GEF-8 REQUEST FOR CEO CHILD ENDORSEMENT/APPROVAL

TABLE OF CONTENTS

General Child Project Information

Child Project Title
Eliminating hazardous chemicals from textile fashion supply chains in India

Region	GEF Project ID
India	11178
Country(ies)	Type of Project
India	FSP
GEF Agency(ies)	GEF Agency Project ID
UNIDO	230079
Project Executing Entity(s)	Project Executing Type
Ministry of Textiles UNIDO	Government GEF Agency
GEF Focal Area (s)	Submission Date
Multi Focal Area	6/27/2024
Type of Trust Fund	Project Duration (Months)
GET	72
GEF Project Grant: (a)	Agency Fee(s) Grant: (b)
7,809,172.00	702,826.00
PPG Amount: (c)	PPG Agency Fee(s): (d)
200,001.00	17,997.00
Total GEF Financing: (a+b+c+d)	Total Co-financing
8729996	43,725,560.00

Project Sector (CCM Only)
Technology Transfer/Innovative Low-Carbon Technologies

Rio Markers

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Land Degradation
Significant Objective 1	No Contribution 0	No Contribution 0	Significant Objective 1

Project Summary

Provide a brief summary description of the project, to offer a snapshot of what is being proposed. The summary should include: (i) what is the problem and issues to be addressed? ii) as a child project under a program, explain how the description fits in the broader context of the specific program; (iii) what are the project objectives, and if the project is intended to be transformative,

how will this be achieved? and (iv) what are the GEBs and/or adaptation benefits, and other key expected results. (max. 250 words, approximately 1/2 page)

India is the second-largest global producer of textiles and garments, contributing 2% to its GDP and 12% to export earnings. The industry employs about 45 million workers directly and 60 million indirectly, with a significant portion being women. India's textile sector is dominated by small and micro enterprises and centered in five main regions, accounting for 85% of the total production. The industry uses over 8000 chemicals (including many hazardous chemicals), and thus contribute significantly to global industrial effluents. The Child Project (CP) – 'Eliminating hazardous chemicals from apparel fashion supply in India' – aims to eliminate hazardous chemicals from India's apparel supply chain. The CP project promotes sustainable practices and reduces environmental impacts, particularly energy and water use, and greenhouse gas (GHG) emissions. The project seeks to transform the textile industry by replacing resource-intensive processes with sustainable alternatives and foster circular and transparent supply chains.

The textile industry faces systemic challenges such as market failure and supply chain fragmentation. The project seeks to address environmental impacts, including reducing persistent organic pollutants (POPs) and GHG emissions. It adopts a holistic value-chain approach to promote cleaner production, resource efficiency, circular business models, sustainable consumption, and innovative materials.

As the first GEF-funded textile project in India, it focuses on the supply chain and lifecycle of textiles, aiming for Global Environmental Benefits (GEBs) derived through interventions at eight clusters (1 - Ahmedabad, 2 - Bhiwandi, 3 - Ichalakaranji, 4 - Kolkata, 5 - Ludhiana, 6 - Panipat, 7 - Surat, and 8 - Tiruppur) and four fashion houses (1 - Aditya Birla Fashion and Retail, 2 - Arvind Ltd, 3 - Tata Trent, and 4 - Vardhman). The project includes six components: (1) innovative design and business models, (2) use of innovative materials, (3) cleaner production, (4) sustainable consumption, (5) post-use 9Rs (reverse logistics), and (6) knowledge management and learning.

The project targets to support over 400 textile factories: cleaner production (320 factories); innovative materials (40 enterprises); and 9Rs practices (40 enterprises). It aims to (a) mitigate 147,000 tCO_2e directly and 294,000 tCO_2e indirectly, (b) reduce harmful chemicals by 10,530 tons directly and 21,060 tons indirectly, and (c) cut POP emissions by 12 g Toxic Equivalent (TEQ) and increase area of landscapes under improved management to benefit biodiversity by 2.128 million ha (by reducing 1277 tons of pesticide use). Benefiting the workforce, especially women, the project will directly impact 40,000 people (60% women) and indirectly benefit 80,000 people (60% women) over six years.

Child Project Description Overview

Project Objective

India is the second-largest global producer of textiles and garments, contributing 2% to its GDP and 12% to export earnings. The industry employs about 45 million workers directly and 60 million indirectly, with a significant portion being women. India's textile sector is dominated by small and micro enterprises and centered in five main regions, accounting for 85% of the total production. The industry uses over 8000 chemicals (including many hazardous chemicals), and thus contribute significantly to global industrial effluents. The Child Project (CP) – 'Eliminating hazardous chemicals from apparel fashion supply in India' – aims to eliminate hazardous chemicals from India's apparel supply chain. The CP project promotes sustainable practices and reduces environmental impacts, particularly

energy and water use, and greenhouse gas (GHG) emissions. The project seeks to transform the textile industry by replacing resource-intensive processes with sustainable alternatives and foster circular and transparent supply chains.

The textile industry faces systemic challenges such as market failure and supply chain fragmentation. The project seeks to address environmental impacts, including reducing persistent organic pollutants (POPs) and GHG emissions. It adopts a holistic value-chain approach to promote cleaner production, resource efficiency, circular business models, sustainable consumption, and innovative materials.

As the first GEF-funded textile project in India, it focuses on the supply chain and lifecycle of textiles, aiming for Global Environmental Benefits (GEBs) derived through interventions at eight clusters (1 - Ahmedabad, 2 - Bhiwandi, 3 - Ichalakaranji, 4 - Kolkata, 5 - Ludhiana, 6 - Panipat, 7 - Surat, and 8 - Tiruppur) and four fashion houses (1 - Aditya Birla Fashion and Retail, 2 - Arvind Ltd, 3 - Tata Trent, and 4 - Vardhman). The project includes six components: (1) innovative design and business models, (2) use of innovative materials, (3) cleaner production, (4) sustainable consumption, (5) post-use 9Rs (reverse logistics), and (6) knowledge management and learning.

The project targets to support over 400 textile factories: cleaner production (320 factories); innovative materials (40 enterprises); and 9Rs practices (40 enterprises). It aims to (a) mitigate 147,000 tCO2e directly and 294,000 tCO2e indirectly, (b) reduce harmful chemicals by 10,530 tons directly and 21,060 tons indirectly, and (c) cut POP emissions by 12 g Toxic Equivalent (TEQ) and increase area of landscapes under improved management to benefit biodiversity by 2.128 million ha (by reducing 1277 tons of pesticide use). Benefiting the workforce, especially women, the project will directly impact 40,000 people (60% women) and indirectly benefit 80,000 people (60% women) over six years.

Project Components

C1: Design & Business Models - Designing innovative, regenerative products and utilizing circular business models

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
591,800.00	6,000,000.00

Outcome:

1.1: Designing innovative, regenerative products and utilizing circular business models

Output:

1.1.1: Regenerative design implementation with four fashion/ textile houses completed.

1.1.2 Ecosystem building for circular business carried out.

1.1.3 Systemic gender inequalities in workplaces reduced.

C2: Innovative Materials-Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
771,000.00	4,925,560.00

Outcome:

2.1: Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials

Output:

2.1.1: Enabling ecosystem through soft support and pilot/demos for innovative, nature-based materials promoted.
2.1.2. Innovative prototypes developed, piloted and scaled up.

3: Cleaner production -Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials

Component Type	Trust Fund
Investment	GET
GEF Project Financing ($)	Co-financing ($)
3,488,022.00	16,000,000.00

Outcome:

3.1. Shifting to production and manufacturing processes which require less water, energy and chemicals and produce less pollution and waste

Output:

3.1.1. Coherent policies on resource management (chemicals, energy, water) in fashion/ textile supply chains developed.
3.1.2. Investment criteria developed and sustainable lending promoted.
3.1.3. Implementation of sustainable chemicals & cleaner production demonstrated.
3.1.4 Capacity of women to participate in cleaner production improved.
3.1.5. IOT solutions to enhance cleaner production introduced and scaled up.

4: Sustainable consumption - Creating markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)

645,800.00	6,800,000.00

Outcome:

4.1. Creating markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity

Output:

4.1.1 Green public procurement policies for apparel fashion/textile houses/MSME promoted.

4.1.2. Sustainable fashion practices promoted by four fashion/Textile houses/brands

4.1.3. Advocacy on sustainable fashion undertaken.

4.1.4. Women-led behavior changes in sustainable and reduced consumption promoted.

5: Post use 9Rs - Implementing a reverse logistics process which moves products and materials back to the manufacturers to reuse or recycle

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
730,800.00	6,000,000.00

Outcome:

5.1. Implementing a reverse logistics process which moves products and materials back to the manufacturers to reuse or recycle

Output:

5.1.1. Post use collection promoted and implementation of 9R's enabled.

5.1.2. Emergence of women's leadership in new business opportunities in 9R's improved.

6: Project Knowledge Management and Learning

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
545,800.00	1,000,000.00

Outcome:

6.1. Knowledge products generation and management

Output:

6.1.1. India textile child project portal for knowledge management and exchange conceptualized, launched and managed.

6.1.2. Supply chain Integrated Programme (IP) knowledge is curated and applied.

6.1.3. Value chain actors are engaged through information dissemination and outreach and apply knowledge.

6.1.4. Opportunities for collaboration and exchange among governments and stakeholders to act through partnerships are facilitated and fostered.

M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
468,550.00	700,000.00

Outcome:

7. Monitoring and Evaluation system completed

Output:

7.1. Monitoring throughout the project cycle carried out.

7.2. Mid-term and terminal evaluation completed.

Component Balances

Project Components	GEF Project Financing ($)	Co-financing ($)
C1: Design & Business Models - Designing innovative, regenerative products and utilizing circular business models	591,800.00	6,000,000.00
C2: Innovative Materials-Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials	771,000.00	4,925,560.00
3: Cleaner production -Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials	3,488,022.00	16,000,000.00
4: Sustainable consumption - Creating markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity	645,800.00	6,800,000.00
5: Post use 9Rs - Implementing a reverse logistics process which moves products and materials back to the manufacturers to reuse or recycle	730,800.00	6,000,000.00
6: Project Knowledge Management and Learning	545,800.00	1,000,000.00

M&E	468,550.00	700,000.00
Subtotal	**7,241,772.00**	**41,425,560.00**
Project Management Cost	567,400.00	2,300,000.00
Total Project Cost ($)	**7,809,172.00**	**43,725,560.00**

Please provide Justification

Additional funds are required as the project will be implemented over a 6-year period. For M&E the budget is increased from 4.32% to 5.99% due to increased cost of M&E and also the GST (Goods and Services Tax) in India. For the PMC the budget is increased from 4.76% to 7.31%. This was found as an absolute necessity even to hire additional project staff (Project Manager and one Finance & Administrative Associate). Additionally, the increase in budget is also due to the longer duration of the project.

CHILD PROJECT OUTLINE

A. PROJECT RATIONALE

Describe the current situation: the global environmental problems and/or climate vulnerabilities that the project will address, the key elements of the system, and underlying drivers of environmental change in the project context, such as population growth, economic development, climate change, sociocultural and political factors, including conflicts, or technological changes. Since this is a child project under a program, please include an explanation of how the context fits within the specific program agenda. Describe the objective of the project, and the justification for it. (Approximately 3-5 pages) see guidance here

Global environmental problems and climate vulnerabilities associated with the textile sector in India

1. India is the second-largest global producer of textiles and garments and third-largest exporter of textiles and supplier to national and international markets for fashion and technical textiles (including performance clothing). The Indian textile and apparel industry contributes 2% to GDP and 12% to export earnings and directly employs about 45 million workers (of which 60%–70% women) and indirectly a further 60 million, making it the second largest employment and livelihood sector after agriculture. The UNEP report on Sustainability and Circularity in the textile value chain[1]1 cites evidence of systemic gender inequality across the industry. The Child project presents an opportunity to correct this.

2. There are about 1200 medium to large textile industries, which are far outnumbered by small- and micro- scale non-integrated spinning, weaving, knitting, fabric finishing, and apparel-making and –finishing enterprises[2]2. About 70 textile and garment clusters in five main regions (Andhra Pradesh, Gujarat, Haryana and Punjab, Maharashtra, and Tamil Nadu) account for 85% of production[3]3. India is also a leading global supplier to the textile industry with the manufacturing of textile fibers, chemicals, including dyestuffs, and machinery.

3. Hazardous chemicals are commercial chemical formulations used in a textile processing facility and applied to a substrate that contain ingredients with the following hazards:

a. Carcinogenic, mutagenic, reprotoxic
b. Endocrine disruption or equivalent concern
c. Persistent, Bioaccumulative, Toxic to aquatic life
d. Respiratory sensitisers
e. Specific Target Organ Toxic

Some hazardous ingredients that meet the above criteria and used in commercial textile chemical formulations are: PFAS, APEOs, Phthalates, Carcinogenic dyes, chloro-benzenes, chloro-toluenes, chlorophenols, chlorinated paraffins, allergenic disperse dyes, azo dyes with cleavable restricted amines, brominated flame retardants, halogenated solvents, VOCs, cyclic siloxanes.
For a better understanding of the above:
A washing-off auxiliary is a commercial chemical formulation used by a textile processing facility and may contain APEOs as the hazardous ingredient.
An oil & water repellant finishing chemical is a commercial chemical formulation and may contain PFAS as the hazardous ingredient.'

4. The textile and fashion industries are also chemical-intensive. UNEP found that over 8000 chemicals are used in the various textile manufacturing processes including chemicals controlled by the Stockholm Convention, with 750 substances hazardous to human health and 440 substances environmentally hazardous[4]4. The Swedish chemical agency identified at least 2400 chemicals in textiles and fashion, of which 10% were considered hazardous, including substances regulated under the Stockholm Convention on Persistent Organic Pollutants (POPs) (e.g., PFOS, PDBEs and chloroparaffins, used primarily for special characteristics as flame retardant, for water and oil repellency, etc.)[5]5. 40% of globally used colorants contain organically bound chlorine [6]6 and are suspect precursors for u-POP (dioxins, furans) as impurity[7]7 and/or through incineration of associated manufacturing and textile wastes.

5. Chemical use is estimated at 0.58 kg chemicals/kg of textiles[8]8 and textiles and garments accounts for an estimated 20% of global industrial effluent generation. With the estimated fiber production of 5.8 million ton annually (2019)[9]9, textile chemicals use in India is estimated about 3.4 million tons including bulk (salts, detergents, etc.) and specialty chemicals (e.g., water repellents, fire retardants, dyestuffs, etc.).

Transforming textiles into a Circular Economy can have a tremendous socio-economic impact. A Circular Textiles Economy would improve the resilience of textiles value and supply chains by connecting its production and disposal ends sustainably[10]10. For the project to be transformative, it is important that social impacts of the linear system are not replicated in a circular value chain. As per an ILO study[11]11, a sustainable transition is expected to create 18 million additional jobs by 2030. An OECD review study in 2020[12]12 backs these judicious assessments and estimates net employment gains in the range of 0%–2% by 2030, due to the transition to a Circular Textiles Economy. The outcomes of a circular economics-driven strategy with women

having a key role would endure for a long time. If women workforce is more skilled and healthier, then their output productivity would increase.

Key environmental problems

6. Table 4 summarizes the environmental problems along the textiles value chain in India, which will be addressed through the project.

Table 4: Global environmental problems along the textiles value chain in India

Topic	Description	Environmental problem	Opportunities
Textile generation and fragmentation of resource use along the textile value chain	Second largest producers and exporters of textiles globally, with production and distribution happening through many dispersed actors using varying processes.	● Generates different kinds of wastes and effluents, including hazardous ones at production, consumption and disposal stages and lacks efficient waste management. ● Some production processes require a significant quantity of water and also several kinds of chemicals, some of them hazardous. ● Processes are energy intensive, thereby emitting GHGs. ● Water-intensive cotton cultivation	Technologies and methodologies exist for optimizing resource use and reducing the environmental impacts significantly
Environmental and socio-economic impacts	Adverse impacts on land, water, air and on workers and communities	Air pollution, waste/effluent disposal including hazardous, high-water use, water scarcity, hazardous chemical use, contamination of groundwater, surface water bodies and soil of landfill sites, ensuing impacts on worker and community health	Large size of the Indian market and customer base can be a good platform to launch awareness campaigns for sustainable products, which will lead to increased acceptance of these products, consequently leading to reduction in environmental impacts.
Chemicals and waste	Chemical-intensive dyeing and finishing processes. While many dyes, textile auxiliaries/chemicals are manufactured and used, there are no data available on the production, distribution, and use of PFAS in India. Both textile waste and process	Number of ETP/CETPs installed can cater only to a limited number of textile industries and is not adequate to process the entire quantity of effluent generated; Available ETPs/CETPs cannot function optimally on all days of the year, due to which, water pollution still happens. Further, no safe	Opportunities exist for reduction of chemicals, water-use, and energy through cleaner production practices and optimal waste management.

	effluents contain residual chemicals.	disposal methodologies exist safe handling and disposal of certain wastes isolated from the effluent by ETPs/CETPs.	
Climate impacts	Open burning/incineration of textile waste (defective clothes at brands, post-consumer waste, MSW containing textile waste) exists.	There is a risk of POP emissions through such practices. Consumes huge quantities of natural resources, pollutes water bodies, and emits GHG.	Opportunities exist for segregation, recovery, and reuse.

7. Textile generation and fragmentation of resource use along the textile value chain in India, and opportunities. Textiles and apparel are a focal sector for growth and diversification in the Government's Made in India mission [13]13. The Government works towards a consolidated approach for greening of apparel fashion value chains. The Ministry of Textiles (MoT) established its sustainability unit supporting, primarily, awareness and understanding of sustainability, supported by action calls of the Union Minister for Textiles to the industry to propose its sustainability roadmap. In 2021, the government launched the Production Linked Incentive (PLI) scheme that provides financial incentives for increased production and diversification in manmade fibers and technical textiles for application in apparel and other fashion and other applications [14]14. In March 2023, the Government announced support to create brownfield Mega Integrated Textile Region Apparel (PM MITRA) Parks in seven states, with specific incentives to enhance competitiveness, innovation, synergies, and environmental performance and thereby expand and diversify garment production from 'fiber-to-fashion' [15]15. Industrial effluents from the textile and garment sector are targeted by different government initiatives, including the National Clean Ganga Mission and adoption of zero liquid discharge as a cross-sectoral industrial pollution control objective.

8. The Government of India is considering a new textile policy that will promote technical textiles and MMF under the Production Linked Incentive (PLI) scheme. The policy will focus on topics such as cotton, silk, wool, jute, man-made fiber, handicrafts, power loom, handloom, and technical textiles. The policy will also cover topics such as human resource development, machinery and technology upgradation, and infrastructure for spinning, weaving, and processing (https://pib.gov.in/Pressreleaseshare.aspx?PRID=1697401, accessed on 07/04/2024).

9. Over a period, the textile industry is facing some problems such as technological obsolesce, high input cost (power and capital), poor access to credit, fragmented units, and absence of fiber neutrality. To address these issues/problems in the Textiles and Apparel Sector, the government has implemented various schemes (https://pib.gov.in/PressReleasePage.aspx?PRID=1606094#:~:text=Government%20is%20formulating%20a%20New,processing%20and%20human%20resource%20development, accessed on 07/04/2024) under the New Textile Policy 2020: (i) Knitting and Knitwear Sector scheme: Government has launched a separate scheme for development of Knitting and Knitwear Sector to boost production in knitting and knitwear cluster at Ludhiana, Kolkata and Tiruppur; (ii) Government is implementing Amended Technology Up-gradation Fund Scheme (ATUFS) for technology up-gradation of the textile industry to incentivize production with an outlay of Rs 17,822 crore (2147 million USD @ 1 USD = 83 INR) during 2016-2022. It is expected to attract investment of Rs 1 lakh crore (12.1 Billion USD) and generate 35.62 lakh (over 3.5 million) employment in the textile sector by 2022; (iii) Government has launched a special package of Rs 6000 crore (723 million USD) in 2016 to boost investment, employment and exports in the garmenting and made-up sector with the

following components, namely, (a) full refund is provided under Remission of State Levies (ROSL) to the exporters for the State level taxes; (b) production linked additional incentive of 10% is provided under the Amended Technology Up-gradation Fund Scheme (ATUFS); (iv) National Handloom Development Programme, Comprehensive Handloom Cluster Development Scheme, Handloom Weaver Comprehensive Welfare Scheme and Yarn Supply Schemes; (v) National Handicrafts Development Programme (NHDP) and Comprehensive Handicraft Cluster Development Schemes; (vi) Power Tex India: A comprehensive scheme for Power loom sector; (vii) Silk Samagra – An integrated Scheme for development of silk; (viii) Jute ICARE for increasing the income of farmers through different interventions; (ix) North East Region Textile Promotion Scheme (NERTPS) for promoting textiles industry.

10. The Government is implementing the Scheme for Integrated Textile Park (SITP), which provides support for creation of world-class infrastructure facilities for setting up of textile units. Until date, 56 textile parks have been sanctioned under SITP, which are under various stages of implementation. For example, 14 textile parks in Gujarat, 1 in Haryana, 13 in Maharashtra, 3 in Punjab, 8 in Tamil Nadu, and 2 in West Bengal, which belong to the cluster states for this Child project. The Gujarat Textile Policy 2020, also known as the amended Gujarat Garment & Apparel Policy (https://www.ittaindia.org/gujarat-textile-policy-view, accessed on 07/04/2024), includes several incentives for textile businesses. These include: (i) 10% reimbursement of stamp duty on the purchase of a plot or shed in the textile park; (ii) 25% financial assistance for hostel or dormitory housing for at least 100 Gujarat residents, up to Rs 7.50 crore 0.90 USD). The Maharashtra State Textile Policy (MSP, Government Resolution No.: Policy 2017/C.R. 6/Tex-5) 2018-23) aims to reduce the gap between cotton production and processing and create jobs in the state through the processing of cotton, silk, wool, non-conventional yarn, and man-made fiber. The policy also aims to double farmers' incomes by 2023 and create over 10 lakh (1 million) jobs in the next five years. The policy also includes investor-friendly benefits, such as: Guidelines for capital grants scheme and self-financed projects instead of interest grants for textile industries, Concession on electricity tariff for textile industries. The Tamil Nadu State Government's New Integrated Textile Policy 2019 (https://www.indiafilings.com/learn/tamilnadu-new-integrated-textile-policy-2019/#:~:text=The%20Tamilnadu%20State%20Government%20has,Textile%20Industry%20through%20this%20policy. accessed on 07/04/2024) aims to promote technical textiles and maintain the growth of the textile value chain. The policy provides support to the southern districts to develop the textile industry and offers higher incentives or subsidies to different sectors in the textile industry. The policy includes the following provisions that are made for technical textiles: (i) 100% stamp duty exemption; (ii) 6% interest subsidy, in addition to incentives from the Central Government; (iii) 9% of the project cost as state grant under the Scheme for Integrated Textile Parks (SITPs); (iv) 2% interest subsidy for modernizing spinning machines that are over 15 years old; and financial assistance for small power loom units having up to 8 looms, for installation of solar photovoltaic plant. The GEF project compliments these schemes and programs of Central and State Governments.

11. Chemicals and waste:

a. Exporters and manufacturers are increasingly engaging with diverse voluntary sustainability standards that are contributing to minimization of use and elimination of hazardous chemicals in fashion. These include: (1) Zero Discharge of Hazardous Chemicals (ZDHC) (direct participation of six textile houses and eleven textile chemical companies) [16]16 and (2) Better Cotton Initiative (BCI) (which has introduced bio-pesticides and increased earnings in three cottons growing districts) [17]17. This child project chiefly focuses on elimination of the use of hazardous chemicals in the industrial part of the apparel fashion supply chain, to complement and build upon, rather than duplicate, the diversity of initiatives already under way on sustainable and/or organic cotton cultivation (e.g., BCI, GiZ and others). The Child project will promote the use of more sustainable cotton and/or alternative fibers (including bamboo, jute, banana, or pineapple based), which would increase the market demand for such sustainable fibers and have a secondary impact in terms of reducing environmental impacts of cotton farming (particularly the use of hazardous pesticides and its impacts on land degradation and biodiversity).

b. Stockholm Convention-India's National Implementation Plan-The Ministry of Environment, Forest and Climate Change (MoEF & CC), The Government of India, with financial and technical support from the Global Environment Facility (GEF), initiated the National Implementation Plan (NIP) development process which involved the ground-level assessment of situation of POPs through inventorization, samples collection, analysis and interpretations (Government of India,2011). India has signed the Stockholm Convention in 14th May 2002 and ratified it in 2006 and subsequently submitted its NIP to phase out the twelve POPs which are well known as the "Dirty Dozen" in 2011. In the NIP, the government developed its strategy to deal with these chemicals and subsequently some regulations were promulgated by the MoEF & CC to act on these chemicals. Further, MoEF & CC has come out with a new notification in 2018 to phase out seven new POPs in the country MoEFF & CC had notified the 'Regulation of Persistent Organic Pollutants Rules, on March 5, 2018 under the provisions of Environment (Protection) Act, 1986 (https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvNjU4XzE1MjU2Nzk4NTJfbWVkaWFwaG90bzMwMDE5LnBkZg== , accessed on 16/04/2024). The regulation inter alia prohibited the manufacture, trade, use, import and export of seven chemicals namely

i. Chlordecone,
ii. Hexabromobiphenyl,
iii. Hexabromodiphenyl ether and Heptabromodiphenylether (Commercial octa-BDE),
iv. Tetrabromodiphenyl ether and Pentabromodiphenyl ether (Commercial penta-BDE),
v. Pentachlorobenzene,
vi. Hexabromocyclododecane, and
vii. Hexachlorobutadiene,

which were already listed as POPs under Stockholm Convention. The MoEF&CC has developed the National Implementation Plan to manage these POPs and some of the key central government agencies who are executing the National Implementation Plan are, the Central Pollution Control Board, Central Power Research Institute, National Environmental Engineering Research Institute (NEERI, Nagpur) and National Institute for Interdisciplinary Science and Technology (NIST), Trivandrum. NEERI has been acting regional center for Stockholm Convention for Southeast Asian countries. Further, along with the Central Pollution Board, the State Pollution Control Boards have been bestowed with the responsibilities for monitoring the emission levels and enforcement of the regulations on POPs at various levels. Nevertheless, the MOEFCC designated research institutions and other researchers have been monitoring and reporting occurrence of PFAS and other POPs chemicals in several different environmental matrices. However, these POPs chemicals can be from sources other than textile finishing applications also.

12. The vast majority of textile and garment fashion industry units have not yet taken consolidated actions to phase out hazardous chemicals and transition to sustainable circular fashion free of hazardous chemicals. The Child project will address the issue by (a) strengthening the policy and implementation partnerships, (b) providing technical assistance and (c) mobilizing market forces and financing.

13. Typically, many textile manufacturing units particularly those in the MSME sector, tend to not adhere adequately enough to applicable ESHS norms, guidelines and/or regulations on safety aspects. This is manifested by observable state-of-affairs in many factories, such as poor industrial housekeeping, disorganized and unclean shop floor layouts, inadequate drainage or waste-collection/disposal facilities/systems, absence of safety features like fire alarms, firefighting equipment, excess pressure alarms in boilers, chlorine leak alarms, chlorine leak safety apparatus, barricades protecting areas posing danger, rubber mats below electrical panels, prominent safety signages, mandating workers to use appropriate PPE, and functional emergency response arrangements. Further, there may be sub-optimal waste handling facilities (solid and liquid, including hazardous), absence of appropriate pollution control equipment in stacks, or inadequate HR policies/practices based on aspects such as non-discrimination and wage parity etc. Worker facilities and amenities (such as toilets for men and women, rest/recreation areas for workers, appropriate PPE during work, etc.) tend to be sub-optimal as well. Lastly, there could be lack of responsive mechanisms for effectively addressing worker issues such as grievance redressal, sexual harassment, accident/incident reporting, and documentation. Plausible reasons for this could be due to limited investment capacity, inadequate awareness on worker safety, resistance on the part of workers themselves to observe safety rules, lax monitoring by statutory regulatory bodies, etc.

14. Climate change: Climate change is the result of increased GHG emissions, subsequent global warming, and the response of the climate system to this warming. The textile industry is one of the most polluting industries in the world. The industry is responsible for 1.2 billion tons of GHG emissions annually, which is more than all annual international flights and maritime shipping combined. The fashion industry is estimated to be responsible for 10% of global carbon emissions, and the UNFCCC estimates that the sector's emissions will rise by more than 60% by 2030 if transformation towards a sustainable fashion industry fails to materialize soon. The high carbon footprint may be attributed to textile industries' complex supply chain vis-à-vis transportation of fabrics and garments from production points, and energy-intensive production processes (An overview of the contribution of the textiles sector to climate change. Available from: https://www.researchgate.net/publication/363270376_An_overview_of_the_contribution_of_the_textiles_sector_to_climate_change [accessed Apr 24, 2024]. Further, logistical requirements of transporting goods domestically/globally at the various stages of production and distribution contribute to textiles' carbon footprint, alongside energy deployed in garment care such as washing, drying, pressing, and dry-cleaning. Finally, the deterioration/burning of textile waste in landfill and/or incineration causes hazardous chemicals and GHG emissions to be released into the environment. Municipal solid waste (MSW) in India is said to contain discarded garments/clothes to the tune of 5%, often the dumps catch fire and contribute to GHG emissions as well as toxic and harmful chemicals (POPs). On the other hand, climate change is also impacting industries' economic performance as resources are becoming scarce, e.g., water shortage in several clusters is forcing the industry to consider alternatives such as use of treated sewage and recycling treated effluents as a substitute to process water demand.

Project-specific baseline information and cluster selection

(i) Textile units in India are spread across India, however, over 70 clusters can be identified with intense textile activities. During the PPG phase, baseline information was gathered from secondary sources and analysis (including literature review) from primary survey and analysis (approximately 400 factories) and from indicative measurements such as energy audits, and chemicals and waste use. Based on the extensive consultation process, including bi-monthly Technical Working Group (TWG) meetings with relevant stakeholders, 16 key clusters were identified representing the value chains of the textile sector (Table 5). A set of criteria were applied to select the clusters. They are (a) Is it a target state at concept – Andhra Pradesh, Gujarat, Haryana, Maharashtra, Punjab and Tamil Nadu, (b) Is it a PM MITRA state Uttar Pradesh, Tamil Nadu, Telangana, Karnataka, Maharashtra, Madhya Pradesh, Gujarat; (c) Hazardous chemicals; (d) Technical textiles; (e) Interest of cluster in adopting sustainability and circular economy aspects; (f) Quantity of production from the cluster; (g) Other considerations (complete textile value chain, CTVC* - 3) Non-CTVC (0) and (h) Government priority areas (Kolkata was identified to represent east). All these were presented and approved by Technical Working Group[18][18]. Consideration was given to (a) textile chemicals and fibre manufacturing clusters, (b) Sustainable chemicals and cleaner production in MSME textile processing clusters, and (c) garment making and finishing.

(ii) A national survey jointly conducted by the Department of Science and Technology (DST) of the Ministry of Science and Technology of India and the United Nations Industrial Development Organization (UNIDO), viz., National Manufacturing Innovation Survey (NMIS) 2021-2022 report. This report comprehensively assessed the state of manufacturing innovation in India towards the achievement of the 2030 Agenda for Sustainable Development, especially Goal 9, and beyond (Indian Textiles & Apparel Sectorial System of Innovation (ITASSI) - Measurement, Analysis And Policy Recommendations, UNIDO-DST Survey Report, March 2023 Vienna, Austria) https://dst.gov.in/sites/default/files/Indian%20Textiles%20Sectorial%20System%20of%20Innovation%20%28ITSSI%29%20Report_0.pdf; https://hub.unido.org/sites/default/files/publications/Textiles%20SSI%20Report.pdf

(iii) A Project was sanctioned by the Ministry of Textiles, Govt. of India, under the Research and Development Scheme to develop Indian size charts based on body measurements of Indian

population for better fitting of ready to wear garments. The project 'INDIAsize' plans to measure 25,000 (Twenty five Thousand) persons aged from 18 to 65 years in six different regions of India using 3D body scanners. It is expected that the retail garment industry will be hugely benefitted from the outcome of the project. https://www.nift.ac.in/niftprojects

(iv) VISIONXT- TREND INSIGHT AND FORECASTING LAB is set up at NIFT under MoT, GOI. This is the first-ever Artificial Intelligence (AI) and Emotional Intelligence (EI) enabled Fashion trend analysis and forecasting initiative with a unique indigenous Deep Learning AI model and Indian Taxonomy of 50+ Indian products. https://www.nift.ac.in/niftprojects

(v) The Repository – Textiles & Crafts project sanctioned by the Ministry of Textiles, Government of India, aimed to develop one-of-a-kind national knowledge portal in the form of an integrated system that will lay down a framework to weave the past and present status of textile, clothing and related crafts with focus on futuristic developments. It was launched on the National Handloom Day 2023, i.e., 07th August, 2023, by the Hon'ble Prime Minister, Shri Narendra Modi. The digital portal will also provide access to vast database including research papers, case studies, dissertations and doctoral theses on textiles, clothing and craft related areas. It will serve as a one stop resource, providing information on new developments and current events relating to textiles and crafts. https://www.vastrashilpakosh.in/

(vi) A Project to prepare roadmap for the integrated and holistic development of Bhagalpur Mega Handloom Cluster was sanctioned by DC (Handlooms), Ministry of Textiles. NIFT Patna has been engaged as Cluster Management and Technical Agency (CMTA) to assist in identification and execution of the project. The deliverables for the Project are conducting diagnostic survey, providing guidelines to prepare RFP for CFC, Dye House, Design Studio and Product Development Centre, Design Research and Market Linkage, and monitoring of Project implementation. https://www.nift.ac.in/node/269

(vii) National Institute of Fashion Technology, Chennai has taken up e-content / MOOC ('Massive Open Online Courses') development of fashion & technology subjects under the 'National Mission on Education through Information & Communication Technology' (NMEICT), MHRD, Govt. of India. https://www.nift.ac.in/node/272

(viii) This Baseline Study 2020 entitled 'Technical Textile Industry in India: Opportunities and Challenges' has been carried out by IIT Delhi on behalf of Ministry of Textiles, Government of India. The report of the study encapsulates various aspects of technical textile industry in India. An attempt has been made to capture all the important elements of the technical textile ecosystem and suggest measures to put this industry on an accelerated growth trajectory that is aligned with the goals of NTTM of Government of India. https://texmin.nic.in/sites/default/files/Baseline_Survey_Technical_Textiles_Sector_20042022.pdf

(ix) Several research projects are undertaken by premier research institutes Under National Technical Textiles Mission (NTTM) https://texmin.nic.in/sites/default/files/Research_Projects_Undertaken_by_Premier_Research_Institutes_Under_NTTM_1.pdf

(x) NITRA has undertaken a project on 'New Approaches to Reduce Water Consumption in Textile Wet Processing' (Sponsored by Ministry of Textiles, Govt. of India). https://www.nitratextile.org/pdf/R&D%20projects%202020-21.pdf

(xi) The Ministry of Textiles recently proposed to select Consulting Agency for conducting a study on 'Mapping of Textile Waste Value Chain (pre & post-consumer) in India' and to help map the textile waste value chain and develop solutions for waste valorization towards contemplating policy measures to address the issue of textile waste in the country. https://www.texmin.nic.in/sites/default/files/RFP_Mapping%20of%20Textile%20Waste%20Value%20Chain%20in%20India.pdf

(xii) Bombay Textile Research Association & other TRAs - BTRA undertook several R&D projects, developed technologies for the textile sectors in India. The focus areas are; test method for Cr(VI) content in dyes/pigments/textile auxiliaries; nanofibers based geotextiles, cotton waste based oil absorbent for oil spill cleanup, automation for select textile machinery, eco-management of textile wet processing for water and chemicals savings, plasma treatment, testing of and low formaldehyde based finishing chemicals, Fire retardant finishing of apparels and home textiles etc. https://www.btraindia.com/

(xiii) Regenerative Production Landscape (RPL) Collaborative has been initiated jointly by Laudes Foundation, IDH-The Sustainable Trade Initiative, WWF India, is an innovative jurisdictional model being implemented in Madhya Pradesh, India to foster agricultural ecosystems that conserve and enhance natural resources and build community resilience whilst enabling businesses to source responsibly. https://www.laudesfoundation.org/latest/news/2022/compact-landscape

Table 5. Name of the selected cluster, and state

Sl No.	Name of Cluster	State
1	Ahmedabad	Gujarat
2	Bhiwandi	Maharashtra
3	Ichalkaranji	Maharashtra
4	Kolkata	West Bengal
5	Ludhiana	Punjab
6	Panipat	Haryana
7	Surat	Gujarat
8	Tiruppur	Tamil Nadu

https://www.laudesfoundation.org/latest/news/2022/compact-landscape

15. In addition, fashion houses were reviewed such as Aditya Birla Fashion and Retail, Bombay Dyeing, Aravind, Vardhman, Grasim (Aditya Birla Group), Siyaram, Raymond, JCT, Shahi, Mufti, and Tata Trent. Based on a careful analysis during the PPG phase and recommendations of the TWG, the following four fashion houses were chosen for project interventions.

a. Aditya Birla Fashion and Retail (Maharashtra)

b. Arvind Fashion Ltd (Maharashtra)
c. Tata Trent (Maharashtra)
d. Vardhman (Madhya Pradesh)

Ahmedabad (Gujarat)

16. Vatva Industrial Estate (VIE) is one of the oldest and pioneering industrial setups in the state of Gujarat. It started its operation in 1960, and is spread over 572 hectares of land housing approximately 2100 small, medium, and large industrial units. Dye and dye intermediates are the major units in the estate with 356 units; 90 units are manufacturing chemicals and 12 industries are involved in textile production, while the remaining industries are involved in plastics and rubbers, engineering, pharmaceuticals, foundry, metal treatment, paint and varnish, steel, and furnace production. In all, there are 110 wet processing units in this cluster. It is obvious that dye, dye intermediates, and textile units are the major source of pollution in the estate.

