mitigation measures.

Applicable IFC Performance Standards in Bleaching processes

- **PS1:** Applicable due to the environmental and social risks associated with bleaching chemicals, wastewater generation, chemical storage, emergency preparedness, and implementation of mitigation measures.
- **PS2:** Addresses occupational health and safety risks associated with chlorine dioxide, hydrogen peroxide, caustic soda, chemical exposure, confined spaces, and process safety.
- **PS3:** Applicable for pollution prevention, chemical management, wastewater treatment, water conservation, and reduction of AOX and air emissions.
- **PS4:** Addresses community health and safety risks associated with chemical releases, transportation of hazardous chemicals, wastewater discharges, and emergency response measures.
- **PS5 to PS8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance.

1.3.5 Pulp Refining

Pulp refining is the mechanical treatment of cellulose fibers in pulp to modify their physical structure, primarily by fibrillation and controlled fiber cutting in order to improve the strength, bonding ability, and papermaking properties of the pulp before it is formed into paper. Refining takes partially processed pulp (from pulping, washing, screening, or recycled fiber preparation) and uses mechanical energy to develop the fiber surface, enhance flexibility, and increase inter-fiber bonding potential.

(a) Key Environmental Risks

- **High Energy Consumption**
 - o Large indirect carbon emissions
 - o High electricity demand leads to an increased operational footprint
 - o Additional heat load on process water
- **Water Use & Process Water Quality:** Refining uses process water (white water) to:
 - o Dilute pulp
 - o Control temperature
 - o Aid fiber swelling

Risks:

 - o Increased wastewater volume
 - o Higher dissolved solids (from fiber fines, fillers)
 - o Fibre loss to drains leads to higher BOD/TSS load in ETP
 - o Potential overflow from refiner pits contaminating drains
- **Noise Pollution:** Refiners generate 80–100 dB noise levels, sometimes higher.

Risks:

 - o Occupational noise exposure
 - o Noise propagation into other plant areas
 - o Increased hearing protection requirements
- **Solid Waste:** Refining produces:
 - o Fiber fines
 - o Rejects from protection screens
 - o Metal fragments (from plate wear)

These enter the wastewater stream and increase:

- o Sludge generation at ETP
- o TSS load (Total Suspended Solids)
- o Maintenance waste requiring proper disposal
- **Lubricants and Oils:** Mechanical refiners use bearings & lubrication systems.

Risks:

- o Oil leaks into process areas
- o Contamination of drains
- o Need for proper handling and disposal of used oil

(b) Social Risks

- **Mechanical Hazards:** Refiners contain:

- o Rotating plates
- o High-speed gears
- o Sharp metal segments

OHS Risks:

- o Entanglement or crush injury during maintenance
- o Plate crash during wrong plate installation
- o Hot surfaces causing burns
- o Vibration injuries for long-term operators

- **Noise Exposure:** Workers near refiner's face:

- o Continuous high noise
- o Risk of hearing loss
- o Need for earmuffs/earplugs

- **Slips, Trips, Falls:** Refining areas are usually:

- o Wet due to white water circulation
- o Slippery from fiber deposits
- o Cluttered with hoses, pipelines

This increases accident risks for workers and contractors.

- **Electrical Safety:** Large refining motors require:

- o MCC rooms
- o VFD panels
- o High-tension electrical feeds

Risks:

- o Arc flash
- o Electrical shocks
- o Fire hazards

- **Ergonomics and Manual Handling:**

- o Refiner plates are large, heavy, and awkward to handle.

Risks:

- o Back injuries
- o Dropped-object hazards
- o Musculoskeletal strain

- **Community Health & Safety Risks:** Refining is inside the mill and poses limited direct community risks, but potential concerns include:

- o Noise propagation if mill boundary is close to residential areas

- o Power fluctuations or electrical load affecting nearby grid stability (rare)
- **Biodiversity / Ecosystem Risks:** Minor risk due to indirect impacts from:
 - o Increased ETP load due to fiber fines
 - o Overflow of refining water affecting nearby land/water bodies

Categorization of activities in Pulp Refining process -Category: B (Moderate Risk)

Pulp refining does not involve direct chemical discharge, its high energy consumption, generation of mechanical noise, and potential worker safety hazards classify it as a moderate-risk process.

Rationale for the categorization of Pulp Refining process:

Project's scale, technology, and mitigation measures ensure that impacts are moderate and controllable. Small scale units have risks which can be managed, however larger units have more E&S risk.

Applicable IFC Performance Standards in Pulp Refining process

- **PS1:** Not primary and risks are minor due to occupational.
- **PS2:** Addresses noise exposure and machine safety.
- **PS3:** Applies to energy-efficient refining technology, reduction of electricity consumption, lubrication management, and control of noise emissions.
- **PS4:** Community safeguards for noise emissions.
- **PS5 to PS8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance.

1.3.6 Paper Making

During the stage of papermaking, diluted pulp fibers, fillers, and chemical additives are uniformly dispersed in solution and deposited onto the paper machine wire (forming section), where they are formed into a continuous wet sheet. This wet fiber mat is then drained, pressed, and dried to produce paper.

It is the core step in converting refined pulp into a continuous paper sheet with uniform thickness, structure, and surface properties.

(a) Key Environmental Risks

- **High Energy Consumption**
 - o Dryer section alone consumes 60–70% of total thermal energy and heat.
 - o Press section and forming section consume significant electrical energy (pumps, vacuum boxes, motors, fans).

Risks:

- o Indirect GHG emissions under scope 2
- o High operational carbon footprint
- o Large electricity demand

- **High Water Consumption**

Sheet formation operates at very low consistency, requiring large dilution water volumes.

Risks:

- o Increased freshwater withdrawal may lead to stress on local water sources
- o High volume of water recirculation can have risk of overflows

- o Additional load on effluent treatment plant (ETP)

- **Wastewater Generation and Water Quality Issues**

The forming section produces:

- o Fiber fines
- o Fillers (clay, CaCO_3)
- o Dissolved and colloidal substances (DCS)
- o Starch, sizing chemicals, dyes

- **Air Emissions & Heat**

The dryer section generates:

- o Volatile Organic Compound
- o Fugitive emissions from coating additives (if used)

- **Solid Waste**

Sheet formation contributes to:

- o Trim waste (edges trimmed from sheet)
- o Defective paper recycled internally

- **Chemical Use**

Additives used in sheet formation include:

- o Wet-end starch
- o Chemical Fillers
- o Dyes/Bleaching/optical brighteners
- o Strength agents

Risks:

- o Chemical spills affect drainage
- o Worker exposure during mixing
- o Increased ETP load

- **Noise Exposure**

Noise levels near forming and press sections often reach over 90–110 dB.

Risks:

- o Long-term hearing loss
- o Need for continuous PPE use

(b) Key Social Risks

Mechanical Hazards

Sheet formation equipment includes:

- o Press rolls (nip pressures extremely high)
- o Large rotating dryers

Risks:

- o Entanglement accidents and Injuries

Heat Stress

Dryer sections operate at 100–170°C.

Risks:

- o Heat exhaustion and dehydration
- o Burns from contact with hot surfaces

Categorization of activities in Paper Formation - Category: B (Moderate Risk)

Intensive chemical use, high-volume of wastewater with significant pH/ /COD/BOD loads, and notable worker safety hazards elevate overall risk. Impacts are manageable but require robust controls; many MSMEs have resource constraints that make compliance challenging.

Rationale for the categorization of Paper Formation

The sheet formation stage of papermaking is categorized as GCF Category B due to moderate environmental and occupational risks associated with high water and energy consumption, generation of fiber-laden wastewater, noise, heat, mechanical hazards from equipments.

Applicable IFC Performance Standards in Paper Formation process

- **PS1:** Fully applicable due to chemical-intensive processes and effluent risks.
- **PS2:** Critical for handling caustic soda and oxidizing agents.
- **PS3:** Focus on water and energy efficiency, ETP compliance.
- **PS4:** Community safeguards for effluent discharge and emergency response.
- **PS 5 to PS 8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance.

1.3.7 Finishing & Converting

- **Finishing** is the set of processes applied to the paper after it is made on the paper machine to improve its surface properties, appearance, functionality and final dimensions before shipping.
- **Converting** refers to the processes that transform finished paper rolls or sheets into final consumer or industrial products.

(a) Key Environmental Risks

Energy Consumption

Cutting, and rewinding uses during production phase of the paper and pulp.

Risks:

- o Indirect GHG emissions
- o Increased electricity demand
- o Higher operational carbon footprint

Waste Generation

These processes generate:

- o Trim waste
- o Off-spec sheets
- o Laminating or coating waste
- o Packaging waste (paper/plastic)

- o Ink/adhesive containers

Risks:

- o Improper disposal leads to solid waste
- o Higher sludge generation if impurity enters wet systems
- o Potential fire hazard during chemical dosing and electrical operation.

Air Emissions

Risks:

- o Respiratory exposure
- o Fire/explosion risk
- o Converting lines (especially tissue, corrugation, printing) also emit: Volatile Organic Compounds (VOCs) from inks, adhesives, coatings and Odour from adhesives or laminates

Chemical Exposure :

- o Printing inks
- o Hot-melt adhesives
- o Coatings (barrier coatings, lamination resins)
- o Cleaning solvents

Risks:

- o Spills contaminating drains
- o Volatile Organic Compounds (VOC) from the process
- o Improper handling of waste chemicals

Noise Pollution

Slitters, rewinders, and printing machines generate 80–95 dB noise.

Risks:

- o Worker hearing loss
- o Partial disturbance if plant boundary is close

Fire and Explosion Hazards: Fire risks arise from

- Friction heat from blades
- Static energy during friction and equipment rolling
- Hot-melt glue systems

(b) Key Social Risks

Mechanical Hazards

- o High-speed rewinders
- o Roller handling systems
- o Nip points in calendar's and laminators
- o Guillotines and embossing rolls

Key hazards:

- o Finger/hand cuts
- o Crushing injuries
- o Entanglement in rotating parts
- o Roll drop accidents (large rolls can weigh tons)

Ergonomic & Manual Handling Risks

- o Lifting heavy rolls
- o Awkward handling of reams, cartons
- o Repetitive motion (packaging, reaming, tissue converting)
- o Musculoskeletal disorders

Heat & Ventilation Issues

Finishing areas (especially calendaring) generate heat.

- o Heat stress
- o Dehydration
- o Poor indoor air quality

Categorization of activities in Finishing and Converting process -Category: B (Moderate Risk)

Emission, waste generation and significant worker safety hazards make this process fall under moderate risk.

Rationale for the categorization of Finishing and Converting process:

Finishing and Converting activities in the pulp & paper industry are categorized as GCF Category B due to moderate environmental impacts related to dust emissions, solid waste generation, energy consumption, and localized VOC emissions, as well as significant occupational safety risks such as cutting hazards, roll handling hazards, nip injuries, noise exposure, and fire risk. These impacts are sites specific, predictable, and can be effectively mitigated using standard operating procedure and management controls at workplace.

Applicable IFC Performance Standards in Finishing and Converting process

- **PS1:** Applicable for management of dust emissions, VOC emissions, solid waste generation, fire hazards, and occupational health and safety risks associated with finishing and converting operations.
- **PS2:** Addresses chemical exposure and heat stress.
- **PS3:** Applies for resource efficiency, energy conservation, waste minimization, VOC control, recycling of trim waste, and pollution prevention.
- **PS4:** Community safeguards for air emissions and wastewater.
- **PS5 to PS8** are conditional because they apply only if projects involve land acquisition affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage without regulatory compliance.

Other Utility Risk Mitigation & Adaptation Technologies

Sr. No.	Eligible Equipment/technology	Process	GCF categorization
1	Crown controlling roll	Calendering / Paper Machine Control	Category B
2	High-temperature soft calender for paper making	Calendering Process	Category B
3	Calendering Machine with AC Variable Frequency Drive	Calendering Process	Category B
4	Chemical Recovery Unit for Spent Liquor	Chemical Recovery Process	Category B

5	Black Liquor Gasification	Chemical Recovery Process	Category B
6	Pocket Ventilation System	Drying / Ventilation Process	Category B
7	Dryer with dryer bars installed inside for paper- making machine	Drying Process	Category B
8	Variable Frequency Drive (by Replacing Dyna Drives)	Electrical Utility	Category B
9	Wide Web Inspection Re-winder with VFD controls	Electrical Utility	Category B
10	Rewinding Machine with VFD controls	Electrical Utility	Category B
11	Vacuum blower	Electrical Utility	Category B
12	Adoption of AC Driving for Papermaking Machine and Winder System	Electrical Utility	Category B
13	Armature Paper Inserting Machine equipped with PLC	Electrical Utility / Automation	Category B
14	Armature Winding Machine equipped with PLC	Electrical Utility / Automation	Category B
15	High-concentration size press	Pressing / Surface Treatment Process	Category B
16	Shoe Press	Pressing / Surface Treatment Process	Category B
17	High concentration pulper	Pulping Process	Category B
18	Bleached Chemi Thermo Mechanical Pulp (BCTMP)	Pulping Process	Category B
19	Drum pulpers	Pulping Process	Category B
20	Extended Delignification System for Cooking of Wood	Pulping Process	Category B
21	Hi-Consistency Pulper	Pulping Process	Category B
22	High Efficiency Refiner	Refining Process	Category B
23	Low Consistency Refining (LCR)	Refining Process	Category B
24	Integration of punched metal screen, slit screen and maceration machine for processing waste paper	Screening / Wastepaper Processing	Category B
25	Multi-functional combined screen	Screening Process	Category B
26	Oxyfuel Burner	Thermal Utility / Combustion	Category B
27	Boiler with Paper Sludge & Other Solid Waste as Fuel	Thermal Utility /Steam Generation	Category B
28	Conversion to Fluidized Bed Combustion Boiler from Stoker Boiler	Thermal Utility /Steam Generation	Category B
29	Boiler Conversion: Atmospheric Fluidised bed to Spouted bed	Thermal Utility /Steam Generation	Category B
30	Heat Recovery Boilers for Waste Combustion	Thermal Utility/ Heat Recovery	Category B
31	Steam- recompression heat pump	Thermal Utility/ Heat Recovery	Category B
32	Cascaded Condensate Recovery System	Thermal Utility/ Heat Recovery	Category B

33	Seven-effect Free Flow Falling Film Evaporator	Thermal Utility/Evaporation	Category B
34	Fabricated Water Ring Vacuum Pumps	Vacuum Generation / Mechanical Utility	Category B
35	Modern Brownstock Washers (BSWs)	Washing Process	Category B
36	Screw Washer	Washing Process	Category B
37	High Efficiency Turbine Pump for Water Intake	Water Handling / Pumping Process	Category B
38	Solar Photo Voltaic power projects for captive use within the existing operating / manufacturing premises	Renewable Energy Tech	Category C
39	Electric mobility - 2 Wheelers, 3 Wheelers, 4 Wheelers, E-buses, E-trucks etc for transit of passengers / industry staffs / transport of consumer goods & finished products etc.	Green Mobility & Logistics	Category C
40	Charging infrastructure and Battery swap set up within the existing operating / manufacturing premises	Green Mobility & Logistics	Category C
41	Wastewater / Effluent treatment / ZLD/	Water-efficient technologies	Category C
42	Rainwater harvesting systems, surface water storage units, stormwater management equipment and aquifer recharge solutions	Water-efficient technologies	Category C
43	Green Buildings using locally suited, durable materials for housing and infrastructure to withstand extreme weather	Climate-resilient materials	Category C

Note-

(i) The above list is indicative and not exhaustive; additional technologies/machines may be considered by the AE for funding only where they fall within the approved scope and eligibility criteria of FMAP, are screened and categorized in accordance with the ESMS, and comply with applicable E&S standards.