Bhiwandi (Maharashtra)

17. Bhiwandi is 30 km away from the municipal limits of Mumbai. Commencement of textile processing activities at Bhiwandi could be traced back to the 1970s. Textile activities are household activities, scattered around Bhiwandi and Saravali industrial areas. Bhiwandi is known for its bustling power loom fabric manufacturing activities. At Bhiwandi, fabric manufacturing is carried out on power looms, and it supplies low-cost fabrics. Hand and power processing co-exist in Bhiwandi. One peculiar feature of the Bhiwandi processing cluster is that even blended shirting fabric is processed by hand processing units. Low power tariff, cheap labour, entrepreneurial talent, proximity to Mumbai (a benefit for Mumbai traders to carry out trade activities at Mumbai with goods being physically available at Bhiwandi, thus saving octroi, toll tax, sales tax and other such taxes, which are either lower at Bhiwandi or are not there at all), etc. Some of the textile houses do not have ETP or CETP in Bhiwandi cluster. The electricity tariffs in Maharashtra are one of the highest in the country, which is a concern for industry competitiveness.

Ichalkaranji (Maharashtra)

18. Ichalkaranji is known as the ‘Manchester of Maharashtra.’ The city houses several small- and medium-scale textile units, majority of them are export-oriented units. The power looms established here have given rise to other supportive industries such as yarn manufacturing, sizing, processing and garment manufacturing. Gradually, there has been a shift from traditional hand looms to power auto looms and now shuttle less looms. The city has four co-operative textile industry estates, and these have played an important role in providing infrastructure facilities such as land, water, transportation, and communication. The city has also been selected for funding under an integrated industrial upgradation scheme funded by the GoI and GoM. The objective of the scheme is to develop the textile cluster and upgrade technology to make the city globally competitive. The scheme would benefit the whole textile industry of Ichalkaranji. Ichalkaranji Textile Development Cluster Ltd (ITDC), which has 62 processing units and 122 sizing units, are involved in textile activities such as bleaching, dyeing, printing, and finishing of cotton synthetic and blended fabrics. Many textile industries have their own effluent treatment plants; however, some are not effective, resulting in release of poorly treated waste water into water bodies such as Panchganga river causing pollution.

Kolkata (West Bengal)

19. Kolkata cluster is well known for spinning, weaving, knitting, processing (dyeing, bleaching, and printing) and garment manufacturing, hosiery, home textiles and jute/mixed products. Availability of skilled workforce is the biggest strength of this cluster. As per WB textile Policy, TexPro Bengal project was initiated under which 9 textile parks are being set up in and around Kolkata under 4 major categories: apparel and garments; dyeing and processing; power loom; workwear and technical textiles. Regent Garment Park at Barasat (120 acres, 300 units manufacturing); Eastern India Garment Manufacturers and Export Federation (EIGMEF) Garment Park at Salt Lake (plug-and-play facility); West Bengal Hosiery Park at Jagdishpur, Howrah (160 units booked space). Metiabruz Garment Cluster in Kolkata (adopted by MSME and AEPC – Apparel Exporters Promotion Council) is the largest Ready-Made Garments (RMG) cluster in India, with 500,000 employees. Annual turnover of this sector is around Rs. 15,000 Cr.

Ludhiana (Punjab)

20. Ludhiana is a known cluster for acrylics and woolen knitwear, though it is now producing all types of products from natural and manmade fibers. Major natural fibers used are cotton, wool, and silk. Manmade fibers used are polyester, acrylic, nylon, viscose, and polypropylene.
21. The cluster has 35 fiber dyeing units, 128 package yarn dyeing units, 70 Hank yarn dyeing units, 370 knit fabric dyeing units, 70 woven fabric dyeing units, 20 made-up units, 150 printing units (knits), 30 printing units (woven), 170 finishing units (50 units are using compactors, 30 units stenters, 10 units zero shrinking machines, 30 units raising, and 50 units bulking).
22. Approximately 13,500 tons of knitted fabric and 300 lakh metres of woven fabric is printed annually. The cluster also houses about 10,000 hosiery/knit garment units, 60 woolen/worsted spinning units, 1 composite woolen unit, 20 cotton spinning units, 5 textile machinery manufacturing units, 15,000 power looms in decentralized sector, and 150 shuttle less looms.

Panipat (Haryana)

23. The Textile Cluster of Panipat is concentrated in and around Panipat City and its suburban villages. Many of the textile recycling units in Panipat are small and medium enterprises, engaged in this process for more than 50 years, and now moving on to the second and third generation of factory owners. Panipat has been a textile and recycling hub. A variety of recycling takes place—with textile waste, both domestic pre-consumer and post-consumer, as well as imported. The industry comprises seven segments, namely, handloom, woolen carpets, shoddy yarn spinning, power-loom industry, dyeing, wet processing, and hosiery woolen yarn industry. The export from all these units is estimated at Rs 11,700 crore. Panipat is the largest manufacturer of shoddy yarn in the world. Shoddy yarn represents yarn made from shredding existing fabric and re-spinning the resulting fibers. Shoddy yarn is primarily used to weave blankets which are used in the Indian Military or during disaster relief operations in the country. The Samalkha division (town) of Panipat is primarily consuming the shoddy yarn raw material to manufacture these blankets on both handlooms and plain power looms. Handloom made-ups and hand-block printing, power loom, woolen and cotton wet processing home textiles are the products produced in factories in this cluster.

24. The concentration of industries, particularly textile and fabric processing units, contributes to air pollution. Solid waste from the industries and the untreated effluents are polluting the water bodies. All of these are causing environmental threats for Panipat and its surroundings.

Surat Cluster (Gujarat)

25. Surat is known as the textile city of Gujarat. Textile industry is one of the oldest and the most widespread industries in Surat. The industrial area in Surat is mainly occupied by textile industries. Main Industrial areas are Sachin, Pandesara, Katodana, Palsana, and Udhana. Surat's workforce comprises primarily migrant workers and they are abundant at present.
26. Surat cluster processes polyester (>90%). It has a total of 720,000 looms. Total fabric production is 13,000 million metres and daily synthetic grey fabric production capacity is 25 million metres. They receive the grey fabrics from the traders/merchant manufacturers of the market and process the fabrics as per their requirement. There are about 150 wholesale markets in Surat. The city of Surat is now known as 'Silk City'. There are about 600 factories in operation in the Surat cluster (200 textile processing units in Sachin, 200 in Pandesara, app. 100 units in Katodana, and about 100 units spread across Palsana and Udhana). These factories have been in existence for 15 to 20 years. The factories are largely mechanized. Some factories are integrated houses starting from yarn to fabric to dyeing/printing, and finishing, but majority of the units are into dyeing/printing of gray fabric – cotton, viscose, synthetic. The dyeing and printing units are engaged in processing of manmade fabrics, i.e., Dyeing, Bleaching, Printing, Finishing of gray fabrics. Mostly these units are processing the gray fabrics on a job work basis.
27. The textile industries in Surat are associated with production of yarn as well as processing of fabric, Jari works and embroidery works. The major raw material (gray cloth) is being procured from local manufacturers/traders. Majority of the units purchase gray fabric; on an average the roll is 100 metres and the average processing time is 2 to 5 hours per batch. Energy cost is approximately 12% to 15% of the total production cost.

28. The power loom sector gives employment to about 600,000 people. Similarly, the processing industry gives employment to about 500,000 people. Besides, many people are engaged in trade, transport, cutting, packing and ancillary industries such as dyes, color, chemicals, and textile engineering. Of the total production of cloth in India, synthetic fabrics account for about 90%. Surat also has a major petrochemical industrial area at Hajira, which is facilitating production of yarn from petroleum, which is the basic raw material for polyester-based textile industry.

29. The synthetic textile waste generated known as 'chindi' is incinerated or used in boilers, which also causes air pollution. The textile waste accounts for approximately 7% of the total waste generated in the city. International brands carrying out textile business in the cluster are also exerting pressure to comply with better environmental practices and consequently, the factories are looking for knowledge support and Technical Assistance to make the required change.

Tiruppur (Tamil Nadu)

30. Tiruppur, in Coimbatore District in the state of Tamil Nadu, is well known for its cotton knitwear production. Tiruppur is known as the 'Knitwear' capital of India. It houses about 9000 knitting, 748 dyeing, bleaching, and processing industries that generate over 90,000 m3/day of wastewater. Twenty central effluent treatment plants (CETPs) are in operation treating wastewater from 502 industries (mostly dyeing units), while other industries are having local treatment plants. Tamil Nadu follows the concept of 'Zero Liquid Discharge' (ZLD) for textile wastewater treatment. The CETPs that are in operation in this cluster have a total handling capacity exceeding 120 million litres per day; about 85 industries have their own independent ETP and recycling system. The CETPs in Tiruppur process the textile effluent in three stages: (1) Pre-treatment, to prepare the raw effluent for recycling process; (2) First stage of membrane-based recycling and (3) Reject management from the recycling plants. Tiruppur is emerging as a hub for recycling pre-consumer textile waste.

31. Handmade carpet-producing pockets exist in Malda, Uttar Dinajpur, and Medinipur (East) with about 1500 carpet weavers, and 3000 ancillary workers. The current annual production of 1 million sq.ft. of carpets (expected to increase to 3.6 million sq.ft). The home furnishings sector (rugs, mats, etc.) uses the natural color cotton (pink cotton, due to the plant's inherent non-modified genetic properties). No synthetic dyes are added to the cotton which means no industrial pollution.

32. Production of cotton yarn has increased by 5.6% in year-over-year data, while the production of cotton cloth has increased by 8.7%. More than 300,000 handlooms are currently operating in the West Bengal textile industry right now. Those handlooms provide direct employment for over 660,000 people. There are over 10,000 power looms in West Bengal that provide employment for another 221,000 people. More than 120 million square metres of cloth was produced on the power looms alone. More than 176 million kg of hosiery cloth was produced by the West Bengal textile industry. Power looms with other textile-related units such as spinning mills, sizing and wrapping, wet processing (dying), garmenting, and calendaring, etc. are present at Ashoknagar and Banipur, Habra in the district of North 24 Parganas, West Bengal.

33. The Indian textile industry has a total of 83 composite Jute mills that are in operation. 64 of those mills are located within West Bengal. A large majority of the mills in West Bengal are congregated around Kolkata. Branded products that are manufactured and marketed represent about one-third of the total textile companies that currently operate in and around Kolkata.

34. Table 6 provides the total number of textile processing units, type of textile products produced for different clusters.

Table 6. Number of industries, products produced in 8 clusters

S. No	Cluster Name	State	No. of Industries	Products Produced
1	Ahmedabad[1]	Gujarat	4396	Spinning, weaving

2	Bhiwandi[2]	Maharashtra	24,500 units 20 yarn dyeing units 40 fabric processing units 100 sizing units 250 RMG	Grey, printed fabric, dyed fabric, cotton fabric to various mix of cotton, synthetic, and other fibers
3	Ichalkaranji	Maharashtra	Power loom: 1,80,000 Semi-auto looms: 20,000 Shuttle lit loom: 1000 Sizing: 175 Processors: 30 Spinning: 12	Cotton, dyed, dabbling, merc, and blended yarn
4	Kolkata[3]	West Bengal	3000	Hosiery, readymade garments including shirts, cotton knitted fabrics, Kantha stitch, and embroidery
5	Ludhiana[4]	Punjab	14000	Spinning, knitting, woolen
6	Panipat[5]	Haryana	10,000	Home furnishing Floor covering Dyeing and printing Yarn processing/looms
7	Surat[6]	Gujarat	50,000	Dyeing and printing
8	Tiruppur	Tamil Nadu	20,000	Dyeing, compacting, knitting, computer embroidery, bleaching, and stitching and finishing

Baseline technical survey findings

35. This section summarizes the key resources used in textile units in eight clusters. In all, 400 industries were visited. 223 industries provided data. 124 industries carried out wet processing units, and data pertaining to chemicals, water and energy use were collected. Whereas, in the remaining 99 industries, only energy use data was gathered. These industries carried out garment making, stitching and knitting processes.

36. The information gathered through questionnaire surveys for hazardous chemical use, water use, waste generated, energy use, environmental pollution and gender are analyzed and presented here (a baseline report annexed provides a detailed account of data, findings, analysis, conclusions, and recommendations).

37. Table 8 presents the extent of resource consumption in all the clusters based on the field survey of 124 industries. The average (per industry) fabric production, dyes, chemicals, coal, firewood, diesel, electricity and water are, 6,328 tons/year, 191 tons/year, 1,676 tons/year, 25,826 tons/year, 28,925 tons/year, 7 KL/year, 12,355 MWh/year, and 1,083,527 KL/year, respectively. The amount of pre-consumer fabric waste generation per factor per year is 2.218 tons.

38. Detailed studies and interactions were carried out to understand and assess wet processing and dyeing operations in all the eight different clusters covering 124 industries. All the eight clusters are situated in different parts of India and process a wide range of fabrics catering to the needs of the export market and domestic market.

39. Out of eight clusters, three clusters, namely, Tiruppur, Kolkata and Ludhiana, process knitted fabrics made from cotton, cotton blends and polyester fibers. Ichalkaranji, Bhiwandi and Ahmedabad clusters process woven fabric made of cotton, blends, spun polyester, viscose, Modal, and 100% polyester fibers with and without Lycra. Surat clusters mostly process lightweight polyester woven fabric for domestic and export markets. In all the above clusters, the majority of products processed is fabric and about 1%–2% yarn. Industries are using soft flow dyeing, a few airflow machines, a few cold pad batch machines and jiggers. Jiggers are

mainly used in woven fabric processing. Knitting sector uses only soft flow and airflow, cold-pad batch dyeing (CPB) techniques. Surat cluster processes 100% polyester fabrics, which do not have much pre-treatments for fabrics similar to cotton. This cluster consumes less chemicals and maximum thermal energy (135oC) because of higher dyeing temperature. In contrast, the average dyeing temperature of cotton fabrics is between 65–75oC.

40. Panipat cluster is unique in their activities. The units in this cluster use pre- and post-consumer waste as raw materials to manufacture yarn and fabric. Post-consumer waste, i.e., used garments are opened to manufacture coarser yarn required for handloom, power loom and knitting to manufacture home furnishing cloth. Majority of the processing industry in Panipat do yarn dyeing and the same is being used for weaving and knitting activities to manufacture home furnishing cloth.

41. The processing data collected from eight different clusters clearly indicate that yarn dyeing (Panipat) consumes more chemicals compared to fabric processing. In yarn dyeing, cabinet dyeing machines are used to dye yarns. Cabinet dyeing requires 12 liters of water per kg of yarn and whereas in soft dyeing for fabric dyeing, water consumption is max 5.5 liters per kg of fabric. All chemicals and auxiliaries addition in textile processing depends on the quantity of water taken for dyeing. As the water quantity increases, chemical and thermal energy requirements also increase.

42. The average dyes and chemical consumption was 0.319 kg per kg of fabric processed and the average water consumption was 166 liters per kg of fabric across the eight clusters.

43. Average fabric hard waste (pre consumer) produced in a dyeing unit was 2,218 kg per year.

44. Hazardous chemical use: Textile wet treatment processes such as sizing, de-sizing, scouring, bleaching, and cleaning, mercerizing, dyeing, printing, and finishing require use of various chemicals to obtain high quality finished product. A survey was carried out in 124 industries across all eight textile clusters. The chemical use is found to depend on the type of fiber/fabric used. For example, lowest chemical consumption happens in the Surat cluster where polyester processing is >90%, with the specific chemical consumption being about 0.152 kg/kg PE fabric. On the other hand, in the Panipat cluster where cotton yarn dyeing occurs, the specific chemical consumption is found to be the highest, 0.492 kg/kg fabric. The average chemical consumption from across all the eight textile clusters is 0.319 kg/kg fabric. This is 44% less than the global average (0.58 kg/kg fabric) of the chemicals used (Allen McArthur).Primary data from field survey of 124 industries for baseline development of fabric production, consumption of chemicals and water, pre-consumer fabric waste and potential for POPs emissions is given in Table 8. The wet processing capacity (fabric production) in the surveyed 124 industries was about 784,649 tonnes per year. The specific chemicals consumption varied in the range 0.152 to 0.492 kg/kg fabric probably due to the different operational practices in these clusters. However, the average specific chemicals consumption was 0.319 kg/kg fabric is found across all the surveyed clusters. This is contributed by dyes (9,4%), salts (48,6%) and other chemicals used in wet processing (42%). The contributions may be generalized to represent all the textile clusters, that dyes (10 ± 2%), salts (50 ± 2%) and other chemicals (41 ± 2%). The quantity 0.319 kg chemicals per kg of fabric in all the 124 surveyed factories, and it is less than the global average of chemicals-use which is 0.58 kg/kg fabric (Ellen Mc Arthur, 2017). This figure was proposed by Bluesign® in 2011 (EHS guidelines for Brands and Retailers, 2011) based on data from previous years.

45. Fabric production capacity and chemicals (dyes and auxiliaries) consumption of 124 surveyed industries was analysed using Linear Regression method (Figure 1). It is observed that among 124 factories, about 15 units process fabric with capacity greater than 10000 and up to 42,000 tons/year. The remaining industries (#109) perform with capacity less than 10000 tons annually, and many of them having capacity about or less than 5000 tons/year. The corresponding linear regression equation is $y = 0.3074x + c$, with regression coefficient (R) greater than 0.97. The specific chemicals consumption derived from the slope of the graph, is found to be 0.3074 kg/kg fabric, while the intercept (c =0) represents that no chemicals are required when fabric production is nil. The equation allows one to calculate chemicals consumption with >97% accuracy when an industry's fabric production capacity is known.

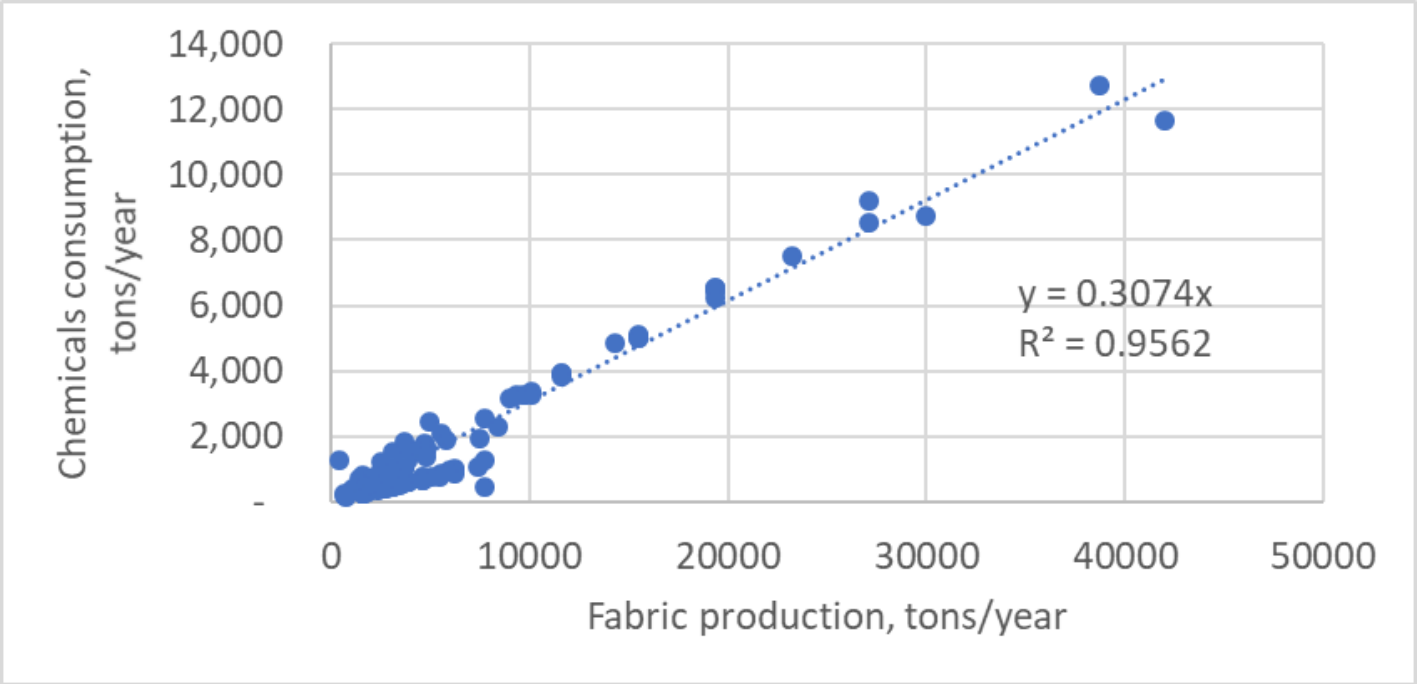

Figure 1: Graph showing linear regression between fabric production and chemicals consumption using the data from 124 surveyed industries among all the 8 textile clusters.

46. In the present survey, the average specific water consumption was found to be 166 kg/kg fabric. During the last decade the Indian textile industry undertook several voluntary measures to conserve water which was reflected in the practice of dyeing of fabrics under low material to liquor ratios (M: L) below 1:6. This also implies reduced use of chemicals. Further, nano-filtration membrane technologies for salt/dye recovery, zero liquid discharge (ZLD) and brine recovery practices in some clusters also resulted in recovery and reuse of salts/chemicals/water. These initiatives may have contributed to the lower chemicals use in the surveyed clusters. A total of 275 ton per year pre-consumer fabric waste is generated in the surveyed industries in all the clusters. This exerts a POPs emission potential of 0.0825 g TEQ/year, as in some clusters this waste is used as fuel for boiler furnaces.

47. Efforts were made to understand how many industries there in each cluster are similar in scale of operation and type of processing to that of surveyed industries in different clusters through stakeholders' consultation and discussions with the industry associations. The information gathered here was used to project the number of similar industries.

48. The project aims to make cleaner production interventions in 320 industries. Hence, a baseline was projected for 320 industries derived from the 124 surveyed industries. The number of industries vary from cluster to cluster. The ratio of number of industries in a cluster to the total number of units in all 8 clusters was used to derive number of industries to be selected in a cluster for proposed project interventions. For example, the number of industries in Ahmedabad cluster is 42, the total number of factories in all 8 clusters is 689 and the total number of industries for proposed project interventions is 320. Thus, the number of industries to be chosen for project interventions in Ahmedabad cluster will be 42*320/689 = 19.51 rounded off to 20. Accordingly, the number of factories to be chosen in different clusters vary from a minimum of 10 factories each in Bhiwandi and Kolkata to 107 in Tiruppur. The number of surveyed industries, estimated number of similar additional industries and total number of (surveyed plus additional) industries and number of industries proposed for project interventions are presented in Table 7.

Table 7. Number of surveyed industries, estimated number of similar additional industries and (surveyed plus additional industries) and number of industries proposed for project interventions - (SEE APPENDIX 1)

49. The data projected for 689 industries (124 surveyed and 565 similar additional industries) and the calculations are presented in Table 10. The wet processing capacity (fabric production) was about 3,311,221

tonnes per year. The corresponding dyes and chemicals consumption is about 947,585 tonnes per year. The quantity of hazardous chemicals covered in this population is 9,472 tonnes per year. A total of 1,547 ton per year pre-consumer fabric waste is generated. This exerts a POPs emission estimate of 0.46 g TEQ/year. The average of surveyed data from 124 factories in respective clusters was used to estimate the quantities for 689 factories.

50. The data projected for 320 factories (based on surveyed 124 factories) and the calculations are presented in Table 11. The wet processing capacity (fabric production) is about 1,537,867 tonnes per year. The corresponding dyes and chemicals consumption is about 440,111 tonnes per year. The quantity of hazardous chemicals covered in the survey sample is 4,399 tonnes per year. A total of 718 ton per year pre-consumer fabric waste will be generated in 320 industries under the project in all the clusters. This exerts a POPs emission potential of 0.216 g TEQ/year.

Table 8: Primary data from field survey of 124 industries for baseline construction dyes, chemicals and other materials consumptions in different textile clusters - (SEE APPENDIX 1)

Table 9: Primary data from field survey of 124 industries for baseline construction of fabric production, consumption of chemicals and water, pre-consumer fabric waste and potential for POPs emissions - (SEE APPENDIX 1)

Table 10: Fabric production, consumption of chemicals and water, and pre-consumer fabric waste generation and its POPs emission potential for the total surveyed & additional number of industries (#689) under each cluster (based on field survey primary data from 124 units) (SEE APPENDIX 1)

Cluster →		Ahmedabad	Bhiwandi	Ichalakaranji	Kolkata	Ludhiana	Panipat	Surat	Tirupur		
Total industries (surveyed + additional) →		42	24	54	21	131	26	161	230	689	
S. No	Details	Cotton and blended Woven fabric	Cotton, cotton with lycra, blends, blends with lycra and viscose woven fabrics	Cotton and Polyester/ cotton, Polyester/ Viscose, viscose woven fabric	Cotton and PET knitted fabrics	Polyester, Polyester/ cotton and cotton knitted fabric	Cotton yarn dyeing	Dyeing of Polyester woven fabric	Dyeing of Cotton knitted fabrics	Sum	Average (per industry unit)
1	Total Fabric Production, tons/year	198,070	402,017	848,414	64,375	588,845	74,793	635,845	498,862	3,311,221	4806
2	Quantity of outdoor fabric (@10% of total fabric production), tons/year	19,807	40,202	84,841	6,437	58,885	7,479	63,585	49,886	331,122	481
3	Total Dyes consumption, tons/year	6,825	11,898	25,550	1,687	16,452	2,245	19,432	14,459	98,548	143
4	Total Chemicals consum	68,707	109,361	248,641	17,957	141,363	34,573	77,363	151,071	849,036	1,232

	ption, tons/year										
5	Total Dyes & Chemicals consumption, tons/year	75,532	121,259	274,192	19,645	157,815	36,817	96,795	165,530	947,585	1,375
6	Specific consumption of dyes and chemicals, kg/kg fabric	0.381	0.302	0.323	0.305	0.268	0.492	0.152	0.331	2.554	0.319
7	Quantity of hazardous chemicals (@1% of total chemicals consumed), tons/year	755	1,213	2,742	196	1,578	368	968	1,652	9,472	13.75
8	Total Water Consumption (KL/year)	37,146,581	64,377,590	161,095,202	12,335,658	98,692,453	8,900,840	81,784,547	90,729,728	555,062,599	805,606
9	Specific consumption of water, kg/kg of fabric	188	160	190	192	168	119	129	182	1,328	166
10	Quantity of Pre-consumer fabric waste, tons/year	112	67	148	57	311	8	252	592	1,547	2.245
11	Emission factor, gTEQ/ton	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0024	
12	Potential for POPs emissions into air, gTEQ/year	0.03	0.02	0.04	0.02	0.09	0.002	0.076	0.18	0.458	

Table 11: Fabric production, consumption of chemicals and water, pre-consumer fabric waste and POPs emission potential for the proposed number of factories for project intervention (based on field survey of 124 units) - (SEE APPENDIX 1)

Cluster →		Ahmedabad	Bhiwandi	Ichalakaranji	Kolkata	Ludhiana	Panipat	Surat	Tirupur		
Number of the factories for the project →		20	11	25	10	61	12	75	107	320	
S.No	Details	Cotton and blended Woven fabric	Cotton, cotton with lycra, blends, blends with lycra and viscose woven fabrics	Cotton and Polyester/ cotton, Polyester/Viscose, viscose woven fabric	Cotton and PET knitted fabrics	Polyester, Polyester/cotton and cotton knitted fabric	Cotton yarn dyeing	Dyeing of Polyester woven fabric	dyeing of Cotton knitted fabrics	Sum	Average (per industry unit)
1	Total Fabric Production, tons/year	91,992	186,713	394,038	29,898	273,484	34,737	295,313	231,692	1,537,867	4,806
2	Quantity of outdoor fabric (@10% of total fabric production), tons/year	9,199	18,671	39,404	2,990	27,348	3,474	29,531	23,169	153,786	481
3	Total Dyes consumption, tons/year	3,170	5,526	11,867	784	7,641	1,042	9,025	6,727	45,782	143
4	Total Chemicals consumption, tons/year	31,910	50,792	115,479	8,340	65,655	16,057	35,931	70,164	394,328	1,232
5	Total dyes and chemicals consumed, tons/year	35,080	56,318	127,346	9,124	73,296	17,100	44,956	76,891	440,111	1,375
6	Quantity of hazardous chemicals (@1% of all chemicals), tons/year	351	563	1273	91	733	171	450	767	4,399	14
7	Specific consumption of chemicals & dyes, kg/kg fabric	0.381	0.302	0.323	0.305	0.268	0.492	0.152	0.331	2.554	0.319
8	Total Water Consumption (KL/year)	17,252,403	29,899,606	74,819,252	5,729,188	45,836,843	4,133,917	37,984,115	42,138,625	257,793,949	805,606
9	Specific consumption of water, kg/kg of fabric	188	160	190	192	168	119	129	182	1,328	166
10	Total pre-consumer fabric waste, tons/year	52	31	69	26	144	4	117	275	718	2.245
11	Emission Factor, g TEQ/ton	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0024	
12	Potential for POPs emissions into air, gTEQ/year	0.016	0.009	0.021	0.008	0.043	0.001	0.035	0.083	0.216	

51. There exist alternatives to PFAS. There are, (i) nano-sized amorphous silica; (ii) dendrimers macro molecules; (iii) poly silanes/siloxanes; (iv) super hydrophobic calcium carbonate; (v) long alkyl-chain polysiloxanes; (vi) hydrophobic polyester; and (vii) fatty Acid Derivatives and Waxes). Some of them are listed by ZDHC as safer alternatives to PFAS (https://www.roadmaptozero.com/). Several global textile chemicals manufacturers (Daikin, Hi-Chem etc.,) post details of various PFAS-free formulations and market also (https://www.daikinchemicals.com/company/sustainability/pfas.html; https://www.hi-chem.co.kr/en/ecofriendly-paper-pulp-chemical-keepresh).

52. Water use: Textile wet processing is considered one of the highest water-consuming segments as water is the preferred medium of application during the various steps of pre-treatment, coloration and chemical finishing. Throughout the manufacturing process, water is used to clean the raw materials as well as for many flushing steps. In fact, it has been discovered that 38% of water is used in the bleaching process, 16% in dyeing,

8% in printing, 14% in boilers, and 24% for other uses. Approximately 150–200 litres of water is required to produce 1 kg fabric. In this survey, the average water consumption in all the 8 clusters is estimated to be 166 kg/kg fabric. Water is primarily used for (a) applying chemicals to textiles and (b) rinsing manufactured textiles. To dye 1 kg of cotton, it requires about 150–200 L water, 30–60 g dyestuff, 0.6–0.8 kg NaCl, which at the end of the process generates nearly 20%–30% of applied unfixed dyes along with high salt content and other auxiliary compounds. The raw materials used for the manufacturing of dyes and dye intermediates are benzene, toluene, xylene, and naphthalene along with certain heavy metals that also cause water pollution.

53. Several textile industries in India have been attempting to save water by adopting water conservation methods in the process. Closed loop operations saved a good amount of water in the sector. Industry in Tiruppur cluster adopted ZLD by which the sector can recycle >80% treated water, thereby saving a lot of fresh water. The recovered brine is also reused in dye baths. In Surat, treated sewage water is reused in the textile sector after applying additional pre-treatments.

54. In this project, interventions are proposed to save water significantly in 400 units; for example, about 13,950 m3 water can be saved for processing 10 tons of fabric in a year (310 working days) by adopting Soft-flow (Airflow) Jet Dyeing process. Similarly, water use can be eliminated by practicing waterless dyeing (supercritical CO2 dyeing). Ultrasound-assisted fabric dyeing can result >30% water saving apart from reductions in energy (20%), fuels (30%) and chemical consumption. Some other interventions suggested can bring about significant water saving to the industry.

55. Waste generated: Several types of solid waste are generated in the textile supply chain. Apart from chemicals-laden primary and secondary sludges from the effluent treatment plants, a lot of other wastes (fiber, fabric, plastic, etc.) are also generated significantly. While most of the fabric waste is recycled, some quantity is burnt or incinerated. In India, a total of 7800+ kilo tons of fabric waste are generated annually, which mainly constitutes pre- and post-consumer textiles waste. In all the clusters also fabric waste is generated significantly. While moderate percentages of fabric wastes are diverted into 9R practices, about 12%–15% is dumped, burnt, or incinerated. For example, the waste generated in the Surat cluster is used as fuel in the furnace for the boiler. Similarly, MSW constitutes ~5% of post-consumer textile waste. From this survey, the average fabric hard waste (pre-consumer) produced in each wet processing unit is about 2.2 to 2.4 tons/year. Due to frequent open burning practice in India, this waste can pose a problem of POP emissions into air. In this project, interventions are proposed to divert more textile waste into 9R practice, to address the issue of emission of POPs into air.

Baseline on energy use

56. Energy is used for both heat and electricity in the industries surveyed. Key data gathered from the primary survey were analysed and presented in tables 8 to 11 in previous sections and also few tables in the subsequent sections. 223 industries (400 industries visited) responded to data pertaining to energy.

57. Energy is used for thermal applications and also electrical applications in all industries. Many industries make use of diesel genset as standby and use it sparingly. The boiler is the main thermal energy provider in all industries surveyed. Coal is used as the only fuel in boilers in Ahmedabad, Kolkata, and Surat clusters. Rest of the four clusters, namely, Bhiwandi, Ludhiana, Panipat and Tiruppur make use of biomass as the only fuel. Both coal and biomass are used in Ichalakaranji cluster.

58. Summary of baseline data for energy use in 124 surveyed industries are provided in Table 8. Key highlights of energy consumption in the surveyed industries is given below;

a. 60 of the 124 industries make use of coal as fuel to meet thermal energy needs. The total coal consumption from these 60 factories is 1,549,577 tons per year and the average coal used per factory is 25,826 ton per year.

b. Rest 64 of the 124 industries make use of biomass as fuel to meet thermal energy needs. The total biomass consumption from these 64 industries is 1,851,223 tons per year and the average biomass consumption in factory 28,925 tons per year.

c. The electricity consumption in all the 124 industries (all 124 industries used electricity) was 1,531,982 MWh per year and the average electricity consumed per industry was 12,355 MWh per year.
d. The total diesel consumption by all surveyed factories was 914 kiloliters per year and the average per industry was about 7 kL per year.
e. Thus, the coal consuming industries consume about 2.02 kgOE per kg of fabric (4.41 kg coal, 0.002 liter diesel and 1.93 kWh per kg of fabric processed).
f. The biomass consuming industries consume about 1.56 kgOE per kg of fabric (3.98 kg biomass, 0.002 liter diesel and 1.93 kWh per kg of fabric processed).
g. GHG Emission generated from energy use: The emission generated per kg of fabric is 6.77 kgCO2 per kg of fabric in coal consuming industries and it is 4.29 kgCO2 per kg of fabric in biomass consuming industries.

59. Energy consumption & GHG emissions in 124 surveyed industries in 8 clusters: Various types of energy sources are used to meet energy requirements. For thermal namely, firewood is used in 64 factories, coal is used in 60 factories in boilers. Electricity is used in all industries and most industries kept as a backup of diesel generators as standby. The energy consumed was calculated in terms of TOE (the calorific values of different fuels used by industries are given in the note below the table). GHG emissions were calculated using standard emission factors (give in the note below the table). The table below provides energy consumed in Tonnes of Oil Equivalent and GHG emissions in tonnes of Carbon Dioxide consumed in 8 clusters for the 124 surveyed industries. Energy consumption in TOE and GHG emissions in tCO2/y for 8 clusters are given in the table below. Following are the key metrics, namely,

a. The average energy consumed per factory is 10399 TOE/y.
b. The total energy consumed by all 124 factories is 1.29 million TOE/y (or 1289530 TOE/y)
c. The average GHG emissions per factory is 47,494 tCO2/y
d. The total emissions generated by all 124 factories is 5.89 million tCO2/y (or 5,889,210 tCO2/y).

Table 12. Annual energy consumption and estimated GHG emissions from 124 surveyed industries

SN	Name of clusters	Ahmedabad	Bhiwandi	Ichalakaranji	Kolkata	Ludhiana	Panipat	Surat	Tirupur	Total	Average
1	Number of factories	11	7	22	6	6	6	36	30	124	
A	**Firewood (64 industries)**										
2	TOE	NA	169395	322280	NA	47243	19110	NA	89900	647928	10124
3	GHG emission, tCO_2/y	NA	798578	1519321	NA	0	0	NA	0	2317899	36217
B	**Coal (60 industries)**										
4	TOE	129107	NA	125507	19724	NA	NA	234756	NA	509094	8485
5	GHG emission, tCO2/y	619049	NA	562188	80359	NA	NA	1051556	NA	2313152	38553
C	**Diesel (as standby in most industries)**										
6	TOE	119	NA	NA	63	114	15	125	321	757	6
7	GHG emission, tCO2/y	348	NA	NA	185	55	43	364	938	1933	16
D	**Electricity (all 124 industries)**										
8	TOE	9849	23193	58852	3018	4355	2375	18680	11428	131750	1063
9	GHG emission, tCO2/y	93911	221143	561147	28781	41521	22645	178109	108969	1256226	10131
E	**Total of energy consumption for 124 industries**										
10	Total TOE	139075	192588	506639	22806	51712	21499	253561	101650	1289530	10399
11	Total GHG emission, tCO2/y	713308	1019721	2642656	109324	41577	22689	1230029	109907	5889210	47494
12	Total GHG emission, MtCO2/y	0.71	1.02	2.64	0.11	0.04	0.02	1.23	0.11	5.89	0.047
F	**Average energy consumption/GHG emissions per industry**										

13	TOE	12643	27513	23029	3801	8619	3583	7043	3388	NA	10399
14	GHG, tCO2/y	64846	145674	120121	18221	6929	3781	34167	3664	NA	47494

Note: Calorific values: Biomass 3500 kcal/kg; Coal (imported) used in Ahmedabad: 5200 kCal/kg; Coal (used in Kolkata): 4500 kCal/kg; Coal (lignite – used in other clusters): 2865 kCal/kg; Diesel: 9180 kCal/L; Electricity: 860 kCal/kWh.
Emission factors: Biomass 1.65 kCO2/kg; Coal (imported) used in Ahmedabad: 2.493 kgCO2/kg; Coal (used in Kolkata): 1.833 kgCO2/kg; 5200 kCal/kg; Coal (lignite – used in other clusters): 1.283 kgCO2/kg; Diesel: 2.68 kgCO2/L; Electricity: 0.82 kCal/kWh.

60. Energy consumption & GHG emissions in 689 industries (124 surveyed and 565 estimated similar additional industries): The estimates are made by taking average energy consumed/ emissions generated per industry in the surveyed industries and multiplying it with 689 and they are presented in the table below.

a. The estimated total energy consumed by 689 industries is 7.17 million TOE/y (or 7,165,210 TOE/y)
b. The estimated GHG emissions generated is 32.72 million tCO2/y.

Table 13. Estimated energy consumption and GHG emissions in 689 industries

SN	Name of cluster	Ahmedabad	Bhiwandi	Ichalakaranji	Kolkata	Ludhiana	Panipat	Surat	Tirupur	Total
1	Number of industries	42	24	54	21	131	26	161	230	689
2	TOE	531013	660303	1243568	79821	1129040	93164	1133980	779314	7165210
3	GHG, tCO_2/y	2723540	3496186	6486519	382634	907754	98317	5500961	842622	32723108
4	GHG, $MtCO_2/y$	2.72	3.50	6.49	0.38	0.91	0.10	5.50	0.84	32.72

61. Energy consumption & GHG emissions in 320 industries (proposed number of industries for project interventions): The estimates are also made for a scenario for 320 factories where the project interventions are proposed. The calculations are made as in the previous scenario for 689 industries and presented in the table below.

a. The estimated total energy consumed by 320 factories is 3.33 million TOE/y (or 3,327,819 TOE/y)
b. The estimated GHG emissions generated is 15.20 million tCO2/y.

Table 14. Estimated energy consumption and GHG emissions in 320 industries

SN	Name of cluster	Ahmedabad	Bhiwandi	Ichalakaranji	Kolkata	Ludhiana	Panipat	Surat	Tirupur	Total
1	Number of industries	20	10	25	10	61	12	75	107	320
2	TOE	252863	275126	575726	38010	525736	42999	528251	362550	3327819
3	GHG, tCO_2/y	1296924	1456744	3003018	182206	422695	45377	2562559	392002	15197960
4	GHG, million tCO2/y	1.30	1.46	3.00	0.18	0.42	0.05	2.56	0.39	15.20

62. Energy/ emission data and analysis for 99 factories: The data was also collected from 99 factories that carried out textile processes like Printing, Garment Manufacturing, Sizing, Spinning, Knitting and Weaving. Though there is no wet processing and these industries are not the priority for interventions under cleaner production component in this project, they are likely candidates for interventions under alternative fibres or/and 9R. These industries consumed only electricity as the main fuel for their operations. The summary of data and calculations are given in table below and the key highlights pertaining to energy use and emission generation are,

a. Average energy consumed per factory was 628 TOE/y
b. Total energy consumed in 99 factories was 62,194 TOE/y
c. The average GHG emissions generated per factory was 515 tCO2/y
d. The total GHG emissions generated from 99 factories was 50,999 tCO2/y.

Table 15. Salient data and analysis for 99 industries surveyed (carrying out Printing, Garment Manufacturing, Sizing, Spinning, Knitting, Weaving)

SN	Cluster ->	**Ahmedabad**	**Bhiwandi**	**Ichalakaranji**	**Kolkata**	**Ludhiana**	**Panipat**	**Surat**	**Tirupur**	**Sum**	**TOE/y**	**GHG Emissions, tCO2/y**
	No of Industries ->	**1**	**10**	**28**	**9**	**18**	**9**	**14**	**10**	**99**		
	Type of Process	**P-1**	**GM -10**	**W-12, SZ-6, S-4, P-6**	**K-7, GM-2**	**S-3, W-2, K-8, GM-5**	**W-5, S-4**	**P-12, T-1, W-1**	**K-1, GM-2, P-7**			
1	Spinning (Ton/year)			8,680		5,270	7,130			21,080		
2	Texturisation (Ton/year)							2,697		2,697		
3	Knitting (Ton/year)				23,870	18,600			3,100	45,570		
4	Sizing (Ton/year)			27,900						27,900		
5	Weaving (Ton/year)			8,841		4,030	7,750	1,550		22,171		
6	Printing (Ton/year)	3,732		71,920				37,414	3,568	1,16,634		
7	Garment Manufacturing (1000 pieces/year)		3,612		3,100	8,804			744	16,260		
8	Spinning Electricity (MWh/year)			32,147		13,440	6,510			52,097	4480	3674
9	Texturisation Electricity (MWh/year)							4,560		4,560	392	322
10	Knitting Electricity (MWh/year)				11,618	8,760			1,344	21,722	1868	1532
11	Sizing Electricity (MWh/year)			13,868						13,868	1193	978
12	Weaving Electricity (MWh/year)			8,989		4,182	2,820	2,844		18,835	1620	1328
13	Printing Electricity (MWh/year)	4,448		89,144				511349	4,580	609,521	52419	42983
14	Garment Manufacturing Electricity (MWh/year)		677		437	1,309			162	2,585	222	182

15	Electrical Energy in Spinning (MWh/T)			3.7		2.55	0.91			2.47		
16	Electrical Energy in Texturisation (MWh/T)							1.69		1.69		
17	Electrical Energy in Knitting (MWh/T)				0.49	0.47			0.43	0.48		
18	Electrical Energy in Sizing (MWh/T)			0.5						0.5		
19	Electrical Energy in Weaving (MWh/T)			1.02		1.04	0.36	1.83		0.85		
20	Electrical Energy in Printing (MWh/T)	1.19		1.24				13.67	1.28	5.23		
21	Electrical Energy in Garment Manufacturing (MWh/1000 pieces)		0.19		0.14	0.15			0.22	0.16		
	Total										**62194**	**50999**
	Average per factory										628	**515**
	Note	P-Printing, GM- Garment Manufacturing, SZ- Sizing, S- Spinning, K-Knitting, W- Weaving										

63. Energy efficiency in boilers and scope to reduce energy use in boilers: During the PPG phase, a set of energy efficiency measures have been identified in almost every factory. The efficiency of boilers was in the range of 55%–70%. It is identified that 8%–12% energy efficiency improvements are possible through interventions. The proposed interventions are as listed below.

- Stop continuous steam venting (Install the latest Float Type Steam Trap by investing very minimum amount)
- Increase boiler feed water temperature by 10 oC (By utilizing heat recovery from condensed steam, blowdown steam, proper heat insulation, and water pre-heater)
- Condensate recovery (Checking feasibility with Energy Consultancy Team and Expertise),
- Semi-automatic interventions for boilers to enhance efficiency

64. Energy conservation measures in electrical utilities: Potential areas for energy conservation in electrical areas have been identified and listed below.

- Replace conventional lights with suitable LEDs (Replace old lighting equipment)
- Replace existing fans with energy efficient super fans (Use latest BLDC fans)

- Optimize light consumption using motion sensors (Automatic motion controls can be used for office rooms)
- Optimize the temperature setting to 23–25 oC for Room AC (Proper setting of temperature will save electrical energy)
- Replace no star-rated ACs with 5-star-rated ACs (High amount of electrical energy saving is possible).

Environmental and social aspects

65. Emissions, effluents, solid wastes: Details regarding waste generation, GHG emissions, etc. are already discussed in paras 40 to 45. Some industries were observed to deploy a range of air pollution control measures such as back filters, wet scrubbers, air pre-heaters, water scrubbers, economizers, and multicyclone equipment, while such equipment was not present in the case of others. For dealing with effluents, some industries had their own pre-treatment facilities while some others were availing services of common effluent treatment plants (CETPs). However, such facilities are yet to come up in sufficient numbers to cover all textiles manufacturing units. It was also found that the industries were disposing of bio-sludge, chemical sludge and hazardous wastes generated in their individual or common treatment facilities, in places such as cement plants or designated land-fills. However, not all manufacturing units are able to follow such best practices to their fullest extent due to a number of constraints such as unavailability of common treatment facilities in their vicinity, unavailability of any proven solution for disposing of certain hazardous salts (as in Tiruppur), high associated costs or financial limitations and even lack of knowledge or awareness. In some cases, CMS Online monitoring systems are observed to be in use for monitoring relevant environmental parameters.

66. Impact on forests, ecologically sensitive areas, CRZ areas or natural habitats: From the interactions with unit owners and cluster associations, it has emerged that all surveyed textile manufacturing units are in demarcated industrial zones or clusters, which do not directly impact any designated forests, ecologically sensitive areas, coastal regulation zone (CRZ) areas, or natural habitats.

67. Cultural heritage: The survey and interactions with cluster associations has confirmed that no textile manufacturing units are located next to or very close to any heritage structure or monument in a manner that such structures might get impacted by their operations.

68. Worker safety: In the context of ensuring worker safety, the responses from a majority of industries are that all necessary worker safety arrangements are in place. Some of the surveyed industries did not provide elaborate responses, possibly implying thereby that there might be shortcomings in the worker safety arrangements. During shop-floor visits to textiles manufacturing facilities, it was observed that only a few important emergency arrangements from amongst options such as firefighting equipment, fire/chemical leak alarms, excess pressure alarms for boilers, emergency assembly areas, etc. were present. In the smaller units, most arrangements of this kind were either rudimentary or absent. Further, as part of their safety protocols, most respondent industries declared that they provide personal protective equipment (PPE) kits in sufficient quantities to workers, particularly for chemical and electrical safety. This includes rubber mats placed near electrical panels to prevent electrical hazards. Other PPE kits typically consist of various items such as acid-proof gloves, insulated gloves, machinery gloves, safety shoes, gumboots, aprons, earbuds, helmets, respiratory masks specifically for use in color stores, and spill kits. However, they mention several problems encountered in convincing the workers to actually don the PPE gadgets and use them effectively. Emergency medical back-up facilities or arrangements were not necessarily in place in some units.

69. Workplace conditions and labor policies: Workplace conditions varied considerably from unit to unit. A few units had good infrastructure in place for labor welfare such as clean toilets for men and women, canteen or lunch room, drinking water, recreation areas, sick-bay, creche facilities, etc. However, in most units such facilities were either rudimentary and ill-maintained or totally absent altogether. All surveyed industries, backed by their respective cluster associations, confirm to have subscribed to equal wage policies and similar other labor-related compliances mandated by Indian law. They also claim to have a functional grievance redressal mechanism available for their workers, the effectiveness of which could not be ascertained in the limited period available for baseline survey. However, it also emerged that most industries lack a functional mechanism to address sexual and other kinds of harassment.

70. Gender: Analysis of the baseline survey has identified a few gender issues of concern.

a. Gender disparities: Data and information gathered during baseline highlights gender disparities in dropout rates, with men showing higher dropout rates compared to women across all skill categories and time frames. This could be due to various factors such as job satisfaction, career opportunities, work environment, and family responsibilities.
b. Skill level impact: The dropout rates among skilled employees, both men and women, are lower compared to unskilled and semi-skilled employees. This suggests that employees with higher skills may have better job prospects, career stability, and job satisfaction, leading to lower dropout rates.
c. Night shift and safety concerns: In India, the Factories Act of 1948 was amended to allow women to work night shifts provided certain conditions relating to safety measures, protection of women's dignity and honor and provision of transport from factory to the nearest point of residence are met. But the survey showed that there was hesitation both among women and the factory owners to employ women in night shifts.
d. Overtime policies: While overtime opportunities are sometimes available for men, there are no provisions for overtime for women. The survey pointed to the persisting challenges related to gender-biased division of labor, working hours and social security.
e. Expectations of women employees: Expectations of women employees were (i) adequate and fair remuneration, (ii) safe and healthy working conditions, (iii) job security, (iv) promotion prospects, (v) decent supervisors, and (vi) respect at the workplace.

Fashion houses

71. Aditya Birla Retail Fashion Limited :ABFRL Company is committed to build consumer-centric, resilient, and sustainable businesses, with a sharp focus on capital efficiency. This commitment to efficiency and profitability is said to cornerstone of its success.
a. ABFRL Company stands as one of India's leading branded fashion and lifestyle entities, with an impressive portfolio of top fashion brands and diverse retail formats. As the country's first billion-dollar pure-play fashion powerhouse, it commands over 10.8 Mn. Sq. ft. of retail space. Our expansive network now comprises nearly 4000 stores spread across 900+ cities and towns, together with a presence in roughly 33,535 multi-brand outlets. This strong and vast infrastructure ensures that the growing needs of our expanding base of brand-conscious consumers are effectively met.
b. It began sustainability journey with the launch of 'ReEarth - For Our Tomorrow' in FY13. This decade-long sustainability practices and implementing various processes has made it more responsive and resilient as an organization. Having achieved the first set of milestones in 2021, it embarked on a transition - Sustainability 2.0 – from 'Process-led to Product led', with a 2025 agenda focusing on product design and development, customer centricity and supply chain. The Product Life Cycle Approach is the fulcrum of our Sustainability.
c. The sustainability at ABFRL is in the core areas viz., Sustainable products, packaging, CSR (Education, health care and sanitation, sustainable livelihood) water and watershed, Digitization and other initiatives.
72. ABFRL (Birla Cellulose) has considerable interest in (i) exploiting agricultural biomass waste as a new generation feedstock for replacing wood-based cellulose, (ii) scaling technologies for recycling post-consumer textile waste based on their expertise in handling pre-consumer textile waste, (iii) promoting anionic VSF fibers, which have greater affinity for disperse dyes and chemicals and thereby reduce water pollution. These efforts very well synchronize with global sustainability efforts. All these aspects are also addressed in this child project also, and thus ABFRL can act as a activity implementer as well as technical knowledge provider under the relevant components of the project.

Vardhman Fashion :

73. Vardhaman is one of the largest vertically integrated manufacturers in India producing yarn and fabrics in the apparel segment (tops and bottoms). Turnover of over US$ 1.0 billion. Production: Yarn-240,000 metric tons per year, weaving capacity of 220 million meters of fabric every year using 1.24 million spindles. Direct employment 30,000 people. Vardhaman has 18 state-of-the art manufacturing facilities located across India and exports to over 75 countries. Vardhaman maintains transparency and traceability and achieves sustainability. It focusses on a green portfolio covering organic, recycled and sustainable fibers and fabrics. The major manufacturing activities are: Spinning, Weaving and Processing. All the dyes and chemicals at Vardhman are GOTS certified and the finished fabric is Oeko-Tex Class-I certified. All manufacturing units are ISO 14001

certified for the Environmental Management System, and ISO 45001 for Occupational Health and Safety Management System.

a. Water: About 90 KL/ton water is consumed in the yarn, fiber and fabric dyeing (max water consumed in this process. Vardhman has set up 52 rainwater harvesting systems with a capacity to recharge 1.75 million KL of water annually. It has 3 fully functional ZLD plants with a combined capacity of 10,800 KLD. Reused in fabric processing. 38% of treated water is recycled within the processes. 100% reuse of STP (9) treated sewage in processing plants at Vardhman fabrics. Approximately. 3.59 million KL wastewater treated annually in 4 ETPs. This treated waste water is used in washing of acrylic and green belt development.

b. Chemicals: Vardhman made several efforts to reduce chemicals; (i) 100% replacement of chlorite bleaching with peroxide bleaching, (ii) Enhanced use of enzymatic desizing replacing chemical desizing, (iii) Identified and eliminated potentially harmful and banned chemicals from manufacturing by working with global bodies like CHEM-ISQM; ZDHC InCheck & Gateway, CleanChain & Clean by Design for eliminating chemicals, (iv) Switched to C-6 chemistry for oil & water repellency, (v) Zero formaldehyde resin for wrinkle free finish, (vi) Installed mechanical finishing (relaxation /continuous tumbler technique) to replace chemical finishing (softening).

c. Energy: Vardhaman also made commendable progress in the energy sector. Some efforts relate to: (i) Installed 13.1 MW of solar power system, expected to generate 233 million kWh of green power, (ii) 10 units at Vardhman registered with PAT scheme and certified as E-Cert, (iii) 30% savings in total energy consumption at Vardhman fabrics, (iv) 3x60 MW captive power plants, (v) 7 MT/day biogas plants.

d. Specific energy consumption (kWh/kg): The specific energy consumption given below suggests Vardhman's commitment to climate change: (i) Spinning: 3.95 (2017/18) reduced to 3.47 (during 2021/22); (ii) Weaving: 2.92 (2017/18) reduced to 2.17 (during 2021/22) and (iii) Processing: 1.85 (2017/18) reduced to 1.81 (during 2021/22).

e. Solid Waste: Vardhman reuses/disposes of waste responsibly. It Increased the reuse of HDPE in pallet packaging from 55% to 95% and hazardous solid wastes are disposed of responsibly in authorized TSDF disposal facilities.

f. Women: Women employment ratio at Vardhman is: Staff - 418/4129; Workers - 9156/16627; 46.1% are women employees; 19 hostels for 5000 women.

Vardhman has set targets to achieve enhanced sustainability in its supply chain operations. It can prove to be worthwhile if the project implementation stage considers their wealth of experience.

Arvind Fashion Ltd :

74. Arvind Limited is a globally renowned integrated solutions provider in textiles, with strong fiber to fashion capabilities. Flagship of the Arvind Group - a textile to retail conglomerate with focus on textiles, apparels, advanced materials, environmental solutions, telecom and omni-channel commerce; it ranks amongst the top suppliers of fabric globally. Headquartered in Ahmedabad, Gujarat, Aravind has interests in denims, wovens and knits, garmenting, and advanced materials, amongst others. Advanced Materials Division (AMD) focuses on new fibers, new technologies, and new products to solve the problems of infrastructure, health and safety, energy, and industrial applications. Annual production capacity is 100 million meters of denim; 150 million meters of woven fabric and 50 million pieces of garments. It procures more than 40% of its cotton from sustainable sources. Arvind is developing a sustainable ecosystem spanning from farm to fabric by investing in farming initiatives and sourcing alternate natural fibers and recycled fibers. As part of its Sustainable Sourcing Strategy, it continues to implement the following initiatives: regenerative, organic and in-conversion cotton, Modal/Tencel; Hemp, Flax, and Bamboo. Others aspects to enhance circularity are recycled cotton, curculose, and seaqual fibers. Blockchain-based end-to-end traceability in denims (in collaboration with Textile Genesis) is available. Its overall sustainability space can be briefed as below:

a. Water: (i) Recycled 1.8 billion liters of water in FY 2021/22 through Sewage Treatment Plant; (ii) Specific water consumption; fabric (liters/meter) - 43.20 in 2019/20; 40.53 in 2020/21 and 26.21 in 2021/22 (iii) Specific water consumption; Garment (liters/piece) - 11.70 in 2019/20; 12.27 in 2020/21 and 12.88 in 2021/22.

b. Chemicals: Some initiatives at Aravind include : (i) Adopted ZDHC (Zero Discharge of Hazardous Chemicals) at all their sites for safe and sustainable chemical management; (ii) Adhered to safer chemistry

frameworks to eliminate hazardous chemicals (iii) PFC-free repellent finish; (iv) Natural plant-based softener for the dyeing process; (v) Concealed resin-baths that control VOC and air emissions; (vi) Finishing processes that retain the hand feel properties of the flame retardant fabric; (vii) Denim With Minimum Synthetic Chemical - A new approach of replacing synthetic Indigo dye stuff, pre-wetting chemicals, and auxiliaries used in sizing and finishing, with biobased material. Initial trials have been successful; (viii) Bio Black - It is a black pigment extracted from sustainably sourced wood waste for printing/coating and (ix) Successful trials in collaboration with Levi's have led to new product adoptions for their Premium label – "Well Thread". Printing and coating applications have been made on white and natural indigo bases for Levi's and (x) Substituted old bleaching technology to reduce water usage.

c. Energy: Under energy vector, Aravind strived to achieve sustainability through (i) Retrofitting the existing machines to make them more efficient, (ii) Replacing thermic fluid-fired Stenter with direct gas-fired Stenter, (iii) Installing air gun in place of hose pipes for cleaning air application, (iv) Installing high-efficiency pump in shirting pump house; (v) Optimizing the run-time of energy intensive equipment based on weather conditions; (vi) Stopping the cooling tower water circulation pump (C-90 air compressor) in winters; (vii) Deactivating humidification plants in dyeing and sizing machine - 50 rope dyeing and Sucker Muller; (viii) Installing energy-efficient washing machine that reduces water and chemical use; (ix) Sourcing renewable energy - signed up for 47 MW wind and solar hybrid plant at the group level, and (x) Switching from coal by creating a backward supply chain of biomass briquettes.

d. GHG emissions: a) GHG Intensity: fabric (kgCO2e/meter) - 1.14 in 2019/20; 1.15 in 2020/21 and 1.16 in 2021/22; b) GHG Intensity: Garment (kgCO2e/piece) - 0.47 in 2019/20; 0.47 in 2020/21 and 0.48 in 2021/22.

e. Women: It strives to achieve gender equality and empower all women and girls: (i) Efficient and organization-wide implementation of POSH Act ; (ii) 11.1% Women Directors on the Company board; (iii) Women: Men (employees) - 274:2900; Workers - 6025:13523; (iv) Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all; (v) Respect and promote safe workplaces to consistently reduce injuries and incidents; (vi) Uphold labor rights; (vii) Ensure gender equality in terms of pay/wages for men and women; (viii) Being equal opportunity employer by eliminating biases of gender, race, disabilities, etc.

f. Solid waste: Each year tons of textile waste end up in landfill. Fortunately, most of it can be recycled and/or reused. Aravind strives to recycle the cutting and reject waste from its value chain and are exploring the possibility of recycling and/or reusing the post-consumer waste garments.

Aravind ran a pilot for the brand Unlimited to spread awareness among customers on the growing problem of textile waste and provide a platform for them to dispose of their old and not-in-use garments in a sustainable manner. Unlimited collected 5700 garments from their customers, weighing approximately 1.3 tons through the campaign. These garments were then segregated based on different parameters and potential to reuse/recycle is being evaluated. Aravind fosters several initiatives for its employees under CSR, namely, schools, hospitals, child day care centers etc.

75. Trent Limited is a fashion retail company, which is a subsidiary of Tata Sons. It has established a strong presence in India's retail fashion industry through the following brands, namely, Westside, Zara, and Zudio. It has 680 retail stores pan India. The company's business model focuses on direct-to-customer channels, while its marketing strategy targets youth and families in tier 1, tier 2, and tier 3 cities. Trent is committed to aligning with sustainability targets in tune with India's climate actions. Trent experts are designing responsibly for the future generations through its actions and operations. Its motto is 'Design and Deliver Fashion & Lifestyle Brands – Responsibly'. Trent demonstrates its responsibility to the planet and people by incorporating six pillars into its Sustainable Strategy. These six pillars include: Resource Efficiency, Product Stewardship, Sustainable Logistics, Social Wellbeing, Strategic CSR, and Governance. The complete value chain will cater to achieve the UN goals for Sustainable Development in alignment with India's target to achieve net zero emissions by 2070. Trent mainly operates through the following four major brands:

a. Westside: A premium to mid-range apparel brand, which contributes to 85% of Trent revenue and expected to grow at 17% CAGR.

b. Zudio: A value retail apparel brand, which contributes 7%–8% of Trent revenue and expected to grow at 50% CAGR. Zudio achieved run-rate of selling 2 million garments per week in FY 2023 across its 353 stores.
c. Zara: Trent holds 49% stake in its JV – Inditex Trent Retail India Private Limited (Inditex Trent). However, the operations of Zara and Massimo Dutti are controlled by Inditex (in entirety), whereas Trent has primarily been a financial investor.
d. Trent Hypermarket: TRENT's 50% retail venture, Trent Hypermarket (THPL), runs the Star brand stores, and was among the first to enter the food and grocery retail business.
i. Sustainable Logistics: Focusing on sustainable logistics Tata Trent has shifted from diesel-based trucks to CNG, increased the size of the trucks to reduce the number of trucks travelling, and opened regional distribution centers to optimize logistics. It has also adopted a few interesting initiatives like itis using smart lighting for stores, maximizing the use of rooftop space for solar electricity generation, and achieving complete circularity of waste from stores, distribution centers, and corporate offices.
ii. Waste Circularity: Achieve complete circularity of waste from stores, distribution centers, and corporate offices. About 326 tons of plastic was collected and recycled through WiseBin during 2023. Together they embarked on collecting and recycling plastic waste and other solid wastes from almost 200 stores and 2 large warehouses. Trent has made efforts to procure biodegradable bags, and recycled cardboard and A4 paper from WiseBin with the aim of promoting circularity.
iii. Women: With about 17,000 employees at Trent, adequately caters to women's respect at workplace and runs several CSR programs to aid ease of living of women.
76. Baseline Analysis (Fashion Houses): All the leading fashion houses mentioned above have undertaken steps to create sustainable operations along the supply chain and contributed significantly to the energy reduction, water and chemicals reduction, elimination of harmful chemicals, upgradation of process technologies/waste management practices, recycle/reuse of water and packaging materials etc. They are keen to – as understood from their respective Annual reports/Sustainability Reports/ websites – increase the intensity of the sustainability call and extend further the wings of sustainability. Their rich experience in GHG emissions control, chemicals management can prove beneficial for the MSME textile clusters in bringing about the change in mindsets and finally realize the benefits of the adoption of sustainability practices listed in this project.

Recent policies

77. The Ministry of Textiles has a large number of schemes and programmes for the textile and apparel sector. Some of the flagship schemes are Technology Upgradation Fund Scheme (TUFS), Scheme for Integrated Textile Parks (SITP), Mega Cluster, Integrated Skill Development Scheme (ISDS), etc. These have been useful and have been contributing to the increasing growth and development of the sector. For the scale and growth momentum that is envisaged, these schemes need to be scaled up substantially. They also need re-engineering and re-calibration to suit the ambitious goals being adopted.
78. The Technology Upgradation Fund Scheme [TUFS] and the Scheme for Integrated Textile Parks (SITP) both involve sizable expenditures. The government included approximately US$ 97 million for the Amended Technology Upgradation Fund Scheme (ATUFS), in the Union Budget 2019/20. This scheme seems to be helpful for industries to undertake technology upgradation (cleaner production) under the proposed India Child project.
79. PM-MITRA Parks are envisaged to help India in achieving the United Nations Sustainable Development Goal 9 ('Build resilient infrastructure, promote sustainable industrialization and foster innovation'). The scheme is to develop integrated large-scale and modern industrial infrastructure facility for entire value-chain of the textile industry. It will reduce logistics costs and improve competitiveness of Indian Textiles. The scheme will help India in attracting investments, boosting employment generation and position itself strongly in the global textile market.

Textile Cluster Development Scheme (TCDS)

80. The Ministry of Textiles is implementing Textile Cluster Development Scheme (TCDS) from 2021/22 to 2025/26 with a view to create an integrated workspace and linkages-based ecosystem for existing as well as potential textile units to make them operationally and financially viable. Cluster development model of TCDS

will bring benefits of critical mass for customization of interventions, economies of scale in operation, competitiveness in manufacturing, cost efficient, better access to technology and information, etc. The total outlay of the scheme is Rs 853 crore (103 million USD) for completing ongoing projects. (Ref. MoT annual report 2022-23; pg. no 5 para 1.6.2)

Integrated Processing Development Scheme (IPDS)

81. IPDS aims to facilitate the textile industry to meet the required environmental standards and to support new common effluent treatment plants (CETPs)/upgradation of CETPs in existing processing clusters as well as new processing parks specially in the coastal zones. The Ministry is scheme (IPDS) since 12th FYP. Based on the experience under the scheme as well as the challenges faced by the textile processing sector, the Ministry has decided to continue the said scheme with some modifications. The scheme began in 2021/22 and will continue till 2025/26 to complete the ongoing projects.

82. The primary objective of the IPDS is to facilitate the Indian textile industry to become globally competitive using environmentally friendly processing standards and technology. The scheme would facilitate the textile units to meet the required environmental standards. The IPDS would support new CETPs in existing processing clusters as well as new processing parks specifically in the area of water and wastewater management as also to promote research and development for cleaner technologies in the processing sector. Following steps are being taken by Government to enhance export (Ref MoT annual report pg no33 para 3.2).

a. Rebate of State and Central Taxes and Levies (RoSCTL): The scheme of Rebate of State and Central Taxes and Levies effective from March 2019 has been continued till 31 March 2024 for exports of Apparel/Garments (chapters 61 and 62) and made-ups (Chapter 63).

b. Remission of Duties and Taxes on Exported Products (RoDTEP): The scheme for Remission of Duties and Taxes on Exported Products (RoDTEP) has been notified by Department of Commerce for reimbursement of Central, State and local level taxes/duties/levies, which are incurred in the process of manufacture and distribution of exported textile products covered under chapters 50–60. This will lead to cost competitiveness of exported products in international markets and better employment opportunities in export-oriented manufacturing industries. The scheme is going to give boost to the domestic industry and Indian exports providing a level playing field for Indian producers in the international market so that domestic taxes/duties are not exported.

Scheme for Training and Capacity Building

83. The Ministry of Textiles is implementing demand-driven and placement-oriented skilling programme called Samarth – Scheme for Capacity Building in Textile Sector – for the entire value chain of the textiles sector (excluding spinning and weaving in the organized sector which are being trained under Pradhan Mantri Kaushal Vikas Yojana). The training programme and course curriculum have been rationalized keeping in view the technological and market demand status of the domestic and international economies. Samarth was initially approved for implementation from 2017/18 to 2019/20 on 20th December 2017.

Key system drivers and opportunities for sustainable textile chain management in India

84. Based on the global environmental problems, system description and national baseline, several key drivers and opportunities exist for textile management in India. Some of them are as follows: (i) regulatory framework, (ii) consumer awareness, (iii) collaboration, (iv) technology and innovation, (v) supply chain transparency, (vi) capacity building and education, (vii) circular economy initiatives, and (viii) financial incentives and investments.

a. There are opportunities to formulate, implement and enforce stringent regulations regarding the use of hazardous chemicals in textile manufacturing, which can be a significant driver for chemical change management across the sector supply chain. Compliance with international standards and benchmarks can create opportunities for aligning Indian textile practices with global sustainability standards. REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) mandates exporters from India to ensure that products do not contain harmful substances listed under REACH, necessitating manufacturers to reduce or stop using such chemicals (such as ZDHC). European Union regulations mandate the use of only certain chemical substances, which can be a driver and opportunity for Indian textile exporters.

b. Increasing awareness among consumers about environmental and health impacts of hazardous chemicals in textiles can drive demand for sustainable products. This creates opportunities for eco-friendly practices and brands that offer safer alternatives.
c. Collaboration among stakeholders such as central ministries/state government departments, pollution control boards, industry associations, brands, and NGOs can drive innovation and best practices for sustainable textile production. Partnerships can facilitate knowledge-sharing, technology transfer, and collective action towards eliminating hazardous chemicals from the supply chain.
d. Investing in technology and innovation and their demonstration of alternative processes and efficient processes can lead to the development of safer and more sustainable textile production methods. Enormous opportunities exist for technologies for cleaner production – reduced energy use, reduced chemical use, waterless dyeing and other water minimizing technologies, waste reduction alternatives – which can reduce reliance on hazardous chemicals.
e. Enhancing transparency across the textile supply chain can help identify areas of improvement and track the use of hazardous chemicals from raw material to finished product. Implementing traceability through ecolabels and certifications can provide assurance to consumers and facilitate informed decision-making.
f. Training and capacity building of textile workers, women, suppliers/service providers, manufacturers, consultants/advisers and bankers on sustainable practices and chemical management can foster the culture of responsibility and compliance. Education initiatives can raise awareness and sensitize stakeholders on the importance of sustainable textile production and encourage adoption of best practices.
g. Promoting circular economy principles such as recycling, upcycling and extended producer responsibility can minimize waste generation and reduce the environmental footprint of the textile industry. Opportunities exist for developing systems for textile recycling and establishing take-back programs for end-of-life garments.
h. Financial incentives, investments, tax incentives for companies that invest in sustainable practices can accelerate adoption of environmentally friendly technologies and processes. Access to green credit and investment in sustainable supply chain projects can also drive positive change.