(ii) The category indicated in the table reflects the typical risk profile of the technology/process itself. Where the same technology is proposed as part of (a) a brownfield enterprise expanding/modernizing in a new location, (b) a greenfield enterprise, or (c) an off-site RE/EE project, the final categorization of the overall subproject shall be determined through ESDD and site/legal screening. In such cases, the subproject may be classified as Category B where land-related, siting, community health and safety, or other site-specific risks are assessed as moderate, site-specific, and manageable.

Currently, 43 technologies/machines are documented under pulp and paper processes, along with an additional indicative **351 cross-functional technologies listed** which are not exhaustive and can be used by MSMEs in the pulp and paper segment is considered under **Annexure 3**.

In addition to it, SIDBI highlights that MSME is required to prepare and maintain the minimum mandatory documentation. These documents collectively demonstrate compliance with GCF ESS, IFC PS, and SIDBI's ESMS. Each MSME must prepare the ESDD Checklist (**Annexure 2**) as part of screening and categorization under FMAP Programme.

Cumulative cluster-level Effluent risks, including CETP capacity, performance, and compliance with regulatory norms, will be explicitly assessed as part of the Environmental & Social Due Diligence (ESDD) for all Category B pulp and paper subprojects. During ESDD, SIDBI's loan officer/relationship manager and E&S expert will:

- verify the operational status, performance, and regulatory compliance of the ETP/ CETP to which the MSME is connected, as appropriate.
- examine whether the additional hydraulic/organic/colour load from the proposed subproject may exceed CETP capacity or receiving-environment limits
- require that MSMEs implement effluent minimization, in-house pre-treatment, and source-level pollution reduction measures as part of the site-specific ESMP.

During inspection, assessment identifies whether the effluent wastewater is non-compliant, or projected incremental loads would exceed treatment or disposal capacity, or environmental compliance cannot be assured even after mitigation, then the subproject will be:

- (a) excluded from FMAP financing, or
- (b) phased/deferred until adequate treatment capacity and regulatory compliance are demonstrably ensured.

This approach is fully consistent with SIDBI's ESMS and ESIA framework, which already screens out non-compliant proposals, excludes higher-risk activities, and requires risk-based appraisal and verification before approval. For all Category B MSMEs need to have prescribed Wastewater within the limit, site-specific ESMP conditions will include effluent minimization, pre-treatment, monitoring, and compliance reporting of Environmental parameters.

1.4 Regulatory compliance analysis (Indian environmental laws + GCF standards)

1.4.1 Central Pollution Control Board (CPCB) of India: Classification of Sectors into Red, Orange, Green, White and Blue Categories, 2025²

Based on Pollution Index (PI) derived from water emissions, air emissions, hazardous waste generation, and resource consumption, CPCB categorizes 419 industrial sectors into four color-coded groups. CPCB has classified total 419 sectors and sub-sectors under Red (125), Orange (137), Green (94), White (54) and Blue (9) categories.

Table 1: List of Industrial Sectors Classified Under Red, Orange, Green, And White Category

Sl. No	CPCB Sl. No.	Pulp & Paper Industry	Industry Category (Based Upon the Pollution Index – PI)
1	115.1	PULP & PAPER (AGRO & WOOD): Manufacturing of bleached chemical pulp, paper, and paperboards	RED

² CPCB, 2025, "Report on Classification of Sectors into Red, Orange, Green, White and Blue Categories (A tool for progressive environmental management)" - 2025

<https://cpcb.nic.in/openpdffile.php?id=TGF0ZXN0RmlsZS9fMTczNzYxMzk2OV9tZWVpYXBob3RvMTEzODMucGRm>

2	115.2	PULP & PAPER (AGRO & WOOD): Unbleached or Totally Chlorine Free (TCF) bleaching for manufacturing chemical pulp, paper, and paperboards	RED
3	115.3	PULP & PAPER (AGRO & WOOD): Bleached grades of chemical pulp, paper, and paperboard having Totally Chlorine Free (TCF) bleaching	RED
4	116.1	PULP AND PAPER (RECYCLED FIBRE/ WASTEPAPER BASED) Pulp & Paper (With bleaching)	RED
5	116.2	PULP AND PAPER (RECYCLED FIBRE/ WASTEPAPER BASED) Pulp & Paper (Without bleaching, capacity ≥ 15 TPD)	RED
6	116.3	PULP AND PAPER (RECYCLED FIBRE/ WASTEPAPER BASED) Pulp & Paper (Without bleaching; plant capacity < 15 TPD)	ORANGE
7	31	Cardboard or corrugated box and paper products (excluding paper or pulp manufacturing and without using boilers)	WHITE
8	12	Bailing (hydraulic press) of waste papers	WHITE

Whereas,

- 1) Red Category industries are High pollution requires frequent monitoring.
- 2) Orange Category industries are Moderate pollution is less frequent, but regulated control.
- 3) Green Category industries are Low pollution—minimal regulatory oversight.
- 4) White Category industries are Practically non-polluting—often exempt from routine consent procedure
- 5) Blue Category industries are essential Environmental Services e.g. Waste Management.

Pollution Index (PI) Ranges & Categories: methodology with equal weighting of **Air pollutant Score** (PI_A), **Water pollutant Score** (PI_W), **Waste Pollutant Score** (PI_H). Each pollutant group is scored out of 100, and the Cumulative Pollution Index is calculated.

- **$PI \geq 80$:** Red
- **$55 \leq PI < 80$:** Orange
- **$25 \leq PI < 55$:** Green
- **$PI < 25$:** White.

Additionally, State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) were authorized to categorize any new or leftover sectors according to the CPCB's 2016 methodology.

1.4.2 IFC Performance Standard (PS) will be checked by Third-party and SIDBI

For Environmental & Social Risk, assessment by Third Party and SIDBI need to be considered the IFC Principles Standard for throughout the process which has been stated above in each process of the pulp and paper segment (Section 2.2).

PS1- Assessment and Management of Environmental and Social Risks and Impacts: Verified through ESDD, ESG Screening Sheets, and ESMP documentation (Annexure 2).

PS2 - Labor & Working Conditions: Checked via OHS audits, PPE, gender safeguards in ESMP.

PS3 - Resource Efficiency & Pollution Prevention: Confirmed through energy/water efficiency measures, Environmental performance reports.

PS4 - Community Health & Safety: Linked to GRM, community disclosure, and effluent/air emission compliance.

PS 5 to PS 8 – Details regarding applicability and requirement for compliance are given as under:

IFC Performance Standard 5 – Land Acquisition and Involuntary Resettlement

- **Applicability:**
 - o Not applicable where Greenfield or expansion projects are undertaken within industrial area, industrial estate, notified industrial zone, special economic zones, Land parcels already designated by the Government for non-agricultural use, or privately purchased land through willing buyer–willing seller transactions with clear title or solar / wind farms etc. where all the necessary statutory permission / infrastructure are available.
 - o May be triggered if land acquisition results in economic displacement (loss of livelihoods, access restrictions) or physical displacement, even in the absence of formal resettlement.
- **Requirements:**
 - o Screening to confirm no involuntary land acquisition; projects involving resettlement or displacement of households are excluded.

IFC Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources

- **Applicability:**
 - o Not applicable where Greenfield or expansion projects are undertaken within industrial area, industrial estate, notified industrial zone, special economic zones, Land parcels already designated by the Government for non-agricultural use, or privately purchased land through willing buyer–willing seller transactions with clear title or solar / wind farms etc. where all the necessary statutory permission / infrastructure are available.
 - o Where virgin wood, agro-fibre, or other living natural-resource inputs are used, supplier due diligence and transaction-specific screening may, where relevant and proportionate, consider sustainable sourcing practices and related biodiversity considerations. Screening is required to ensure no conversion or degradation of natural habitats, wetlands, forests, or protected areas.
- **Requirements:**
 - o Any project with potential impacts on critical habitats is ineligible under the programme.

IFC Performance Standard 7 – Indigenous People

- **Applicability:**
 - o Not applicable where Greenfield or expansion projects are undertaken within industrial area, industrial estate, notified industrial zone, special economic zones, Land parcels already designated by the Government for non-agricultural use, or privately purchased land through willing buyer–willing seller transactions with clear title or solar / wind farms etc. where all the necessary statutory permission / infrastructure are available.
 - o Screening is required to confirm absence of Indigenous People / communities are not affected by the project.
- **Requirements:**

- o Any project with potential impacts on Indigenous People / communities are ineligible under the programme.

IFC Performance Standard 8 – Cultural Heritage

- **Applicability:**

- o Not applicable where Greenfield or expansion projects are undertaken within industrial area, industrial estate, notified industrial zone, special economic zones, Land parcels already designated by the Government for non-agricultural use, or privately purchased land through willing buyer–willing seller transactions with clear title or solar / wind farms etc. where all the necessary statutory permission / infrastructure are available.
- o Screening is required to ensure that there is no known impact on sites of cultural, archaeological, or religious significance.

- **Requirements:**

- o No financing of projects involving significant impacts on cultural heritage.

For Brownfield projects set up by an existing enterprise within its existing industrial premises, the Environmental and Social Impact Assessment (ESIA) confirms that IFC Performance Standards PS 5 to PS 8 that is relating to land acquisition and involuntary resettlement; Indigenous Peoples; biodiversity and critical habitats; and cultural heritage are not applicable, as these activities do not involve land acquisition, displacement, impacts on sensitive ecosystems, or disturbance of cultural assets.

However, in case of brownfield enterprises going in for expansion or modernization in a new location and for setting up of a Greenfield enterprise, land is generally acquired. While PS 5–8 may be triggered in these cases due to land acquisition, SIDBI ensures that these risks are adequately identified, assessed, and mitigated within the scope of this ESIA & ESMP, ensuring no adverse environmental or social impacts i.e., land acquisition for the project does not affect biodiversity-sensitive areas, indigenous communities, or cultural heritage. If the land acquisition affects any of the PS 5-8 triggers, SIDBI will not assist the project under GCF-FMAP Programme.

Accredited Entity (SIDBI) clarifies that any subproject that triggers PS5–PS8 requirements will be automatically deemed ineligible under the FMAP programme as currently structured. This aligns with SIDBI's existing ESMS, which already: screens out high-risk proposals and all Category A / I-1 activities during initial screening and due diligence.

Detailed ESDD, ESG risk rating, and site verification to confirm safeguard compliance prior to sanction of project. Rejects any project that fails to meet E&S compliance or falls under the exclusion list.

Under FMAP Programme, SIDBI will not finance any MSME subproject that involves land acquisition with physical/economic displacement of people, impacts on Indigenous Peoples, activities located within or adversely affecting critical habitats or legally protected ecosystems, any kind of risks to cultural heritage or archaeological resources.

Social Risks & Safeguards

Social risks include chemical exposure, inadequate sanitation, potential forced labor, and community impacts from wastewater discharge. Vulnerable groups comprise contract and migrant labour, women workers, workers involved in chemical handling and wastewater management activities, and nearby households. Safeguards will include substituting safer chemicals, enforcing PPE usage and sanitation standards, conducting supplier due diligence to prevent labor exploitation, and providing gender-sensitive facilities to ensure inclusivity and worker welfare.

1.5 Stakeholder Engagement & Monitoring

Stakeholder engagement begins at the appraisal stage for all the sub-projects. Engagement activities include: -

- Consultations with MSME owners, workers, machinery suppliers and other stakeholders (if necessary) about the project.
- Awareness sessions on Energy conservation, Emission reduction, OHS, chemical safety, E&S risk assessment & mitigation, and social, labor & Gender rights etc.
- Disclosure of applicable safeguard requirements, ESMP obligations, and mitigation responsibilities.
- SIDBI shall ensure continuous stakeholder engagement throughout implementation, including periodic site visits, safety meetings, and environmental monitoring interactions.

Stakeholder engagement will focus on transparency and inclusivity throughout project implementation. Key actions include community disclosure on environmental management practices, establishment of a worker grievance redressal mechanism, and regular safety briefings for all operational staff and workers.

Monitoring will be guided by measurable indicators such as effluent discharge norms, Personal Protective Equipment (PPE) compliance, percentage of workers trained on chemical exposure and handling, and average grievance resolution time. These indicators will ensure accountability and continuous improvement in environmental and social performance.

The FMAP programme integrates stakeholder engagement, public disclosure, and grievance redressal as core elements of its Environmental & Social Management System. MSME subprojects are embedded within densely populated industrial clusters. Therefore, meaningful engagement with workers, nearby communities, and institutional stakeholders is critical to ensure transparency, risk communication, and participatory monitoring.

1.6 Impact Category & GCF Linkages

The overall impact is assessed as moderate, site-specific, and reversible with appropriate controls. Based on GCF categorization, Raw Material Preparation, Pulping (Fiber Separation), Pulp Washing & Screening, Bleaching (For white paper grades), Pulp Refining, Paper Making (Sheet Formation), Finishing & Converting processes / operations fall under **Category B (I-2)** due to potential chemical and pollutant-related risks, while low-risk interventions are classified as **Category C (I-3)**.

The rationale for this classification lies in the fact that wastewater, emissions and chemical hazards can be effectively managed through pollution control systems and safer chemical practices, whereas Category C activities have minimal or no adverse impacts and mostly involve dry processes without any heat treatment / effluents / emissions.