85. Gender dimensions in the textile value chain in India: The garment sector is a key entry point for women entering the formal economy, bringing with it unprecedented opportunities for advancing women's economic empowerment. Women represent one of the largest pools of untapped talent for manufacturers, and closing the gender gap in manufacturing is the key to businesses' ability to evolve and expand. Yet, many opportunities are not yet realized. Women are underrepresented in leadership positions and their voice is largely absent from relevant decision-making and social dialogue processes.
a. India ratified the CEDAW in 1994 with two declaratory statements and a reservation. CEDAW has contributed to legal reforms, increased awareness, and advocacy for women's empowerment with laws pertaining to sexual harassment at workplace and maternity benefit amendment. Other legal provisions for women include the Wages Act and the Occupational Safety, Health, and Working Conditions Code.
b. The gender gaps identified were (i) systemic inequalities, (ii) no practice of collecting sex disaggregated indicators, (iii) pay equity gap in lower categories of employment, (iv) inadequate skills to move up to higher job categories and (v) no exposure to technological innovations in production.
c. Historically, manufacturing has been a male-dominated industry, and gender stereotypes and biases have contributed to the limited representation of women in the sector. Women often face barriers to entry, including limited access to education and training, as well as cultural and societal pressures that steer them away from such traditionally male-dominated fields.
d. The gender action plan would positively and directly impact 24,000 women, indirectly impact 48,000 women over the six-year project period. It would additionally directly and indirectly impact 12,300 unskilled male migrant labor. It would also address inequalities faced by vulnerable, unskilled, migrant, male, labor. The implementation of this gender action plan in combination with other commitments would ensure availability of a large workforce with higher skills and happier, healthier employees. It would make the 400 units directly targeted by the project compatible with GEF requirements.

e. The gender goal of the project is 'Women enabled to be the architects as well as the beneficiaries of efforts to build a cleaner apparel fashion chain in India'. The benefits of the outputs of this gender action plan and the number of women and migrant men are (i) reduced systemic inequalities in work places (4800 women), (ii) increased capacities of women to participate and become beneficiaries of cleaner production (18,000 women and 11,900 men, (iii) improved women-led behavioral changes in sustainable and less consumption (50 influential women trigger behavior change) and (iv) emergence of women's leadership in new business opportunities in 9Rs (30 women-led startups employ 1200 women and 400 men).

Barriers to advances to eliminate hazardous chemicals from the apparel fashion supply chain in India

86. Several barriers hinder the elimination of hazardous chemicals from the apparel fashion supply chain in India. They are listed below.

a. Policy and regulatory barriers: There are limited policies/regulation on the efficient use of resources, limit/ban on hazardous chemicals use in the Indian textile sector. For example, there is no specific policy or regulation in India at present with respect to PFAS controlling or limiting its use, production, disposal etc. The current regulatory status in India with regard to a few POPs chemicals of relevance to textile sectors is given below (Table). Where a policy exists, enforcement can be weak, allowing non-compliant practices to persist. Nevertheless, the MOEFCC designated research institutions and other researchers have been monitoring and reporting occurrence of PFAS and other POPs chemicals in several different environmental matrices. However, the sources of these POPs chemicals can be also from other than textile finishing applications. The policy and regulatory mechanisms have also been varying across clusters in India, for example, Zero Liquid Discharge is an essential activity for textile units in Tiruppur (on a court ruling), while it is not so in other clusters.

Table 16. POPs chemical and regulatory status in India

Sr. No.	POPs chemical	Regulatory Status in India
1	(i) Tetra- bromo Dipehenyl Ethers & penta-bromo Dipehenyl Ethers, Hexabromodiphenyl ether and (ii) hepta-bromodiphenyl ether	The Ministry of Environment, Forest and Climate Change notification which came into effect on 5th March 2018 G.S.R. 207 (E) section 3 and section 6 of the Environment (Protection) Act, 1986 (29 of 1986), read with rule 13 of the Environment (Protection) Rules, 1986, thereby passed the order to ban Tetra- bromo Dipehenyl Ethers & penta-bromo Dipehenyl Ethers, Hexabromodiphenyl ether and hepta-bromodiphenyl ether from manufacture, trade, use, import and export.
2	PFAS /PFOS	Currently India doesn't have any specific regulation and policy on Poly Fluoro Octane Sulfonic acid.
3	Decabromodiphenyl ether (DecaBDE)	Currently India doesn't have any specific policy for Decabromodiphenyl Ether (DecaBDE)
4	Phthalates	Currently India doesn't have any specific regulation and policy on plasticizers.

b. Barrier of cost: Implementing safer alternatives and technologies often requires significant investments. Particularly when lower cost options are available, they become cost of compliance. Many MSMEs may find it financially challenging to transition.

c. Awareness barriers: Stakeholders in supply chain such as manufacturers, workers, industry consultants, bankers, and demand chain – retailers, designers, and consumers do not seem to be aware of health and environmental impacts of hazardous chemicals, hindering adoption of safer practices. The lack of awareness of proven alternative methods further adds to this barrier.

d. Complex textile supply chain as barrier: The Textile supply chain is complex and fragmented. Majority of the fabrics come from domestic weaving industry or are imported, while MSMEs process them. Both synthetic and natural fibers are being used. This makes it difficult to trace and control chemical usage across various stages of production.

e. Barriers of conventional practices and resistance to change: Conventional dyeing and finishing methods depend on hazardous chemicals. In addition, the data on this is limited. Shifting away from these practices necessitates changes in processes and mindset.
f. Barriers to technologies: Many MSMEs are not aware of alternative technologies for sustainable textile production and reduced chemical use. Lack of access to such technology and credible knowledge sources also acts as barriers, particularly for MSMEs.
g. Barriers of data/information/supply chain transparency: Most units do not seem to have proper data management and are not forthcoming to share data, particularly on hazardous chemical use. This poses a challenge in supply chain transparency. It becomes more complicated with the global supply chain where accountability is even more dispersed.
h. Barriers of market: Although consumer demand for sustainable products is growing, it is not significant enough to drive widespread change and particularly in price-sensitive markets.

B. CHILD PROJECT DESCRIPTION

This section asks for a theory of change as part of a joined-up description of the project as a whole, including how it addresses priorities related to the specific program, and how it will benefit from the coordination platform. The project description is expected to cover the key elements of good project design in an integrated way. It is also expected to meet the GEF's policy requirements on gender, stakeholders, private sector, and knowledge management and learning (see section D). This section should be a narrative that reads like a joined-up story and not independent elements that answer the guiding questions contained in the guidance document. (Approximately 3-5 pages) see guidance here

Objective of the Child Project

87. The main objective of India Child Project is to eliminate hazardous chemicals from the apparel fashion supply chain in India while promoting sustainable practices and reducing environmental impacts, particularly in terms of energy and water use, and greenhouse gas emissions.

Theory of Change

88. The Child Project: The Theory of Change (ToC) of the Indian Child Project is based on the ToC developed for the Program Framework Document, and thus presents a common approach – among all the Child Projects – of the strengthened baseline significantly. The Program, including the components, and outcomes, is captured in Figure 2.

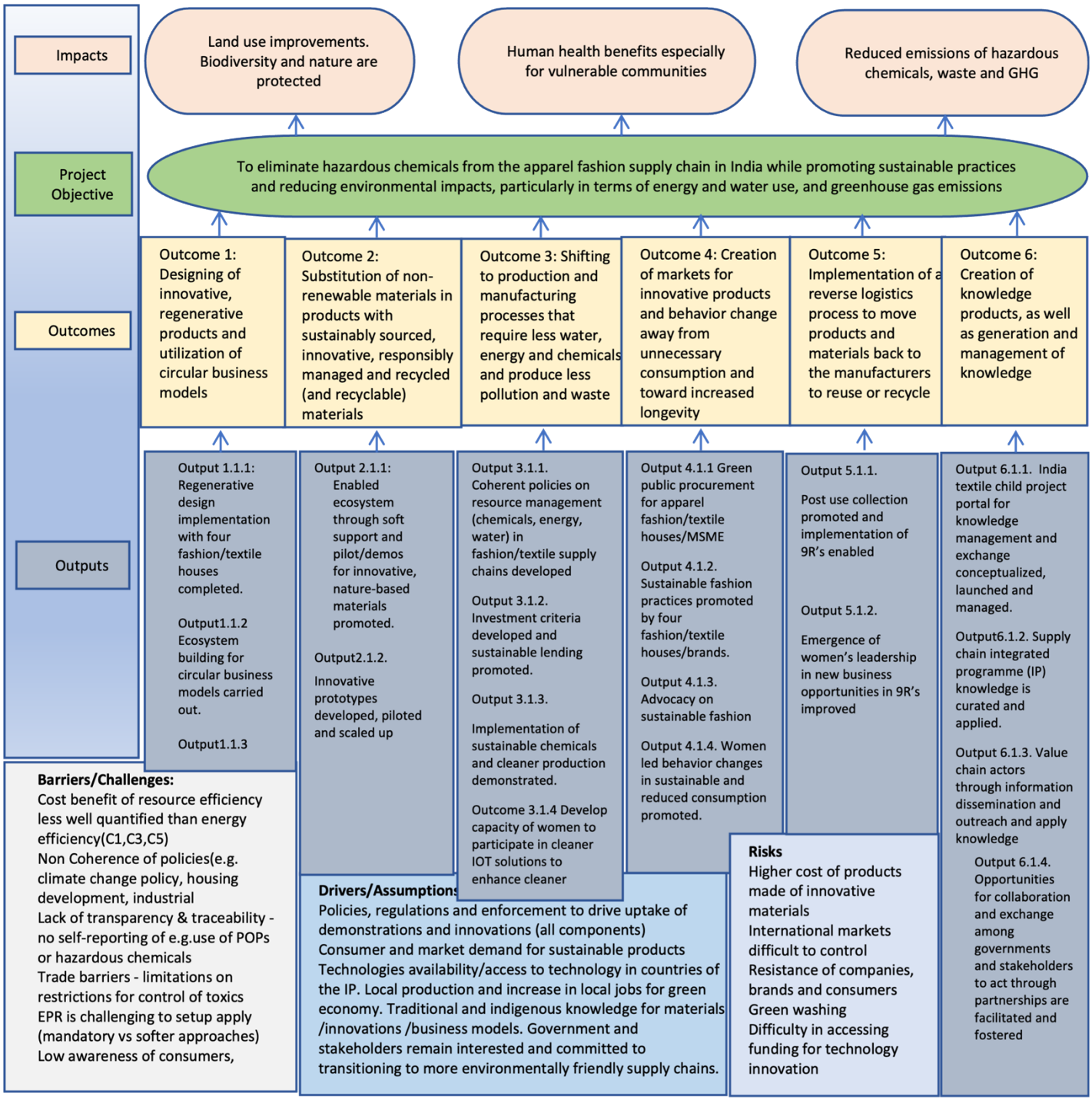

Figure 2. Theory of Change

89. The TOC shows how the anticipated impact of the Child Project with focus on the reduction of POPs and GHG is overarching the project objective to eliminate hazardous chemicals from the apparel fashion supply chain in India while promoting sustainable practices and reducing environmental impacts, particularly in terms of energy and water use, and GHG emissions and the six project components of C1: Design & Business Models - Designing innovative, regenerative products and utilizing circular business models; C2: Innovative materials - Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials; C3: Cleaner production - Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials;

C4: Sustainable consumption - Creating markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity; C5: Post-use 9Rs - Implementing a reverse logistics process which moves products and materials back to the manufacturers to reuse or recycle; and C6: - Child project knowledge management.

90. The outputs are reflecting country consultations with focus on activities, as outlined in the below project component/outcome/output description, which will enable the reduction of POPs and GHG emissions while benefiting people along selected interventions of the national textile value-chain. The transformational elements will be embedded in upstream, mid-stream and downstream elements with focus on reverting textile back to the value-chain in close cooperation with enhanced regulatory and policy enabling environmental, technical supportive interventions, including cleaner production, design and resource-efficiency aspects, extensive stakeholder consultations and national knowledge management activities which are aligning with the Global Knowledge Management Project.

Child Project Components

91. Guided by the program's Theory of Change, this Child Project will address the objective of eliminating hazardous chemical use in the textile sector in India through six components. The components, outcomes, outputs and activities are described below.

Component 1: Design and Business Models - Designing innovative, regenerative products and utilizing circular business models.

92. The Indian textile and apparel market size was estimated at around US$ 165 Bn in 2022, with the domestic market constituting $125 Bn and exports contributing to US$ 40 Bn. The market size of the industry is projected to grow at a 10% CAGR to reach $ 350 Bn by 2030. Circular business models, such as repair, resale, rental, and upcycling, are designed to keep products in circulation for longer. These models allow businesses to generate revenue from service provision and reuse, rather than from the sale of new products. Sustainable fashion brands can focus on creating high value for their business by using organic materials, eco-friendly dyes, and low waste designs. The following outcomes, outputs and activities are planned under the component.

Outcome 1.1: Designing of innovative, regenerative products and utilization of circular business models

93. The fabric industry is a dynamic and ever-evolving landscape, where trends and innovations shape our perception and interaction with various end uses. Moreover, today several emerging fabric trends showcase innovative designs that captivate fashion enthusiasts, interior decorators, and industry professionals. From sustainable textiles to digital prints and beyond, these cutting-edge developments are pushing creative boundaries and transforming the fabric industry. In an era of conscious consumerism and environmental awareness, sustainable textiles have taken the spotlight. The demand for eco-friendly materials that reduce environmental impact without sacrificing quality or style has surged. Organic cotton, banana, arecanut, coconut, hemp, and bamboo fabrics are gaining popularity due to their sustainable cultivation practices and natural properties. These fabrics offer guilt-free fashion choices for consumers seeking environmentally responsible alternatives. This outcome aims to propagate and promote innovative and regenerative products and realize global environmental benefits.

Output 1.1.1: Regenerative design implementation with four fashion/textile houses completed

94. Regenerative design in textiles products involves designing garments with the end in mind, considering their entire lifecycle from production to disposal. It also includes using eco-friendly and ethically sourced materials, prioritizing materials that have a minimal environmental impact, supporting workers and their communities. Implementation of the regenerative design will be carried out in four fashion houses and scale them up in other MSME garment sector. To achieve this output, the following activities will be carried out.

Activity 1.1.1.1. Develop green procurement policy for the private sector (fashion houses, MSME units)

95. The procurement practices encompass procurement of raw materials, machinery, packaging and distribution, operations, office components, disposals, and suppliers' engagement and services. Reviews reveal that 14% of firms are committed to implementing green procurement, purchasing Eco-Labeled machinery (7%), purchasing of energy star machinery (18%), repairing the equipment (12%), purchasing of sustainable raw materials (68%), recycled plastic products (16%), using chemicals that are not harmful to human health or environment (92%), certification of Oeko-Tex-100 (92%), GOTS, Bluesign, environment clearance from the Ministry of Environment (84%), use of bio-based packaging (16%), purchasing materials that are not harmful to human health (100%), reducing consumption through reusing or recycling (16%), reusing or recycling the used products (8%). There exists a gap between the green procurement standards and the practices the garments industry practically undertakes.

96. The activity aims to develop green procurement policies for the identified fashion houses in this project. Though some of the fashion houses have their own sustainability practices, there is room for incremental improvements and updating them, Aditya Birla policy accessed on 05/04/2024). However, such robust green procurement policy does not exist in MSME garments/domestic fashion lines in India. Though most of the fashion houses also follow the international policy of respective brands for whom they are exporting, there are limited or no such explicit procurement policies for domestic brands. The green procurement policy developed will not only be developed and revised/updated twice during the project period, as the industry is growing, and modern and sustainable methods are evolving. This activity may receive a boost by integrating with Apparel Export Promotion Council (AEPC), India; Clothing Manufacturers Association of India (CMAI) and Retailers Association of India.

Activity 1.1.1.2. Develop and Promote standards and certification for circular designs

97. The intervention focuses on establishing standards and certifications for circular designs in the fashion industry, promoting sustainability and innovation. The Central Pollution Control Board (CPCB, GOI) awards the Ecomark label to consumer goods that meet certain quality and environmental criteria. The activity includes development of standards and certification for circular designs. They will be promoted through project platform/s, workshops, training programmes, publications, and campaigns during the project period. Furthermore, the Ministry of Textiles and central/ state governments will continue to promote them.

Output 1.1.2: Ecosystem building for circular business models carried out

98. This output focuses on building an ecosystem for circular business models in the apparel fashion supply chain in India. The goal is to create a supportive environment for adopting circular practices like designing regenerative products and promoting circularity. This involves engaging stakeholders, providing training, advocating for supportive policies, supporting innovation, and facilitating collaboration. By implementing these activities, This Output aims to enable the adoption of circular practices, contributing to the elimination of hazardous chemicals and promoting sustainability in the industry.

Activity 1.1.2.1. Develop a policy to create an enabling environment for circular business models and eco-designs

99. Circular business models aim to minimize waste and maximize value creation by designing, producing, delivering, and recovering products and services. They are based on the principles of reduce, reuse, and recycle. An environmental policy can be a powerful tool for driving the transition to a circular economy. The circular economy can help reduce the use of natural resources, limit biodiversity loss, and reduce greenhouse gas emissions The activity aims to develop a comprehensive policy for creating an enabling environment (incentives, supporting circularity and eco-design in fashion) for enhancing circular economy in the textile & fashion sectors. One comprehensive policy with multiple elements will be the output and it will focus on effective use of pre and post-consumer waste. The policy would have a gender focus. It would ensure that the differentiated needs of women workers especially relating to wages, maternity benefits, human rights violations,

work place harassment and equal opportunities for women led enterprises are not negotiable in the ecosystem built.

Activity 1.1.2.2. Develop tax incentive models for encouraging adoption of circular business models developed
100. The activity aims to develop models of tax incentives for circularity in fashion, rewarding businesses for adopting circular practices. The standard GST rate for textile products is 12%, while 5% GST is applied if the cost of apparel and footwear is less than ₹1,000. There exist no tax incentives for sustainable textiles as of now in India. The activity aims to reduce environmental impact and promote sustainability through fiscal incentives, stimulating innovation and compliance.

Activity 1.1.2.3. Provide green credit/loan provided for circular business
101. The activity aims to develop criteria and other back-end templates to the banks to enable them to give green credit/loan to fashion/textile houses. The activity proposes to obtain Ecomark for 20 fashion/textile houses to whom four banks provide green credit/loan to the tune of Rs 50 crore (6.4 million USD) by Mid-term. The banks will provide an additional Rs 50 crore (6.4 million USD) to 20 more fashion/textile houses by end of project.

Activity 1.1.2.4. Develop capacity building modules and capacity building for the industry/designers on regenerative design
102. The Ministry of Textiles (MoT), Government of India, has introduced a new scheme titled 'Scheme for Capacity Building in Textile Sector (SCBTS)' which is also called 'Samarth'. Samarth is launched with a view to transforming the unskilled manpower to skilled workforce in various sectors such as garment, knitting, processing, manmade and synthetic fibers and other unorganized textile sector including traditional sectors like jute, silk, handloom, handicraft and carpet by running certified skill development programmes in these sub-sectors across the country. The scheme has a physical target of training 10 lakh (1 million) persons (9 lakh persons in organized and 1 lakh persons in traditional sectors) over a period of 3 years (2017–20). The Samarth scheme has a high focus on skilling women. Technical skill sets targeted at women would be included and offered.
103. The activity under this Child Project aims to develop educational modules and workshops on regenerative design for fashion professionals, aiming to raise awareness, promote best practices, build skills, and encourage innovation. It addresses the importance of avoiding the use of hazardous chemicals and environmental degradation by empowering professionals to adopt sustainable practices, with assumptions including engagement willingness and risks related to resistance and resource constraints. The educational modules would be developed with a gender lens. As far as possible there would be equal representation of men and women as speakers, panelists in workshops.

Output 1.1.3: Systemic gender inequalities in workplaces reduced
104. This activity focuses on addressing systemic inequalities in workplaces in the apparel fashion supply chain in India. Through activities such as gender analysis, capacity building, gender-responsive design, promoting equal opportunities, and monitoring and evaluation, the project aims to create a more inclusive and equitable environment. By integrating gender considerations into the design and implementation of innovative products and circular business models, the activity seeks to promote diversity, address existing inequalities, and contribute to the elimination of hazardous chemicals while promoting sustainability in the industry.

Activity 1.1.3.1. Create awareness among women on decent work deficits and mobilize pay equity between men and women for similar work results
105. There is some disparity between decent work as understood by UNIDO/GEF and the current practices. These include men and women hired by contractors and posted in textile units. This denies the women their legal rights as employees, especially maternity benefits, creches, good diet as mandated by law. Some tasks that would be carried out are (i) awareness raising by women lawyers (ii) conversations with industry associations about their duties and obligations. It is expected that because of this activity the benefits to women workers

would increase, they would be able to contribute to the profitability of the unit and the dropout among women employees would reduce.

Activity 1.1.3.2. Sensitize textile MSME, fashion houses and other stakeholders about benefits of implementing decent work protocols

106. This activity focuses on sensitizing textile stakeholders and fashion houses in the Indian apparel fashion supply chain about the advantages and effectiveness of implementing decent work protocols. This involves conducting stakeholders' meetings, seminars, and industry forums to discuss the benefits of fair and inclusive work practices. This activity would carry out advocacy for supportive policies and monitor implementation of these protocols. An appropriate Gender compliance manual/ Gender toolkit will be prepared and shared with MSMEs so that it acts a guide to implement Gender in their respective industries.

Activity 1.1.3.3. Initiate dialogues and discussions leading to consensus building among relevant stakeholders about pay equity between men and women for similar work

107. Gender stereotyping in the textile and apparel sector is the norm. The percentage of women employees in the readymade garments sector is high and it is low in processing and technical textiles for example. Pay equity is a complex issue especially with migrant and contractual labor. With the introduction of cleaner production, more automation/mechanization is expected. Women's work is mostly not related to machines. There is a serious threat of women being rendered redundant in the process of industry modernization. The activity would focus on the issue of men and women doing similar work involving management and labor. Women would be encouraged to change their job description, participate in skilling, and be introduced into operating machines and other male-dominated operations. With an increasing number of women moving to male-dominated jobs, the issue of pay equity for similar work would then have to be negotiated for women and by women who transition to higher and different job categories. The project would support such a transition and support women in addressing pay equity issues.

Activity 1.1.3.4. Mid-term and end-term survey carried out on reduction in decent work deficits, pay parity and women moving to higher job categories

108. This activity would initiate mid-term and end-term surveys to track the delivery and the impact of the gender mainstreaming processes. Specifically, it would track sex disaggregated data collection, gender balance, gender bias and gender disparities in the mid-term survey. This would be carried out through multi-stakeholder data collection and key individual interviews. The mid-term survey would recommend course correction, if required. The end-term survey would capture the impact of the project on women, vulnerable migrants and on the sector overall. The recommendations of the end-term survey would institutionalize gender mainstreaming and it is expected that it would leave a lasting impression on the way gender is understood by the sector.

Component 2: Innovative Materials - Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials

109. This component focuses on transforming materials used in apparel fashion production in India. By replacing non-renewable materials with sustainably sourced and recycled alternatives, the project aims to improve resource efficiency and minimize the use of hazardous chemicals from the supply chain, aligning with circular economy principles. Through activities such as material evaluation, innovation promotion, capacity building, and market development, Component 2 seeks to drive the adoption of sustainable practices in the apparel fashion industry. Ultimately, it aims to create an environment conducive to the widespread use of innovative and responsibly managed materials, contributing to a safer and more sustainable fashion supply chain in India.

Outcome 2.1: Substitution of non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials

110. This outcome focuses on substituting non-renewable materials in the apparel fashion supply chain in India with sustainably sourced, innovative, responsibly managed, and recycled materials. Through activities such as material identification, innovation promotion, capacity building, and market development, the project aims to reduce the environmental footprint of apparel fashion production and minimize the use of hazardous chemicals. Ultimately, Outcome 2.1 contributes to promoting sustainability and circularity in the fashion industry while aligning with the broader objective of eliminating hazardous chemicals from the supply chain.

Output 2.1.1: Enabled ecosystem through soft support and pilot/demos for promoting innovative, nature-based materials

111. This output aims to create an enabling environment for the adoption of innovative, nature-based materials in the apparel fashion supply chain in India. This is achieved through soft support initiatives, pilot demonstrations, stakeholder engagement, and knowledge sharing. The goal is to showcase the feasibility and benefits of using sustainable materials, thereby encouraging their wider adoption, and contributing to the elimination of hazardous chemicals while promoting sustainability in the industry.

Activity 2.1.1.1. Develop guidelines for sourcing innovative materials

112. Sustainable sourcing is (i) looking for suppliers with certifications like OEKO-TEX, GOTS, Bluesign, the Better Cotton Initiative (BCI) or others, which demonstrate a commitment to ethical sourcing and eco-friendly practices; (ii) ask details about the fabric's article or item number, weight, lab testing, and construction, fabric quality and (iii) looking for manufacturers producing eco-friendly home textiles (organic cotton eliminates the use of toxic fertilizers and pesticides, protecting the environment and farmers' health). This activity aims to establish criteria and develop guidelines for sourcing sustainable materials in apparel fashion. It promotes innovation, transparency, and accountability in material sourcing, addressing hazardous chemical use and environmental impact.

Activity 2.1.1.2. Develop supplier reporting tools/self-assessment methods for sustainable/innovative textiles

113. Supplier reporting tools can help organizations identify potential risks, monitor compliance, and improve supplier performance. Some tools that can help with supplier reporting include: Supplier management software, Supplier relationship management (SRM) software, Supplier data management, Supplier scorecard, and GEP SMART. This activity aims to develop reporting tools for textile suppliers particularly to track sustainable material usage, promoting eco-friendly practices. Solutions include software/templates, training, and integration with supply chain systems. It addresses unsustainable textile production, relying on supplier participation, accurate data, and managing resource constraints for success. It is assumed that self-reporting practice can enhance visibility of use of innovative materials by the suppliers and hence they will adopt the developed tools. Suppliers' fear of delicacy and losing confidentiality could be a risk.

Activity 2.1.1.3. Fashion brands/garment industry engage with MSME/FH in extraction of natural /viscose fiber from waste biomass (banana, areca, etc.)

114. Both banana and arecanut are cultivated in India. As per recent data, banana is cultivated on 110,000 ha of land in Maharashtra, Andhra, Tamil Nadu, Karnataka, and Kerala states, while arecanut cultivation in 770,000 ha land mostly occurs along western ghats regions including Tamil Nadu, Karnataka, and Kerala states in the southern part of India and north of West Bengal. About 78% of arecanut production happens in Karnataka. About 60 tons/ha of banana waste biomass is generated, while 5.0 ton/ha of arecanut waste (waste husk) is generated. In both cases, the fiber quantity varies from 0.40–0.60 ton/ha. The combined potential of fiber production is 500,000 tons annually. Currently, a large proportion of this waste is either left to decompose naturally or burnt off. Burning can cause serious air pollution in the neighborhoods. Some small-scale value addition practices happen for making areca leaf plates, mats, etc. Banana fiber blended fabrics/articles are also showcased by some highly staggered efforts by a few entrepreneurs.

115. However, the fiber extraction from banana and arecanut biomass waste is currently low. There is a need to facilitate and accelerate fiber extraction capacity so that a substantial amount of cotton can be substituted. The sector is highly disaggregated and family centered at present. The sector may face supply vs demand issues,

but given an increased demand by garment manufacturers driven by consumer interest in sustainable products, this industry can rise to extract natural fibers and contribute to value addition. Through this project, it is proposed to support the small firms engaged in fiber extraction with technology/equipment, e.g., automatic banana/areca fiber extracting machines.

116. In India, cotton farming uses chemical pesticides @ 0.60 kg pesticides/ha to produce an average 0.47 tons of cotton/ha. That is, 1.2766 kg pesticide/ton of cotton produced. The pesticides consumption in India is lower than the global average 1.80 kg pesticides/ha for cotton production (https://www.soilassociation.org/media/11662/coolcotton.pdf) as farmers here practice integrated farming. Thus, by substitution of cotton with banana and arecanut fibers (1,000,000 tons), it is possible to eliminate about 1,275 tons of pesticides in 4 years accounting for reduction in the POPs emissions into air.

117. These fibers may be beneficially converted into fabrics, optionally blending with cotton. Thus, these natural fibers have a combined potential to substitute 500,000 tons of cotton yearly. It is proposed to substitute 50% of the total potential (250,000 tons/year) and about 1,000,000 tons/4 years. The intervention may require two years from the beginning of the project to realize the proposed cotton substitution potential. About 10 MSME units produce 250,000 tons of natural fibers by mid-term and 30 MSMEs produce 750,000 tons of natural fibers by the end-term.

118. The banana/areca waste biomass can also be used for manufacturing Viscose fiber. This is an innovative fiber. Birla cellulose fiber Division of the Aditya Birla group has expressed interest in manufacturing Viscose fiber using waste biomass. They may target 5% of the units for Viscose Staple Fiber (VSF) production (about 3,500 TPD) to derive waste biomass from banana and Areca origin. 1 Fashion House (fiber division) will attain 2% viscose fiber production to be met from biomass waste by mid-term, and 5% (cumulative) by the end of the project.

119. In India, cotton farming uses chemical pesticides @ 0.60 kg pesticides/ha to produce @ avg 0.47 tons of cotton/ha Thus, by substitution of cotton with banana and arecanut fibers (1,000,000 tons), it is possible to eliminate 1,275 tons of pesticides in 4 years accounting for reduction in the POPs emission into air. It may be inferred that the project may contribute to the following targets of the Kunming-Montreal Global Biodiversity Framework (CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY , Fifteenth meeting – Part II, Montreal, Canada, 7-19 December 2022 , Agenda item 9A):

Target 2 (Bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while ensuring their restoration and sustainable use). The project's focus on promoting sustainable land management practices and reducing pesticide use in cotton farming could contribute to the conservation and restoration of ecosystems and reduce the loss of areas of high biodiversity importance;

Target 3 (Ensure that at least 30 per cent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories and practices, as applicable, by 2030). The project's potential impact on reducing pesticide use and promoting sustainable land management practices could indirectly contribute to the effective conservation and management of terrestrial areas, particularly those important for biodiversity;

Target 7 (Reduce pollution risks and the negative impact of pollution from all sources, by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, including by reducing excess nutrients lost to the environment by at least half, pesticides by at least two thirds, and eliminating the discharge of plastic waste by 2030, and by reducing the overall risk from pesticides and highly hazardous chemicals by at least half including through sound management of chemicals and waste and preventing, reducing, and working towards eliminating pollution from excess nutrients, biocides, plastic waste, and other sources). The project's focus on eliminating hazardous chemicals from the textile supply chain and promoting cleaner production practices directly contributes to reducing pollution risks and the negative impact of pollution on biodiversity and ecosystem functions. The project's efforts to reduce pesticide use in cotton farming also align with this target.

Target 10 (Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through integrated pest management, agroecological and other innovative approaches contributing to the resilience and long-term efficiency and

productivity of these production systems, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services, by 2030). The project's focus on promoting sustainable practices in the textile industry, including the use of sustainable materials and cleaner production techniques, aligns with this target. The project's potential impact on reducing pesticide use in cotton farming also contributes to the sustainable management of agricultural areas.

120. Currently, these fibers are extracted manually engaging more women labor, with production capacity below 3–5 kg/day/person. This activity envisages that the existing small firms engaged in extraction of banana/arecanut fibers be supported with automatic fiber extraction machines, motivating them to produce more quantity of fibers per day in the range 1–4 tons per day. The financial support is proposed to be extended to MSME firms each engaged in banana and arecanut fiber extraction activity. Furthermore, the Ministry of Textiles and its functioning arms across India can be potential stakeholders under this activity and to convince garment brands to support and purchase more natural fiber-based fabrics from the small firms, which will have a multiplier effect on the productivity of the identified natural fibers.

Activity 2.1.1.4. Develop guidelines for sustainable/innovative investment criteria and leverage lending

121. This activity focuses on developing guidelines for sustainable and innovative investment criteria to promote the adoption of nature-based materials in the apparel fashion supply chain. These guidelines emphasize the use of sustainably sourced materials, environmental sustainability, social responsibility, innovation and technology, financial viability, and stakeholder engagement. By establishing clear criteria and involving relevant stakeholders, the activity aims to facilitate the transition to more environmentally friendly and socially responsible practices in the fashion industry.

Activity 2.1.1.5. Engage credit institutions engaged for providing green credit/loans

122. Credit institutions offering green credit/loans aim to defend the environment and preserve natural resources while creating value. It is also called ethical banking or sustainable banking. Gender aspects would be incorporated into discussions with credit institutions to ensure higher participation of women led enterprises in promoting nature-based solutions. Some examples include softer loans for green buildings and financing electric vehicles. There is a need for mobilizing credit institutions to consider sustainable textile categories in order to finance the industries engaged in this business. This activity engages credit institutions to offer green credit/loans, incentivizing sustainable practices and eco-friendly materials in apparel fashion supply chains. It fosters partnerships, conducts awareness/sensitization programs, to encourage credit institutions to provide green credit. The intervention assumes cooperation from credit institutions, business participation, and market demand for sustainable products.

Activity 2.1.1.6. Encourage buyers to purchase innovative material products at higher premiums from suppliers/industry

123. Some ways to encourage buyers to purchase garments at higher premiums from retailers: (i) Create a personalized shopping experience by improving in-store services and streamlining the payment process; (ii) Optimize website for mobile (this can improve the user experience and lead to higher conversion rates and sales); (iii) Conduct promotion programs (many clothing store chains launch sales promotion campaigns like sales-off, buy 1 get 1, and Black Friday); (iv) Use email marketing (showcase items frequently purchased together, offer a list of similar products, or provide special discounts for future purchases); (v) Host an event (get people excited with the promise of a unique event. Make it even more irresistible with raffles, giveaways, or other freebies); (vi) Use influencer marketing approach to help sway the buying decisions of consumers in favor of a product. For example, create buzz or chatter about the brand and attract the attention of the users interested in the product.

124. Encouraging buyers in fashion to invest in sustainable materials at a premium incentivizes suppliers towards eco-friendly practices. This intervention addresses hazardous chemical use in the supply chain by shifting demand to sustainable materials. Assumptions include buyer commitment for innovative products, market demand, and supplier capacity, crucial for its success. This intervention targets enhancing buyer

awareness (and readies them to purchase at higher premium) by holding 'experience centers' during textile expos in India jointly with brands. The activity aims to influence 100 buyers at the end of mid-term and 1250 buyers by the end-term. It is possible that buyers may go by market trends and do not get attracted to innovative products.

Output 2.1.2: Innovative prototypes developed, piloted and scaled up

125. There are some individual manufacturers of fashion articles using innovative materials (e.g., banana and areca) across some States in India. However, they often face stiff resistance from the consumers/buyers as they are not fully aware of the durability of the article (being natural is considered as vulnerable for quick damage) and withdraw interest in the article. Moreover, there are issues related to absence of small, medium scale fiber extraction/manufacturing in India.

126. This output focuses on developing prototypes and conducting pilot demonstrations of sustainable materials in India's apparel fashion supply chain. The aim is to showcase the practical application and scalability of these materials, aligning with the goal of substituting non-renewable materials with sustainable alternatives to eliminate hazardous chemicals. Through activities like prototype development, pilot demonstrations, scaling up initiatives, and monitoring, the output aims to promote the adoption of innovative/natural materials, ultimately contributing to sustainability and hazardous chemical elimination in the industry. Fashion brands and other individual manufacturers of garments using innovative materials will be engaged in developing the prototypes, scale it up and replicate them across the garment industry, while they responsibly source the natural fibers extracted from the banana and arecanut biomass waste from the respective disaggregated small firms engaged in fiber extraction.

Activity:2.1.2.1. Implement innovative prototypes and use of existing knowledge

127. Natural fibers, recycled polyester, nanotechnology, conductive materials, waterless dyeing techniques, bio-based materials, biodegradable dyes, are a few examples of innovative materials intended for textiles. A related prototype is an early version of a textile product from which future versions will be developed. Prototyping typically includes the specific hardware, fabric, and specifications of the final design, all the way down to the types of stitching used on every seam. Both physical and digital prototypes can be made. This intervention focuses on implementing prototypes of sustainable materials and leveraging existing knowledge to promote their adoption in apparel fashion supply chains by using either physical or digital prototyping methods. It addresses hazardous chemical use by showcasing eco-friendly options, relying on industry buy-in and successful pilot projects, while acknowledging risks like technical feasibility and market demand.

Activity:2.1.2.2. Implement pilot/demonstrations on innovative materials

128. Promoting the use of natural fibers (banana, areca) is targeted. Garment prototypes that deploy banana and bamboo already exist in the Indian market. Arecanut fiber/leaf-based articles are also available. It is proposed to make 5 pilot demos/prototypes by mid-term and 10 (cumulative) by the end of the project. Partial finance may be provided for prototype designers and scaleup and execution of the innovative materials. Pilot demonstrations would be implemented preferentially in women led enterprises, Women designers' perspectives would be included in design, of innovative materials.