1.7 Community Health and Safety

In line with Community Health & Safety, the ESIA acknowledges that MSME operations require structured systems for emergency preparedness, fire and explosion prevention, and safe handling of hazardous materials. This report tries to highlight key risks associated with chemical exposure, heat

stress, emissions, boiler operations and hazardous effluent handling. To make these requirements explicit, every Category B subproject will be required to maintain and implement a Site-Specific Emergency Preparedness & Response Plan (EPRP), covering at minimum: chemical spill response and containment; fire and explosion prevention measures for pulping chemicals, bleaching chemicals, paper dust, solvents (where applicable), and thermal units; boiler and pressurized steam safety, evacuation procedures with clear signage; worker training and periodic emergency drills. coordination with local emergency services.

Where relevant, MSMEs must also address traffic and road safety risks linked to sourcing raw materials (wood chips, recovered paper, process chemicals and fuels) and outward movement of finished products. Although most MSMEs operate inside established industrial parks and clusters, which already include controlled internal transport infrastructure, MSMEs implement measures to minimize off-site impacts, including safe loading and unloading, vehicle movement scheduling, and spill/accident response.

MSME units ought to ensure that external stakeholders, including nearby residents, worker housing, local authorities, or downstream users are informed of community health and safety measures relevant to them. This includes disclosure of emergency procedures, contact details of grievance focal points, and communication of associated risks, consistent with the stakeholder engagement and disclosure practices already defined in the ESIA, which include community disclosure, periodic meetings, and dissemination of safeguard responsibilities

1.8 Disclosure Requirements & GCF linkages

- **Category B (I-2):** Requires ESIA & ESMP and 30-day advance disclosure before GCF Board consideration.
- **GCF Linkages**
 - o Disclosure applies to Raw Material Preparation, Pulping (Fiber Separation), Pulp Washing & Screening, Bleaching, Pulp Refining, Paper Making, and Finishing & Converting processes/operations.
 - o Requires ESIA & ESMP and 30-day advance disclosure under GCF Information Disclosure Policy.
- **Category C (I-3):** No advance disclosure required under GCF Information Disclosure Policy.
- **GCF Linkages**
 - o Applies to low-risk renewable energy, energy-efficiency, water-efficiency, climate-resilient, and similar interventions with minimal or no adverse environmental and social impacts. For this, no advanced disclosure is required.

1.9 Pulp and Paper Sector: Environmental Risks, Mitigation, and GCF Classification

Table 2: E&S Risk Assessment with Mitigation Measures Across Pulp and Paper Manufacturing Processes

Process	Key Environmental & Social Risks	Mitigation Measures	GCF Category	Rationale	Applicable IFC PS
Raw Material Preparation	dust & noise; fugitive emissions; fire risk in biomass stacks; ergonomic/manual handling injuries; community truck traffic impacts; invasive pests in imported chips	Possible to supplier E&S due diligence; dust suppression & enclosures; noise control & silencers; safe stacking & fire detection; traffic management & community road safety; pest controls; PPE & ergonomics	B (I-2)	Significant E&S risks manageable with structured controls; biodiversity risk rises if sourcing from sensitive habitats	PS 1, PS2, PS3 & PS4
Pulping (Fiber Separation)	High energy & steam use; odorous reduced sulfur compounds (TRS); chemical hazards (NaOH, Na ₂ S); effluent generation; risk of spills/black liquor tank failures; occupational exposure to heat & chemicals	Closed-loop chemical recovery (evaporators, recovery boiler, secondary containment; automated dosing; H ₂ S monitoring & ventilation; high-integrity tanks with overfill protection; heat stress management; preventive maintenance	B (I-2)	Potential for major, wide-area impacts (air/odour, catastrophic spills) and complex effluents	PS 1, PS2, PS3 & PS4
Pulp Washing & Screening	High water use; high-load wastewater (BOD/COD/TSS); fiber losses; noise; confined space & rotating equipment hazards	Water pinch & counter-current washing; fiber recovery; variable frequency drives & guarding; enclosed screens; wastewater equalization & primary treatment	B (I-2)	Impacts are site-specific and reversible; managed through management system.	PS1, PS2, PS3 & PS4
Bleaching	AOX formation (if chlorinated stages); toxic/odorous gases (ClO ₂); corrosion; hazardous chemical storage; acute exposure risks; effluent ecotoxicity	Transition to ECF-light/TCF where feasible; optimize kappa; closed-loop filtrate recycling; ClO ₂ generation with scrubbing; sealed systems & emergency scrubbers; high-integrity chemical	B (I-2)	AOX and acute toxic risks can cause significant, widespread impacts without advanced controls. Can be managed through	PS 1, PS2, PS3 & PS4

Process	Key Environmental & Social Risks	Mitigation Measures	GCF Category	Rationale	Applicable IFC PS
		storage; continuous emissions/ambient monitoring; advanced wastewater treatment if AOX		mitigation measures	
Pulp Refining	High electricity demand; noise/vibration; pinch/entanglement ; heat exposure	Energy-efficient refiners; load management; acoustic enclosures; lockout-tagout (LOTO), guarding; vibration isolation; heat stress controls	B (I-2)	Predominantly occupational & energy use issues	PS 1, PS2, PS3 & PS4
Paper Making (Sheet Formation)	Very high thermal energy & steam use; dryer hood emissions (moisture, VOCs from sizing); condensate & white-water losses; slip/trip; nip hazards; chemical exposure (starch, resins)	Heat recovery (hood exhaust/condensate); advanced heat pumps/biomass/NG boilers; condensate return; white water reuse; enclosure & ventilation of size press; nip guarding & interlocks; chemical substitution & closed dosing; non-contact seals	B (I-2)	Significant but controllable energy, water, and safety risks	PS1, PS2, PS3 & PS4
Finishing & converting	Coating chemicals (latex, solvents); dust; noise; ergonomic/laceration risks; solid waste (trim/offcuts); packaging waste	Low-VOC/aqueous coatings; LEV for booths; dust extraction; machine guarding; ergonomic work design; trim recovery & recycling; solvent management plans	B (I-2)	Localized, manageable OHS & emissions/waste risks	PS1, PS2, PS3 & PS4

Note: References in the above table cover major, widespread, catastrophic or significant consequences describe potential high-consequence failure scenarios. Final sub-project categorization shall be determined at the pre-mitigation stage through transaction-specific ESDD, considering the nature and scale of the activity, hazardous-material inventories, process design, location, site context and affected receptors. A sub-project may be classified as Category B only where its potential risks and impacts are limited, few, generally site-specific, largely reversible and readily addressed through mitigation measures. Where screening identifies potentially significant, diverse, irreversible or difficult-to-manage risks or impacts, the sub-project shall be treated as Category A-equivalent and excluded from FMAP financing.

Through the Exclusion list (attached as annexure 1) screening, Environmental and Social Due Diligence (ESDD) process, supported by SIDBI's ESG risk rating tools, and site-level verification visits, the

Environmental and Social Impact Assessment (ESIA) has been done for the pulp and paper sector. Risks have been considered and aligned with GCF standards.

Notwithstanding the potential triggering of PS 5–8 due to land-related aspects, the above-listed technologies, machinery, and projects shall be classified as **Category B** under SIDBI's Environmental and Social Risk Categorization framework **irrespective of the activity**, in the following scenarios:

(a) **Brownfield enterprises** undertaking expansion, modernization, or capacity augmentation of their existing operations through implementation of Energy Efficiency (EE) Projects / the establishment of renewable energy projects at a **new location**; and (b) Setting up of **Greenfield enterprises** with the EE / RE technologies mentioned in this ESIA / ESMP.

Such classification is based on the nature and scale of impacts, which are generally **site-specific, reversible, and readily mitigable** through standard environmental and social management measures. Accordingly, these projects are subject to proportionate Environmental and Social Due Diligence (ESDD) in line with SIDBI's ESMS.

In addition to the EE projects set up / to be established in a new location or any RE Projects (solar, wind, hybrid, etc.) established by MSME units for captive or own consumption and located outside the borrower's operating premises may trigger IFC Performance Standards (PS) 5–8, primarily due to land-related considerations. These projects are typically developed on land classified as barren or dry land under applicable national land-use regulations, with no existing residential or commercial usage. The project site is generally selected based on technical considerations viz., systematic process balancing high resource availability (wind/solar) with proximity to grid infrastructure for power evacuation, no adverse environmental impact, and favorable topography.

Similarly, a Greenfield or brownfield enterprise setting up a standalone offsite RE project (solar, wind, hybrid, etc.) for non-captive purpose under GCF-FMAP Programme, shall be classified as "Category-B" as these projects involve land acquisition. In such cases, the PS 5–8 may be triggered due to land acquisition. SIDBI ensures that these risks are adequately identified, assessed, and mitigated within the scope of this ESIA & ESMP, ensuring no adverse environmental or social impacts i.e., land acquisition for the project does not affect biodiversity-sensitive areas, indigenous communities, or cultural heritage. If the land acquisition affects any of the PS 5-8 triggers, SIDBI will not assist the project under GCF-FMAP Programme.

Prior to sanction and disbursement, SIDBI ensures that all statutory approvals and clearances related to land and project development are in place, including valid land registration or lease documentation and approvals from relevant authorities such as State Electricity Boards and local Distribution Companies (DISCOMs).

Land acquisition for such projects is undertaken strictly on a willing buyer–willing seller basis in compliance with applicable Indian laws. SIDBI verifies the reasonableness of land costs through third-party valuation by bank-empaneled valuers and validates title and ownership through legal due diligence conducted by empaneled advocates to identify any encumbrances, disputes, or litigation risks. Review of land records and plot maps forms part of the appraisal process stage.

Accordingly, while PS 5–8 may be triggered in these cases due to land acquisition and land-use aspects, SIDBI ensures that these risks are adequately identified, assessed, and mitigated within the scope of this ESIA& ESMP, ensuring no adverse environmental or social impacts i.e., land acquisition for the project does not affect biodiversity-sensitive areas, indigenous communities, or cultural heritage. If the land acquisition affects any of the PS 5-8 triggers, SIDBI will not assist the project under GCF-FMAP Programme.

Moving forward, the focus shifts to the documentation and implementation of the Environmental and Social Management Plan (ESMP). ESMP will operationalize the ESIA findings by translating them into actionable safeguards, including specific mitigation measures, monitoring indicators, and clear responsibilities for each Category B subproject under the pulp and paper sector.

Below are the tailored ESMPs for all Category B subprojects based on the outcomes of ESDD and site inspections. This ESMP plan will then be formally shared with the borrowers, accompanied by structured training sessions to build their capacity in implementing the safeguards. MSMEs will be required to provide a formal undertaking, committing to applicable compliance with the ESMP, including adherence to pollution control measures, occupational health and safety standards, gender and inclusion safeguards, and grievance redressal mechanisms.

This integrated approach ensures that risks remain site-specific, reversible, and effectively mitigated, while embedding ESG principles and inclusive practices into every financed project by the Accredited Entity.

Section 2:

2. Environmental and Social Management Plan (ESMP): Implementation Framework for Category B Sub-projects of Pulp and Paper Sector

Under direct financing SIDBI is responsible for ensuring that all subprojects under the Program adhere to the Green Climate Fund (GCF) Environmental and Social Safeguards (ESS) and follow a proportionate, risk-based due diligence process. This responsibility is rooted in the GCF revised Environmental and Social Policy.

SIDBI shall ensure that every financed subproject, regardless of scale or sector meet the GCF Environmental & Social Policy requirements. This includes:

- Applying GCF's risk screening and categorization system (A/B/C) to each subproject.
 - Ensuring that the GCF ESS (aligned with IFC Performance Standards) are triggered, assessed, and managed based on the potential environmental and social impacts.
 - Ensuring alignment with national regulatory requirements and ongoing compliance monitoring.
- GCF explicitly requires accredited entities to integrate the GCF ESP and safeguards into their due-diligence and project-approval processes.

SIDBI's own ESMS further strengthens this responsibility by requiring systematic identification, appraisal, risk classification, and monitoring of E&S risks across all financed MSME subprojects. SIDBI ensures that E&S assessments are proportionate to the level of risk and appropriately tailored to the specific attributes, scale, and sensitivities of the pulp and paper sector. This includes Fit-for-Purpose ESIA for the sub-projects mentioned in the Section 1.2.

2.1 Objective of the ESMP

- 1 Identify potential Environmental and Social issues or threats associated with the proposed project activities and suggest procedures and measures to avoid, prevent, mitigate or compensate for them in line with the standard mitigation hierarchy.
- 2 Integrate environmental and social safeguards into MSME financing as a mandatory standard for all Category B subprojects.
- 3 Ensure that the ESMP is made available in public domain and data for ESDD are obtained from MSME borrowers.
- 4 Create awareness and encourage MSMEs to adopt E&S framework and to build capacity to implement the same.
- 5 Align MSME's operations with National Environmental legislation and GCF Environmental and Social Policy, ensuring risks remain site-specific, reversible, and mitigated.

2.2 Screening and Categorization of Activities

- **Initial Screening:** All MSME proposals are screened against SIDBI's Exclusion List; Category A projects are rejected outright.

- **ESDD Process:** Category B projects undergo detailed due diligence using SIDBI's checklist, ESG risk rating tool, and site verification.
- **ESMP Preparation:** Based on ESDD findings, this project-specific ESMPs outlining mitigation measures, monitoring indicators, responsibilities, and timelines.
- **Sharing with MSMEs:** ESMPs are formally shared with borrowers, ensuring clarity on obligations.

2.3 Risk Identification and Assessment

- Risks identified during ESDD (wastewater discharge, hazardous waste, air emissions, OHS concerns, gender risks) are mapped into the ESMP.
- Each ESMP specifies:
 - **Mitigation measures** (ETP, Pollution control, PPE, safer chemicals).
 - **Monitoring indicators** (BOD/COD levels, emission compliance, PPE usage rates).
 - **Responsible people** within the MSME.
 - **Timelines** for implementation.
- MSMEs are trained to understand E&S/ OHS risk categories and mitigation pathways, ensuring ownership of safeguards.
- SIDBI stipulates that MSMEs must ensure standard working conditions and requisite worker amenities, consistent with the availability and operational requirements of all Category B MSMEs. These expectations are aligned with India's National Labor Code, which consolidates 29 existing labor laws into four comprehensive codes (1) Wages, (2) Social Security, (3) Industrial Relations, and (4) Occupational Safety—effective from 21 November 2025.
- These obligations are already embedded within several Environmental & Social (E&S) risk sections under Performance Standard 2 (PS 2), which mandates compliance with national regulations on fair wages, working hours, employee benefits, non-discrimination, and occupational health and safety.