129. Natural fibers, recycled polyester, nanotechnology, conductive materials, waterless dyeing techniques, bio-based materials, biodegradable dyes, are a few examples of innovative materials intended for textiles. This intervention conducts pilot projects and demonstrations to test sustainable materials in fashion supply chains, aiming to scale up successful prototypes. The activity on natural fibers aims to have 10 pilots by mid-term and 30 pilots by the end of the project. It addresses elimination of hazardous chemicals by promoting sustainable alternatives.

Component 3: Cleaner Production - Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials

130. Component 3 focuses on implementing cleaner production practices in the apparel fashion supply chain in India. This involves making interventions of energy efficiency, electricity through solar photovoltaics and concentrating solar heat to meet heat application, promoting process innovation to minimize hazardous chemical use, reducing water use, and integrating cleaner practices throughout the supply chain, ensuring compliance with environmental standards. By doing so, the project aims to demonstrate the reduction of the environmental footprint of the industry, eliminate hazardous chemicals, and promote sustainability.

Outcome 3.1: Shifting to production and manufacturing processes that require less water, energy and chemicals leading to less pollution and waste generation.

131. This outcome focuses on transitioning production and manufacturing practices in the apparel fashion supply chain in India towards greater sustainability and environmental responsibility. This involves optimizing processes, improving resource efficiency, substituting materials with lower environmental impact, reducing pollution, ensuring compliance with standards, and building capacity within the industry. By implementing these strategies, the project aims to reduce the environmental footprint of the industry, minimize hazardous chemical use, and promote cleaner, more sustainable production methods. This outcome is expected to be achieved through the outputs/activities to develop coherent policies, reviewing regulations and recommend appropriate revisions/newer ones encouraging cleaner production; create an atmosphere for green lending, and help some factories to implement cleaner production methods.

Output 3.1.1: Coherent policies on resource management (chemicals, energy, water) in fashion/ textile supply chains developed

132. This output focuses on developing coherent policies for resource management in the fashion and textile supply chains in India, specifically addressing chemicals, energy, and water usage and waste generation. The project will conduct policy analysis, engage stakeholders, develop policies, provide capacity building, advocate for policy adoption, and establish monitoring mechanisms. Gender perspectives would be included in the coherent policies developed. These efforts aim to promote sustainable practices and facilitate the shift towards cleaner production processes, ultimately reducing the environmental impact of the industry.

Activity 3.1.1.1. Review of schemes and guidelines of different central ministries/state departments/for cleaner production

133. Cleaner production practices (CPP) are a continuous preventive environmental strategy that can be applied to products, services, and processes to increase efficiency and reduce risks to the environment and humans. The Central Pollution Control Board (CPCB) has a charter for water recycling and pollution prevention in textiles (https://cpcb.nic.in/ngrba/charter_textile.pdf#:~:text=in%20last%20decade%20Indian%20textile%20industry%20has,and%20specific%20effluent%20generation%2C%20issues%20of%20technological, accessed on 06/04/2024). The charter has demonstrated and implemented cleaner technology and waste minimization practices. The current regulations/laws/permits require review from the perspective of cleaner production. The intervention involves reviewing regulations to align fashion/textile production with cleaner practices, aiming to reduce pollution, chemical usage and foster better waste management practices. It assesses current regulations, identifies gaps, and proposes regulatory and policy enhancements. Success hinges on government's priority, industry compliance, and effective enforcement to achieve sustainability goals in manufacturing processes.

Activity 3.1.1.2. Build the capacity of government officials on cleaner production

134. Pollution control boards conduct regular capacity building programs in various aspects of prevention, abatement and control of pollution, waste minimization, cleaner production technologies, new guidelines and acts, and also conduct on-site training. The technical, non-technical and scientific personnel are trained in specific areas for their skill up-gradation and to enhance capacity building in the Board. The intervention aims to enhance enforcement of cleaner production regulations in the fashion/textile industry by providing training, resources, and support to government officials. It addresses pollution, waste management, fossil fuel use, and chemical use, assuming government commitment, industry cooperation, and overcoming capacity constraints.

Success hinges on effective enforcement and resource allocation. It targets imparting capacity to 100 officials initially (mid-term) and 250 officials by the end of the project.

Activity 3.1.1.3. Provide support for supplier reporting (reporting tools or self-assessment)

135. Supplier reporting tools can help organizations identify potential risks, monitor compliance, and improve supplier performance. Some tools that can help with supplier reporting include: Supplier management software, Supplier relationship management (SRM) software, Supplier data management, supplier scorecard and GEP SMART. This activity aims to develop reporting tools for textile suppliers particularly to track sustainable material usage, promoting eco-friendly practices. Solutions include software/templates, training, and integration with supply chain systems. The intervention establishes a system for supplier reporting in fashion/textile supply chains, using reporting tools or self-assessment methods to track resource management practices. It aims to enhance transparency, identify areas for improvement, and drive reductions in pollution, waste, fossil fuel, and chemical use, assuming supplier participation, accurate data, and capacity building. It is aimed to launch one tool and target its use by 100 suppliers at mid-term and 320 suppliers at the end term. Self-reporting practice can enhance visibility of use of cleaner production by the suppliers and hence they will adopt. On the other hand, suppliers may be afraid of sensitivity and losing confidentiality if they adopt reporting practice.

Output 3.1.2.: Investment criteria developed and sustainable lending promoted

136. This output seeks to encourage financial institutions and investors to prioritize environmental and social sustainability and gender representation when providing funding to businesses in the apparel fashion supply chain. By engaging stakeholders, developing guidelines, building capacity, creating incentives, fostering partnerships, and establishing monitoring mechanisms, the project aims to drive the adoption of sustainable lending and investment practices. This output is achieved through appropriate activities of developing criteria for lending, incentives provided by the brands to their suppliers encouraging them to adopt cleaner production methods, engaging financing institutions to consider green credit, etc.

Activity 3.1.2.1. Develop criteria for sustainable lending and investments developed

137. The activity involves developing criteria for sustainable lending and investments in the apparel fashion supply chain. These criteria prioritize projects that reduce hazardous chemicals, enhance resource efficiency, prevent pollution, promote sustainable materials, adhere to social and environmental standards, ensure financial viability, and engage stakeholders. The lending agencies would be encouraged to include additional criteria for sustainable lending and investments to women led enterprises. By establishing these guidelines, financial institutions can support cleaner production and hazardous chemical elimination, contributing to environmental and social sustainability in the fashion industry.

Activity 3.1.2.2. Brands provide financial incentives to suppliers with cleaner production technologies

138. Brands that are keen to promote cleaner production technologies in the textile sector can incentivize their suppliers through financial resources and institutional resources. The intervention incentivizes suppliers in the fashion/textile industry to adopt cleaner production technologies through financial rewards and support from brands. By motivating suppliers to invest in sustainability, it addresses pollution, waste, fossil fuel, and chemical use, contingent on supplier engagement, brand commitment, and market demand for sustainable products. It targets 100 suppliers to receive incentives from brands (mid-term) and 200 suppliers at the end of the project period. It is assumed that brands are keen to promote cleaner production, while a risk can be that brands may hike product cost.

Activity 3.1.2.3. Credit institutions provide green credit/loan to manufacturers/suppliers engaged in cleaner production

139. Cleaner production aims to increase the efficiency of production lines, reducing risk to people and to the environment, using preventive environmental strategies for products, services, and processes. This activity

aims to engage credit institutions to offer green credit or loans that incentivizes manufacturers and suppliers to adopt cleaner production processes, reducing water, energy, chemical use, and waste.

Output 3.1.3. Implementation of sustainable chemicals and cleaner production demonstrated

140. Sustainable chemicals and cleaner production implementation pilots will be implemented in eight clusters consisting of manufacturers of textile chemicals/auxiliaries, fiber spinning, weaving/ knitting, chemical processing, textile processing, garment making and finishing. Impact of sustainable chemicals and cleaner production on men and women in the work force would also be a parameter to be considered in the selection of clusters. The pilots will concern (i) using and developing alternative ecological materials, such as natural fibers and natural dyes wherever feasible (ii) using less toxic chemical products, (iii) improving technical and manufacturing processes, (iv) reducing energy consumption, water use, waste reduction. This activity aims to demonstrate reduction of hazardous chemical use, water use, energy use, environmental pollution, and GHG emissions in 320 industries in eight different clusters. The relevant interventions will be carried out in all the factories to demonstrate the impact of interventions.

141. The project may explore potential to partner with experts/organizations to implement sustainable chemicals and cleaner production demonstration. The project can use the available tools, if any, to measure and implement elimination of hazardous chemicals

Activity 3.1.3.1. Implement clean energy interventions

142. Energy efficiency is the first important step in clean energy and thus this will be prioritized and will be implemented in all the 320 factories. A shift in energy use is critical to cleaner production technologies, using solar energy wherever feasible is preferred as it reduces GHG emissions significantly. Under this activity pilot demonstrations on clean energy within MSME textile clusters showcase sustainable energy solutions to reduce environmental impact. It targets 12 pilots by mid-term and 12 pilots by end of the project with over 5% reductions in GHG emissions. The key interventions are given below.

143. Through this activity, energy efficiency (EE) interventions will be carried out. The interventions will consist of measures to reduce thermal energy and electrical energy use. EE interventions will be carried out in both areas. The interventions will be customized based on a detailed energy audit and technical assistance will be provided to implement. The proposed set of interventions may include the following:

a. Thermal energy: Expected energy savings in thermal area 15% to 24%

i. Waste heat recovery from flue gas: Heat recovery systems recommended when flue gas temperature exiting the boiler is more than 200oC. Economizer, air preheater, solid fuel dryer for moist fuels (moisture above 40%), condensing economizer for gas-fired installations are recommended. It is possible to achieve flue gas temperature <100oC. Expected energy savings are 5% to 10%.

ii. Insulation: Uninsulated boiler surface and pipelines were observed during visits. Such surfaces cause heat loss and are also a safety hazard. The Child Project will push units to follow insulation guidelines available in the thermal engineering domain, wrap with mineral wool insulation from reputed manufacturers as per the recommendations and good engineering practice. Expected energy savings are 2% to 3%.

iii. Steam traps: Removes condensate from steam and enhances heat transfer in the user equipment. The expected energy savings are 2%.

iv. Condensate recovery: Feedwater preheating using process return condensate. Condensate cooling below 90oC is possible. The expected energy savings are 3%.

v. Air vents, flash steam recovery: Heat recovery from blowdown vessel flash steam. Condensate collection after heat recovery is an additional advantage. To be mixed with process return condensate and save on makeup water. Apart from heat recovery, flash steam recovery reduces water treatment cost. The expected energy savings are 1%.

vi. Instrumentation and control: Install pressure and temperature gauges on steam, water, and fuel lines. Steam pressure-based control loop for fuel firing and combustion control. Periodic verification of control instruments with dial gauges to ensure efficient operation. Combustion product measurement and air fuel ratio setting for optimum combustion. Automatic furnace draft control.

vii. Ash cleaning mechanism: Applicable for solid fuel fired boilers. Installing soot blowers – sonic/ steam/compressed air, Periodic manual cleaning (scraping) of heating surface and Water washing of heating surface during shutdown are some of the recommendations.
viii. Energy efficient burner: Applicable for oil/gas boilers, the recommended measures are modulation burner in place of burner for continuous firing, Low NOx and low excess air burner, Preheated air burner. The expected energy savings are 2% to 5%.
ix. Fuel switch/fuel blending: Improves fuel combustion. Better fuel economy with blending cheaper fuel.
x. Water preheating for boiler/processing from solar heater/concentrator: Preheating of water using waste heat/alternate energy source enhances efficiency. Typical methods are Water preheating using flue gas from boiler, using heat from flash steam, blowdown cooler, ash cooler, condensate cooler; Solar energy integration – flat plate collector, compound parabolic concentrators, Vacuum tubes; Solar steam generators – parabolic dish, Scheffler dish, parabolic trough. Linear Fresnel concentrators. The expected energy savings are 1% to 2%.
b. Savings in electrical energy: Expected energy savings is 10% to 15%
i. Replacement of conventional lights with suitable LEDs (Replace old lighting equipment)
ii. Replacement of existing fans with energy efficient super fans (Use latest BLDC fans)
iii. Optimization of light consumption using motion sensors (Automatic motion controls can be used for office rooms)
iv. Optimize the temperature setting to 24oC for Room AC (Proper temperature settings will save electrical energy) aligned to GOI policy
v. Replacement of No star ACs with 5-star ACs (High amount of electrical energy can be possible).

144. Under this activity, TA and small incentives will be provided through the project grants. The investments in EE equipment will be made by the factories. The sub-activities covered are as follows:
a. Energy efficiency
i. Baseline audit, with customized recommendations for EE interventions
ii. Handholding support to implement EE interventions
iii. Post-implementation measurements/assessments
iv. Small incentives (depending on availability of funds in project, for unproven/innovative interventions shall be prioritized).

145. The activity includes providing technical assistance to install solar photovoltaics that can generate electricity and meet the electricity requirements within the industry. It is aimed to facilitate installation of a total of 1600 kW by the end of the project period in about 16 factories (each of 100 kW). The investments will be made by the factories. Project grants will be used to
a. prepare detailed project report for establishing solar PV and
b. post-implementation assessment
146. Most factories require steam/heat in their factories for textile processing. The activity includes installation of concentrating solar heat systems in 16 factories culminating to 3200 m2 of collector area by end of the project. Most hardware investments will be made by the factories. Project grants will be provided for the following namely,
a. prepare detailed project report for establishing CSH.
b. technical assistance to implement CSH.
c. post-implementation assessment.
d. small incentives (depending on availability of funds in project, for unproven/innovative interventions shall be prioritized).
147. Technical guidance, assistance, incentives/ facilitating incentives and leveraging carbon credits will be provided to fashion houses to engage them in enhancing energy efficiency, reducing emissions through renewable energy interventions such as solar photovoltaics and concentrating solar heat systems. The details shall be depending on baseline situation gathered at the project implementation phase and need based and with approval of PSC.

Activity 3.1.3.2. Pilot/demonstrate alternative non-hazardous chemical use

148. Pilot demonstrations on reducing hazardous chemicals (Per- and poly-fluro alkyl sulfonates, PFAS) in textile production clusters are proposed under this activity. Apart from PFAS substances, it is regarded that all those textile chemicals that contain halogen atoms (e.g., PFAS, halogen-containing dyes, high performance reactive dyes, optical brighteners, halogen-containing solvents/reagents, etc.) in the chemical structure can lead to POPs generation and become target substances for elimination. To address PFAS-related challenges, companies are undertaking some of the following measures:

a. Phasing out PFAS use and seeking alternatives in products and processes.
b. Transparently labeling products as 'PFAS-free' to inform consumers.
c. Ensuring PFAS-free raw materials and components through strict procurement guidelines.
d. Investing in research for PFAS-free alternatives and technologies.
e. Responsibly disposing of PFAS-containing waste to prevent further environmental contamination.
f. Actively monitoring and addressing PFAS contamination in facilities and surrounding areas.
g. Adhering to evolving regulations related to PFAS use and reporting.

149. Eighty pilots to reduce 2625 tons of hazardous chemicals by mid-term and 320 pilots for eliminating 10,500 tons (cumulative) by the end of the project period are planned. The project implementation team would consider the gender aspects when recommending the eighty pilots. The details of intervention for reduction of hazardous chemicals (POPs emissions) are given below.

a. This activity looks towards creating an enabling environment for greater use of safer alternatives to per- & poly fluoro alkyl sulfonates (PFAS) free specialty finishes in garment/fashion sectors. There are currently no REACH-like or TSCA-like regulations for hazardous chemicals in India. However, India adopted the law on Prior Informed Consent (PIC) which sets guidelines for the export and import of hazardous chemicals.
b. The focus of this activity is on textile chemical/auxiliaries manufacturing industries across eight identified clusters in India. As they manufacture and supply chemicals to textile wet processors, the chemicals change, i.e., shifting to safer alternatives to PFAS, has to happen there. Each textile cluster has 10–15 chemical manufacturing units to meet the requirements in the cluster. Inter-cluster chemical supplies also could be there.
c. Some textile chemical manufacturing industries in India may supply formulations that are either devoid of PFAS (C8 & above) or use short-chain (5-carbon, 6-carbon) PFAS, which may be used for creating water/oil repellency on the fabric. They fulfill the functions of PFAS without any detrimental effects. Safer alternatives help in reducing POPs emissions (PAHs, Dioxins, Furans, PCBs).
d. As can be anticipated, the process of chemical change is slow and demand-driven. It requires willful participation of project implementers, chemical manufacturers, wet processors, brands/garment industries to work on the same platform to achieve the objective of the chemical change. Therefore, it is proposed that the Ministry of Textiles floats a relevant policy/directive to brands/garment manufacturers to encourage enhanced use of safer alternatives, brands raise demand for safer alternatives to PFAS, textile chemical manufacturers increase production of safer alternatives. The chemical change will happen gradually across all the sectors. The project will partially support manufacturers to enhance production capacity with technology/technical assistance.

150. Demonstration Stage: Active Chemical Change Management (CCM) will be initiated at the identified chemical manufacturers across the eight clusters (10–15 units per cluster) to allocate and eliminate PFAS from their production facilities. The entire process includes stage-wise actions; analysis of chemical inventories for harmful chemicals (names, volumes), identification of suitable and safer alternatives, guidance to chemical manufacturers to switch over to identified safer alternatives to monitor and quantify the change in chemical management (cluster level). At first, 80 MSME chemical manufacturers/units will be taken for these interventions which will result in about 25% of the target quantity (10,530 tons), which amounts to the elimination of 2625 tons of hazardous chemicals. Project implementers may set ~20% higher target (12,500 tons) to ensure attaining of 10,530 tons target within the project duration.

a. Replication stage: The intervention will be replicated in 320 MSME wet processing units resulting in further reduction of chemicals to the tune of 10,530 tons (cumulative) during the project period.

b. Demonstration stage and replication stage: In all, 400 MSME units will make interventions and eliminate 10,530 tons of hazardous chemicals during the entire project period.
c. Additional benefits: The elimination of 21,060 tons of hazardous chemicals will occur through indirect means (21,060 tons) adopting safer alternatives.

Activity 3.1.3.3. Carry out cleaner production pilots/demonstrations carried out to reduce chemicals, water and energy

151. Cleaner production implementation pilots will be implemented in eight clusters (wet processing units). Four types of wet processing technologies were identified for this purpose. Their selection was based on innovativeness, potential to reduce chemicals, water and energy, performance status of existing technologies in the field and greater good to the society (Global Environmental Benefits). This activity targets significant chemicals/water saving through implementation of (i) Ultrasound assisted wet processing, (ii) Cold pad batch dyeing technology, (iii) Air-flow jet dyeing, and (iv) Waterless dyeing (Supercritical-CO2 dyeing).

a. Ultrasonic Technology comprises retrofitting of ultrasonic technology in textile wet processing (desizing, mercerization, bleaching, dyeing, washing). This is particularly useful for water reduction in washing operations. This is a type of process intensification technology, which effectively eases the wet operations by reducing input/resource quantities and operating hours. This method uses ultrasonic power and cavitation to improve the efficiency of the processes mentioned above. The retrofit technology is available with Weber Ultrasonic and Geratex Machinery Pvt Ltd, Vadodara. Implementation of this activity can lead to reduction of 30% chemicals, 30% water, and 50% energy saving. The project also aims to make interventions in two wet processing units by mid-term and 10 interventions in wet processing units by the end of the project. The project grants will be used to support CAPEX partly. The factory will invest in the rest of CAPEX and O&M.

b. Cold Pad Batch Dyeing Machines: Cold pad batch dyeing (CPBD) is an alternative method of reactive dyeing that uses fewer resources. It is a semi-continuous dyeing process. It is mainly used in the dyeing of cellulosic fiber like cotton or viscose (knit and woven fabric) with reactive dyes. It is primarily a cold method where the dyeing temperature is 20—25 °C and uses cold to medium brand reactive dyes. A cooling system is used for cooling the dye liquid and bath also. Cold pad batch dyeing is a process that offers some unique advantages, namely, 100% salt-free, greater dye uptake, and less water pollution. The effluent released from this process is easily treatable without having to resort to advanced Zero Liquid Technologies. Thus, CAPEX/OPEX on treatment of dyeing wastewater in ETP/CETPs is within control. Several CPBD machine manufacturers exist in India: Thakore Exports, Ahmedabad; Kusters Calico Machinery Limited, Vadodara; and Bhatt Bros, Surat. The project aims to make interventions in 10 dyeing units with CPBD technology by mid-term and in 40 units (cumulative) by the end of the project. The project grants will be used to support CAPEX partly. The factory will invest in the rest of CAPEX and O&M.

c. Soft Flow - Air Flow - Jet Dyeing (AFJD) Machines: It uses high-speed airflow to push cloth through dye liquor. The dye liquor is sprayed onto the fabric in a mist form, and the air jet keeps the fabric in circulation. This reduces the consumption of water, steam energy, and chemicals. The corresponding material to Liquor (M:L) ratio is less than 1:4 , while a conventional hydraulic process operates at a ratio higher than 1.0:5.5 in soft flow jet dyeing machines. Consumption of electrical energy is marginally high but savings of auxiliaries and basic chemicals of about 40%, and >30% water saved is significant. Wintech Engineering in Surat manufactures these machines. The project aims to make interventions in 10 dyeing units with AFJD technology by mid-term and in 40 units (cumulative) by the end of the project. The project grants will be used to support CAPEX partly. The factory will invest in the rest of CAPEX and O&M.

d. Supercritical CO2 dyeing (waterless dyeing): In traditional water-dyeing technology, textiles should undergo multiple processes with the help of dyeing aids/agents, chemicals/salts, surfactants and reduction clearing agents. In contrast, for the supercritical waterless dyeing technology, only supercritical fluid is needed for dyeing and circulation, after which the pressure and temperature can be lowered and the whole process is finished, without producing any wastewater. Also, as carbon dioxide automatically detaches from textiles and remaining dyes, the latter can be reused. More importantly, as operation procedures are reduced, the dyeing cycle is also shortened from several hours to 15–60 minutes; energy is also saved due to the lower operational time and temperature. It has several advantages demonstrated, >98% dye uptake, dyes/chemicals saved,

eliminates water use and hence no polluted water generation, no additives, short process time due to high diffusion, easy separation of dye from SC-CO2 and recovery, carbon dioxide can be reused. Proven pilots were carried out by Aravind Ltd, Sasmira's Institute of Design and Textiles (SIDT,Mumbai,https://sidt.edu.in/), and The Bombay Textile Research Association (BTRA, https://www.btraindia.com/). Large-scale plants are manufactured by Dyecoo (The Netherlands) and eCO2dye (USA). Dyecoo's, Dyeox 4 machine can treat 3.0–3.5 tons of fabric or yarn per day, based on a maximum width of two meters and 160 kilos per batch and an average of 20–22 batches treated per day. The DyeOx is a 130-ton steel machine with three dye vessels that can each hold 20–200 kg, for a maximum daily capacity of 4000 kg. It uses a closed-loop system that recycles 95% of carbon dioxide after each batch, and it does not require wastewater treatment. It eliminates the need for auxiliary chemicals, such as surfactants (>50%), saves CAPEX/OPEX on treatment of dyeing wastewater in ETP/CETPs. The project aims to make interventions in 1 MSME dyeing unit with SC-CO2 technology by mid-term and in 3 MSME dyeing units (cumulative) by the end of the project. The project grants will be used to support CAPEX partly through GOI schemes for deployment of innovative and cleaner production technologies. The factory will invest in the rest of CAPEX and O&M.

152. Pilots and demonstrations focus on reducing chemical/water consumption in textile production across MSME clusters. Through this activity, pilot demonstrations will be supported in the following cases.

a. 12 Ultrasound assisted dyeing/washings
b. 40 Cold pad batch dyeing machines
c. 40 Air-flow jet dyeing machines
d. 3 waterless dyeing (SC-CO2 dyeing) units

Activity 3.1.3.4. Capacity building to implement cleaner production in the textile sector

153. The above interventions are aimed at reducing the energy, chemical, water-use needs by enhancing the capacity of different people in the textile sector to be successful. Men and women owners and 2–4 technicians (including women technicians wherever available) will be trained from the participating factories. In addition, consultants providing consultancy support to the industry will also be trained in all the 8 clusters. Relevant government officials will also be trained. Three related modules for experts/consultants/advisors to the industry. They may include certified energy auditors, certified energy managers, chartered engineers, etc. The project may partner with experts/organizations to build capacity to implement cleaner production in the textile sector.

Activity 3.1.3.5. Upgrade procedures, practices and infrastructure pertaining to Environment, Social, Health and Safety (ESHS) aspects

154. This activity is based on the Environment and Social (E&S) Assessment undertaken on this project and its recommendations. Based on E&S risks and likely impacts identified by this assessment, an Environment and Social Management Plan (ESMP) has been prepared. It is evident that the project (based on its main objectives) primarily focuses upon addressing important environmental issues confronting the textile sector such as air pollution, water consumption, and waste and effluent disposal. As a consequence, most of the project's planned activities or interventions – such as chemical-use reduction or replacement, promotion of recycling and circular economy, and reduction in energy consumption – strive to address these very issues. Therefore, the focus of this ESMP has been directed towards those aspects, which are not already covered by any of the proposed project interventions. The risk analysis undertaken during the E&S Assessment exercise has indicated that the aspects not covered by project interventions mainly fall in the realm of Environment, Social, Health and Safety (ESHS). This is along expected lines as most textile industries happen to belong to the MSME sector, where considerable weakness in the ESHS aspects is apparent.

155. Consequently, the focus of this activity lies on (a) enhancing the quality of all proposed project implementation activities from the ESHS angle, (b) fostering reforms or improvements in the ESHS aspects of 320 units earmarked for launching various pilot demos under this project and (c) establishing futuristic management systems which will track infrastructure such as solar PV coming up in the project and ensuring that the resulting E-waste is optimally disposed of at the end of its productive life. ESHS reforms will be

instituted by way of guiding the selected units in preparing their own ESHS strengthening plans (ESHS-SPs) and facilitating them in implementing them. Some features of the ESHS-SPs could be as follows:

a. Fostering well-planned, organized, and clean shop-floor layouts with proper drainage and waste-collection/disposal facilities/systems.
b. Incorporation of safety features or infrastructure such as fire alarms, firefighting equipment, excess pressure alarms in boilers, chlorine leak alarms, chlorine leak safety apparatus, barricades protecting areas posing danger, rubber mats below electrical panels, prominent safety signages, mandating workers to use appropriate PPE, putting in place functional emergency response arrangements, accident/incident reporting systems, etc.
c. Developing and adopting improved HR policies/practices that are based on aspects such as
i. Non-discrimination, wage parity, etc.
ii. Providing for improved worker facilities and amenities (such as toilets for men and women, rest/recreation areas for workers, appropriate PPE during work, etc.)
iii. Making available a responsive mechanism for effectively addressing worker issues such as grievance redressal and sexual harassment.

156. The activity will achieve the above in three stages: (i) Training management and technical staff of respective units in preparation of ESHS-SPs; (ii) Assisting and guiding them while they prepare and finalize their respective ESHS-SPs and (iii) Monitoring and overseeing the implementation of the ESHS-SPs. It is proposed to drive the ESHS agenda in the project through the concept of an 'Environment and Social Clinic (ESC)'. The ESC will be one of the components of the project's institutional structure. It will be manned by a specialized environment agency with pan-India presence and with qualified E&S experts at national and regional levels on its rolls to effectively discharge the above-mentioned functions in all selected textile clusters.

Output 3.1.4: Capacity of women to participate in cleaner production improved

157. This output focuses on empowering women to engage in cleaner production practices. Through gender-specific training, skills development, awareness campaigns, mentorship, and access to resources, the activity aims to promote gender equality and enhance women's participation in sustainable production processes. By providing women with the necessary knowledge, skills, and opportunities, the activity would enable them to actively contribute and be prepared to implement/operate/maintain cleaner production initiatives, thereby advancing sustainability and promoting economic empowerment.

Activity 3.1.4.1. Conduct familiarization sessions for men and women workers on technological innovations and services adopted by textile units

158. The activity involves conducting familiarization sessions about technological advances (automation, higher safety, lower drudgery, speed of production, water, energy chemicals reduction for example) that promote cleaner production. Through tailored sessions, workers are equipped and enthused to participate in sustainable production processes. The activity would also include feedback from men, women, skilled, semi-skilled and unskilled workers to evaluate the effectiveness of the sessions.

Activity 3.1.4.2. Develop curriculum for technical skill and conduct training on cleaner production for women and migrant men

159. This activity focuses on developing new and specialized technical training courses on cleaner production specifically designed for women and migrant men. It would cover topics such as sustainable material sourcing, resource use efficiency, waste management, and safe chemicals handling. It would have components on gender sensitization and women's leadership too. Courses for women on the shop floor would have content on motivating women into technical work and eliminate fears around stepping into male-dominated skills and jobs. The activity would also identify suitable partners who could offer these courses. Furthermore, the activity would also include feedback from men, women, skilled, semi-skilled and unskilled workers to evaluate the effectiveness of the sessions and modify courses and course content as required.

Activity 3.1.4.3. Gender perspective included in the project supported cleaner production interventions in factories

160. The PPG phase identified a high level of gender blindness among stakeholders. To ensure that gender concerns are not ignored in the shift to cleaner production, this activity aims to integrate a gender perspective by engaging with technology providers in all aspects of clean technology selection, installation, operation, and data management. It would improve gender balance in the teams engaged in cleaner production. Skilling and apprenticeship for women and migrant men will also be offered based on assessment of need. Knowledge sharing and feedback mechanisms would be a part of the activities planned.

Output 3.1.5. IOT solutions to enhance cleaner production introduced and scaled up

161. The project aims to introduce and scale up IoT solutions to enhance cleaner production processes across the textile industry. The integration of IoT technologies is pivotal for monitoring and controlling chemical/water usage, ensuring a significant reduction in hazardous substances throughout the supply chain. IoT solutions enable real-time data collection and analysis, providing insights into various stages of textile manufacturing. These technologies facilitate precise monitoring of chemical inputs, emissions, and waste, thereby optimizing processes and reducing environmental impact. For instance, IoT sensors can track the specific gravity and acidity of chemicals in real time, ensuring compliance with safety standards and minimizing overuse.

162. Furthermore, IoT-driven automation can streamline production workflows, enhancing operational efficiency and reducing human error. Automated systems can alert operators to potential issues, such as chemical spills or equipment malfunctions, allowing for immediate corrective actions. This not only improves safety but also minimizes downtime and production losses. The scalability of IoT solutions ensures that even small and medium enterprises (SMEs) can adopt these innovations, fostering industry-wide sustainability. Activities are drawn to demonstrate some of the above.

Activity 3.1.5.1. Implement Digital Twin with IoT systems

163. In the apparel Life Cycle Assessment (LCA) – i.e., from Seed to Apparel manufacturing – the effect of environmental impact can be measured with emerging and disrupting technologies available. The technology enablers allow us to measure and provide science-based data to allow for course correction and report best practices. In any manufacturing facility, data capture from the process is essential towards impact assessment, gap resolution, implementation, and verification/validation of on-going operations. The generic solutions are available for other sectors, systems have been proof-tested in textile industries, but need to scale up. 8 digital twin with IoT systems (1 in each cluster) will be implemented with an approximate cost of 48,000 USD. The estimated cost per system is about 12,000 to 120,000 USD depending on the number of parameters covered and extent of implementation. For example, Digital Twin solutions assess and provide recommendations for optimized outcomes in the following areas:

Figure 3. Digital solutions for in Textile processing units

Activity 3.1.5.2. Implement IOT solutions for POPs measurements in textiles

164. In the case of the life cycle of the technical textiles/functional textiles, systems using Artificial Intelligence (AI) based multispectral vision and IoT devices (in combination) would provide for the remnants of PoPs and provide instantaneous alerts, notifications, and recommendations to course correct the processes. This will allow the supply chain to minimize their inefficiencies and improve production metrics like Overall Efficiency Effectiveness (OEE). This solution (tool) would allow the units at all stages of production to optimize as in filament, yarn, fabric, and subsequent process like patterns leading to finished apparel goods. There is a need to develop a near infrared spectrometer specific to textile chemicals to enable multispectral analysis. One such IoT based tool can be set up in one of the key central government agencies who are executing the National Implementation Plan viz., the Central Pollution Control Board, Central Power Research Institute, National Environmental Engineering Research Institute (NEERI, Nagpur) and National Institute for Interdisciplinary Science and Technology (NIST), Trivandrum. It is estimated to cost about 50,000 USD for hardware and software (20,000 USD hardware and 30,000 USD).

Activity 3.1.5.3. Implement Digital Twin IOT system using AI/ML (Artificial Intelligence and Machine Language) for water measurement

165. Digital Twin with IoT systems will be introduced to measure outcomes in the aforementioned micro-level activities of water conservation, reuse with introduction of digital systems including Artificial Intelligence and Machine learning (AI/ML) process management tools that provide for alerts, notifications and recommendation basis recognized and approved patterns and business rules. This product has been tested for many effluents and textiles and is available in the market. There is potential to scale it up in the textile industry to reduce consumption of water and chemicals. Sixteen systems (two per cluster) will be installed at a total cost of 32,000 USD.

Component 4: Sustainable consumption - Creating markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity

166. Component 4 of the program aims to promote sustainable consumption practices in the apparel fashion supply chain in India. Strategies include increasing green procurement by large procurers of cloth, including uniform, Government e-market place, etc. or for apparel/fashion/textile houses. This includes developing

sustainable products, educating consumers, fostering behavior change, promoting supply chain transparency, adopting circular economy models, advocating for policy changes, increasing education, and consumer-focused campaigns through influencers, including women champions and others. By implementing these strategies, the project seeks to create markets for innovative, environmentally responsible products, encourage responsible consumer behavior, and contribute to the reduction of hazardous chemicals and environmental degradation in the fashion industry.

Outcome 4.1: Creation of markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity.

167. This outcome aims to foster sustainable consumption practices within the apparel fashion supply chain in India. It focuses on creating markets for innovative products and promoting behavior change away from unnecessary consumption towards increased product longevity. Strategies include product innovation, market development, consumer education, behavior change interventions, collaboration, and monitoring efforts. Through these initiatives, the project seeks to drive demand for sustainable and long-lasting products, reduce environmental and social impacts, and contribute to the elimination of hazardous chemicals and environmental degradation in the fashion industry. This outcome is achieved through four outputs including promotion of green procurement, promotion of sustainable fashion by four fashion/textile houses, advocacy on sustainable fashion, and women-led behavior changes in sustainable and reduced consumption.

Output 4.1.1: Green public procurement policies for apparel fashion/textile houses/MSME promoted.

168. This output aims to implement green public procurement policies for apparel fashion and textile houses in India. By collaborating with government agencies and stakeholders, the project will develop tailored policies outlining criteria for procuring sustainable products. There are large procurers like Government e-marketplace (launched in 2016, GeM is an online platform created as an open and transparent platform for government buyers, 100% government owned, non-profit company under the Ministry of Commerce and Industry, Link: https://gem.gov.in/). GeM has made 3.50 lakh crore, i.e., 42.16 Billion USD. It has over 3,081,000 products with 66,663 buyer organizations and 5,893,283 sellers and service providers of them, 14.89% MSME service providers, e-Dhaga is another e-commerce platform launched by the National Handloom Development Corporation to promote handloom products), Military, education and other ministries who can initiate policies to procure fabric/cloth with low/no hazardous chemicals could also be targeted. Capacity building initiatives will train procurement officers and officials, while supplier engagement efforts will promote adoption of sustainable practices. Monitoring mechanisms will ensure compliance, while awareness campaigns will highlight the benefits of green procurement. Overall, this output seeks to drive demand for sustainable products, reduce environmental impact, and eliminate hazardous chemicals from supply chains.

Activity 4.1.1.1. Develop sustainable public procurement templates

169. This initiative focuses on creating templates to promote sustainable public procurement (including green procurement policies) in apparel fashion and textile industries. Many public institutions are involved in procurement of products including textiles such as Government e-marketplace, Central ministries/state governments/other entities. The activity provides procurement templates, which these entities can include in their procurement policies and eventually in the tenders

Activity 4.1.1.2. Revise, develop and promote ecolabels & consumer information

170. Promoting ecolabels and consumer information in apparel fashion aims to foster sustainable consumption. The MoEFCC, Government of India, has initiated ‘Ecomark’ with the aim of labeling environmentally friendly products and it is applicable to textiles in India. Though it was initiated in 2023, it is yet to be rolled out. Specific criteria for eco-labeling textiles considering factors such as environmental impact, sustainable sourcing, manufacturing processes and the project activity will support the activity. In addition, the activity will focus on promoting the label in the textile value chain.