2.4 ESMP Implementation

- SIDBI will organize need based awareness sessions for MSMEs on Environmental & Social Risk, pollution control compliance, OHS, gender equality, SEAH prevention, stakeholder engagement and grievance redressal etc. for internal and external stakeholders.
- Information / data are collected from MSMEs in the ESDD format which will be verified by AEs officials.
- Suitable covenants shall be incorporated in the loan sanction letter / loan agreement to ensure that compliance is made by the MSMEs.

2.5 Mitigation Plan for Category B Subprojects for Stakeholders Understanding to Adopt Process Specific Mitigation Plan

Process Stage under Category B	Key E&S Risks	Mitigation (ESMP)	Measures	Monitoring / Validation Requirements
Raw Material Preparation	Wood dust emissions, noise, fire hazards,	Install dust suppression and extraction systems;	Dust and noise monitoring;	machine

(Debarking, Chipping, Handling)	mechanical injuries, traffic and community safety risks associated with raw material transport	machine guarding; traffic management plans; fire prevention measures; PPE; safe material storage practices	safety inspections; traffic incident records; housekeeping inspections; fire drill and fire protection system records
Pulping (Mechanical, Chemical, Recycled Fibre)	Chemical exposure (NaOH, Na ₂ S), H ₂ S/TRS gas exposure, high pressure and temperature, wastewater generation, chemical spills, worker safety risks	Closed process systems; automated chemical dosing; secondary containment; pressure relief devices; gas detection and ventilation systems; confined-space procedures; PPE; emergency response procedures	Chemical inventory records; wastewater quality monitoring; gas detector calibration logs; pressure vessel inspection records; operator training records; incident and near-miss reports
Pulp Washing & Screening	High BOD/COD wastewater, fibre losses, suspended solids, rotating equipment hazards, slippery surfaces, worker exposure to residual chemicals	Fibre recovery systems; efficient washing systems; wastewater collection and treatment; machine guarding; drainage management; anti-slip work areas; PPE	Effluent quality monitoring (pH, COD, BOD, TSS); fibre recovery performance records; machine inspection checklists; housekeeping records; OHS inspection reports
Bleaching	Chlorine dioxide exposure, hazardous chemical handling, AOX generation, wastewater contamination, toxic gas release, worker health risks	Enclosed bleaching systems; gas detection systems; ventilation and scrubbers; chemical containment; safer chemical handling procedures; PPE; emergency response plans	Gas monitoring and calibration records; effluent quality monitoring; chemical storage inspections; emergency drill records; worker exposure and training records
Pulp Refining	High noise and vibration, mechanical hazards, energy consumption, lubricant leakage, ergonomic injuries	Acoustic enclosures; machine guarding; preventive maintenance; lubrication management; energy-efficient refiners; hearing protection programme; PPE	Noise monitoring reports; equipment maintenance records; lubrication logs; energy consumption records; OHS inspection reports
Paper Making (Sheet Formation,	Entanglement and nip-point hazards, heat and steam exposure, high water and energy	Machine guards and emergency stops; LOTO procedures; heat insulation; white-water	Safety interlock testing records; water and energy consumption records; maintenance logs;

Pressing and Drying)	consumption, white-water losses, slips and falls	recovery and reuse systems; PPE; workplace safety procedures	workplace inspection reports; incident records
Finishing & Converting	Paper dust generation, cutting and crushing injuries, ergonomic risks, noise, fire hazards, waste generation	Dust extraction systems; machine guarding; ergonomic workstations; fire prevention measures; waste segregation; PPE; safe operating procedures	Dust monitoring records; machine safeguarding inspections; waste disposal records; ergonomic assessments; fire protection system inspections

2.5.1 Asset-based Environmental & Social Mitigation Measures

SIDBI has adopted an asset-anchored, risk-cluster approach, which aligns with FMAP's asset-specific financing model and SIDBI's experience under previous green-lending programme(s). This approach ensures consistent, practical and uniform application of mitigation requirements across all Category B MSMEs, regardless of location.

To operationalize this approach, risk clusters aligned with international pulp and paper E&S standards like IFC Performance Standards for pollution control, OHS, CHS, labour & GRM, gender & SEAH/POSH.

Detailed asset-based mitigation tables, summarizing:

- (I) key E&S risk drivers linked to FMAP-financed assets, and
- (II) mandatory mitigation and O&M measures to be included in sub-project ESMPs.

This structure reflects good international practice, ensures compliance feasibility for MSMEs, and provides a clear and scalable framework that can be uniformly implemented across India's diverse pulp and paper sector.

To ensure asset-specific environmental and social risk management across pulp and paper sub-projects, a consolidated asset-anchored mitigation has been added in table 3 down below. The table summarizes, for each key asset or technology, the associated process step, principal E&S risk pathways identified in the ESIA, and the minimum mitigation and O&M requirements to be included in sub-project ESMPs. This format aligns with internationally recognized good practice. The credit officers during sub-project appraisal and evaluation shall customize and expand the listed measures based on the actual technologies, scale, and site conditions.

Table 3: Asset Based Environmental & Social Mitigation measures

Assets / Technology	Process Step	Key E&S Risks	Mitigation Measures (ESMP)	O&M Requirements	Responsible Parties
Debarking & Chipping Equipment	Raw Material Preparation	Wood dust, noise, fire risk, mechanical injury, truck	Dust suppression systems, machine	Daily inspection of equipment, dust-control systems, fire	MSME Owner / Production Supervisor

		movement hazards	guarding, traffic management plan, fire detection systems, PPE, emergency stop devices	prevention measures, operator training, housekeeping records	
Pulper / Digester	Pulping	Chemical exposure (NaOH, Na ₂ S), heat, pressure, splashes, H ₂ S/TRS gas exposure, confined-space hazards	Closed digesters, automated chemical dosing systems, pressure relief valves, gas detection systems, ventilation, confined-space procedures, PPE, eyewash/showers	Daily inspection, chemical inventory management, safety system checks, operator training, preventive maintenance	MSME Owner / Production Supervisor
Pulp Washing & Screening System	Pulp Washing & Screening	High-BOD/COD wastewater, fibre losses, mechanical hazards, chemical exposure, wet-surface slip hazards	Efficient washing systems, fibre recovery units, machine guarding, wastewater collection and treatment, anti-slip flooring, PPE	Routine inspection of washers/screens, wastewater monitoring, housekeeping, maintenance records	MSME Owner / Process Supervisor
Bleaching Unit	Bleaching	Chlorine dioxide exposure, hazardous chemical exposure, AOX generation, wastewater pollution, chemical spills	Enclosed bleaching systems, gas detectors, ventilation systems, emergency scrubbers, PPE, chemical containment systems, process	Gas-detector calibration, effluent monitoring, chemical inventory checks, emergency system testing	MSME Owner / E&S Manager

			optimization to reduce AOX		
Refiner	Pulp Refining	Noise exposure, mechanical hazards, vibration, high electricity consumption, lubricant leakage	Acoustic enclosures, machine guarding, energy-efficient refiners, vibration controls, lubrication management, PPE	Routine inspection, lubrication monitoring, noise monitoring, preventive maintenance, operator training	MSME Owner / Production Manager
Paper Machine	Sheet Formation & Drying	Entanglement, nip-point injuries, noise, heat stress, steam exposure, high energy use, white-water losses	Machine guards, emergency stops, lockout-tagout (LOTO), heat insulation, noise control measures, white-water recovery and reuse, PPE	Routine lubrication, safety interlock testing, steam-system inspection, operator training, preventive maintenance	MSME Owner / Production Manager
Recovery Boiler / Chemical Recovery Unit	Chemical Recovery & Steam Generation	Explosion, burns, SOx/NOx/TRS emissions, high-pressure steam hazards, chemical-release incidents	Certified installation, pressure relief valves (PRVs), emission-control systems, stack monitoring, automated controls, PPE, emergency shutdown systems	Annual statutory inspection, emission monitoring, boiler efficiency checks, safety-system testing, operator competency assessments	MSME Owner / Boiler Operator
Effluent Treatment Plant (ETP) / ZLD System	Wastewater Treatment	Untreated discharge, sludge generation, brine/concentrate streams, evaporator salts,	Proper treatment systems, PPE, safe storage, authorized disposal/reuse of sludge, brine, concentrate, and	Daily pH/COD/BOD checks, sludge and concentrate disposal records, equipment	ETP Operator / MSME Owner

		environmental contamination	salt residuals, compliance monitoring	inspection, regulatory compliance monitoring	
Chemical Storage Area	All Processes	Chemical spills, fire, incompatible chemical storage, worker exposure	Secondary containment, ventilation, spill kits, chemical segregation and compatibility controls, safety signage, emergency response equipment	Monthly inventory verification, storage-condition inspections, spill-response preparedness checks	Storekeeper / Supervisor
DG Set	Backup Power	Air emissions, noise, fuel leakage, used-oil generation	Acoustic enclosure, stack compliance, spill prevention systems, proper fuel storage, used-oil management	Emission testing, fuel consumption records, oil logs, used-oil disposal records, preventive maintenance	Maintenance Supervisor
Fire Safety Systems	Entire Facility	Fire outbreak, paper dust ignition, chemical fires, worker injury	Fire detectors, hydrants, extinguishers, alarm systems, emergency response plans, evacuation signage, fire-water systems	Monthly inspections, mock drills, equipment testing, fire-risk assessments, emergency preparedness reviews	OHS Team / MSME Management

Responsible parties might not have Technical Environmental expert at Micro and Small -MSME. In such cases, they may consider the unit head, and capable individual may be assigned as the responsible person for environmental management.

Where ZLD, evaporation, membrane concentration, or crystallisation systems are installed, the Environmental and Social Due Diligence (ESDD) and site-specific ESMP shall identify the expected residual streams, including sludge, brine, concentrate, evaporator salts, and crystallised salts, as applicable. The MSME shall maintain records of approximate quantities generated, relevant characteristics, storage arrangements, reuse/recovery opportunities, and authorized treatment or disposal pathways, supported by monitoring & disposal records, and applicable regulatory compliance documentation (if applicable).

Residual risks that remain after technology adoption include chemical exposure, heat stress, noise, emergency preparedness gaps, labor welfare considerations, Gender-Responsive Infrastructure designed to ensure the safety, privacy and dignity of female worker, and SEAH/harassment risks. These are addressed through unit-specific ESMP measures described in Section 2.5.2 and Section 4.

2.5.2 SIDBI's Activity-Wise Environmental & Social Management Plan (ESMP)

Section 2.5.1 outlines SIDBI's internal environmental and social management procedures for FMAP direct-lending operations. These steps form part of SIDBI's institutional ESMS and run parallel to the MSME-level ESMP requirements presented in Section 2.5.3.

Table 4: SIDBI's Activity Wise ESMP

Sl. No.	Activity	Description	Responsibility	Frequency
1	Project Screening / E&S Risk Categorization	Ensure projects listed in the FMAP Exclusion List are not taken up. Initial risk categorization is applied to screen out high-risk (Category A/I-1) proposals.	SIDBI	At project evaluation and loan application stage
2a	Environmental and Social Due Diligence (ESDD)	Evaluation of E&S risks, compliance gaps and identification of applicable mitigation measures. Projects not meeting E&S requirements will either be rejected or asked to strengthen compliance before appraisal.	Borrower (MSME)	With each loan application
2b	Review of ESDD Report	Examination and verification of ESDD documents and evidence for completeness, adequacy, and alignment with FMAP requirements.	SIDBI	At loan application review
3	Technical Assessment	Assessment of energy/resource savings, pollution reduction, OHS improvements, and other E&S benefits of the proposed assets.	SIDBI	During loan appraisal
4	E&S Rating	Scoring of environmental and social performance using SIDBI's ESG/Green Rating Tool to support decision-making.	SIDBI	During loan appraisal
5a	Environmental & Social Management Plan (ESMP) Review	Based on ESDD findings, SIDBI reviews the MSME's ESMP or ESHS strengthening plan, ensuring inclusion of: (i) mitigation measures, (ii) monitoring indicators, (iii) responsibilities, (iv) timelines, and (v) residual-risk actions. ESMPs are shared with MSMEs during the lending process.	SIDBI + MSME	During loan appraisal
5b	Training & Awareness	MSMEs receive guidance/training on ESMP implementation	SIDBI / MSME	Need based

Sl. No.	Activity	Description	Responsibility	Frequency
6a	E&S Supervision	Site visits, document reviews and verification of ESMP implementation using M&V protocols, ESDD formats and the ESG Rating Tool.	SIDBI	Periodical visit during tenure of loan [generally once in a year]
6b	Monitoring & Reporting	Independent third-party monitoring (sample-based) may be undertaken to assess ESMP implementation, including checks on SEAH safeguards, labour and gender measures, and asset-specific mitigation. Findings will be integrated into FMAP programme-level reporting.	SIDBI / Third-Party Agency (if appointed)	As per program requirement

2.5.3 MSME Stage-wise for Assets Based Monitoring Under Environmental & Social Management Plan (ESMP)

This MSME stage-wise ESMP sets minimum E&S actions and responsibilities for each stage of the sub-project cycle screening/appraisal, installation, commissioning, routine operation, monitoring & reporting, and decommissioning.

Actions are explicitly linked to the risk clusters in Section 2.5 (Pollution & Resource Efficiency; OHS & Workplace Safety; Community Health & Safety; Labour & GRM; Gender, SEAH/ POSH & Inclusion) and anchored to FMAP-financed asset types (e.g., ETPs, rooftop PV, mobility).

SIDBI will apply its standard procedures for internal review, including onsite verification by Relationship Manager (RM), and use of structured tools (ESDD formats, and M&V protocols). Technical Assistance (TA) will support MSMEs to implement unit-level ESMPs, and sample-based third-party verification will provide independent checks at portfolio level.