Activity 4.1.1.3. Prepare advisory for potential Trade controls on POPs treated materials

171. This activity aims to prepare advisory on POP-treated materials in apparel fashion to reduce hazardous chemical use. It leverages scientific evidence on POPs' harms to promote safer alternatives. The Ministry of Textiles may collaborate with concerned ministries to initiate trade controls on POP-treated materials.

Output 4.1.2: Sustainable fashion practices promoted by fashion/textile houses/brands.

172. This output entails collaborating with four fashion/textile houses to promote sustainable fashion practices. This involves working with retailers committed to sustainability, assisting them in adopting sustainable practices, providing training and capacity building, implementing pilot projects, engaging the public through awareness campaigns, and monitoring and evaluating the impact of these efforts. The goal is to encourage the adoption of low/no hazardous chemical use methods, materials, and supply chain practices within the fashion industry, ultimately driving market demand for sustainable products and contributing to a more environmentally responsible fashion industry in India.

Activity 4.1.2.1. Facilitate fashion houses/brands to provide incentives to retailers for selling sustainable apparel

173. Through this activity, the project will meet and motivate the fashion houses to provide financial incentives to retailers selling apparels with low/no chemicals use. Success depends on retailer adoption, consumer demand, and the effectiveness of incentives in transforming the market towards sustainability.

Output 4.1.3: Advocacy on sustainable fashion undertaken.

174. This output focuses on advocating for sustainable fashion practices within India's apparel fashion supply chain. Through stakeholder engagement, awareness campaigns, policy advocacy, industry standards, capacity building, public engagement, and monitoring efforts, the project aims to drive systemic change. The objective is to raise awareness, influence stakeholders, and enact policy changes that support the adoption of sustainable practices and promote responsible consumption behaviors. Awareness creation for students from fashion technology, graduates and diploma colleges will be targeted.

Activity 4.1.3.1. Develop IEC modules and promote public education on textile using no hazardous chemical and sustainable consumption

175. It is estimated that there are over 30,000 students (diploma/undergraduate) studying in over 1000 fashion institutes across India. It is essential to involve them in promoting textiles using no hazardous chemicals and sustainable consumption. Through this activity, modules will be developed, more importantly online education material and impact awareness to them.

Activity 4.1.3.2. Develop modules and build capacity for retailers on marketing sustainable products

176. This activity aims at educating retailers on sustainable product marketing to boost consumer awareness and demand for sustainable fashion. Appropriate modules, particularly audio-visuals will be developed to create awareness and it is expected that the retailers will engage to market sustainable products. Success relies on retailer engagement, consumer demand, and retailer influence on purchasing decisions.

Activity 4.1.3.3. Conduct consumer-focused campaigns

177. Under this activity, consumer-focused campaigns promoting sustainable fashion, aiming to change behavior towards longevity and reduced consumption will be carried out. Campaigns will be carried out through marathons and a digital campaign shall be carried out to promote textile with no hazardous chemicals, alternative materials, and sustainable consumption. It will make use of existing international/national days such as World Environment Day, Gandhi Jayanti, etc. A docket of advice on initiating World/National Sustainable Textile Day will be provided to the concerned authorities. It is aimed at influencing consumer choices. It will

engage brand ambassadors/ influencers. Success depends on consumer engagement, sustained behavioral change, and campaign impact on market behavior, driving a shift towards sustainability.

Output 4.1.4: Women-led behavior changes in sustainable fashion and reduced consumption promoted

178. Aims to engage women within and outside the apparel fashion supply chain in India, who are leaders in their profession to lead behavior changes towards sustainable consumption. Women influencers will be identified who will use different platforms to promote the message of using textiles without hazardous chemicals and sustainable consumption. Appropriate messages will be developed for use by these influencers. This is expected to trigger behavior change amongst consumers towards purchasing textiles with no hazardous chemicals and adopting sustainable consumption.

Activity 4.1.4.1. Engage women influencers for triggering behavior change towards sustainable fashion

179. Under this activity, women influencers such as fashion designers, models, bloggers, activists, entrepreneurs, and celebrities who have a significant following and influence over consumer behavior will be identified. The project will sensitize these influencers on the present situation and the need for cleaner production, alternative materials, moving away from hazardous chemical use, and unsustainable consumption. Appropriate content, campaign design, and initiatives aimed at promoting sustainable consumption behaviors will be made. This could include organizing eco-friendly fashion shows, launching sustainable clothing lines, or hosting awareness-raising events.

Component 5: Post-use 9Rs - Implementing a reverse logistics process that moves products and materials back to the manufacturers to reuse or recycle (Post-use 9Rs)

180. This component focuses on implementing a reverse logistics process known as post-use 9Rs within the apparel fashion supply chain in India. The 9Rs are Refuse, Rethink and Reduce (R1–R2); Reuse, Repair, Refurbish, Remanufacture, and Repurpose (R3–R7); and Recycle and Recover (R8–R9). In this component, the project enables post-use collection, 9Rs, supporting a few selected and forthcoming factories to include producer stewardship schemes (in readiness for EPR) and support pilot demonstration on reverse logistics. During the PPG phase, it was found out that women may be keener on leading such startups, and the project supports them. At present, there is no repository or a database connecting the value chain actors in reverse logistics. The project will provide such a platform, create a database, and enable the value chain actors to interact with each other.

Outcome 5.1: Implementation a reverse logistics process to move products and materials back to the manufacturers to reuse or recycle

181. This outcome aims to establish an efficient and sustainable reverse logistics process for non-hazardous materials within the apparel fashion supply chain in India. Developing a policy around waste management, promotion of post-use collection of post-use material and enabling implementation of 9R's practices, developing factories readiness for EPR (extended producer responsibility), pilot demonstration of reverse logistics, creation of database of value chain for 9R's and women leadership in 9R's new opportunities are some of the activities to move products and materials back to the manufacturers to reuse/recycle, etc.

Output 5.1.1: Post-use collection promoted and implementation of 9R's enabled

182. Under this output, several activities are planned to promote post-use collection of textiles and enable implementation of 9R's to foster a circular economy approach. There is no cohesive policy on textile waste management at present barring specific hazardous wastes (mixed or waste salts) that are generated from textile manufacturing or processing industries. These wastes must be collected in leak-proof bags or drums and transported in authorized vehicles with the required safeguards

(https://cpcb.nic.in/uploads/hwmd/68_SOP.pdf#:~:text=1%20Hazardous%20waste%20i.e.%20mixed/waste%20salts%20generated,SPCB/PCC%20authorized%20covered%20vehicles%20with%20requisite%20safeguards accessed on 05/04/2024). Developing policy/policies on waste management can initiate actions on circularity in waste use.

183. There are very few agencies like Reverse Resources who are looking at waste as business. Given the huge quantities of textile waste in India, a lot of actions along the full value chain from collection to reuse are required. There is no database at present. It is proposed to set up such a database. It is also proposed to set up a few pilots to demonstrate reverse logistics. Extended Producer Responsibility currently is in practice with plastics waste in India, however, it appears in the medium to long term, it may become inevitable for the textile sector, hence, some preparatory activities are also planned under the project output. All these actions together are expected to promote the post-use collection of textiles and enable implementation of 9R's.

Activity 5.1.1.1. Develop a comprehensive policy on waste management

184. This activity envisages preparing a coherent policy to organize the waste management sector which includes concerns about pre- and post-consumer textile wastes also. It envisages to preparing the policy and updating it periodically, at least once after the project mid-term. The Ministry of Textile (MoT) will consider project inputs and liaise with relevant ministries to float a coherent policy for regulating textile waste in India.

Activity 5.1.1.2. Develop EPR (Extended Producer Responsibility) guidelines and prepare textile MSME to implement EPR

185. Establishing an enabling environment for EPR infrastructure in apparel supply chains shifts responsibility to producers for end-of-life products, promoting circular economy principles. Scientifically supported, it addresses waste challenges, assuming stakeholder collaboration, regulatory backing, and infrastructure investment for effective implementation.

186. In India, the concept of EPR was introduced under the Plastic Waste Management Rules in 2016 (https://eprplastic.cpcb.gov.in/#/plastic/home). Since then, several other sectors have been brought under its purview, including e-waste, batteries, and packaging waste. The Ministry of Environment, Forest, and Climate Change (MoEFCC) has been actively working towards creating a framework for EPR implementation in the country (https://cpcb.nic.in/uploads/plasticwaste/PWM-Amendment-Rules-2022.pdf, accessed on 17/06/2024). Producers, importers, and brand owners in India are required to fulfill their EPR obligations by registering with the Central Pollution Control Board (CPCB) or the State Pollution Control Boards (SPCBs). This registration allows businesses to legally operate and ensures that they are accountable for managing the waste generated by their products. Currently, textile waste management in India is integrated and regulated under the existing waste management framework under plastic waste management, which is a good starting point for incorporating the EPR principles into the textile sector (https://www.intechopen.com/chapters/88770, accessed on 17/06/2024). A separate EPR on the textile would allow separate resource allocation for the textile waste management sector. It would make the textile manufacturing industry more accountable and responsible for their actions and would promote tailored approaches to suit the industry's needs as well as a gradual transition towards an environment-friendly manufacturing process EPR for textiles holds producers of textile products responsible for the environmentally sound management of their waste. This responsibility includes the establishment of take (or buy)-back systems, the establishment of collection centers, and the development of partnerships with authorized dismantlers or recyclers. CPCB issues an EPR certificate online, which needs to be renewed periodically.

187. This activity envisages to prepare EPR infrastructure (regulatory compliances, life cycle and end-of-cycle, collection, and recycling) for textile waste in India. It envisages preparing the revised EPR infrastructure

and update it periodically, at least once after mid-term during the project. It is assumed that MoT/TC/CPCB will consider project inputs and float an updated EPR infrastructure for issuing guidelines for textile waste management in India.

Activity 5.1.1.3. Engaged credit institutions for green credit to develop reverse logistics/collection infrastructure

188. Reverse logistics and collection infrastructure is important for organized management of textile wastes. Collaborating with credit institutions for green credit/loan supports investment in sustainable infrastructure for reverse logistics and collection and may immensely benefit textile supply chains.

Activity 5.1.1.4. Carry out pilots/demonstrations on reverse logistics for post-consumer waste

189. Conducting pilots/demonstrations on reverse logistics tests and refining methods for returning products and materials to manufacturers for reuse or recycling. It addresses scalability and technological feasibility assumptions, fostering stakeholder engagement and best practice adoption in apparel supply chains. This activity assumes substantial waste reduction which otherwise is diverted into landfills. The envisaged risk is, if the reverse logistics-based pilots are too complex and cost-intensive, they may face resistance during the implementation stage.

190. The interventions identified for textile waste sectors are (i) Promoting textile waste (post-consumer fabric/fiber) diversion for 9R use; The project aims to make interventions in 40 MSME units, with the above interventions during the entire project period.

191. India has the second largest vertically integrated textile industry in the world. Currently the textile waste management sector in India is highly unorganized. The Indian textile waste ecosystem consists of manufacturers, recyclers, waste handlers, sorters and other industry stakeholders. There exists an opportunity to position itself as a global hub for circular textiles by establishing textile recycling clusters. This requires a clear understanding of the fragmented value chain and multiple players involved in the organized and decentralized sector to identify policy prescriptions needed to introduce targeted incentives. Despite the absence of advanced technologies, the Indian textile recycling ecosystem has established a stronghold in mechanical recycling and the usage of manual sorting methods. Currently, the textile waste being generated and handled in India can be classified across three waste streams: pre-consumer, domestic post-consumer and imported waste (https://www.idhsustainabletrade.com/uploaded/2023/09/IDH_textile-waste-cost-analysis_2023.pdf). It critically depends on the quantum and quality of collected post-use cloths/garments. Estimates suggest that India manages ~7793 kilotons of textile waste annually from three sources: domestic manufacturers generating pre-consumer waste, domestic consumers generating post-consumer waste, and imported waste coming from other countries. Some waste processors located in the Panipat sector import post-consumer waste from Europe and the USA. The import cost varies between INR 25 and 110 per kg. They upcycle the waste (6.0 ton/day) and supply blankets to Raymod, Airforce, and Army. In most sectors, these recycle/repurpose operations are in small-scale units (SSI), where cloth sorting and shredding practices are outdated.

192. Through this activity, it is proposed to support 40 MSME waste processing units with technology/equipment. Each unit is identified to upgrade operations with 1 set of equipment (1 Hard Waste Fabric Opening Line + 1 Sorting Machine). This will upgrade the MSME industry performance leading to greater waste processing capacity. It aims to divert 100,000 tons of post-consumer textile waste by mid-term and 400,000 tons (cumulative) by the end of the project.

193. 10 MSME units will implement these interventions which will result in elimination of uPOPs into air. This intervention is aimed at reduction of textile fabric waste by 100,000 tons by mid-term, of which 10% is estimated to be burnt (10,000 tons). This will reduce uPOPs by 3.00 g TEQ/year (emission factor 300 ug/ton). Another 10 MSME units will implement the intervention leading to cumulative reduction of 400,000 tons post-consumer textile by the end of the project. This will result in reduction of POPs emissions into air by 12.0g TEQ/4-years.

Activity 5.1.1.5 Created a database or platform connecting value chain actors for waste repurposing

194. Textile waste value chain includes several players at different stages, interconnecting them functionally will positively influence overall textile waste management. Establishing a database or platform that connects value chain actors enhances the effective handling of textile waste materials handling effectively. It tackles fragmentation, enabling collaboration and resource sharing for optimized waste repurposing. Challenges include data management and scalability, requiring stakeholder engagement and technological solutions. The risk that could be foreseen is that value chain actors may refuse to divulge information on the developed platform.

Output 5.1.2: Emergence of women's leadership in new business opportunities in 9Rs improved

195. This output aims to empower women entrepreneurs to lead innovative ventures aligned with circular economy principles in the apparel fashion supply chain in India. Through targeted support, capacity building, networking, access to markets, innovation, policy advocacy, and monitoring efforts, the project seeks to unlock the potential of women leaders to initiate 9R business.

Activity 5.1.2.1. Established women-led 9R enterprises

196. During the preparatory phase, it was found out that women can take leadership roles in 9R and other allied businesses. Under this activity, the project will identify agencies that will incubate women-led enterprises promoting 9R enterprises. For example, the Centre for Environmental Education (CEE) is promoting such women-led enterprises in the textile sector. Through capacity building, business incubation, and employment commitments, the project aims to promote gender equality and foster sustainable entrepreneurship. Engagement with incubators would also include incubation for all women led enterprises especially in nature-based fibers. The project will train and mentor women entrepreneurs who are developing innovative recycling solutions for textile waste. These entrepreneurs could commit to employing over 50% women in their operations, creating opportunities for women's leadership, workforce, and economic empowerment within the circular economy.

Component 6: India Child Project Knowledge Management and Learning

197. Component 6 focuses on Project Knowledge Management (KM), which is crucial for effective communication, collaboration, and dissemination of knowledge. This component aims to transfer the knowledge available across the globe and particularly from other Child projects to the India Child project to draw lessons from. However, it will also share the best practices observed and developed in India through the India Child project to other Child projects and other countries through synthesized knowledge products and learning tools. To be effective in eliminating hazardous chemicals, addressing the whole value chain in textiles is important. The KM component aims to curate and apply knowledge on supply chains. A key area of opportunities through this component is a set of outputs planned to exchange knowledge among all stakeholders, factories, industry associations, governments, facilitating agencies from within and outside the country. Thus, the following strategies are planned under the KM component, namely, (1) developing knowledge sharing platforms, (2) building capacity, (3) documenting the lessons learned, (4) collaborating and networking, (5) creating communication materials for reaching wider audience, and (6) establishing mechanisms to assess the effectiveness of KM. By implementing these strategies, the project aims to strengthen collaboration, enhance learning, and maximize the impact of hazardous chemical elimination efforts in the apparel fashion supply chain.

Outcome 6.1: Creation of knowledge products, as well as generation and management of knowledge

198. This outcome of the project focuses on generating and managing knowledge products related to hazardous chemical elimination in India's apparel fashion supply chain. It aims to consolidate project findings, best practices, and lessons learned to support informed decision-making and promote sustainable practices. It

also pools knowledge from other countries, including other Child projects and the global project for the benefit of the stakeholders under India Child project.

Output 6.1.1: India Textile Child Project portal for knowledge management and exchange conceptualized, launched and managed

199. The portal will be designed for three-way interaction among the Project Management Unit (PMU), other Child projects and global projects, and the Indian stakeholders. Content development, portal establishment, material upload, quality assurance, promotion, user support, and monitoring are part of the portal development management and exchange. The content will be in the local languages and curated specifically to address the Indian context. Local language information, awareness, knowledge is required as many shopfloor workers, women who are responsible to the project interventions are not conversant with English. Hence, it is essential for not only implementing the proposed project interventions, but to scale them up during and post project. The portal should also be made available for at least 5 to 10 additional years beyond the project period to ensure that knowledge is available. Entities like MoT, ICT, Textile Committee, or any other entity identified by Project Steering Committee may anchor the portal. As portal would be multilingual (English plus), thus, will also help other countries to be aware and benefit from India experience.

Activity 6.1.1.1. Conceptualize, launch and manage India Textile Child Project portal for project period

200. All knowledge products, project documents, awareness material, training material, capacity building modules, best practices from the project interventions developed under the India Child project will be uploaded on the portal. The portal will either load the update/best practices from other Child projects and global projects on the portal or provide a link with appropriate description. Best practices of ecolabeling, certification, alternative/ innovative material, cleaner production, etc. across the globe will be collected and uploaded on the portal. It will be developed and managed by project grants, beyond which the Ministry of Textiles will continue and update it.

Activity 6.1.1.2. Develop and upload e-newsletters

201. Since the project is global and simultaneously many countries are also implementing the projects, the lessons are going to be humongous. The e-newsletter planned in this activity will not only capture best practices globally, in India, and updates from the India Child project but also capture updates from other Child projects. Furthermore, the global component of the project has an enormous focus on the knowledge generation and exchange, the e-newsletter will be a medium to reach the stakeholders through the project.

Activity 6.1.1.3. Develop best practices packages for chemical management for the textile sector in India

202. Through this activity, the project will identify such best practices and prepare a ‘Best practices compendium towards eliminating use of hazardous chemicals, energy, water and improved ESHS, regenerative design, innovative materials, 9Rs in the apparel fashion supply chain’. In addition to a compendium, which will be uploaded on India Textile Child project portal, appropriate audio-visuals will be developed. They will help in creating awareness/sensitizing/training stakeholders towards chemical management. This activity will be accomplished in Year-1 as it would then be handy for all to consider the right choices and implement.

Activity 6.1.1.4. Develop best practices from India Child Project

203. The India Child Project implements various interventions involving pilots/demos and capacity building across the textile value chain. Through this activity, the project will develop case studies, publications, reports, articles on the best practices in the supply chain, including audio-visual (A-V) modules based on successful project interventions. This will help the stakeholders replicate project best practices aimed at hazardous chemical elimination efforts and allied interventions in the apparel fashion supply chain

nationally/internationally. All material on the best practices across the textile supply chain will be uploaded on the India Textile Child Project Portal.

Activity 6.1.1.5. Study initiated on health issues of women textile workers

204. There is limited published literature about the health impacts on women working in the textile and apparel sector. This activity would initiate a study on the health impacts on women working in different segments and job categories in the project clusters. This activity would throw light on the unique challenges women face due to their gender and occupational roles. The study would also recommend best practices for safeguarding health of women workers across different segments. The findings would be published and disseminated through the different communication channels of the project.

Output 6.1.2: Supply chains Integrated Programme (IP) knowledge is curated and applied

205. This output aims to leverage insights and best practices gathered from the IP to inform and allow free flow of information on eliminating hazardous chemicals from the apparel fashion supply chain among the stakeholders. Here, wherever required, material will be developed in English, Hindi and other vernacular languages to maximize the reach. In addition, these contributions will be made open to global online knowledge management also. Two activities planned under this output are described below.

Activity 6.1.2.1. National knowledge management (KM) for MoT (in Hindi and English) – for national outreach

206. The activity involves the development of knowledge management materials in both Hindi, English and regional languages to ensure accessibility and inclusivity. The project will develop a comprehensive knowledge management strategy tailored to the needs of the Ministry of Textiles (MoT). This is aimed at providing information on projects to the stakeholders. An app will also be developed for sharing knowledge with stakeholders. This can help scale up the project intervention and inform the purpose to other factories. Social media messages will be developed and will be reached through app, portal, Twitter handle, Facebook, Instagram, etc.

Output 6.1.3: Value chain actors are engaged through information dissemination and outreach and apply knowledge

207. It is crucial to keep stakeholders engaged to ensure project results are achieved and scaled up. This can be done through two-way knowledge/information dissemination and outreach. This output is achieved through activities under appropriate physical and e-platforms and setting up awards and recognitions. Platforms, events, and awards to facilitate knowledge exchange and recognize achievements in hazardous chemical elimination efforts in the apparel fashion supply chain will be one of the key tools.

Activity 6.1.3.1. Establish platforms connecting value chain actors and institute awards

208. The activity focuses on establishing platforms to connect stakeholders in the apparel fashion supply chain, fostering collaboration and innovation towards better hazardous chemical elimination. These platforms facilitate communication, networking events, and knowledge exchange, promoting the adoption of sustainable alternatives.

209. Through this activity, a digital platform for promoting interventions among B2S (Business to Suppliers) and B2C (Business to Customers) will be developed and managed. Features like forums, discussion boards, and interactive tools will encourage engagement, while metrics tracking website traffic and user interactions will gauge effectiveness. Through this initiative, stakeholders can collaborate effectively, access valuable resources, and drive collective action toward a safer and more sustainable industry.

210. This activity entails establishing performance awards to recognize/honor outstanding practices in hazardous chemical elimination within the apparel fashion supply chain. For instance, award categories might include recognizing innovative technologies for chemical substitution or honoring initiatives promoting supply chain circularity and transparency. The process involves developing transparent criteria, facilitating

nominations, forming an evaluation panel, and organizing an award ceremony to recognize winners. Multiple award categories are considered to encompass various aspects of sustainability, and the award ceremony will also serve as a platform for knowledge sharing and networking. Follow-up activities will sustain the momentum generated by the award, ensuring continuous improvement and collective action towards sustainable chemical management. The project activity fosters a culture of excellence and collaboration in hazardous chemical elimination practices.

Output 6.1.4: Opportunities for collaboration and exchange among governments and stakeholders to take action through partnerships are facilitated and fostered

211. This output is aimed at a continued engagement between central/state governments with all the stakeholders and fostering and facilitating productive partnerships to achieve better elimination of hazardous chemicals from the supply chain. It is important to sensitize everyone in the value chain and encourage meaningful partnerships, participating in the events, campaigns, competitions, and dialogues, which are all key factors for efficient knowledge management. The project will also support international tours (though to a limited and need basis) to learn and exchange information and knowledge from each other and develop partnerships to pilot successful demos from other Child project countries in India.

Activity 6.1.4.1. Facilitate/participate in international events, meetings and workshops, capacity building, knowledge exchange for key project team members, industry and industry association representatives, R&D institutes representatives to learn from best practices - International travel

212. This activity focuses on facilitating the participation of cluster factories/industry association representatives, officials, bankers in the relevant international and national events aimed at exchanging knowledge and best practices related to hazardous chemical elimination in the apparel fashion supply chain. This involves identifying suitable events, providing logistical support, and encouraging active engagement in knowledge-sharing activities. By participating in these events, factory representatives can learn from other industry best practices, share their experiences, and collaborate with peers to advance sustainable practices. For example, project participating factories may attend conferences organized by industry associations, seminars hosted by research institutions, or workshops focused on sustainable production processes.

213. Through this activity, the project empowers factories to integrate new knowledge and practices into their operations, driving positive change towards hazardous chemical elimination.

214. This activity involves organizing international tours for stakeholders within the apparel fashion supply chain to learn from best practices in regenerative design, innovative materials, and cleaner production techniques. The tours will be meticulously planned to include visits to renowned facilities and institutions, workshops, seminars, and networking events. Participants are selected from various sectors to ensure diversity and relevance to the tour objectives. Clear learning objectives are defined, focusing on themes such as waste reduction, circular economy models, and sustainable supply chain management. During the tours, participants engage in knowledge sharing, peer-to-peer learning, and networking opportunities with international counterparts. Follow-up actions are implemented to integrate tour learnings into project activities and organizational practices.

215. For example, stakeholders might visit a sustainable textile facility in Scandinavia known for its regenerative design principles and innovative materials sourcing. They attend workshops on waste reduction strategies and engage in discussions with experts in the field. Upon their return, they share their insights with their organizations and implement new practices to drive positive change in hazardous chemical elimination efforts within the apparel fashion supply chain.

Stakeholders' engagement

216. Furthermore, during the Project Preparation phase, visits were conducted to selected clusters and carried out cluster-level stakeholder consultation, consulted many agencies, and carried out a national stakeholders' consultation. Based on all these, the following a stakeholders' engagement plan has been developed and is attached as Annexure 1. The following table lists the types of stakeholders identified, their names, roles and potential contributions to the project.

Table 17. Stakeholder groups, name, role, and engagement

Stakeholders/ main groups	Stakeholder's name/ agency	Content engagement, contribution to the project and potential role
Implementing Agency	UNIDO	GEF Implementing agency. UNIDO is a specialized agency of the United Nations that promotes inclusive and sustainable industrial development. UNIDO will contribute as knowledge partner, introducing best practices, and learnings from similar initiatives from global projects and elsewhere in the world, and act as overall guide on project management. UNIDO will also be a PSC (Project Steering Committee) member. UNIDO will also be implementing. Component 6. Knowledge Management and Learning
National Executing Agency (NEA)	Ministry of Textiles (MoT)	TheMoT is the National Executing Agency (NEA) of the project. A senior official from the ministry will be Chairperson of the PSC to lead and monitor project activities in the country. MoT will also nominate a National Project Director (NPD) to the project who will guide PMU and support project implementation. In addition, the NPD will chair the PEC (Project Executive Committee).
Ministries	Ministry of Environment, Forest, and Climate Change (MoEFCC)	The MoEFCC hosts the GEF Operational Focal Point of India and MoEFCC is also contributing to the project through co-financing in kind. They will be a member of the PSC.
	Ministry of New and Renewable Energy (MNRE)	MNRE is the core central ministry promoting renewable energy in India. This India Textiles project has solar, thermal, and SPV project interventions. MNRE formulates policies, guidelines, and administers schemes. The project and project beneficiaries can also benefit from MNRE schemes. MNRE will be one of the PSC members who will bring renewable energy related knowledge and support.
	Ministry of Micro, Small and Medium enterprises (MoMSME)	The India Textile Child project includes interventions in MSME. The MoMSME is the anchor ministry for MSME. UNIDO has several collaborative initiatives with MoMSME. MoMSME will bring enormous knowledge and support to MSME. They will be a member of the PSC.
	Ministry of Commerce (MoC)	The MoC in addition to its core activities also promotes trade-related regulations pertaining to sustainable textiles. They will be invitees to members of PSC and will be invited on need basis.
	Ministry of Jal Shakti	The Ministry is responsible for water resources, river development etc. As the textile units consume significant water resources, the participation of the ministry can help the common objectives of conserving water resources. The Ministry will be invitee on the PSC.

	Ministry of Chemicals & Fertilisers	The Ministry is responsible for planning, development and regulations of chemicals apart from many other responsibilities. The textile industry makes use of chemicals and hence their participation contributes to formulation of appropriate policies for textile processing. The Ministry will be invitee on the PSC.
	Department of Promotion of Industry and Internal Trade (DPIIT)	DPIIT serves as the focal point for reporting and coordination of projects implemented in India under the United Nations Industrial Development Organization (UNIDO), particularly those related to industrial development and sustainable growth. DPIIT will be a member of PSC.
Project Management Unit (PMU)	UNIDO and Ministry of Textiles (MoT)	The project will be executed through a PMU. The PMU will consist of a National Project Manager (NPM). PMU will report to UNIDO and be guided by the National Executing Agency (NEA) through the NPD and the PSC.
Fund management agency	Textile Committee	The Textile Committee will be responsible for fund management. They will be invited member of PSC.
	National Productivity Council (NPC)	NPC will provide technical inputs as and when required on energy related interventions. They will be invitees to PSC whenever required.
Government and National Agencies	Bureau of Energy Efficiency (BEE)	BEE provides guidance to mainstream energy efficiency measures in their overall energy efficiency policy promotion and regulatory framework in the country. They are a member of the PSC.
Sector Skill Councils	Skill Council for Green Job (SCGJ)	The Ministry of Skilling has established Sector Councils to develop course curricula (in the form of Qualification Packs [QPs]), impart skilling, certify the candidates, accredit agencies imparting skilling. The QPs go through rigorous scrutiny and approval processes. Skilling modules developed under the project can be included into the scheme of actions of sector skill councils to roll out at the national level. The SCGJ and other relevant sector skill councils may leverage project interventions to develop skilling QPs around energy-related interventions such as energy efficiency, CST, and roll out the skilling during or/and beyond the project.
Industry	Industry associations	Textile industry associations are active at cluster level and also at national level. The project will engage with both entities. The associations will be invitees to the PSC on a need basis. Industry associations will be involved in mobilizing the textile factories as project participating units. They will motivate owners to participate in project interventions (i) in participating in sensitization programs, (ii) in releasing their staff for awareness/training/skill development, (iii) investing in technology packages and (iv) participating using the software/apps developed under the project. Major associations from the eight clusters will be involved during the project. Their role will be to facilitate workshops, create outreach and sensitize not only participating units but also others to participate. They will encourage units to demonstrate and replicate interventions. They will also be involved in the dissemination efforts of the project. Industry associations shall promote scale-up of the project intervention in non-project units.

Beneficiaries / Local private sectors	Textile units Fashion houses	Textile units will be the main beneficiaries of the project. The participating units will share data, cooperate with PMU, Project Executing Entity and Technical Partner for proposed interventions, implement the recommended changes and comply with the monitoring protocols. The owners/managers of textile units will participate in awareness/ sensitization programs of the project. They will nominate their staff for training/skilling in enhancing the energy efficiency of boilers. They will also participate by downloading online apps developed by the project and piloting them. They will pilot and adopt tools for project implementation, developed by the project. They will also make equity contributions and leverage loans to make the required interventions for implementing cleaner production.
	Fashion houses	Fashion houses (Aditya, Arvind, Trent, Vardhman) are co-financing partners and beneficiaries of the project. They are already involved in exporting textiles meeting the requirements of buyers. However, the project will provide input guidelines/standards that can be implemented for the domestic market. They will make equity contributions and leverage loans to make the required interventions for implementing regenerative designs, innovative material, cleaner production, 9Rs. They will be invited to PSC as invitee on a need basis.
	NGOs	The project has envisaged several gender activities and 9R activities where CSO- NGOs have specific leverage in mobilizing the communities. They will be invitees to the PSC on a need basis. Some of the NGOs who were consulted during the PPG phase doing activities around this are CEE, Solidaridad, and Reverse Resources. They may be consulted for outcome from their current engagement and further may be engaged to carry out some of the project components/ activities.
	Academia and technical research institutions	Academia and research institutions are involved in research and innovation in new knowledge, products, data, and analysis. The project will make consultations on methods to reduce use of chemicals, energy, waste, water and GHG emissions. They will be invited to the consultation meetings, sharing knowledge on a need basis by the PMU.
	Fashion institutes/ Institutes awarding degree on textiles	It is estimated that there are about 1000 fashion institutes. There are several institutes conducting bachelors/masters/PhD courses in textiles. It is critical that the students studying in these institutes need to internalize the aspects pertaining to eliminating hazardous chemicals used in textiles. Hence, the project will engage their representatives.
Financial Sector	Small Industrial Development Bank of India (SIDBI)	Financial institutions are expected to provide loans to textile units to purchase and install interventions identified by the project. They will participate in financing components, guide in formulating financing packages. SIDBI will be a member of the PSC. Other bankers may be invited to as per requirement identified by PMU.
	Lead banks	Lead banks in respective clusters will be informed of the project interventions and their goals. They will be sensitized to consider lending for project interventions in textile units.
	Impact investors/ Angel investors/CSR funds	Impact investors/Angel investors/CSR funds are likely to provide financial support for some of the innovative interventions like regenerative design, innovative material, 9Rs, etc. Efforts will be made to engage them and invite them to the PSC whenever needed.
Other stakeholders	Gender experts	Gender experts will be invited to the PSC to seek their advice on reviewing and inclusion of the Gender Action Plan in the project.

Knowledge Management and Learning

217. The Child Project Knowledge Management (KM) Strategy is based on the knowledge management strategy for the Global Coordination Project (GCP, GEF ID 11177), entitled 'Global replication to eliminate hazardous chemicals from supply chains: Knowledge and Learning' to facilitate the dissemination, utilization, and application of knowledge and learning between the Integrated Program (IP) and Child Project on textile in India, and vice versa. As per GCP, the knowledge management strategy for the GEF Child Project in India will have the following two components: (1) knowledge management and (2) communication and collaboration.

218. The vision of this KM strategy is aligned with the GCP's vision to gather, learn from, and apply knowledge gathered at the national level and vis-versa learn from supportive knowledge developed under the GCP to achieve the overall IP-11 program's objective. Especially with support of the GCP, country-level stakeholder engagement will be ensured for the generation of best practices and other knowledge management generation. The main elements of the GCP's KM strategy will be the following:

a. Multi-level stakeholder engagement approach (as outlined in the separate Stakeholders Engagement Strategy Annex) to ensure support, coordination and ownership of the project and support along the textile value-chain in India.

b. Child Project capacity-building program and training session to address knowledge and capacity needs within the project objective.

c. Outline a clear and practical communication, coordination, and knowledge management exchange system among all Child Project stakeholders, and vis-a-vis the GCP.

d. Develop and execute a monitoring and evaluation (M&E) system to report on Knowledge Management activities during Child Project execution.

219. The two goals of GCP KM strategy are the following:

a. Knowledge Exchange and Synthesis: The GCP will establish a robust KMP to facilitate real-time analysis and exchange of knowledge among CPs. This system will enable efficient development of knowledge products and services in a consistent manner, ensuring alignment with project objectives and avoiding duplication of efforts. Emphasis will be placed on categorizing and comparing data and knowledge generated from various projects to derive valuable insights and promote synergy in knowledge production. Furthermore, best practices and lessons learned within each child project will be carefully documented and made accessible for long-term replication, both within and beyond the IP.

b. Scaling Up and Replication: Beyond the confines of the GCP, the KM workstream will consolidate key lessons learned and best practices from CPs, making them accessible and adaptable to countries outside the program. This dissemination of knowledge aims to facilitate effective replication and scaling up of successful interventions in neighboring countries and at a global level. By engaging with stakeholders beyond the program, the KM initiative seeks to amplify its impact and promote the adoption of sustainable practices on a wider scale.

220. Thus, the Child Project KM will ensure that knowledge management products, lessons learned, and best practices are being drafted based on GCP guidance and templates to design knowledge management products in a consistent, clear and not-duplicated manner.

221. The detailed KM strategy for this Child Project is provided in Annex 2.

Monitoring and Evaluation

222. The project execution agency (Ministry of Textiles [MoT]) will ensure systematic monitoring of the project in line with the GEF's Guidelines[1] ("Guidelines on the GEF project and program cycle policy: GEFC.52.Inf.06._Rev.01") and GEF's Policy on Monitoring.

223. The Ministry of Textiles (MoT) will be responsible for monitoring day-to-day project activities under the guidance of UNIDO as the implementing agency and will develop and submit annual and quarterly progress and financial reports. These reports will track the progress according to the workplan and budget and identify any obstacles faced during implementation and mitigating actions to be taken.