Table 5: E&S Actions and Responsibilities by Project Stage

E&S Actions (Asset-Anchored)	Asset-Specific Conditions	Responsibilities	Evidence / Records to Maintain	Verification & Frequency
Apply exclusion list, ESDD screening, and risk categorization	Confirm proposed pulp & paper activity is eligible under FMAP and does not trigger PS5-PS8 impacts, critical habitats, involuntary resettlement, or Category A risks.	MSME & SIDBI RM	ESDD Checklist, site layout, process flow diagram, technology details, legal land documents	Pre-sanction site visit and appraisal stage
Regulatory Environmental compliance review	Verify validity of Consent to Establish (CTE), Consent to Operate (CTO), Factory Licence, Boiler Certification, Hazardous Waste Authorization, groundwater abstraction permission (if applicable).	MSME & SIDBI RM, E&S Expert	Copies of approvals, permits, compliance status reports	Pre-sanction and document review stage
Assessment of water, effluent	Review availability and adequacy of ETP/ZLD,	MSME, SIDBI RM & E&S Expert	ETP design, water balance,	During appraisal and

and pollution-control infrastructure	wastewater recycling systems, sludge management arrangements, CETP connectivity (if applicable).		wastewater analysis reports, CETP agreement	site inspection
Chemical and hazardous material risk assessment	Applicable to digesters, bleaching units, chemical recovery systems and chemical storage areas handling NaOH, Na ₂ S, chlorine dioxide, hydrogen peroxide, acids, fuels, oils, etc.	MSME & SIDBI E&S Expert	Chemical inventory, SDS/MSDS records, storage layout, emergency response procedures	Appraisal stage
Baseline Occupational Health & Safety (OHS) assessment	Assess machine guarding, PPE availability, confined space management, pressure vessel safety, fire protection, emergency preparedness, contractor safety systems.	MSME & SIDBI RM	OHS policy, PPE records, training records, EPRP, fire NOC (where applicable)	Pre-sanction site visit
Labour, GRM, Gender and POSH due diligence	Verify labour compliance, worker welfare facilities, grievance mechanism, POSH committee, separate sanitation facilities for women workers and contractor management practices.	MSME & SIDBI RM	Labour records, POSH documentation, GRM register, worker facility records	During appraisal
Assessment of air emissions and energy systems	Review boilers, recovery boilers, lime kilns, DG sets, WHR systems, stacks, APCDs, fuel storage and emission monitoring arrangements.	MSME & E&S Expert	Emission monitoring reports, stack details, fuel inventory, APCD records	During appraisal and technical due diligence
Community Health & Safety review	Assess traffic movement, chemical transport, wastewater discharge pathways, nearby receptors, emergency communication mechanisms and community risk profile.	MSME & SIDBI RM, E&S Expert	Site maps, traffic management plans, emergency contact procedures	Pre-sanction verification
Asset-specific ESMP requirements identified and incorporated into appraisal	Define unit-specific mitigation measures for pulping, bleaching, paper production, wastewater management, chemical handling, waste disposal,	MSME, SIDBI RM & E&S Expert	Draft ESMP, action plan, monitoring indicators, implementation responsibilities	Project appraisal stage

	worker safety and emergency response.			
Residual risk assessment and loan covenant preparation	Identify corrective actions, monitoring obligations, reporting requirements, wastewater compliance commitments, OHS improvements and E&S performance covenants.	SIDBI & MSME	ESMP commitments, appraisal note, sanction conditions	Prior to sanction

This section outlines the minimum, stage-wise environmental and social (E&S) actions and responsibilities that MSME sub-projects are required to follow under FMAP. These actions are designed to be practical, asset-anchored, and implementation-oriented, helping MSME units translate FMAP safeguards into day-to-day operational practices.

This whole section, which describes SIDBI's internal ESMS procedures for appraisal, supervision, and portfolio-level reporting under FMAP's direct-lending modality.

Structure and Linkages

The stage-wise ESMP covers the full cycle of MSME sub-projects, including: screening/appraisal, installation, commissioning, routine operation, monitoring & reporting, and decommissioning.

Each action item is explicitly linked to the risk clusters identified in Section 2.5

- Pollution & Resource Efficiency
- Occupational Health & Safety
- Community Health & Safety
- Labor & GRM
- Gender, SEAH/POSH & Inclusion

These requirements are aligned with the specific asset types financed under FMAP, such as ETPs, boilers, rooftop solar PV systems and mobility solutions. This ensures that MSMEs can clearly understand the E&S expectations related to the particular technologies they adopt.

Implementation and Verification

To support consistent and reliable implementation, SIDBI will apply its standard internal review processes, including onsite verification by the Relationship Manager and Technical Officials. SIDBI will also use structured assessment tools such as the ESG/Green Rating Tool, ESDD formats, and Measurement & Verification (M&V) protocols to ensure transparency and uniformity in evaluations.

MSMEs will receive Technical Training and Capacity Building (as TA workshop) to prepare and implement unit-level ESMPs or E&S strengthening plans. In addition, sample-based third-party verification will provide independent oversight across the programme, helping validate ESMP implementation and strengthen portfolio-level monitoring.

The responsibilities and actions described in this section apply to MSMEs, SIDBI, technology vendors/contractors, third-party verifiers, and Technical Assistance providers only.

2.6 Management and Monitoring Requirements

Effective E&S management requires the SIDBI to implement continuous monitoring, reporting, supervision, and corrective-action mechanisms. These obligations are established under the GCF Environmental and Social Policy, the GCF Screening & Categorization Guidance, and SIDBI's own ESMS.

Environmental & Social (E&S) performance and compliance with the ESMP:

- Monitoring the implementation of ESMP measures for each subproject throughout the project lifecycle.
- Ensuring compliance with GCF Environmental and Social Safeguards (ESS), host-country regulations, and approved subproject-specific ESMPs.
- Maintaining systematic E&S performance records, including effluent monitoring, waste management, occupational health and safety (OHS) indicators, grievance redressal data, and stakeholder engagement logs.
- Reporting to the GCF on the project's E&S performance through periodic progress reports.

The GCF Environmental & Social Policy explicitly requires accredited entities to ensure implementation, monitoring, and compliance with mitigation measures identified in ESIA/ESMP. SIDBI's ESMS additionally requires ongoing E&S risk management, including monitoring and reporting across subprojects through the entire project cycle.

Conduct periodic site audits, inspections, and impact assessments:

Regular site visits/audits at a frequency proportionate to risk category are conducted and the details are as under:

- High-risk subprojects - quarterly or more frequent monitoring
- Moderate-risk - semi-annual or annual monitoring
- Low-risk - annual or desk-based compliance checks.
- Track actual impacts versus predicted impacts identified in ESIA, adjusting mitigation measures as needed (adaptive management).
- Document non-compliances and ensure corrective action plans (CAPs) are implemented within agreed timelines.

SIDBI's ESMF and project cycle framework specify monitoring frequency, site audits, incident reviews, and corrective-action tracking as core components of E&S supervision.

The World Bank/IFC ESF and GCF guidance emphasize adaptive monitoring, disclosure, and ongoing reassessment of risks throughout implementation, requiring borrowers/accredited entities to adjust measures whenever impacts deviate from predictions.

At the varying levels of E&S capacity across MSMEs, technical assistance (TA), capacity-building and independent verification mechanisms form an integral part of FMAP's implementation strategy. SIDBI already applies similar models across its green financing lines, including external technical partners, third-party auditors, and structured reporting formats.

Technical Assistance (TA) providers will help MSMEs prepare site-specific ESMPs strengthening plans, aligned with the risk clusters and asset-specific mitigation requirements in Section 2.5.

Under the Technical Assistance (TA) plan, dedicated workshops will be organized to build the capacity of MSMEs, PFIs, and NBFCs on the application of environmental and social safeguards (the number of workshops can be increased as per requirement and size of participants). These workshops will provide

structured knowledge on how E&S aspects are integrated during project screening, implementation, and monitoring & verification (M&V). A specialized agency will be engaged (as per the TA plan submitted during proposal) to design and deliver the workshops, preparing training materials and guidance aligned with GCF's E&S standards and the FMAP programme. SIDBI EE team will be actively involved in the preparation, review, and finalization of these materials to ensure their relevance and quality. This initiative will strengthen institutional understanding and practice of E&S compliance, thereby supporting the effective adoption of low-carbon technologies within the MSME sector.

- MSMEs will receive guidance on documentation and residual-risk management, emergency preparedness, and labor/women-safety safeguards.
- ESG Rating Tool, ESDD checklists and M&V protocols will be used to standardize assessment and strengthen implementation.

Regarding Third-Party Monitoring and Sample Based Verification, SIDBI will engage independent agencies for sample-based verification across the MSME portfolio. Third party verifiers will review implementation of ESMP actions, conduct site visits, and check evidence records like pollutant load, effluent logs, OHS training, emergency systems, GRM functioning, POSH/SEAH. Verification findings will serve into portfolio level reporting, corrective actions, and capacity-building needs.

SIDBI's Technical Officials (E&S Expert) and Relationship Managers, will monitor progress at key applicable ESMP stages. TA workshop and third-party findings will be integrated into SIDBI's internal supervision, tracking, and periodic reporting to GCF as per FAA. This will strengthen alignment between implementation and program-level accountability. This combined approach ensures that MSMEs receive hands-on support to meet ESMP requirements, while SIDBI maintains a robust oversight framework consistent with FMAP safeguards and SIDBI's green lending standards.

3. Loan Processing Framework for Direct Lending Operations³

3.1 Loan Screening and Approval Process (for direct loans)

The Loan Approval Process is a comprehensive three-stage procedure designed to rigorously evaluate loan applications and ensure adherence to the stringent criteria.

The first stage, Application and Initial Screening, is conducted at the branch level by the Relationship Manager of SIDBI. During this phase, applications are meticulously screened for completeness, including submission of mandatory documentation such as climate-related, environmental, and social safeguards documents. Incomplete applications are promptly rejected/ hand held to be completed, as the case may be, while only those deemed complete undergo initial screening against the exclusion list criteria. Further, at this stage, the individual proposals would be assessed for the following to ensure that they do not fall under the Cat. A/ I-1 activities of GCF:

1. Project outlay (if more than USD 60 million per project)
2. Whether the potential impact (environmental and/or social risks) are diverse, irreversible, or unprecedented
3. Whether the impact of the project be addressed through adequate policy implementation and workplace standards and suitable norms?

Based on the above assessment, if the project is found to be in the category Cat. A/ I-1 of, then the project will be screened out and will not be considered for financing.

Applications that meet the criteria are forwarded to the second stage, Due Diligence, while those that fall under the exclusion list (which includes the Category A/I1 projects) are rejected. The Due Diligence stage is executed in parallel at the branch level and involves several crucial assessments. The second level of screening will be done by means of the ESG rating tool (attached as Annexure 7 of ESMS). The Processing Officer conducts evaluations related to Know Your Customer (KYC) requirements, financial viability, credit due diligence and checking of ESDD checklist information (Annexure- 2). Concurrently, the Climate Expert, Technical Expert and E&S expert at the Project Management Unit (PMU) will perform climate-related, technical due diligence and will check the projects for ESS compliance (using the ESG rating tool) to ensure the soundness of the proposed project from a technical, E&S and climate perspective.

In the third stage, technically sound and financially viable applications proceed to the Credit Appraisal Memorandum preparation phase. The Processing team comprising Maker and Checker compiles a comprehensive Credit Appraisal Memorandum, which is then presented to the Loan Sanctioning Committee for final evaluation and decision-making. To maintain transparency and impartiality, no member involved in the Initial Application Screening and Due Diligence processes is permitted to be part of the Loan Sanctioning Committee.

³ SIDBI, "Environment and Social Management System (ESMS) 'Financing Mitigation & Adaptation Projects (FMAP) in Indian MSMEs", Page 27-29, <https://www.sidbi.in/assets/front/pdf/ESMS-FMAP-E.pdf>

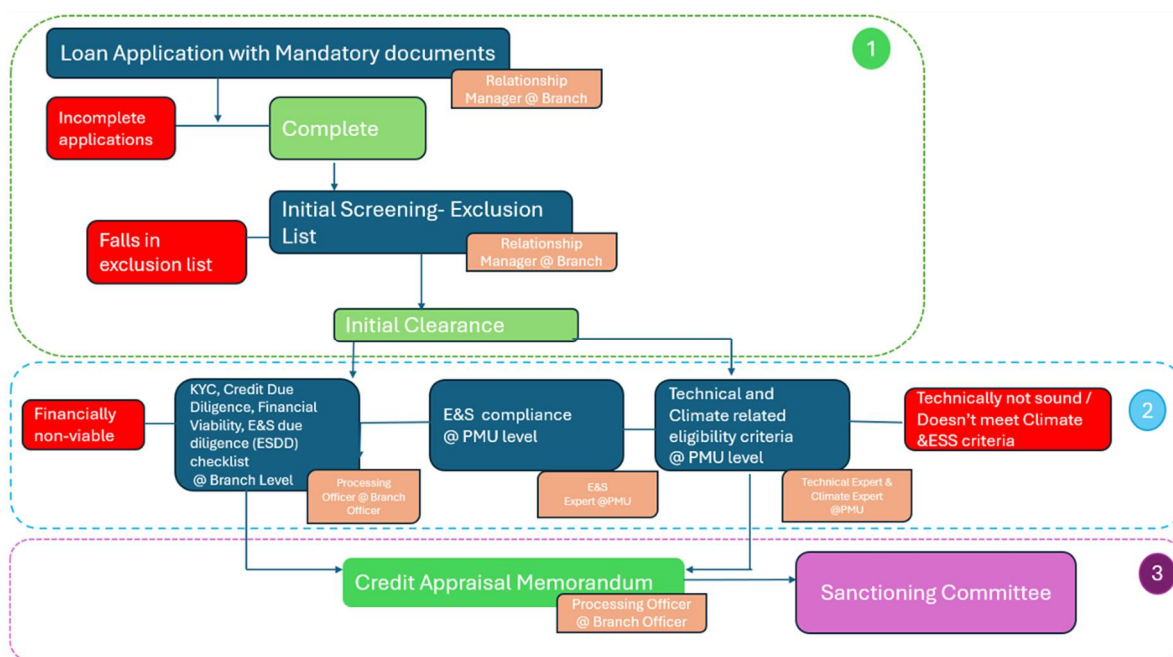


Figure 1: Loan Application Process

For direct loans, risk screening is carried out by SIDBI at the individual project level before financial approval. Each MSME proposal undergoes detailed checks against the exclusion list and Category A/I-1 criteria. Environmental and Social Due Diligence (ESDD) is performed, supported by the ESG rating tool, and project-specific ESMPs are prepared to ensure compliance with environmental and social safeguards. This ensures that only technically sound and compliant projects are financed directly by SIDBI.