224. The main M&E reporting activities will include:

- Inception Phase Meeting and Report (within first 6 months)

- Baseline, mid-point and final monitoring of GEF Core Indicators/GEBs
- Yearly Project Implementation Review (PIR) to UNEP and GEF
- Yearly Co-financing Report
- Quarterly progress and financial reports
- Monitoring of Environmental and Social Safeguards (ESS) Risks
- Semi-annual Progress/Operational Reports to UNEP
- Monitoring visits to pilot sites
- Final Project Operational Completion Report

225. In line with the GEF Evaluation requirements and UNIDO's Evaluation Policy, GEF Full-Sized Projects and any project with a duration of 4 years or more will be subject to an independent Mid-Term Evaluation or management-led Mid-Term Review at mid-point (will be completed within 3 years of signing the agreement between UNIDO and MoT). All GEF-funded projects are subject to a performance assessment when they reach operational completion. This performance assessment will be either an independent Terminal Evaluation or a management-led Terminal Review (TE/TR), which will be completed 2 months prior to end of project (6th year). Both the mid-term evaluation and Terminal Evaluation, will be conducted by UNIDO as implementing agency.

226. In addition to the project's M&E reporting, it is expected that the project will share these key reports and if required will provide inputs to the Global Projects M&E reporting including the Integrated Program Annual Report, the Global Project's M&E kick-off meeting; Quarterly reports; Mid-term Evaluation and Terminal Evaluation if appropriate.

Table 18. Allocation of GEF grants for different M&E activities

Type of M&E Activity	Engaged Parties	GEF Grant (USD)	Co-financing (USD)	Time frame
Project inception workshop and report preparation	PMU, UNIDO, consultants	40,000	60,000	Within first six months of Project start up, with reports immediately following Inception Workshop
Baseline, mid-point and final monitoring of GEF Core Indicators/GEBs	PMU, UNIDO, Consultants	30,000	30,000	Year 1, Year 3 and Year 6
Yearly Project Implementation Review (PIR) to UNEP and GEF	PMU, UNIDO	30,000	60,000	Annual
Yearly Co-financing Report	PMU, UNIDO	30,000	40,000	Annual
Quarterly progress and financial reports	PMU, UNIDO	30,000	50,000	Quarterly
Monitoring of Environmental and Social Safeguards (ESS) Risks	PMU	36,000	50,000	Quarterly
Semi-annual Progress/ Operational Reports to UNEP	PMU, UNIDO	30,000	25,000	Semi-annual

Monitoring Visits to Pilot Sites	PMU, MOT	36,000	178,000	Semi-annual
Final Project Operational Completion Report	PMU	40,000	60,000	Year 6
Promotional Material	PMU	42,550	47,000	As required
PSC Meetings	PMU	24,000	80,000	
Final workshop	PMU	20,000	20,000	
Mid-term Review	UNIDO, External consultants	40,000		Mid-term of the project (expenditure or at the end of two years) whichever is earlier
Project Terminal Evaluation	Independent evaluators, PMU, UNIDO PM, and UNIDO Evaluation Group	40,000		Within 6 months of completion of project implementation
Total indicative cost		**468,550**	**700,000**	

227. Mid-term Review will be conducted in the third year of the project and the final report shall be submitted before 36th month. Project Terminal Evaluation shall be initiated by 6th year 66th month and will be concluded by 69th month.

Institutional Arrangement and Coordination with Ongoing Initiatives and Project.

Please describe the Institutional Arrangements for the execution of this child project, including framework and mechanisms for coordination, governance, financial management and procurement. This should include consideration for linking with other relevant initiatives at country-level (if a country child project) or regional/global level (for coordination platform child project). If possible, please summarize the flow of funds (diagram), accountabilities for project management and financial reporting (organogram), including audit, and staffing plans. (max. 500 words, approximately 1 page)

The Government of the Republic of India agrees to apply to the present project, mutatis mutandis, the provisions of the Revised Standard Technical Assistance Agreement concluded between the United Nations and the Specialized Agencies and the Government on 31 August 1956 and as amended on 3 October 1963."

228. Project Implementation: UNIDO, as the GEF implementing agency, will be responsible for the overall project supervision, overseeing the project progress through the monitoring and evaluation of activities and progress reports of the established components. It will be responsible for quality assurance procedures, organize contracting with the Executing Agency (EA), approve progress reports and clear disbursement. UNIDO will be responsible for contracting independent evaluators for undertaking the mid and terminal evaluations. UNIDO will also monitor progress to ensure the proper quality of outputs. UNIDO will also take part in the Project Steering Committee (PSC) and can request the PSC to meet outside of the planned schedule as deemed necessary. UNIDO will report project implementing progress to GEF. In addition, UNIDO will also execute Component 6. Knowledge Management and Learning. All procurements for goods and services carried out by UNIDO will follow the rules and regulations of the UNIDO Procurement Manual and thereby applying open competition to the extent possible.

229. National Execution Agency: The Ministry of Textile (MoT) will be the Executing Agency. MoT will host the Project Management Unit (PMU), supported by the project expert team, which will coordinate, manage

and be responsible for the project activities on a day-to-day basis. Two component resource persons will provide technical inputs. Component Resource Person 1 will provide technical inputs in implementing activities under the components 1, 2, 4 and 5. S/he will also oversee the implementation and report it to NPM. Component Resource Person 2 will provide technical inputs in implementing activities under the component 3. S/he will also oversee the implementation and report it to NPM. MoT will be sharing the annual Project Steering Committee (PSC) meeting, including the approval of the annual workplan and budget. The contracting of the indicated National Execution Agency MoT will follow UNIDOs rules and regulations of the UNIDO Grant Manual for direct grant awards

230. Textiles Committee, Mumbai will be engaged as fund management agency. UNIDO will release funds periodically as per UNIDO fund dispersal norms to TC on the advice of NPD/PMU. TC will release funds to vendors, consultants, project team, etc. on the advice of NPD/PMU.

231. The project implementation framework with various stakeholders is represented in Figure 4.

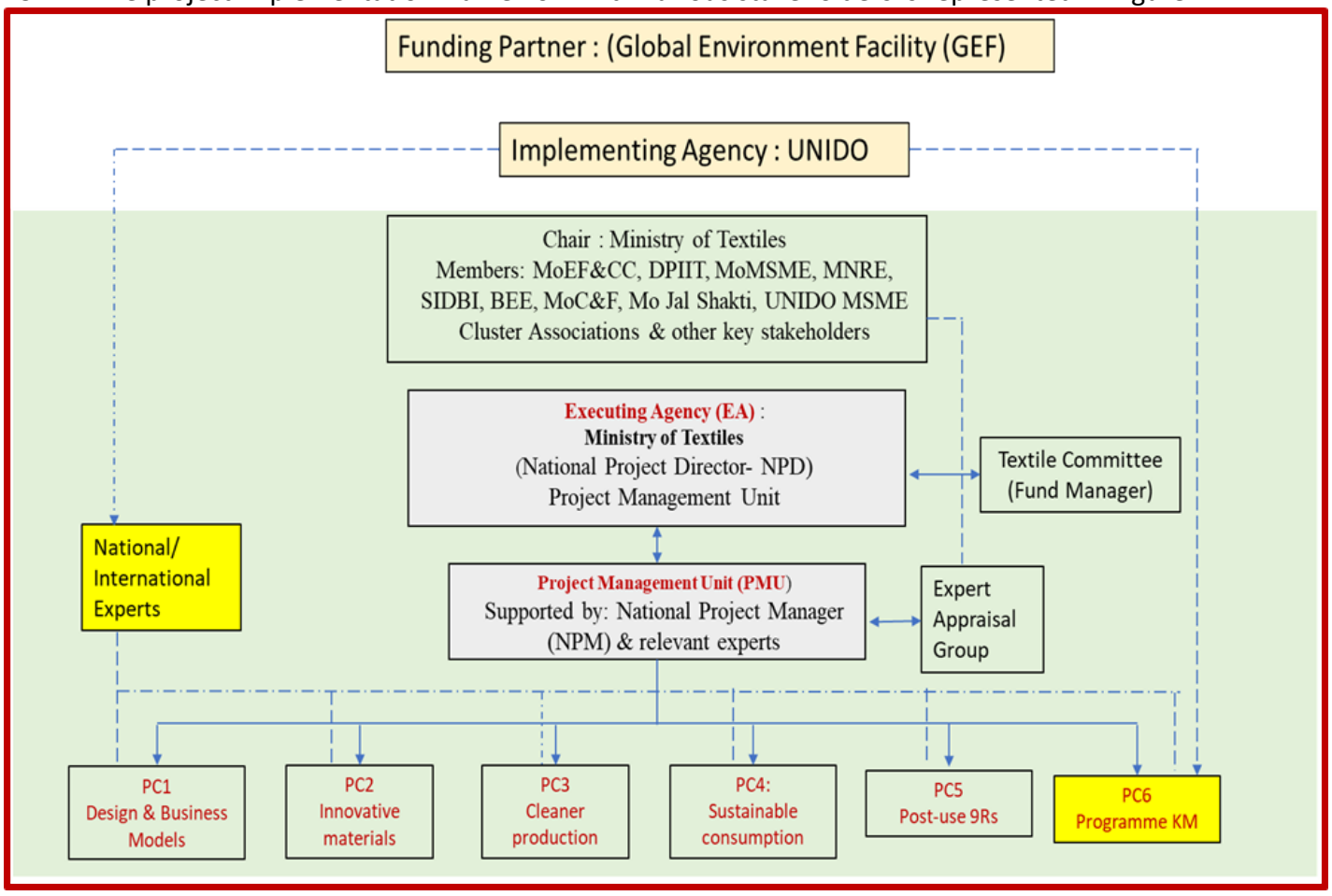

Figure 4. Organogram

Project Management Unit (PMU)

232. The PMU will have members for overall project implementation and coordination and Monitoring and Evaluation, who will be placed in an office space provided by MoT and guided by the National Project Director.

233. The specific tasks of PMU are as follows:

a. Submission of Annual Work Plan/Quarterly Work Plans/Budgets aligned to approved GEF CEO Endorsement document
b. Provide inputs to UNIDO in preparing and finalizing Annual Progress Reports (APR)/ Project Information Reports (PIR)
c. Submission of Quarterly Progress Reports (semi years or periodically as required)
d. Submission of reports, providing progress information, reports as required by NEA, UNIDO
e. Coordinating with vendors, consulting agencies, experts and others for implementing, tracking project and following up on timely submissions
f. Risk management as outlined in this Project Document
g. Procurement of goods and services, including human resources
h. Financial management, including overseeing financial expenditures against project budgets
i. Track and monitor co-financing for this project
j. Periodic field visits for tracking, monitoring, consultations with associations and overseeing project implementation
k. Undertaking sensitization programs and monitoring progress on Environmental and Social Safeguards and Gender Plan
l. Facilitating conduction of Mid-Term Review and Terminal Evaluation of the project.

National Project Manager (NPM)

234. The NPM will lead the PMU and will be responsible to liaise with all entities involved in project implementation. The NPM's primary responsibility is to ensure that the project produces the results specified in the project document, to the required quality and within the time and the cost. The NPM will be the custodian of the Project Document and as such will be responsible for overseeing compliance with the agreed work plan and budget. The NPM will ensure that subsequent revisions to the Project Document are verified and approved by the PSC and in accordance with the requirements of the Government and GEF. The NPM will report to UNIDO and work under the consultation and guidance of the National Project Director. The NPM maintains the project management plan and coordinates scheduling of activities. The NPM prepares, collates all project management and financial reports, and ensures effective communication and coordination of the project team and partners; establishes the result monitoring systems and facilitates all project evaluations and reviews; and keeps track of project risks and issues in the project's risk and issues log.All recruited consultants and experts will report to the National Project Manager.

235. The NPM will inform the PSC through NPD of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted. The specific tasks of NPM are as follows.
a. Overall coordination to implement the project
b. Guiding Component Resource Persons at Project Execution Partners, and the consultants
c. Liaising with NEA/NPD, UNIDO-India/HQ and Textile Committee
d. NPM will coordinate, develop Annual Work Plan and budgets in consultation with the above, place it for approvals and secure approvals
e. NPM will coordinate submission of quarterly progress reports, and provide plan for next quarter and fund request in timely manner
f. Coordinate conducting inception workshop, prepare management responses and submit them in consultation with the concerned
g. Coordinate timely conduction of PSC meetings and document them
h. Coordinate operational closure and transfer assets of the project.
236. NPM is responsible for preparing/collating reports as per Project Document and reporting to UNIDO through the NPD for all Components/Outcomes to PSC, UNIDO and GEF.

Project Steering Committee (PSC)

237. The Project Steering Committee (PSC) meeting is held annually to support and guide the project activities to align with national needs. The PSC will be led by the MoT as a chair, and the members will

include UNIDO, MoEF&CC, MoMSME, DPIIT, MNRE, SIDBI and Technical Institutions (e.g., ICT, Mumbai; IIT Mumbai, Textile institutions such as SITRA and ATIRA) all of which are the members during the PPG phase, while it will be confirmed during the implementation. Further, PSC may invite experts and others as invitees on need basis. A senior official from the Ministry of Textiles will chair the PSC meetings and ensure the project progress and accountability. Specific responsibilities of the PSC include the ones listed below

a. Provide overall guidance and direction to the project
b. Address project issues as raised by the PMU
c. Provide guidance on new project risks, and agree on possible mitigation and management actions to address them
d. Advise on major and minor amendments to the project within the parameters set by UNIDO-GEF, such as change in clusters if the situation compels without impacting the achievements on targets for core indicators.
e. Ensure coordination between various donor (co-financing entities) and government-funded projects and programmes
f. Review the project progress, assess performance, and appraise the Annual Work Plan for the following year
g. Ensure commitment of human resources to support project implementation, arbitrating any issues within the project
h. Provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plan
i. Review the final project report package during an end-of-project review meeting to discuss lessons learned and opportunities for scaling up.

National Executing Agency (NEA)

238. NEA for this project is the Ministry of Textiles, Government of India. NEA assumes full responsibility and accountability for the effective use of GEF resources and the delivery of outputs, as set forth in this document. The NEA is responsible for executing this project. A senior official of the MoT will be appointed as National Project Director (NPD). It would execute the project through a Project Management Unit. Their responsibilities are as follows:

a. Approving and signing the multi-year/annual work plan,
b. Approving and signing the combined delivery report at the end of the year,
c. Guiding PMU in executing project activities and,
d. Signing the financial report or the fund authorization and certificate of expenditure.

Will the GEF Agency play an execution role on this child project? Yes

If so, please describe that role here and the justification.

At the request of the Ministry of Textiles UNIDO will execute Component 6. Knowledge Management and Learning.

Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing (max. 500 words, approximately 1 page)

Project-specific baseline information and cluster selection

(i) Textile units in India are spread across India, however, over 70 clusters can be identified with intense textile activities. During the PPG phase, baseline information was gathered from secondary sources and analysis (including literature review) from primary survey and analysis (approximately 400 factories) and from indicative measurements such as energy audits, and chemicals and waste use. Based on the extensive consultation process, including bi-monthly Technical Working Group (TWG) meetings with relevant stakeholders, 16 key clusters were identified representing the value chains

of the textile sector (Table 5). A set of criteria were applied to select the clusters. They are (a) Is it a target state at concept – Andhra Pradesh, Gujarat, Haryana, Maharashtra, Punjab and Tamil Nadu, (b) Is it a PM MITRA state Uttar Pradesh, Tamil Nadu, Telangana, Karnataka, Maharashtra, Madhya Pradesh, Gujarat; (c) Hazardous chemicals; (d) Technical textiles; (e) Interest of cluster in adopting sustainability and circular economy aspects; (f) Quantity of production from the cluster; (g) Other considerations (complete textile value chain, CTVC* - 3) Non-CTVC (0) and (h) Government priority areas (Kolkata was identified to represent east). All these were presented and approved by Technical Working Group . Consideration was given to (a) textile chemicals and fibre manufacturing clusters, (b) Sustainable chemicals and cleaner production in MSME textile processing clusters, and (c) garment making and finishing.

(ii) A national survey jointly conducted by the Department of Science and Technology (DST) of the Ministry of Science and Technology of India and the United Nations Industrial Development Organization (UNIDO), viz., National Manufacturing Innovation Survey (NMIS) 2021-2022 report. This report comprehensively assessed the state of manufacturing innovation in India towards the achievement of the 2030 Agenda for Sustainable Development, especially Goal 9, and beyond (Indian Textiles & Apparel Sectorial System of Innovation (ITASSI) - Measurement, Analysis And Policy Recommendations, UNIDO-DST Survey Report, March 2023 Vienna, Austria) https://dst.gov.in/sites/default/files/Indian%20Textiles%20Sectorial%20System%20of%20Innovation%20%28ITSSI%29%20Report_0.pdf; https://hub.unido.org/sites/default/files/publications/Textiles%20SSI%20Report.pdf

(iii) A Project was sanctioned by the Ministry of Textiles, Govt. of India, under the Research and Development Scheme to develop Indian size charts based on body measurements of Indian population for better fitting of ready to wear garments. The project 'INDIAsize' plans to measure 25000 (Twenty five Thousand) persons aged from 18 to 65 years in six different regions of India using 3D body scanners. It is expected that the retail garment industry will be hugely benefitted from the outcome of the project. https://www.nift.ac.in/niftprojects

(iv) VISIONXT- TREND INSIGHT AND FORECASTING LAB is set up at NIFT under MoT, GOI. This is the first-ever Artificial Intelligence (AI) and Emotional Intelligence (EI) enabled Fashion trend analysis and forecasting initiative with a unique indigenous Deep Learning AI model and Indian Taxonomy of 50+ Indian products. https://www.nift.ac.in/niftprojects

(v) The Repository – Textiles & Crafts project sanctioned by the Ministry of Textiles, Government of India, aimed to develop one-of-a-kind national knowledge portal in the form of an integrated system that will lay down a framework to weave the past and present status of textile, clothing and related crafts with focus on futuristic developments. It was launched on the National Handloom Day 2023, i.e., 07th August, 2023, by the Hon'ble Prime Minister, Shri Narendra Modi. The digital portal will also provide access to vast database including research papers, case studies, dissertations and doctoral theses on textiles, clothing and craft related areas. It will serve as a one stop resource, providing information on new developments and current events relating to textiles and crafts. https://www.vastrashilpakosh.in/

(vi) A Project to prepare roadmap for the integrated and holistic development of Bhagalpur Mega Handloom Cluster was sanctioned by DC (Handlooms), Ministry of Textiles. NIFT Patna has been engaged as Cluster Management and Technical Agency (CMTA) to assist in identification and execution of the project. The deliverables for the Project are conducting diagnostic survey, providing guidelines to prepare RFP for CFC, Dye House, Design Studio and Product Development Centre, Design Research and Market Linkage, and monitoring of Project implementation. https://www.nift.ac.in/node/269

(vii) National Institute of Fashion Technology, Chennai has taken up e-content / MOOC ('Massive Open Online Courses') development of fashion & technology subjects under the 'National Mission on Education through Information & Communication Technology' (NMEICT), MHRD, Govt. of India. https://www.nift.ac.in/node/272

(viii) This Baseline Study 2020 entitled 'Technical Textile Industry in India: Opportunities and Challenges' has been carried out by IIT Delhi on behalf of Ministry of Textiles, Government of India. The report of the study encapsulates various aspects of technical textile industry in India. An attempt has been made to capture all the important elements of the technical textile ecosystem and suggest measures to put this industry on an accelerated growth trajectory that is aligned with the goals of NTTM of Government of India. https://texmin.nic.in/sites/default/files/Baseline_Survey_Technical_Textiles_Sector_20042022.pdf

(ix) Several research projects are undertaken by premier research institutes Under National Technical Textiles Mission (NTTM) https://texmin.nic.in/sites/default/files/Research_Projects_Undertaken_by_Premier_Research_Institutes_Under_NTTM_1.pdf

(x) NITRA has undertaken a project on 'New Approaches to Reduce Water Consumption in Textile Wet Processing' (Sponsored by Ministry of Textiles, Govt. of India). https://www.nitratextile.org/pdf/R&D%20projects%202020-21.pdf

(xi) The Ministry of Textiles recently proposed to select Consulting Agency for conducting a study on 'Mapping of Textile Waste Value Chain (pre & post-consumer) in India' and to help map the textile waste value chain and develop solutions for waste valorization towards contemplating policy measures to address the issue of textile waste in the country. https://www.texmin.nic.in/sites/default/files/RFP_Mapping%20of%20Textile%20Waste%20Value%20Chain%20in%20India.pdf

(xii) Bombay Textile Research Association & other TRAs - BTRA undertook several R&D projects, developed technologies for the textile sectors in India. The focus areas are; test method for Cr(VI) content in dyes/pigments/textile auxiliaries; nanofibers based geotextiles, cotton waste based oil absorbent for oil spill cleanup, automation for select textile machinery, eco-management of textile wet processing for water and chemicals savings, plasma treatment, testing of and low formaldehyde based finishing chemicals, Fire retardant finishing of apparels and home textiles etc. https://www.btraindia.com/

(xiii) Regenerative Production Landscape (RPL) Collaborative has been initiated jointly by Laudes Foundation, IDH-The Sustainable Trade Initiative, WWF India, is an

innovative jurisdictional model being implemented in Madhya Pradesh, India to foster agricultural ecosystems that conserve and enhance natural resources and build community resilience whilst enabling businesses to source responsibly. https://www.laudesfoundation.org/latest/news/2022/compact-landscape

Table On Core Indicators

Core Indicators

Indicate expected results in each relevant indicator using methodologies indicated in the GEF-8 Results Measurement Framework Guidelines. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Indicator 4 Area of landscapes under improved practices (hectares; excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
0	2128000	0	0

Indicator 4.1 Area of landscapes under improved management to benefit biodiversity (hectares, qualitative assessment, non-certified)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
	2,128,000.00		

Indicator 4.2 Area of landscapes under third-party certification incorporating biodiversity considerations

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Type/Name of Third Party Certification

Indicator 4.3 Area of landscapes under sustainable land management in production systems

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4.4 Area of High Conservation Value or other forest loss avoided

Disaggregation Type	Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4.5 Terrestrial OECMs supported

Name of the OECMs	WDPA-ID	Total Ha (Expected at PIF)	Total Ha (Expected at CEO Endorsement)	Total Ha (Achieved at MTR)	Total Ha (Achieved at TE)

Documents (Document(s) that justifies the HCVF)

Title

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)	231000	147000	0	0
Expected metric tons of CO_2e (indirect)	0	294000	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)				
Expected metric tons of CO_2e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)	231,000	147,000		
Expected metric tons of CO_2e (indirect)		294,000		
Anticipated start year of accounting		2025		
Duration of accounting		6		

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Indicator 9 Chemicals of global concern and their waste reduced

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
18,000.00	31,590.00	0.00	0.00

Indicator 9.1 Solid and liquid Persistent Organic Pollutants (POPs) removed or disposed (POPs type)

POPs type	Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	18,000.00	31,590.00		

Indicator 9.2 Quantity of mercury reduced (metric tons)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.3 Hydrochloroflurocarbons (HCFC) Reduced/Phased out (metric tons)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.4 Number of countries with legislation and policy implemented to control chemicals and waste (Use this sub-indicator in addition to one of the sub-indicators 9.1, 9.2 and 9.3 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
1	1		

Indicator 9.5 Number of low-chemical/non-chemical systems implemented, particularly in food production, manufacturing and cities (Use this sub-indicator in addition to one of the sub-indicators 9.1, 9.2 and 9.3 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 9.6 POPs/Mercury containing materials and products directly avoided

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.7 Highly Hazardous Pesticides eliminated

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.8 Avoided residual plastic waste

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

5,200.00			

Indicator 10 Persistent organic pollutants to air reduced

Grams of toxic equivalent gTEQ (Expected at PIF)	Grams of toxic equivalent gTEQ (Expected at CEO Endorsement)	Grams of toxic equivalent gTEQ (Achieved at MTR)	Grams of toxic equivalent gTEQ (Achieved at TE)
2.50	12.00		

Indicator 10.1 Number of countries with legislation and policy implemented to control emissions of POPs to air (Use this sub-indicator in addition to Core Indicator 10 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 10.2 Number of emission control technologies/practices implemented (Use this sub-indicator in addition to Core Indicator 10 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	24,000	72,000		
Male	16,000	48,000		
Total	**40,000**	**120,000**	0	**0**

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

Please see Appendix 5 for GEB methodologies

- Greenhouse Gas Emissions Mitigate: 147,000 tCO2e (direct); 294,000 tCO2e (indirect)
- Chemicals of global concern and their waste reduced (metric ton of toxic chemicals reduced): 10,530 ton (Direct); 21,060 ton (indirect)
- Persistent organic pollutants to air reduced (grams of toxic equivalent gTEQ): 12
- Area of landscapes under improved management to benefit biodiversity (ha): 2,128,000
- People benefiting from GEF-financed investments disaggregated by sex (count)40,000 (60% women) (direct) + 80,000 (60%women) (indirect)

(over 6 year project period)

Explanation is provided below for GEB calculations for GHG reduction due to energy interventions below and the same is also included in CEOED at Annexure 5.

Description of GEB calculations - Energy

The project conducted baseline audits across all eight clusters. Based on the survey results, the average baseline GHG emissions per factory were calculated at 47,494 tCO2. Detailed cluster-wise and fuel-wise factory data are provided in the baseline section of the CEOED.

The project has identified three energy interventions:

1. Energy Efficiency (EE) measures
2. Solar Photovoltaic (SPV) installations
3. Concentrating Solar Heat (CSH) systems

These interventions target both thermal and electrical energy needs. Implementation is planned in a limited sample of factories to stay within budget, while still ensuring enough visibility to trigger scalability. Below is a summary of the interventions and the GEB (Global Environmental Benefits) procedure:

Energy Efficiency Interventions

EE interventions are planned in 24 factories over four years. The first year will focus on preparatory activities, including factory identification, awareness creation, baseline audits, solution development, and finalization with the beneficiary factories. In the second year, interventions will be completed in four factories, with impacts on energy consumption and GHG emissions reductions beginning in year three. A similar approach will be followed in years three, four, and five. No interventions are planned for year six.

The estimated GHG reduction from EE interventions is 2,375 tCO2 per year per factory, against a baseline of 47,494 tCO2. The cumulative GHG emissions reduction over the six-year project duration is projected at 142,482 tCO2. The 24 factories are expected to collectively reduce 56,993 tCO2 annually. The lifespan of the EE measures ranges from 5 to 10 years, and their performance will be tracked and reported in post-implementation reports, as well as in PIR (Project Implementation Report), MTR (Mid-Term Review), and TE (Terminal Evaluation).

GHG Calculations for SPV Interventions

SPV interventions are planned in 16 factories, following a similar implementation process to the EE measures.

Each factory will have an average SPV installation of 100 kW, generating approximately 132,000 kWh annually (1,320 kWh per kW). This will result in an annual GHG reduction of 112 tCO2 (at 0.84 kgCO2 per kWh). Across all 16 factories, a total of 1.6 MW of SPV capacity will be installed. The cumulative GHG reduction over the six-year project is estimated at 1,795 tCO2, while the annual reduction will be 1,571 tCO2, generating 2.112 million kWh of electricity per year.

GHG Calculations for Concentrating Solar Heat (CSH) Systems

CSH interventions are also planned in 16 factories, with GHG calculations following the same approach as the EE measures.

Each factory will install a CSH system covering an average of 200 square meters. This installation will reduce GHG emissions by 0.35 tCO2 per square meter annually. A typical 200 square meter system will thus reduce around 70 tCO2 per year. Across the 16 factories, a total of 3,200 square meters of CSH systems will be installed, leading to a cumulative GHG reduction of 2,800 tCO2 over six years, with an annual reduction of 1,120 tCO2.

Overall Impact of Interventions

In total, energy interventions (EE, SPV, and CSH) are planned in 52 factories. As much as possible, interventions will be distributed across clusters, with each cluster receiving 1 to 2 interventions of each type. The first year will focus on preparatory activities such as identifying interested factories, raising awareness, conducting baseline audits, assessing sites for solar installation, and selecting vendors for the interventions.

The total cumulative GHG emission reduction during the six-year project is estimated at 147,077 tCO2 (rounded to 147,000 tCO2). The annual GHG emission reduction from the 52 installations is projected to be 59,684 tCO2.

It is expected that the direct interventions supported by the project will encourage more factories to adopt similar measures. A conservative estimate suggests that the number of factories adopting these interventions could double during the project period, leading to an indirect GHG reduction equivalent to twice the direct interventions. This would result in an additional reduction of 294,000 tCO2 over the project duration, with monitoring by the PMU based on cluster information.

Key Risks

	Rating	Explanation of risk and mitigation measures
CONTEXT		
Climate	Moderate	Climate change such as heat stress may impact productivity of people and events like floods and water stress in increased summer may impact operations of Textile units and also affect project outcomes. Mitigation measure/s: The project will include creating awareness on climate risks in the project clusters. Project activities aim at reducing chemical, energy, water use, that reduce GHG emissions eventually contributing to climate change mitigation.
Environmental and Social	Moderate	Environmental risks include waste generation, GHG emissions, high water and chemical consumption, and hazardous waste disposal. Social risks encompass inadequate ESHS/OHS infrastructure, worker safety issues, discriminatory policies, wage disparities, and ineffective grievance redressal mechanisms. Mitigation measures are integrated into the project's main interventions. An Environmental and Social Management Plan (ESMP) will ensure that all project activities are reviewed and strengthened from an environmental and social perspective. This plan includes upgrading existing ESHS/OHS systems and procedures to enhance compliance with safety standards and labor welfare regulations. Additionally, the project will focus on developing and operationalizing managerial systems for proper disposal of E-waste generated from the adoption of new technologies. An 'Environment and Social Clinic' (ESC) will be established as part of the project's management structure. The ESC, staffed by an expert environmental agency, will assist individual units in conducting ESHS reviews and preparing ESHS Strengthening Plans. It will also monitor and support ESHS activities, providing expert advice and capacity-building training for factory management and workers. Despite these measures, some risks may persist at reduced levels, particularly due to the

		financial and managerial constraints of MSME sector units. Thus, the overall risk is rated as Moderate.
Political and Governance	Moderate	Though India's apparel fashion sector complies to export requirements, the regulations for sustainable textiles are yet to be developed and enforced in India. There is general resistance from industry stakeholders, influenced by economic interests, hindering compliance. Additionally, inadequate resources or expertise within regulatory bodies may hamper effective monitoring and enforcement. The project has several activities to mitigate these risks. The project provides support setting relevant policies, setting standards, certifications. It also supports developing procurement policies of fashion houses, engaging stakeholder factories in clusters to comply with the policies and regulation. The project creates public awareness, upskills officials to enable them to effectively monitor and enforce policies.
INNOVATION		
Institutional and Policy	Moderate	The project faces institutional and policy risks, including issues related to regulatory enforcement of hazardous chemical use, management of effluents, water use, textile waste management etc. To mitigate these, the project will enhance institutional capacity and policy frameworks by collaborating with government agencies, establishing clear roles, and advocating for supportive incentives for MSMEs. Regular stakeholder consultations and workshops will build awareness and compliance. The project will provide technical support, facilitate policy dialogues, and develop comprehensive guidelines. Despite these efforts, some risks will persist due to sector complexity, rating the overall risk as Substantial.
Technological	Moderate	Adoption of new technologies and integration into existing processes is seen with skepticism and factories are hesitant to accept them unless demonstrated. To mitigate these, the project will provide technical support and training to ensure smooth implementation and operation of energy efficient, non-hazardous alternative, equipment that make use of chemicals & water more efficiently. The project will offer Technical Assistance to implement technology solutions and limited financial incentives for those interventions which have long term incentives but have potential to become viable when scaled up. In addition, the project supports the establishment of pilot projects and provides financial incentives to encourage technology adoption. Despite these measures, initial adoption challenges may persist, rating the overall technological risk as Moderate.
Financial and Business Model	Moderate	The project partners may not sustain the project activities particularly replacing hazardous chemical use (which are recurrent in nature) due to unviable costs without appropriate scale of market, policy regime. To mitigate the risks, the project will evaluate the interventions carefully before their interventions. Where essential project will facilitate incentives from brands on one hand, and on the other include criteria to encourage procurement of textile products produced through cleaner production, alternative non-hazardous chemicals.

EXECUTION		
Capacity	Low	The country has a fair level of implementation capacity and national schemes as outlined in baseline initiatives through private and government. The new interventions identified under the project require a certain set of skills to implement. The project will identify appropriate resources (experts/ expert agencies) and address capacity gaps in implementing project components effectively.
Fiduciary	Low	Fiduciary risks associated with the project may be related to management of project funds, release of financial incentives to factories/ enterprises. The reporting of baseline, and post implementation measurements are key reference documents for financial incentives. To mitigate this risk, the project applies financial controls of UNIDO, Ministry of Textiles based on where the goods/ services are procured. Further, for release of financial incentives, the PMU will set up a committee for release of financial incentives with representatives from MOT, UNIDO and experts (as per requirement).
Stakeholder	Moderate	There are chances that stakeholders, particularly industries may not engage fully or delay in engagement. This can result in inadequate, timely implementation of activities and achieve the desired project outcomes particularly core indicators. To mitigate this risk, the project aims to engage with industry associations to motivate and nudge the industries to implement project interventions. The project will engage with the brands/ fashion houses to encourage/ incentivize their supply industries to embrace project interventions. The project will also engage government officials by training them on project interventions who in turn also can encourage and nudge industries to embrace project interventions.
Other	Moderate	The project faces gender risks, given the predominant employment of women in the sector. Gender disparities in wages, discriminatory practices, and lack of representation in decision-making pose challenges. The project prioritizes gender impact, aiming to indirectly affect 24,000 women and 48,000 women during its six-year duration. Gender considerations are integrated across project components, focusing on reducing workplace inequalities, capacity-building for women in cleaner production, promoting sustainable consumption through women influencers, and establishing women-led enterprises. A knowledge component targets understanding health impacts on women workers. The gender action plan identifies barriers and suggests actions, with low-grade risks anticipated in specific activities like gender mainstreaming resistance and pay equity gaps. Mitigation measures include sensitizing decision-makers, skilling women for non-traditional roles, promoting industry growth reliant on women's participation, and advocating for safer work environments to address pay disparities. With a six-year timeline, the project has ample opportunity to address gender risks effectively while actively stimulating women's participation in the sector.

Overall Risk Rating	Moderate	The project has been categorized as moderate risk when screened based on the above set of parameters.

C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Explain how the proposed interventions are aligned with GEF- 8 programming strategies, including the specific integrated program priorities, and country and regional priorities, Describe how these country strategies and plans relate to the multilateral environmental agreements, such as through NDCs, NBSAPs, etc.

For projects aiming to generate biodiversity benefits (regardless of what the source of the resources is - i.e., BD, CC or LD), please identify which of the 23 targets of the Kunming-Montreal Global Biodiversity Framework the project contributes to and explain how.

(max. 500 words, approximately 1 page)

239. Greenhouse gas emissions mitigated (metric ton of CO2e): The project uses a baseline assessment to quantify current GHG emissions and hazardous chemical usage in the apparel supply chain. By implementing sustainable practices and cleaner production techniques in 400 textile factories, direct emission reductions are calculated. Indirect reductions are estimated through the ripple effect due to awareness, sensitization, training and capacity building; as well as through market transformation and policy influence. The approach includes benchmarking against industry baseline, making interventions of conservative energy efficiency in boilers, energy using equipment in the textile MSME units, renewable energy (solar electricity, solar heat) to reduce GHG emissions. The interventions designed aim for mitigating 147,000 tCO2 directly and 294,000 tCO2 indirectly over six years.

240. Chemicals of global concern and their waste reduced (metric ton of toxic chemicals reduced): The project targets reducing chemicals of global concern by 10530 metric tons directly and 21,060 tons indirectly, and persistent organic pollutants (POPs) by 12.0 g TEQ. The approach begins with a baseline assessment of current chemical use and emissions in the apparel supply chain. Through Chemical Change Management (CCM), harmful chemicals are identified and replaced with safer alternatives across eight clusters, leveraging analysis, project guidance, and monitoring. Collaboration with key stakeholders, including chemical manufacturers and fashion brands, ensures a coordinated effort. Engagement with proven organizations tohelp implement best practices. This comprehensive strategy ensures systematic reduction of toxic chemicals and POPs, achieving the project's environmental objectives.