Risk management for the direct loans is focused on the individual project level. Each MSME borrower must demonstrate compliance with the sectoral ESIA/ESMP and ESMS, which outlines impact/mitigation measures, monitoring indicators, and responsibilities. SIDBI, as the Accredited Entity (AE), directly screens proposals, by ensuring that MSME's submit a holistic Environment Social Due Diligence (ESDD) which encompasses environment and social risks like (Pollution control, Labour issues, Occupational health and safety, SEAH, Grievance Redressal, Gender), and ensures that every project meets environmental and social safeguards before financial approval.

3.2 Risk Identification & Mitigation Strategy

Table 6: Identification risk and its mitigation strategy

Type	Risks Identified	Mitigation Measures
Environmental	Toxic discharges, hazardous emissions, noise fury, waste chaos	Advanced pollution control (air, water & noise whatever applicable), Waste management, wherever applicable, clean tech retrofits, real-time monitoring, Statutory and regulatory clearances, climate-smart innovation, proper hands-on training be given to the operators before operation, regular inspections, Operation & Maintenance of machineries / equipment, Fire safety guidelines /manuals, Do's & Don'ts in the facility etc.
Social	Unsafe labour conditions, gender	Institutional safeguards, Personal protective Equipment (PPE) like Masks, Goggles, Gloves, Harness must be provided, Display boards

	inequity, SEAH, underpayment	with danger signs placed at electrical and hazardous areas, Wage enforcement, GRMs, Gender Action Plans. Integration of Labor management procedures like contractual compliance, payroll audits, transparent wage scales, direct payment system into the bank accounts (as applicable) shall be taken care by borrower MSMEs and their management.
Community	Health deterioration, land stress, exclusion	Community consultations, inclusive benefits, shared infrastructure
Technological	Digital illiteracy, surveillance misuse, e-waste from sensors	Literacy drives, ethical tech use, green IoT design, traceable recycling chains

4. Grievance Redress Mechanism

The sectoral ESMP clearly outlines MSME-level expectations for grievance redressal. At the MSME/site level, each unit must prominently display the internal grievance focal point's details (name/phone/email) at entrances, shop floors, canteens, and dormitories. Worker induction and refresher toolbox talks will include a short briefing on internal grievance channels, escalation options to the Grievance Redressal Committee/Body, and access to the SIDBI GRM as described in SIDBI's ESMS-FMAP (Section 9.5 Awareness and Capacity Building) and GCF IRM.

Each MSME must maintain simple, accessible grievance channels such as a name of grievance officer as point of contact, complaint register/box and ensure basic logging, tracking, and timely resolution of labour / gender based, OHS, SEAH/POSH, and Environmental & Social grievances. SIDBI will verify MSME-level GRM performance during annual ESS Monitoring & Verification (ESS M&V) visits and through any third-party verification done under the Programme. MSMEs will also submit periodic reports to SIDBI summarizing grievance categories, acknowledgements, resolutions, open cases, and corrective actions taken.

In 2013, the Government of India notified the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act (POSH Act). The Act aspires to ensure women's right to workplace equality, free from sexual harassment through compliance with the above-mentioned three elements. It is important to note that the Act provides a civil remedy to women and is in addition to other laws that are currently in force. Consequently, any woman who wishes to report instances of sexual harassment at the workplace has the right to take recourse of both civil and criminal proceedings. As a public financial institution, SIDBI has adopted the POSH policy of the Government of India (Refer Attachment 2 of ESMS in page no 125 -135).

Grievance Redressal Policy (Refer Attachment 3 of ESMS) is based on the principles of customer service and customer satisfaction which would in turn broaden its customer base. SIDBI's policy on grievance redressal follows broadly the following principles:

- Customers are always treated fairly
- Grievances raised by customers are dealt with courtesy and on time
- SIDBI will treat all grievances efficiently and fairly as they can damage the Bank's reputation and business if handled otherwise
- SIDBI's employees must work in good faith and without prejudice to the interests of the customer
- Customers are fully informed of avenues to escalate their complaints/ grievances within the organization and their rights to alternative remedy if they are not fully satisfied with the response of the Bank to their complaints in keeping with the above policy, the GRM has the following provisions:

(a) Registration of complaint: Customer can lodge / register his grievance through any of the following channels:

- Complaint in Person
- Complaints through post / mail / email
- Online Registration of Complaints and
- Grievances lodged through the Public Grievance Portal such as Centralized Public Grievances Redress and Monitoring System (CPGRAMS) (www.pgportal.gov.in)

(b) Mandatory display/ disclosure requirements at SIDBI Offices: The following are displayed/ disclosed at the SIDBI offices for easy filing of grievances.

- Complaint Book/Register
- Complaints/Suggestion Box
- Complaint form at SIDBI website homepage
- Notice Board displaying contact details of Nodal Officers for grievances, escalation of unresolved grievances within 8 working days, and details of Chief Grievance Officer to be approached when not satisfied with the redress.

(c) Resolution of grievances / complaints: The process includes

- acknowledgement after receipt of complaint
- escalation matrix
- referring unsatisfied complaints to higher levels, etc.

Anonymous complaints are not entertained. All efforts are made to resolve each complaint received by the Bank generally within stipulated time as per the following escalation matrix:

Table 7: Escalation matrix at SIDBI

Level	SIDBI Office	Official In-charge
First	Branch Office	Nodal Officer at Branch level
Second	Regional Office	Nodal Officer at Regional level
Third	Head Office	Chief Grievance Officer

There may be some complaints which require deeper analyses from all possible angles. In such cases, the Bank will try to resolve the grievance within one month from the receipt of complaint. In case of unsatisfactory resolution, the resolution can be escalated to a higher level.

4.1 SIDBI's 3-Tier GRM

SIDBI has a three-tier grievance/ complaint redressal system which can be accessed @ <https://www.sidbi.in/complaints> The details are given below:

Level 1 – Branch Office Level

At the Branch Office, a complaint can be filed in person, post/ email to SIDBI and register online. When a complaint is registered, a unique Complaint ID will be generated/issued. The following complete details to be furnished while registering the complaints, enabling them to address the concern(s) in a holistic and timely manner:

- Full name of Complainant
- Customer ID if an existing Customer
- Complainant's Contact details (address, telephone number and e-mail)
- Reference number of Transaction/Complaint ID, depending on purpose

In case of non-receipt of reply within 8 working days of registering the complaint or unsatisfactory reply, it can be escalated to Level 2, using Complaint ID.

Level 2 – Regional Office Level

In case of non-receipt of reply within 8 working days of registering the complaint or unsatisfactory reply, the complaint can escalate it to Level 2 (Regional In-charge), using Complaint ID.

Level 3 – Head Office Level

If registered complaint is not resolved satisfactorily within 5 working days from date of escalation at regional level (Level 2), the complainant can contact Chief Grievance Officer/ Alternate Chief Grievance Officer.

SIDBI has a functional and well-structured three-tier GRM in place. The existing GRM will be utilized for the bilateral / multilateral supported programs /project. SIDBI will ensure that its GRM is adequately advertised at the levels of all stakeholders.

Additionally, a focal point for the programme will be appointed or nominated who can be contacted to obtain any project-related information or for registering suggestions/grievances. Details of the focal point for each case shall be made available on the SIDBI/project website.

To assess the overall effectiveness and efficiency of the project GRM, an evaluation will be conducted on an annual basis. Results will be shared with all concerned stakeholders to facilitate improvement in the performance of the GRM and provide necessary feedback. The following points may be assessed during such evaluations:

- Number of complaints/ queries received,
- Category of complainants (Type of stakeholder),
- Status of the complaints (rejected, closed, reopened, ongoing),
- Response time involved in the resolution of complaints,
- Feedback from the aggrieved/ complainants, if any

Further, GCF Independent Redressal Mechanism (IRM) can be accessed on the following link (<https://irm.greenclimate.fund/>), wherein affected parties/person can directly file a complaint if they are negatively affected by the projects/programmes funded by Green Climate Fund (GCF).

4.2 Grievance Redressal for Customers & Stakeholders

SIDBI ensures grievance redressal through continuous stakeholder engagement. For non-customers, awareness of mechanisms under Govt. of India/SIDBI/GCF is created via consultations. Citizens may lodge grievances 24x7 through the **Centralized Public Grievance Redress and Monitoring System (CPGRAMS)**⁴, accessible via web and mobile (UMANG App). Complaints can be tracked with a unique ID and appeals filed if resolution is unsatisfactory.

4.3 Gender-Based Violence & SEAH Risk Identification and Management

While section 4 covers about the labor vulnerabilities including gender safeguards and compliance with India's Sexual Harassment of Women at Workplace (Prevention, Prohibition & Redressal) Act, 2013; commonly known as the **POSH Act** and provides for SEAH/gender assessment under independent monitoring. Accordingly, SIDBI follows the POSH Act, ensuring zero tolerance for GBV/SEAH⁵. The Act mandates:

- Broad definition of workplace (including organized/unorganized sectors).

⁴ <https://pgportal.gov.in/>

⁵ SIDBI, "Environment and Social Management System (ESMS) 'Financing Mitigation & Adaptation Projects (FMAP) in Indian MSMEs", Page 71, <https://www.sidbi.in/assets/front/pdf/ESMS-FMAP-E.pdf>

- Internal & Local Complaints Committees.
- Defined complaint filing and inquiry process.
- Employer duties: safe environment, awareness programs, support to complainants, treating harassment as misconduct, and timely reporting.

MSMEs shall comply with institutional arrangements and report under programme mechanisms. As a Grievance/SEAH/POSH risk screening step, SIDBI ensures MSMEs undertake that Grievance/SEAH/POSH related information i.e., whether the unit has Internal Complaint Committee with respect to Grievance/SEAH/POSH and any cases registered / resolved. Further, Survivor-Centered Handling i.e., (confidentiality, non-retaliation, referral pathways) are followed as per POSH Act.

In addition, Gender Assessment and Gender Action Plan under FMAP in GCF FMAP 241 has been captured in accordance with GCF requirement on Gender and Grievance. Reference Link:- [fp241-gender-assessment-cover.pdf](#) and [fp241-gender-action-plan-cover.pdf](#)

SIDBI explicitly stipulates that all Category B MSMEs must adhere to minimum labour and working-condition standards aligned with IFC Performance Standard 2, the GCF Environmental and Social Safeguards (ESS), and India's National Labour Code. The Labour Code—effective from 21 November 2025—consolidates 29 existing labour laws into four integrated codes covering:

1. **Wages,**
2. **Social Security,**
3. **Industrial Relations,** and
4. **Occupational Safety, Health and Working Conditions.**

These requirements are designed to identify and manage worker-related risks while ensuring that enterprises maintain safe, fair, and legally compliant workplaces.

It is essential for MSMEs to institutionalize grievance redressal processes to enhance their accountability and stakeholder's trust. Accordingly, MSMEs shall maintain register/records covering the following details: -

- i. Total number of grievances received
- ii. Summary of grievances received
- iii. Details of grievances resolved, pending, reasons for delay in addressing the pending grievances, etc.
- iv. Details of number of sexual harassment complaints received and action undertaken to address such complaints.

In addition, SIDBI mandates that all MSMEs comply with India's statutory prohibitions on child labour and forced or bonded labour. Enterprises must also ensure the protection and fair treatment of vulnerable worker groups, including contract workers, migrant workers, and women workers, along with providing all necessary workplace amenities and welfare facilities in line with national regulations and international good practice.

At MSME site, Workers can access to Nodal officer (name/phone/email) regarding the POSH/SEAH through Prominent display board at entrances, shopfloors, canteens and dormitories/restroom for their Grievance Redressal Issues. Subsequently, worker induction & refresher toolbox talks are included with a short briefing on Internal Grievance Mechanism options, escalation to Grievance Redressal Management Committee/Body and under SIDBI's report on ESMS- FMAP in Indian MSMEs - section 9.5

Awareness and Capacity Building ESMP training already committed which covers ESMP implementation.

Verification will be carried out during follow-up visits by SIDBI officers or by third party verification done under the programme, which the ESMP already prescribes. Periodic MSME submission to SIDBI covers various categories like Labor/Gender/OHS/SEAH/environment and resolved within the given timeline with corrective actions taken etc.

4.4 Conflict Sensitivity Assessment⁶

- **Community Health & Safety:** OHS safeguards are checked via ESDD/ESG tools before lending. Annual audits ensure compliance. Borrowers must provide medical care, redress, and compensation in case of incidents.
- **Land Acquisition:** Projects are screened to avoid acquisition/resettlement affecting biodiversity-sensitive areas, indigenous communities, or cultural heritage.
- **Indigenous Peoples:** Projects will not be assisted affecting people in voluntary isolation.

5. Monitoring, Evaluation & Reporting Requirements

The FMAP programme adopts a **comprehensive, multilayered Monitoring and Evaluation (M&E) system** that integrates subproject-level ESMP implementation, programme-level oversight, and reporting to the Green Climate Fund (GCF). Monitoring responsibilities are shared across SIDBI, MSME borrowers, third-party agencies, and SIDBI's Programme Management Unit (PMU). The approach ensures continuous oversight of environmental and social performance, GHG emission reductions, and compliance throughout the project lifecycle.

5.1 Continuous Monitoring and Reporting Obligations

1. Monitoring Level (SIDBI)

SIDBI conducts **end-to-end monitoring** from project appraisal through implementation and closure. This includes:

- **Pre-Sanction visits** before loan sanction, where SIDBI verifies actual site conditions through:
 - o On-site walkthrough inspections
 - o Stakeholder interviews (workers, supervisors, management)
 - o Photographic verification and geo-tagged evidence
 - o Cross-checking compliance with the exclusion list
 - o ESDD and ESG scoring
- **Verification of mitigation measures** listed in the project-specific ESMPs, including:
 - o Pollution control infrastructure
 - o PPE availability and OHS practices
 - o Chemical management and hazardous waste disposal
 - o Gender, SEAH, and labor compliance (aligned with new National Labour Codes, effective 21 Nov 2025)

⁶ SIDBI, "Environment and Social Management System (ESMS) 'Financing Mitigation & Adaptation Projects (FMAP) in Indian MSMEs", Page 73- & 74, <https://www.sidbi.in/assets/front/pdf/ESMS-FMAP-E.pdf>

- **Annual supervision missions**, including site audits, documentation checks, and follow-ups on corrective actions. **Ensuring submission** by MSMEs, tied to undertakings signed during ESMP rollout.

2. Third-Party Monitoring

During the initial six years of the programme:

- A **third-party M&E agency** develops monitoring tools, reporting formats, and conducts verification audits.
- From years **7–13**, SIDBI's PMU technical/M&E officer conducts field-level monitoring using the validated tools.
- Independent sample-based evaluations assess:
 - o ESMP implementation on the ground
 - o Gender and SEAH Action Plan compliance
 - o E&S risk mitigation effectiveness
 - o Climate benefits (GHG reductions, energy savings, water efficiency)

3. Programme-Level Monitoring by SIDBI

SIDBI monitors:

- Sub-loan performance and disbursements
- Co-financing mobilization
- Climate results (GHG reductions, energy savings)
- Progress towards outputs (beneficiaries, women-led MSMEs, EVs financed, solar projects, etc.)
- Institutional strengthening indicators

All findings feed into Performance Reports and the Annual Performance Report (APR).

5.2 Integration with GCF's Annual Performance Report (APR)

The APR consolidates monitoring results from all financing channels and fulfils SIDBI's obligations. Key elements include:

1. Subproject Disclosure & Reporting

- All directly financed subprojects are disclosed and included in APR submissions.
- APR includes:
 - o Summaries of ESIA/ESDD/ESMP implementation
 - o Significant changes or material variances post-disclosure
 - o Portfolio-level corrective actions
 - o Updates on safeguards, gender, SEAH, OHS, climate resilience, and pollution control compliance.

2. Climate & Results Reporting

SIDBI submits:

- **Traceable Excel-based GHG reduction calculations** annually, using:
 - o Energy savings data from MSMEs
 - o Internationally recognized methodologies (CDM, ISO standards)
- **Programme-level indicators**, including:
 - o Core indicator 1 (GHG emission reductions)
 - o Core indicator 2 (beneficiaries)
 - o Core indicator 3 (value of climate-resilient assets)
 - o Core indicators 5–8 (institutional strengthening, innovation, knowledge creation)

3. Compliance Confirmation

Every APR confirms that:

- Sub-loans comply with eligibility criteria
- Sectoral ESMP guidelines are met
- Co-financing ratios are maintained
- All monitoring data meets Evaluation Policy requirements
- Programme-level progress aligns with climate impacts, results framework, and ESMS commitments.

6. Conclusion

The ESIA and ESMP under FMAP is a commitment to responsible industrial transformation for Category B subprojects under direct lending component. These measures would safeguard our environment, uphold workers' dignity and safety, protect community health, and anchor our path toward a sustainable future.

Annexure 1- Negative / Exclusion List

SIDBI does not finance the following (Negative/Exclusionary List of projects) out of the GCF Proceeds:

- i. Production or trade in any product or activity deemed illegal under Indian laws or regulations or international conventions and agreements.
- ii. Production or trade in weapons and munitions.
- iii. Production or trade in alcoholic beverages (excluding beer and wine).
- iv. Production or trade in tobacco.
- v. Gambling, casinos, and equivalent enterprises.
- vi. Trade in wildlife or wildlife products regulated under CITES.
- vii. Production or trade in radioactive materials.
- viii. Production or trade in or use of unbounded asbestos fibers.
- ix. Commercial logging operations or the purchase of logging equipment for use in primary tropical moist forest (prohibited by the Forestry policy).
- x. Production or trade in products containing PCBs.
- xi. Production or trade in pharmaceuticals subject to international phase outs or bans.
- xii. Drift net fishing in the marine environment using nets in excess of 2.5 km. in length.
- xiii. Production or trade in ozone depleting substances (ODS) subject to international phase out.
- xiv. Production or trade in pesticides/herbicides subject to international phase outs or bans as agreed by GOI based on Stockholm convention.
- xv. Production or activities involving harmful or exploitative form of child labour or forced labour.
- xvi. Projects/ activities requiring land acquisition and/ or causing Loss of Land / loss of source of income / loss of livelihoods, impacts on community/ displacement of people or communities from private or public lands or any negative impacts on livelihoods.
- xvii. Projects located in areas of significant settlement or impacting the natural and cultural resources of tribal people and adversely affecting the land, culture, livelihood, and way of life of tribal and indigenous people.
- xviii. Projects located in sensitive ecological areas and natural/ cultural heritage locations. If any activities are proposed in these areas, then the beneficiaries must obtain the requisite permissions. These permissions are required if the activities are taken up within one km from the sensitive ecological areas or heritage locations.
- xix. Category A Projects with potentially significant adverse environmental and/or social risks and impacts that, individually or cumulatively, are diverse, irreversible, or unprecedented and I1 i.e. when an intermediary's existing or proposed portfolio includes or is expected to include financial exposure to activities with potentially significant adverse environmental and social.
- xx. Projects that affect in any way Indigenous Peoples with limited external contact, also known as peoples "in voluntary isolation", "isolated peoples" or "remote groups".
- xxi. Production and distribution of racist, anti-democratic and/or neo-Nazi media.
- xxii. Projects that involve the conversion or degradation of Critical Natural Habitats
- xxiii. Large agricultural or forestry enterprises (>5,000 ha) producing palm oil or wood that do not comply with recognised international certification systems (e.g. RSPO or FSC) or equivalent regulations.
- xxiv. Practices which prevent employees from lawfully exercising their rights of association and collective bargaining
- xxv. Nuclear power plants (apart from measures that reduce environmental hazards of existing assets) and mines with uranium as an essential source of extraction.
- xxvi. Prospection, exploration and mining of coal; land-based means of transport and related infrastructure essentially used for coal; power plants, heating stations and cogeneration facilities essentially fired with coal, as well as associated stub lines.
- xxvii. Non-conventional prospection, exploration and extraction of oil from bituminous shale, tar sands or oil sands.
- xxviii. Cross-border trade in waste products unless compliant with the Basel Convention and the underlying regulations.
- xxix. Production or trade of persistent organic pollutants (POPs)
- xxx. Prohibited transboundary trade in waste (under the Basel Convention)
- xxxi. Investments which could be associated with the destruction or significant impairment of areas particularly worthy of protection (without adequate compensation in accordance with international standards).
- xxxii. Production or trade in wood or other forestry products other than from sustainably managed forests.
- xxxiii. Production, trade, storage, or transport of significant volumes of hazardous chemicals, or commercial scale usage of hazardous chemicals. Hazardous chemicals include gasoline, kerosene, and other petroleum products.
- xxxiv. Production or activities that impinge on the lands owned, or claimed under adjudication, by Indigenous Peoples, without full documented consent of such peoples.

Annexure 2 - Environmental & Social Due Diligence (ESDD) Checklist

Name of the MSME enterprise:

Project Location with address:

S.No.	Particulars	Response	Remarks
<i>A. Environmental Aspects</i>			
1	Environmental Clearance from MoEFCC* / SEIAA**	Yes / No / Not Applicable / Applied For	- If 'Yes', attach copy of the same. - If 'Applied For', attach copy of the application submitted by the MSME unit to the concerned SPCB or the receipt copy of the fee paid to the SPCB.
2	Valid Consent(s) / Clearances from SPCB/CPCB	Yes / No / Not Applicable / Applied For	- If 'Yes', attach copy of Consent to Establish (CTE) / Consent to Operate (CTO). - If 'Applied For', then attach copy of the application submitted by the MSME unit to the concerned SPCB or the receipt copy of the fee paid to the SPCB.
3	Whether the unit has received any notice for regulatory non-compliance or violation of norms or consent conditions or faced any litigation or material settlement of convictions in court	Yes/No	If 'Yes', state reasons, which led to industry being notified as 'non-compliant' and actions undertaken to become compliant. State clearly whether the issue has been resolved or not. If not, state reasons clearly.
4	Compliance of consent - for eg. Installation of pollution control measure suggested as per consent	Yes / No / Not Applicable	list out deviations if any
<i>B. Social Aspects</i>			
5	Does the unit employ child and / or forced labor for its operations	Yes/No	

6	Does the unit follow minimum wages act / No discrimination on the grounds of religion/ethnicity/colour/ race/ gender and caste.	Yes/No	
7	Does the unit employ Occupational, Health and Safety related measures for its operations <i>[For example: Workers wearing Gloves, helmet, mask during operations (especially during welding operations), installation of fire safety measures (e.g. workable / usable fire extinguishers having pressure gauge needle in green zone), etc.]</i>	Yes/No	
8	Does the unit comply with labour welfare requirements like ESI /EPF etc	Yes / No	
9	Does the unit have occupational facilities such as canteen / restroom / toilet for the worker	Yes/ No	
10	Does the unit employ women? If yes, whether separate facilities such as toilet / rest room provided to them	Yes / No	
11	Does the unit have a Grievance Redressal Mechanism (GRM) and Grievance Register to lodge complaints.	Yes / No / Not Applicable	
12	Does the unit have Internal Complaint Committee with respect to The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) POSH Act / Sexual Exploitation, Abuse, and Harassment (SEAH)	Yes / No / Not Applicable	
13	Do the unit received any complaint or any cases registered under POSH Act / SEAH till date	Yes / No	
14	Is there any provision for Physically handicapped/ Challenged person in the workforce despite of gender.	Yes / No / Not Applicable	
15	Does the unit have prominent display boards indicating	Yes / No / Not Applicable	

	GRM(MSME) contact person details / SIDBI Grievance redressal contact details/ GCF independent redressal mechanism details.		
16	Does the unit have Emergency Preparedness Response Plan (EPRP).	Yes / No / Not Applicable	
17	Is there availability of First Aid at the site and tie up with the local hospital in case of emergency?	Yes / No / Not Applicable	
<i>C. General Land Related Aspects – Common for all types of projects</i>			
18	Does the project / unit is located in the notified industrial area & park / cluster / Special Economic Zone etc	Yes / No	<i>If no, the following questions are to be answered (Question 19, 20, 21 & 22)</i>
19	Does the project require compulsory land acquisition causing displacement of the resident / Involuntary resettlement	Yes / No / Not Applicable	
20	Does the unit / project is located in, areas of significant settlement and / or collective attachment of tribal people / Indigenous People.	Yes / No / Not Applicable	
21	Does the project involves signification alteration / damage / removal of any critical cultural heritage	Yes / No / Not Applicable	
22	Is the project / unit located closer (within 10 KM) to any eco sensitive zone such as national parks / reserved forests	Yes / No / Not Applicable	
<i>D. Land-related Aspects</i> (Only for Brownfield enterprises going for expansion and modernization of their existing operations in a new location / premises; and (ii) Greenfield projects i.e., setting up of new enterprises)			
23	Land Status / use classification	• industrial area, industrial estate • notified industrial zone, • special economic zones, • Land parcels already designated by the Government for non-agricultural use,	

		• solar / wind farms etc where all the necessary statutory permission / infrastructure are available	
24	Transaction Status - Mode of Land Access / Acquisition	• Purchased from Govt (outright / lease) • Privately purchased land through willing buyer-willing seller transactions with clear title • Private Lease • Owned / inherited - Others (please specify)	

* Ministry of Environment, Forest and Climate Change

** State Environment Impact Assessment Authority

(Promoters Signature)

It is hereby certified that the information provided in the above ESDD report by the project proponent has been duly checked/ verified by the undersigned and is found to have sufficient environment and social safeguard measures in place and therefore may be considered for providing loan.

Signature :
 Name of Person :
 Designation :
 Name of the SIDBI Branch :

For the use of SIDBI Branch

- ☐ Approved
☐ Conditional Approval (Specify the conditions)
☐ Not Approved, Reason(s) thereof

Annexure 3- List of Cross Functional Technology

The technologies mentioned below are used across all the industrial sectors which improves Energy Efficiency, results in cleaner production, enhances resource efficiency and would also result in reduction of GHG emissions which are aligned with the FMAP Programme objective. The E&S Risk Categorization of these technologies would depend on the industrial process as mentioned in this document.

Further, it is to be mentioned that these technologies are also used for projects with backward and forward integration within the eligible industrial sectors identified under the FMAP Programme.

In addition to the above, if the project includes both mitigation and adaptation measures, suitable bifurcation and tagging would be done for the purpose of inclusion in the project and reporting to GCF under the FMAP Programme.

The following cross-sectoral technologies would be funded under the FMAP Programme including the sector under reference.

Sr. No.	Technology Name
1	Variable Frequency Drives
2	Energy Efficient Transformers
3	Energy Efficient Fluorescent Lamps
4	Compact Fluorescent Lamps
5	Metal Halides Lamps
6	High Pressure Sodium Vapor Lamps
7	Light Emitting Diode
8	Microprocessor Based Intelligent Control
9	Exclusive Transformer for Lighting
10	Servo Stabilizer
11	Electronic Ballast
12	Energy Efficient Air Compressors & Blowers
13	Energy Efficient Fans & Pumps
14	Capacitors
15	Automatic Power factor Controller
16	Soft Starter for Motors
17	Maximum Demand Controller
18	Automatic Temperature Controller
19	High-frequency Induction Irradiation
20	High-frequency Melting Furnace
21	Highly Sensitive and Responsive Arc Furnace
22	High-performance Electrolytic Furnace
23	Electromagnetic Irradiation
24	Common Incinerator Alongwith Power Generation Facilities
25	Screw Compressor
26	Computer Desktop Virtual Machine
27	Cooling Towers (Fills with PVC Honey Comb)

28	Wide Belt Sander
29	Spindle Moulder
30	Multi-boring machine
31	Visi cooler
32	Robot Arms
33	Enginator based on Natural Gas
34	CNC Router
35	Vacuum forming machine with thermostat control
36	Edge Bander Sprint with Power- PC Control
37	Enterprise Resource Planning (ERP) (with PPG module)
38	Automatic Book Sewing Machine
39	Tunnel Dryer for mosquito coil industry
40	Induction Lighting
41	SCADA system
42	Energy Management System
43	Water-tube Boiler (by replacing conventional Smoke-tube Boiler)
44	Condensate Recovery & Recycle System
45	Energy Efficient Boilers
46	Recuperators
47	Cogeneration
48	Heat Pumps
49	Energy Efficient Refrigeration System
50	Automatic Combustion Control for Boilers / Furnaces
51	Regenerative Burners for Furnace
52	Heat Recovery Systems for Boilers (Economizer, Air Pre- heater)
53	Outdoor Intake Control / Variable Air Volume / Heat exchanger
54	High Efficiency DG Set for Power Generation (Low Fuel Consumption with Pollution Control & Canopy)
55	Waste Heat Recovery Boiler
56	Thermal Insulation for Hot & Cold Systems
57	Dehumidification Dryer
58	Building Energy Management System
59	Municipal Solid Waste Based Power Generation
60	Building Energy Management System (BEMS) & Concentrated Solar Thermal Power (CSP)
61	Bioreactor with PLC
62	Batching Plant with Microprocessor Control
63	Wire Condenser Welding Machine equipped with PLC
64	2 Stations Auto Balancing Machine equipped with PLC
65	Standing Seam Roofing and Curving
66	Energy Efficient Air Compressors
67	Variable Frequency Drive for Screw Compressors
68	Heat of Compression Air Dryers (Replacing Desiccant Air Dryer)
69	Variable Frequency Drive for Oil Pump in Hydraulic Power Packs
70	Energy Efficient Exhaust Fans

71	Variable Frequency Drive for Hot Air Circulation Fan for Preheating Furnace
72	Air Preheater (for Furnace Flue Gas Waste Heat Recovery)
73	CNC Cutting Machine with End Former
74	Fully Automatic CNC Return Bender
75	Automatic Ring Sizing and Loading Machine
76	CNC Vertical Machining Centre
77	Vacuum Holding for Non-Ferrous Components for High-Speed Milling
78	CNC Co-ordinate Measuring Machine
79	CNC Sharpening and Profile Grinding, Automatic Broach Sharpening Machine
80	Turning Machine with Variable Frequency Drive with Regenerative Braking System
81	Servo Electric Turret Punch Machine
82	Abrasive Assisted High Pressure Water Jet Cutting
83	Inverter Based Welding Machine
84	CNC Plasma Cutting Machine
85	Double Polishing Machine (with Inverter Control)
86	Pressure Die Casting Machine
87	Semi-Automatic Pillar Type Hydraulic Hot Moulding Press (with PLC Control)
88	CNC Electronic Spring Control Machine
89	Fully Automatic Hydraulic Hot Chamber with Diesel Burner
90	Rotary Table Machine for Surface Finishing and Polishing (with Inverter Speed Regulation)
91	CNC Punching Forming Machine
92	Open Back Double Point Press - PLC Controlled
93	Automatic Transfer Unit
94	CNC Garter Spring Former
95	Electro-Hydraulic CNC Punching Machine
96	Automatic NC Control Bending Machine
97	Sensor Oxy- Height Control (OHC) and Sensor Plasma Height Control (PHC)
98	Gasifier Based Heat Treatment Furnace
99	Insulated Gate Bipolar Transistor Based Inverter
100	Cylinder Block Boring and Milling Machine (with Variable Speed and Cycle Control)
101	Duplex Roller Polishing Machine
102	Nut Former Machine
103	Double End Chamfering Machine for Pipes
104	Heavy Duty Plano Milling Machine (using AC Variable Drive)
105	Heavy Duty Multi- Coil Electromagnetic Rectangular Chuck (with Variable Control Unit)
106	NC Hydraulic Shearing Machine
107	NC Flame Cutting Machine
108	CNC Spring Making Machine
109	CNC Wire Bending Machine
110	Plano Miller with 3 Cutting Head
111	Electro Permanent Magnetic - Plate Handling System
112	Electro Permanent Magnetic - Telescopic Spreader Beam
113	Electro Permanent Magnetic - Tilting Plate Handling

114	Electro Permanent Magnetic - Billet Handling Machine
115	Modular Electro Permanent Magnets
116	Battery Operated Electro Permanent Magnetic Lifter
117	Heavy Duty EPM Systems for Rail Machining
118	EPM Modules for Fast Mould Clamping
119	Electro Permanent Magnetic Chucks (MAGNASLOT)
120	CMM Machine (Coordinate Measuring Machine)
121	High Speed Circular Sawing Machine 2, 3 & 4 Hole drilling SPM
122	15 Hole drilling SPM
123	4 Way U drilling & fine boring SPM
124	Multi spindle drilling head SPM
125	Three pillar types drilling SPM
126	2Way fine boring SPM
127	CNC Rotary Draw tube bender
128	Electronic Servo
129	CNC Straightening and cutting machine
130	Single Axis NC Tube bender with linear and rotary indexing arrangement
131	Marine engine
132	Corner cleaning machine equipped with PLC control
133	Automatic end milling machine
134	Two Glazing Bead Saw with automatic control
135	High Alumina Brick Refractories
136	Servo Driven Spring Coiling Lathe Machine
137	Cold Heading Machine
138	CNC Engraving Machine
139	Pick and Place Machine
140	NC Cutter and Rotary
141	Radial CNC Multi Spindle Drilling Machine
142	Electrically heated Nitriding Furnace
143	CAM Machine
144	Travelling head clicking machine
145	Aluminum Profiling Extrusion Machines (Hydraulic using Variable Pumps with PLC Controlled)
146	Single Spindle Vertical Honing Machine with VFD control
147	Slant Bed CNC Lathe
148	Panel Cutter machine (PLC controlled)
149	CNC machining centre with Inverter controlled
150	Laser Cutting machine
151	Cylindrical Grinding Machine (with Inverter control)
152	CNC Tool and Cutter Grinder
153	CNC Column Moving Horizontal Machining Centre
154	Automatic end cutter
155	Intermix (with water cooled rotors)
156	Hydraulic Cone Crusher
157	5 axis CNC Tool and Cutter Grinding Machine

158	Flat Bed CNC Chucker
159	Vertical Sliding Head Machine
160	Turn Auto Loading and Unloading CNC Machine
161	Impregnating Plant with VFD controls
162	Automatic Vacuum Press
163	Fully Automatic Polishing Machine (with Frequency Converter)
164	Pilger Machine
165	Hydraulic Puller (with electronically controlled and brake hydraulic dynamometer)
166	Conveyor System
167	Polishing Machine
168	Hydraulic Deep Draw Press with Die Cushion complete with Hydraulic power pack (With PLC control)
169	Seam Welding Machine (with Microprocessor based weld control)
170	5 Axes Universal Milling Machine
171	Multi-wire Cutting Machine with Automatic control using PC
172	Fiber Laser Marking System
173	Gapframe Mechanical Press with PLC Control
174	Continuous Hardening and Tempering Line Furnace
175	Tube Straightening & Cutting Machine equipped with PLC
176	Serpentine Bending Machine equipped with PLC
177	Wire Flattering Mill
178	CNC/PLC based Sheet Metal Rolling and Forming Machine with VFD
179	Spooling Machines (with Variable Frequency Drive Control)
180	High Speed Metal cutting band saw with PLC and VFD control
181	AI&ML based IoT platform for Energy and Asset management
182	Air Pre Heater & Drying Bed in furnace
183	Automation and Control System
184	Automation of Withering Troughs
185	Back Pressure Turbine
186	BEE 5 Star Rated AC
187	Combustion Control System for Boiler
188	Condensate recovery system in boiler/jet drying machine
189	Desiccant-based cooling systems / DeVAP (Desiccant Enhanced Evaporative) HVAC
190	DeSuperheater for Chiller Compressors
191	Economiser in boiler/Thermic Fluid Heater
192	Electric annealing furnace
193	Electric Dry Vacuum Pumps
194	Electric Extrusion Melting
195	Electric Melting Furnace
196	Electrical Servo Drives
197	Energy Efficient Brushless Direct Current (BLDC) Fan
198	Energy Efficient Pumps - 5 Star Rating Pumps
199	Energy efficient Refrigeration Compressor
200	Energy Efficient Screw Compressor
201	Energy Efficient Turbo Blower

202	Energy recovery ventilation (ERV)
203	ETEKINA (Heat pipe technology for thermal energy recovery in industrial applications)
204	Gas Engine based co-generation technology
205	Gas fired Annealing furnace
206	Gas-fired Reheating Furnace with WHR System
207	Gasifier for Electrical Application
208	Ground & Water source Heat Pumps (GSHP)
209	Hanger Shot Blast Machine
210	Heat Exchanger
211	Heat Pump
212	Hot Air Generator from Briquette
213	Hydrogen fired Vapour absorption machine
214	IGBT based Induction furnace
215	IGBT based temperature control
216	Infrared (IR) Heaters
217	Light emitting diode (LED) Lighting
218	Light Pipe
219	Low-Grade Waste Heat Recovery System (LGWHRS)
220	Magnetocaloric Refrigerator
221	Mechanical Vapor Recompression (MVR) Evaporator
222	Micro Turbine
223	Motors (IE3 or IE4 or IE5)
224	Oxy-fuel combustion in reheat furnace
225	PUF insulation
226	Recuperative burner for heat recovery for high medium temperature furnaces
227	Regenerative burners for high temperature furnaces
228	Screw Compressor with Permanent Magnet (PM) motor
229	Static Reactive Power Generator with Harmonics Filter
230	Steam operated pumping traps
231	Temperature controller for cooling tower fan
232	Thermo Compression
233	Tri-generation
234	Variable Frequency Drives (VFD)
235	Variable Refrigerant flow (VRF) in HVAC
236	Waste Heat Recovery for power generation
237	Compact Scan Digitizing System
238	Mechanical Press with PLC and VFD control
239	Electric Overhead Travelling Crane with VFD
240	PLC based Fully Automatic Sawing Machine
241	PLC based Vertical Boring Mill
242	CNC Surface Grinder Machine
243	Harmonic filter
244	Ceramic Fiber Insulation for Batch Furnaces
245	TIG welding machine (using thyristorised control)

246	Infrared Irradiation
247	Hot Water Generator
248	Turbulators (for gas fired boilers)
249	Vertical Roller Mill (VRM)
250	Alternative Fuels & Raw Material (AFR) Utilization
251	Energy efficient impeller
252	Methane Capture technology
253	Replacement of steam turbine drive with high-speed motor drive
254	Electric Vehicles and Charging Infrastructure
255	Nano composite surface treatment for condenser in power plant
256	Torrefaction Technology
257	CNC Bending Machine
258	CNC Gear Hobbing Machine
259	CNC Grinding Machine
260	CNC Horizontal M/c Centre
261	CNC Machine (Special Purpose Machine)
262	CNC Milling M/C
263	CNC Turn –Mill Centre
264	CNC Turret Punch Machine
265	CNC Wire Cut Machine
266	Falling Film Evaporator (Re-refining of Lubricating Oil)
267	Wiped Film Evaporator (Re-refining of Lubricating Oil)
268	Fine Grinding (CBN Surface Grinding Machine)
269	Gas Fired / Oil Crucible Melting Furnace
270	CNC Wire Cut
271	CNC Milling
272	CNC Lathe
273	Gas Based Generator set
274	Computerized Automatic Electroplating / Zinc Plants
275	Heavy Duty Horizontal Machining Center
276	CNC Hydraulic Press Brake
277	Automatic Electrostatic Powder Coating Machine
278	CNC Milling Machine - Vertical Machining Centre
279	PVD (Multi-arc Ion) Coating Machine
280	CNC 3 Axes Hobbing Machine
281	Sealed Quench Furnace (use of Thyristor Power Controller and PLC)
282	Paint Shop with Waste Heat Recovery System
283	CNC Hydraulic Guillotine Shearing Press
284	CNC Turret Punch Press
285	Continuous Gas Carburising Furnace with Endogas Generator
286	Electronic Spring Coiling Machines
287	CNC Gear shaving machine
288	Medium Frequency End- bar Heater

289	Electrical Annealing Bogie Furnaces
290	Gasifier for Melting and Reheating Process
291	Rotoberatory Furnace
292	Aeroseal duct sealing technology
293	Energy Efficient technology for ECBC/Eco-niwas Samhita
294	Radiant Cooling
295	VAM Chillers
296	High Efficiency Automatic Door
297	High Efficiency Automatic Revolving Door
298	Woody Textile Insulator
299	Other Building Material Contributing to Increased Heat Insulation Performance of Building Equipment
300	Hollow Heading Machine
301	Heading Machine with Semi Cover
302	Carbon Fiber Fan
303	Hydraulic Coupling
304	CNC Based Gear Tester
305	Conveyorised Powder Coating Curing Oven
306	Energy Efficient Air Conditioner
307	Energy Efficient Refrigerators (High Efficiency Compressors, Improved Insulation and Precise Temperature and Defrost Mechanisms to Improve Energy Efficiency)
308	Vapour Absorption Refrigeration
309	Fuel Cell Cogeneration System
310	Energy Efficient Elevators
311	Equipment, Machinery and Construction Material Contributing to Increased Energy Savings
312	Heat Reclaim Ventilation / Air Conditioning System
313	High Efficiency Escalator
314	Inorganic Textile Insulator
315	Forming Plastic Insulator
316	Heat insulating opening material
317	Air Sealing Support Material
318	Heat Absorbing Glass / Low Emissivity Glass (Window Panel)
319	Common Effluent Treatment Plant
320	Machine Fixed-film Bio Reactor ETP
321	Membrane Bio Reactor ETP
322	Automatic Coil Winding Machine
323	Vacuum Impregnation plant
324	Semi-Automatic Press
325	Automatic CNC Core Cutting Machine
326	Hi Speed Precision Power Press with Computerized Control
327	Vacuum Impregnated Plant
328	Automatic/CNC Coil Winding Machine
329	Temperature Control Drying Oven
330	Amorphous Metal Core Transformers

331	CNC Core Cutting Machine
332	Natural Gas Based Oven
333	Microprocessor Based Electric Furnace
334	Plasma Cutting Inverter
335	Catalytic Enameling Machine
336	Extruder with Temperature Control, Pre- heating, Speed Control
337	XPLATE on FD Fan to improve boiler combustion efficiency
338	Solar PV Modules and Semi/Automatic Solar PV Module manufacturing Line
339	IGBT based welding machine
340	Windmills
341	Solar Photovoltaic
342	Micro Hydro
343	Biomass / Bagasse (Gasifier or Cogeneration)
344	Solar Water Heater
345	Wind Ventilator (Wind Powered Exhaust Fan)
346	Solar Power Inverters
347	Renewable Energy based Steam Boiler
348	Residual Derived Fuel (RDF) based Power Generation Plant
349	Powerless Ventilators
350	Renewable Energy Projects (Solar, Wind, biomass etc.) for both captive & non-captive purpose
351	Waste to Energy projects including Compressed Biogas Projects

Note- (i) The above list is indicative and not exhaustive; additional technologies/machines may be considered by the AE for funding only where they fall within the approved scope and eligibility criteria of FMAP, are screened and categorized in accordance with the ESMS, and comply with applicable E&S standards.

(ii) The category indicated in the table reflects the typical risk profile of the technology/process itself. Where the same technology is proposed as part of (a) a brownfield enterprise expanding/modernizing in a new location, (b) a greenfield enterprise, or (c) an off-site RE/EE project, the final categorization of the overall subproject shall be determined through ESDD and site/legal screening. In such cases, the sub-project may be classified as Category B where land-related, siting, community health and safety, or other site-specific risks are assessed as moderate, site-specific, and manageable.