241. People benefiting from GEF-financed investments disaggregated by sex (count): The project aims to benefit 40,000 people directly (60% women) and 80,000 indirectly (60% women) through GEF-financed investments. The methodological approach involves identifying key stakeholders in the apparel supply chain, including workers in textile factories, MSMEs, and surrounding communities. The project focuses on improving working conditions, reducing health risks from hazardous chemicals, and promoting sustainable practices, which directly impact the workforce. By targeting 400 textile factories and promoting safer alternatives, the project ensures widespread adoption of better practices, enhancing worker safety and well-being. Special emphasis is placed on women's participation, recognizing their significant role in the textile industry. Outreach and training programs are designed to empower women, ensuring they constitute a majority of the beneficiaries. The underlying logic is that systemic improvements in the supply chain to achieve the set targets of direct and indirect beneficiaries.

Risks to Project Implementation

242. The risk category, rating, assessment and mitigation measures are provided in the Annex 4.

243. The Ministry of Environment, Forest and Climate Change (MoEFCC), The Government of India, with financial and technical support from the Global Environment Facility (GEF), initiated the National Implementation Plan (NIP) development process which involved the ground-level assessment of situation of POPs through inventorization, samples collection, analysis and interpretations (Government of India,2011). India has signed the Stockholm

Convention in 14th May 2002 and ratified it in 2006 and subsequently submitted its NIP to phase out the twelve POPs which are well known as the “Dirty Dozen” in 2011. In the NIP, the government developed its strategy to deal with these chemicals and subsequently some regulations were promulgated by the MoEF & CC to act on these chemicals. Further, MoEF & CC has come out with a new notification in 2018 to phase out seven new POPs in the country MoEFF & CC had notified the 'Regulation of Persistent Organic Pollutants Rules, on March 5, 2018 under the provisions of Environment (Protection) Act, 1986 (https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvNjU4XzE1MjU2Nzk4NTJfbWVkaWFwaG90bzMwMDE5LnBkZg==, accessed on 16/04/2024). The regulation inter alia prohibited the manufacture, trade, use, import and export of seven chemicals namely (i) Chlordecone, (ii) Hexabromobiphenyl, (iii) Hexabromodiphenyl ether and Heptabromodiphenylether (Commercial octa-BDE), (iv) Tetrabromodiphenyl ether and Pentabromodiphenyl ether (Commercial penta-BDE), (v) Pentachlorobenzene, (vi) Hexabromocyclododecane, and (vii) Hexachlorobutadiene, which were already listed as POPs under Stockholm Convention. The MoEF& CC has developed the National Implementation Plan to manage these POPs and some of the key central government agencies who are executing the National Implementation Plan are, the Central Pollution Control Board, Central Power Research Institute, National Environmental Engineering Research Institute (NEERI, Nagpur) and National Institute for Interdisciplinary Science and Technology (NIST), Trivandrum. NEERI has been acting regional center for Stockholm Convention for Southeast Asian countries. Further, along with the Central Pollution Board, the State Pollution Control Boards have been bestowed with the responsibilities for monitoring the emission levels and enforcement of the regulations on POPs at various levels. It may be prudent to consider this consortium during the GEF project implantation phase. Some textiles related policies/regulations related hazardous chemicals, their use, export/import are mentioned below.

244. License of Dual Use Items Under 'Scomet' Category from Directorate General of Foreign Trade (DGFT, 1724877/2022/Tech-CPC, annexure-II; https://chemicals.gov.in/scomet)- In Foreign Trade Policy, dual-use items have been given the nomenclature of Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET). Export of dual-use items and technologies under India's Foreign Trade Policy is regulated. Export of dual-use items and technologies is either prohibited or is permitted under a license. In the list of SCOMET items, chemicals come under 'Category-1'.

245. The chemicals listed in Annex III include pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by two or more Parties and which the Conference of the Parties has decided to subject to the Prior Informed Consent (PIC) procedure. India is a signatory to PIC.

246. The law on Prior Informed Consent (PIC) sets guidelines for the export and import of hazardous chemicals that are banned or severely restricted in the EU. Through this mechanism, countries due to receive hazardous chemicals are informed in advance and have the possibility of rejecting their import.

247. Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in international trade, date of ratification, 24/05/2005; Accession (a); date of entry into force, 22/08/2005

248. Rotterdam Convention Decision RC-9/7 (Adoption of Annex VII), entry into force 06/11/2020

249. Consumer products that contain the listed aromatic amines originating from restricted azo dyes are currently prohibited from being manufactured or sold in many countries including India. India has published legislation prohibiting the handling of a total of 112 azo- and benzidine-based dyes. In 1993, the Government of India prohibited the handling of 42 benzidine-based dyes. The Ministry of Environment and Forests further prohibited the handling of an additional 70 azo dyes in 1997. According to the Indian import policy, the import of textiles and textile articles is permitted subject to the condition that they do not contain any of the hazardous dyes (azo dyes) whose handling, production, carriage or use is prohibited in India under the provisions of the Environment (Protection) Act, 1986. This amendment was made to the Indian legislation by the Notification No. 03 (RE-2001)/1997-2002 dated on 31 March 2001.

250. Under the Notification of Ministry of Commerce No. 19/2015-2020 dated 4.09.2015, the import consignments shall be accompanied by a pre-shipment certificate (PSC) from a textile testing laboratory accredited to the National Accreditation Agency (NAA) of the country of origin, certifying that the products do not contain any of the prohibited substances under azo dyes (Table 1). Testing must be done for every style and colour to ensure compliance with the azo requirement. https://www.sgs.com/en-be/news/2023/10/safeguards-12923-india-updates-azo-dye-requirements-for-imported-apparel-and-textile-products.

251. The Child Project is fully aligned to the GEF 8 programming strategy, as it is defined and outlined as one of eleven Integrated Programs in the GEF-8 Strategy. It is a multi-focal area program delivering integrated

solutions to address multiple environmental challenges and achieve higher visibility and momentum through connecting different environmental, social and economic agendas.

252. The Child Project is designed to explicitly address the four transformation levers identified by the GEF, as shown in the Theory of Change. The child project is aligned with national priorities, particularly in relation to MEA obligations across all focal areas. GEB estimates are derived from these and other national sources and demonstrate direct contribution of the child projects to national priorities and commitments.

253. The trade especially exports have been focusing on use of non-hazardous material. Stakeholder consultations have revealed that the supply chain industries are looking forward to interventions that are proposed in India Child Project, as it helps them to align with production methods which will meet international benchmarks. The project is not only helpful in enhancing trade and increasing economics of supply chain but also acts as appropriate business strategy.

254. Several stakeholders were consulted during the PPG phase. This helped in developing, revising, defining scope of work for interventions. A list of stakeholders consulted is given below.

- National stakeholders-cum-validation workshop - 14 May 2024
- Stakeholders Meetings with Industry Associations - 371 nos. participated in these meetings
- List of industries surveyed for baseline and consultation
- Stakeholder consultations during BHARAT TEX - 2024 (Global Textile Expo, New Delhi, Feb 26-29, 2024)
- List and address of organisation/individual experts consulted

National stakeholder cum validation workshop, UN House, New Delhi, 14 May 2024

255. The National Stakeholders-cum-Validation Workshop was held on 14 May 2024 at UN House, New Delhi. 40 people participated, represented by key government departments: Ms. Prajakta L Verma, Joint Secretary, MOT; Ms. Roop Rashi, Textile Commissioner; Mr. Dinesh Runiwal, Additional Director (Sc-E) from the Ministry of Environment, Forests & Climate Change; Mr. SP Verma, Secretary, Textile Committee; General Manager from the Small Industries Development Bank of India (SIDBI), Villgro, Impact Investor, 9R entrepreneur from Ahmedabad, representatives from various textile clusters like Tiruppur, Surat, Haryana, Kolkata, Ahmedabad, and Panipat. Other attendees included representatives from Academia, and consultancy organizations ASCI and Global SusTech. UNIDO provided context to the meeting, global programme and institutional arrangement, ASCI presented baseline analysis and Sustech presented activities, components, of CEO ED for GEF-UNIDO- MOD India Textile proposal. Key highlights of the workshop are as follows:

- Activities/outputs, outcomes and components were in principle agreed. Some suggestions were made for incorporation in the subsequent draft.
- SIDBI suggested to examine the scope for interest subvention for incentivizing the project textile factories
- Impact investors said they are keen to collaborate with programme, however, they will consider co-financing the programme at the time of project implementation

Table 21. Stakeholder meetings with Industry Associations

S.No.	Cluster	Organisation/ association/ person	Address	Date of consultation	Attendees
1	Ahmedabad	The Textile Association India, Ahmedabad	Dinesh Hall, The Textile Association India, Ahmedabad, Gujarat	23-May-24	20
2	Bhiwandi	Bhiwandi textile Manufacturers Association	Hotel Utsav Grand, Bhiwandi, Maharashtra	22-May-24	10

3	Ichalkaranji	Ichalkaranji Powerloom weavers Association	Darbar Hall, Fortune Mall, Ichalkaranji, Maharashtra	29-Apr-24	120
4	Kolkata	West Bengal Hosiery Association (WBHA)	Board room, Bharat Chamber of Commerce, 9/1, Syed Amir Ali Avenue, Kolkata	03-May-24	24
		Indian Jute Mills Association	Royal Exchange, 3rd Floor, 6 Netaji Subhas Road, Dalhousie, Kolkata		39
5	Ludhiana	Knitwear & Textile Club	Sutlej Club, Ludhiana, Punjab	10-May-24	43
6	Panipat	Haryana Chamber of Commerce & Industry	Conference hall, Hotel Days, Panipat, Haryana	08-May-24	27
7	Surat	South Gujarat Textile Processors Association	Conference Hall, SGTPA, Pandesara, Surat, Gujarat	15-Mar-24	49
8	Tirupur	Tirupur Exporters Association	Board Room, TEA, 62, Appachi Nagar Main Road, Kongu Nagar, Tiruppur, TN	04-Apr-24	31
		Dyers Association of Tirupur	Board Room, Perundurai SIPCOT Textile Processors Association		8
Total					371

Table 22. List of industries surveyed for baseline and consultation

S.No	Cluster	Type of units	Date of consultation	Surveyed industries
1	Ahmedabad	Dyeing, printing	13 March to 30 June 2024	12
2	Bhiwandi	Dyeing, printing	13 March to 31 June 2024	17
3	Ichalkaranji	Dyeing printing & finishing, Weaving, Air jet loom, Spinning mills, Sizing yarn, Sizing industry, Garment industry, Dyeing & processing, loom industry, cotton works	13 March to 31 May 2024	50
4	Kolkata	Bleaching, dyeing, finishing, fabric, apparel	13 March to 31 May 2024	15
5	Ludhiana	Knitting, Garment, winter garment, weaving, dyeing mill, spinning mill, garment manufacturing, readymade garments	13 March to 31 May 2024	24
6	Panipat	Garment, Textile industry	13 March to 31 June 2024	15
7	Surat	Dyeing & printing, Printing cloths	13 March to 31 May 2024	50

8	Tiruppur	Processing of knitted fabrics, Dyeing processing, Printed cloths, Exports garments, Knitting, Dyeing and printing	13 March to 31 May 2024	40
TOTAL				223

Table 23. Stakeholder consultations during BHARAT TEX - 2024 (Global Textile Expo, New Delhi, 26–29 February 2024)

S.No.	Stakeholder	Information gathered
1	Mr. P. Manikandan KKP Fine Linen Pvt Ltd., #88, Salem Road, Namakkal – 637 001, Tamil Nadu flpdm@kkpindia.com	K.K.P. Textiles Pvt Limited has 1,00,000 spindle capacity textile units at N. Pudupatti, 8 km from Namakkal town towards Trichy, Tamil Nadu, South India. Makes 100% Cotton Yarn for High-Speed Knitting and weaving Ring Spun yarn (carded/ Combed. KKP has presently customers throughout India for Cotton Yarn and Viscose Yarn. Also, KKP is exporting its Cotton Yarn and Viscose yarn to Europe, far East and other Asian countries.
2	Mr. Tiju Peter Triangle Weavers, Muhamma, P.O. Chertala, Alappuzha - 688 525, Kerala, India. Email: info@trainglewevers.com	This unit processes natural fibers such as coir, jute into mats. The processing capacity is 80,000 m^2/month (weight is ~ 4.0 kg/m^2). Yarn waste is reused. About 15% fibre waste (<1" long fibers) is generated which is used as fuel for cooking. Among the employees, 25 are staff, 100 workers, 40% women.
3	Mr. Karthik P Airwill Home Collections Pvt Ltd, Karur, SF No. 170A1A1A, Naval Nagar Opposite Old Salem Road, Kathaparai Village, Vennaimalai Post, Manmangalam Taluk, Karur – 639 006, Tamil Nadu. Email:karthik@airwillhomecollections.com	It is a powerloom unit with 2500 m^2/day (16" width fabric) production capacity using recycled yarn from recycled fabric. Weaving capacity is 750 kg/day (fabric weight is 300 g/m, i.e., 200 gsm). Procian dyes (99%) are used for fabric dyeing. Fabric waste mainly cuttings is about 10 kg/day, which is reused as cushion fillings. NO liquid waste is generated. Power consumption is 12,500 kWh (units)/month @ Rs 8/unit. Diesel sets (2 x 20 kV) support the unit when there is power cut from the state grid. The industry is inclined to go for rooftop solar power, but due to absence of Net Metering policy in TN, excess PV power is charged for putting into the grid. This is an unattractive situation for switching over to renewable energy sources whereas about 100 weavers in Karur would like to embrace solar PV power for their operations. A policy shift is awaited here.
4	Mr. Aravind Saini Jindal Ecotex, E-43, Industrial Area, Near Old Court, Panipat – 132 103. Email: arvind@jindalecotex.com	Recycling units for technical textiles. Requested virtual meetings for more details.

5	Mr. Ankit Dargad Annapurna Textiles, E-88/3, MIDC, Akkalkot Road, Solapur (MH), India -413 006. Email: enquiry.antex@gmail.com	This unit produces terry towels, bath towels. Annual production is 1,00,000 tons for both domestic and export. The raw material is recycled cotton from cotton fabric cuttings from the garment industry. Both grey and dyed yarns are used for weaving. The fabrics are dyed then using about 8–10 different colors. The dye uptake is said to be 50–60 g/kg fabric.
6	Mr. D L Hareendra Indiwara Teejay India Pvt Ltd, (Brandix), Plot No. 15, BIAC SEZ, Pudimadaka Road, Atchutapuram, Visakhapatnam – 531 011. Email: rodneyr@teejay.com	The processes involved are yarn, knitting, jet dyeing to obtain finished textile fabric, 55 tons/day (5.5 million meters/month). Water use is said to be about 90L/kg fabric. Energy and chemicals details were not readily available with the Brandix representative at Bharat tex.
7	Mr. Govind Zanwar Beyond Terry Towels, E-73, MIDC, Akkalkot Road, Solapur – 413 006 - MS, India. Email: zanwargovind@gmail.com	Manufacturers and exporters of Terry towels & Allied Products, specialized in bamboo yarn plain, terry towels and all textile items. Bamboo fibre is imported from China, yarn is made and knitted into fabric. The cost of bamboo fibre is said to be Rs 250–270/kg. The unit expressed concern that bamboo fibre-making technology is not available in India, and the cost of fibre-making technology is exorbitant Rs. 150–200 crore, (18.1 to 24.1 million USD). They hope that GOI will subsidize the technology cost and also develop the fibre-making technology indigenously.
8	Dr. Shirishkumar B. Vhanbatte, Dean R&D, DKTE's Textile & Engineering Institute, Rajwada, Ichalkaranji – 416 115, MS, Email: deanreaserch@dkte.ac.in	Ichalkaranji has about 25,000 automatic looms and 1,25,000 power looms and produces textiles and allied products. Textile processing cap in Ichalkaranji is only 10%, about 90% processing is done from Pali, Rajasthan and brought back to Ichalkarangi for knitting/weaving. The production cap is 10 million meters/day with 150 sizing units, and 35 dyeing units of 500 T/day capacity. Water use is said to be about 150 L/kg fabric. Liquid wastes are treated in three CETPs. Waste generated is Fibre/fabroic. Biosolids from CETP are sent to LF at Taloja.
9	Hemali Sangani Thermaissance, 15 Blue Rose Industroal Estate, Western Express Highway, Borivali (East) Mumbai – 400 066. Email: hemali.sangani@thermaissance	Manufacturer of technical textiles. Requested online meeting for more details.
10	Mr. Jaideep Sajdeh Texool Refashion, 58 A-Wotld Trade Center, Cuffe Parade, Mumbai - 400 005. Email: recycle@texool.com	This unit is engaged in post-consumer waste recycling with over 50 years of experience. Total fibre/fabric waste generation in India is said to be about 7800 KT/year. The wastes are upcyled by this unit. According to the Director of this unit, 21% of the post-consumer textile waste goes to landfill or incinerators. Texool Refashion has a tie-up with ASCI's India Wash Innovation Hub.

11	Mr. Asim Tewari Centre for Machine Intelligence & Data Science, Department of Mechanical Engineering, IIT, Mumbai – 400 076. Email: asim.tewari@iitb.ac.in	Visited the stall by IIT, Mumbai department super critical CO_2-based dyeing of textile fabrics.
12	Mr. Ranjit Sasi, Director: Business & Operations, India, Reverse Resources, Email: ranjit@reverseresources.net	Collected his insights into textile waste recycling.
13	Mr. C. Vijayakumar SCM Textile Spinners, Pudupalayam, S.F.NO.39, N.G.PALAYAM PIRIVU, THEKKALUR, AVINASHI – 641 654, INDIA. marketing@scmts.net	SCM is one roof' textile solutions provider offering a wide range of textile products, which includes Slubs, Blends (CT+PE), Specials with several sub-products. Some of the products are Organic and BCI compliant.
14	Mr. Ganesh Ram Anubha Industries Pvt Ltd, Plot No. 369, 371, 377-NH-8, Village & Taluka Palsana, Surat-394315. E-mail: ganesh.ram@anubhaindustries.com	Provides denim and piece-dyed fabric solutions for both national and international markets. Main products are denim and piece dyed fabrics, and we focus on sustainable cotton and cotton blended fabrics, through different yarns, compositions, weaves and finishes. Focusses on sourcing technologies used to dispose of materials, in line with (UNDP) Program's 17 Sustainable Development Goals. Anubha installed a state-of-the-art recovery plant, in which 90% of the chemical caustic — used in the manufacturing process — is recovered and reused during the mercerizing process.
15	Mr. Makhesh Kumar Rhythm Knit India (P) Ltd. #4A, Old Ramakrishnapuram, 1st Street, Tirupur – 641 607. Email: mail@bulletimpex.in	Rhythm Knit is a quality-focused knitwear garments manufacturer based out of Tirupur. Rhythm specializes in making children pajamas and t-shirts. It includes printing and garmenting with over 300 sewing machines. Rhythm manufactures about 15,000 garments per day.
16	Panel Discussion-Innovation nexus: pioneering circular solutions for sustainability (recycle)	About 7.7 million tons/year waste is generated in India. Restart Alliance proposes to add 1 million ton recycled fibers into the global textile supply chain by 2030. It has NIR tests for the quality of waste. Discussions are wide over AI-enabled waste processing and tracking, Renewcell opined that only 1% of recycled waste goes into textile manufacturing.

17	Panel discussion: Future of Textiles-ESG and Sustainability	Attended by Mrs Gauri Singh (IRENA), Mrs Prajakta Verma (Secretary, MOT), Jasmer Dingra (IdH). The discussions highlighted that Tirupur sector is tapping solar (1800 MW) and wind (200 MW) energy for their knitting operations, the Surat sector is substituting a part of fresh water demand by using treated sewage, Better Cotton Initiative that precludes use of pesticides; traceability of cotton back and forth; about the need for standardizing water and fertilizer application for cotton growing. Ambuja Foundation representatives felt the need for more women stakeholders in BCI activities. Hardeep Desai of Cotton Connect emphasized on self-mobilization approach, monitoring and hand holding, partnership mentoring. Automation is also stressed under BCI. MMF fiber-based Technical Textiles consumed about 16 liters water/kg fiber; 1 kg oil/kg fiber, design MMF for longer use to make it sustainable. Usha Yarn opined that ESG, carbon footprint are necessary. Virgin fiber versus recycled fiber-quality issues, coordination at all levels was suggested. Arvind Ltd, suggested waterless dyeing, and100% water recycling as measures towards sustainability.
18	Waterless Clean Colour SystemTM by George Yang. e.Dye® Ltd, No19, Huangpujiang Mid. Road, Lujia Town, Kunshan City, Jiangshu Province – 215 331, China. Email: george.y@e-dye.com	Mr. George Yang, Founder e.Dye waterless Colour System™ China made a presentation on solution based dyeing of polyester fabric, and claimed >4000 hours of color fastness and 100% recyclability when compared to water-based dyeing (20 hours color fastness). He felt that 60% of the clothes in our closet are never worn! He suggested stopping fast fashion to reduce pollution from dumping of textiles.

Table 24. List and address of organization/individual experts consulted

S.No.	Name of organisations/individual experts	Brief remarks
1	Mr. Srihari WBN Consulting, Prestige Falcon City, Bengaluru – 560 062. Email: srihari@wbncglobal.com Virtual on 10 February 2024	IOT expert - provides expertise to Fashion houses. He informed us on his involvement in providing innovative solutions, AI-based defect detection, and sustainable practices to Textile sectors, particularly fashion houses.
2	Mr. Renjit Sasi Reverse Resources, Email: ranjit@reverseresources.net Virtual on 6 March 2024	Reverse Resources is a global tech company, founded in 2015, focused on textile waste management, collaborating with UNIDO, boasting 750+ factories, aiming for supply chain sustainability.

3	Dr H L Vijayakumar Expert, Textiles Email: srihari@wbncglobal.com Virtual on 12 February 2024	Dr Vijayakumar has worked in academic institutions and led internationally funded projects such as Swiss Agency for Development and Cooperation. He was Executive Director, Vogue group of institutes, Director, Army Institute of Fashion and Technology, Head, Textile Department, Bapuji Institute of Engineering and Technology. He provided a range of inputs and contacts to many industries, vendors, experts apart from giving his suggestions.
3	Mr. Sanjay Mane, Suman Chemical Industries Limited 23 February 2024 Virtual followed up with in person.	They specialize in producing sustainable specialty chemicals for various industries, and have a strong focus on zero-waste operations and renewable energy. They collaborate with certification bodies to eliminate hazardous chemicals and are expanding their capacity.
4	Professor R. D. Kale, Head, Department of Fibres & Textile Processing Technology, Institute of Chemical Technology, Nathalal Parekh Marg, Matunga, Mumbai – 400 019 In person meeting on 17 May 2024	Discussed on innovative fibers, PFAS alternatives, and cleaner production technologies. ICT department showcased their extensive R&D and practical experience in various supply chain aspects, demonstrating innovative methods like banana and bamboo fiber extraction, biodegradable dyes, and plasma techniques, with Prof. Kale expressing satisfaction with the interventions.
5	Mr. Sanoj Alinkil CRM Manager-India, Blusign Technologies AG, C/o SGS India Pvt Ltd, SGS House, 4B, Adi Shankaracharya Marg, Chandan nagar, Vikhroli West, Mumbai – 400 083. In person meeting on 17 May 2024	Bluesign provides technical support to the textile sector to achieve the export standards. We discussed alternatives to PFAS and how Bluesign can complement the target removal of 10,500 tons/6 years of hazardous chemicals. They seem to have worthwhile and perhaps valuable resources for project in eliminating hazardous chemicals.
6	Mr. Saket Kulkarni Implementation Manager-South Asia, ZDHC, 5-128, WeWork, Hiranandani Estate, Thane West – 400 601. In person meeting on 17 May 2024	Discussions revolved around PFAS chemicals, and about identifying possible alternatives, already existing in the market. ZDHC presented their activities and took us through their website and showed the MRSL list, how the harmful chemicals can be phased out, how the industries get their products/formulations registered for certification with ZDHC. Reducing MRSL concentration range could be one of the ways to reduce hazardous chemicals use. ZDHC gateway has several alternatives listed of which some were chosen by the Sustech team also.

7	Meeting with Bluesign® TEAM: South-Asia: Katharina Mayer, Sanoj Alinkil, Shahan Reza and Prashant Pote Virtual meeting	The goal of eliminating 10,500 tons of harmful chemicals was introduced, with input from Bluesign and representatives from India and Bangladesh, including discussions on PFAS phase-out in Thailand and Taiwan. Ms. Mayer from Bluesign expressed confidence in achieving the project's chemical targets and mentioned their extensive list of alternatives, emphasizing the importance of selecting appropriate substitutes based on industry needs. Bluesign showed keenness in collaborating with the project in implementation.
8	J K Vyas, CEO, Narol textile Infrastructure and Enviro Management (NTIEM)- CETP	Discussed the use of chemicals in the Ahmedabad textile cluster and explained the project benefits to the industries. Agreed to allow his industries to participate in a baseline survey

E. OTHER REQUIREMENTS

Branding and Visibility

256. To enhance branding and visibility for the project titled “Eliminating hazardous chemicals from apparel fashion supply chain in India”, following strategies will be considered;

- Name and logo of GEF, UNIDO and Ministry of Textiles will be appropriately displayed
- Website and online presence: Global website and India Child Project portal
- Engage stakeholders and partners and leverage their networks to amplify the project’s reach
- Organise events and workshops to raise awareness about project and engage stakeholders in discussions about eliminating hazardous chemicals
- Media and public relations – press releases, media interviews
- Articles, publications, compendium, Audio-visuals
- Engaging through social media to advocate
- Participate in events, workshops organized by others and make use of speaking opportunities

Knowledge management*

We confirm that an approach to Knowledge Management and Learning has been clearly described during Project Preparation in the Project Description and that these activities have been budgeted and an anticipated timeline for delivery of relevant outputs has been provided.

x Yes

257. The Child Project Knowledge Management (KM) Strategy is based on the knowledge management strategy for the Global Coordination Project (GCP, GEF ID 11177), entitled 'Global replication to eliminate hazardous chemicals from supply chains: Knowledge and Learning' to facilitate the dissemination, utilization, and application of knowledge and learning between the Integrated Program (IP) and Child Project on textile in India, and vice versa.

258. As per GCP, the knowledge management strategy for the GEF Child Project in India will have the following two components: (1) knowledge management and (2) communication and collaboration.

259. The vision of this KM strategy is aligned with the GCP's vision to gather, learn from, and apply knowledge gathered at the national level and vice-versa learn from supportive knowledge developed under the GCP to achieve the overall IP-11 program's objective. Especially with support of the GCP, country-level stakeholder engagement will be ensured for the generation of best practices and other knowledge management generation.

260. The main elements of the CP's KM strategy will be the following:

a. Multi-level stakeholder engagement approach (as outlined in the separate Stakeholders Engagement Strategy Annex) to ensure support, coordination and ownership of the project and support along the textile value-chain in India.

b. Child Project capacity-building program and training session to address knowledge and capacity needs within the project objective.

c. Outline a clear and practical communication, coordination and knowledge management exchange system among all Child Project stakeholders, and vis-a-vis the GCP.

d. Make concerted efforts to promote sustainable fashion to the public and other stakeholders, as an aspirational concept that is worth pursuing.

e. Develop and execute a monitoring and evaluation (M&E) system to report on Knowledge Management activities during Child Project execution.

261. The two goals of GCP KM strategy are the following:

a. Knowledge Exchange and Synthesis: The GCP will establish a robust KMP to facilitate real-time analysis and exchange of knowledge among CPs. This system will enable efficient development of knowledge products and services in a consistent manner, ensuring alignment with project objectives and avoiding duplication of efforts. Emphasis will be placed on categorizing and comparing data and knowledge generated from various projects to derive valuable insights and promote synergy in knowledge production. Furthermore, best practices and lessons learned within each child project will be carefully documented and made accessible for long-term replication, both within and beyond the IP.

b. Scaling Up and Replication: Beyond the confines of the GCP, the KM workstream will consolidate key lessons learned and best practices from CPs, making them accessible and adaptable to countries outside the program. This dissemination of knowledge aims to facilitate effective replication and scaling up of successful interventions in neighboring countries and at a global level. By engaging with stakeholders beyond the program, the KM initiative seeks to amplify its impact and promote the adoption of sustainable practices on a wider scale.

Thus, the Child Project KM will ensure that knowledge management products, lessons learned, and best practices are being drafted based on GCP guidance and templates to design knowledge management products in a consistent, clear, and not-duplicated manner. The detailed KM plan can be found in Annex 2.

Table 25. KM stakeholder group, knowledge gap, capacity, knowledge and training needs

Priority KM Stakeholder Group	Knowledge gaps	Capacity, knowledge, and training needs
1. Government Agencies (e.g., regulatory, etc.)	• Regulatory Compliance and Safety Standards • Transparency and Traceability • Capacity Building and Stakeholder Collaboration • Gender Equity and Social Welfare	Guidance, trainings, international exchange
2.Major National Supply Chain Fashion Industry Players: - Designers - Procurers - Manufactures - Retailers - Consumers - Waste Managers	• Sustainable Material Sourcing • Regulatory Compliance and Safety Standards • Waste Management • Technological Integration • Collaboration with Stakeholders • Innovation in Material and Chemical Alternatives • Transparency and Traceability • Gender Equity and Social Welfare	Guidance, trainings, international exchange
3. Sustainable Industry Experts and Researchers: civil society, academia, NGOs, indigenous orgs, etc.	• Understanding Environmental and Health Impacts related to the textile sector • Sustainable Material Sourcing • Waste Management • Technological Integration • Innovation in Material and Chemical Alternatives • Impact on Human Health and the Environment	Guidance, trainings, international exchange

	• Gender Equity and Social Welfare	
4. Financial Institutions (e.g., SIBDA)	Technological Integration	Meetings

D. POLICY REQUIREMENTS

Gender Equality and Women's Empowerment:

We confirm that gender dimensions relevant to the project have been addressed during Project Preparation as per GEF Policy and are clearly articulated in the child Project Description (Section B).

Yes

1) Does the project expect to include any gender-responsive-measures to address gender gaps or promote gender equality and women's empowerment?

Yes

If the child project expects to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment, please indicate in which results area(s) the project is expected to contribute to gender equality:

Closing gender gaps in access to and control over natural resources;

Improving women's participation and decision-making; and/or

Yes

Generating socio-economic benefits or services for women.

Yes

2) Does the child project's results framework or logical framework include gender-sensitive indicators?

Yes

Stakeholder Engagement

We confirm that key stakeholders were consulted during Project Preparation as required per GEF policy, their relevant roles to project outcomes has been clearly articulated in the Child Project Description (Section B) and that a Stakeholder Engagement Plan has been developed before CEO endorsement**.**

Yes

Select what role civil society will play in the Project:

Consulted only; Yes

Member of Advisory Body; Contractor;

Co-financier;

Member of project steering committee or equivalent decision-making body ;

Executor or co-executor;

Other (Please explain)

Private Sector

Will there be private sector engagement in the Child project?

Yes

And if so, has its role been described and justified in section B "Child project description"?

Yes

Environmental and Social Safeguards

We confirm that we have provided information regarding Environmental and Social risks associated with the proposed child project or program, including risk screenings/ assessments and, if applicable, management plans or other measures to address identified risks and impacts (this information should be presented in Annex E).

Yes

Please provide overall Project/Program Risk Classification

Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
	Medium/Moderate		

E. OTHER REQUIREMENTS

Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described during Project Preparation in the Project Description and that these activities have been budgeted and an anticipated timeline for delivery of relevant outputs has been provided. This includes budget for linking with and participation in knowledge exchange activities organized through the coordination platform.

Yes

Socio-economic Benefits

We confirm that the child project design has considered socio-economic benefits to be delivered by the project and these have been clearly described in the Project Description and will be monitored and reported on during project implementation (at MTR and TER).

Yes

ANNEX A: FINANCING TABLES

GEF Financing Table

Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	GEF Project Grant($)	Agency Fee($)	Total GEF Financing ($)
UNIDO	GET	India	Chemicals and Waste	CW IP Contributions	Grant	2,919,451.00	262,751.00	3,182,202.00
UNIDO	GET	India	Climate Change	CC STAR Allocation: IPs	Grant	2,683,563.00	241,521.00	2,925,084.00
UNIDO	GET	India	Climate Change	CC IP Matching Incentives	Grant	894,521.00	80,507.00	975,028.00
UNIDO	GET	India	International Waters	International Waters: IW IP Contributions	Grant	1,311,637.00	118,047.00	1,429,684.00
Total GEF Resources ($)						**7,809,172.00**	**702,826.00**	**8,511,998.00**

Project Preparation Grant (PPG)

Was a Project Preparation Grant requested? true

PPG Amount ($) 200001

PPG Agency Fee ($) 17997

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	PPG($)	Agency Fee($)	Total PPG Funding($)
UNIDO	GET	India	Chemicals and Waste	CW IP Contributions	74,769.00	6,729.00	81,498.00
UNIDO	GET	India	Climate Change	CC STAR Allocation: IPs	68,730.00	6,183.00	74,913.00
UNIDO	GET	India	Climate Change	CC IP Matching Incentives	22,910.00	2,061.00	24,971.00
UNIDO	GET	India	International Waters	International Waters: IW IP Contributions	33,592.00	3,024.00	36,616.00
Total PPG Amount ($)					**200,001.00**	**17,997.00**	**217,998.00**

Please provide Justification

Changes are made to accommodate the required 3:1 CC/IP matching ratio

Sources of Funds for Country Star Allocation

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Sources of Funds	Total($)
UNIDO	GET	India	Climate Change	CC STAR Allocation	2,999,997.00
Total GEF Resources					**2,999,997.00**

Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing($)	Co-financing($)
Hazardous Chemicals IP	GET	7,809,172.00	43725560
Total Project Cost		**7,809,172.00**	**43,725,560.00**

Confirmed Co-financing for the project, by name and type

Please include evidence for each co-financing source for this project in the tab of the portal

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Private Sector	Dyers Association of Tirupur (DAT)	Equity	Investment mobilized	2700000
Private Sector	Knitwear & Textile Club	Equity	Investment mobilized	2700000
Private Sector	South Gujarat Textile Processors Association (SGTPA)	Equity	Investment mobilized	2700000
Private Sector	Tamil Nadu Textile Entrepreneurs	Equity	Investment mobilized	2700000
Private Sector	Federation of Industrial & Commercial Organization	Equity	Investment mobilized	4700000
Private Sector	Global Alliance for Textile Sustainability Council	Equity	Investment mobilized	2700000
Private Sector	Small Industries Development Bank of India (SIDBI)	Loans	Investment mobilized	10000000

Private Sector	Birla Cellulose - Grasim Industries Ltd	In-kind	Investment mobilized	2000000
GEF Agency	UNIDO	Grant	Investment mobilized	110000
GEF Agency	UNIDO	In-kind	Recurrent expenditures	250000
Private Sector	Krushna Contex (Dessan Group)	Equity	Investment mobilized	1000000
Recipient Country Government	Ministry of Textiles	In-kind	Recurrent expenditures	10500000
Private Sector	Solidaridad	In-kind	Recurrent expenditures	1500000
Others	Partnership for Action in Green Economy (PAGE)	In-kind	Recurrent expenditures	165560
Total Co-financing				**43,725,560.00**

Please describe the investment mobilized portion of the co-financing

The private sector was requested to provide co-financing letters to show interest and commitment. Co-financing financing contribution differs among the partners; however, efforts will be made during the project inception phase to obtain additional co-financing. Through the consultation meetings held to develop the PIF and during the PPG phase a significant amount of co-financing has been mobilized during the project preparation grant phase and additional co-financing from other partners is expected to materialize during implementation. This co-financing is the result of extensive consultations with public and private partners during PPG to identify needs and shared priorities where the GEF grant could have the largest impact. The project will also mobilise co-financing from private sector. The private sector includes both fashion houses and manufacturing MSMEs. Fashion houses have committed to co-financing of 4 million USD in R&D to produce prototypes, campaigns to promote; contributing to formulate policies/ procurement procedures, incentivizing retailers to sell - textiles produced through non-hazardous chemicals use, innovative material, regenerative designs, etc. The project would mobilise equity from manufacturing MSMEs. Investments in the form of equity are expected from the manufacturing MSMEs in the cleaner production adoption of interventions to reduce/ avoid hazardous chemical use, energy efficiency and Renewable Energy interventions, reduction of water and IOT solutions. Similarly local banks and financial institutes will extend loans to participating factories to invest in cleaner production. This co-financing will be used under component 2, 3 and 5 to the project participating factories. SIDBI (Small Industries Development Bank of India) has committed to lending. SIDBI co-financing is expected to be invested in hardware costs. UNIDO co-financing amount will be spent on strengthening knowledge management and learning component. UNIDO will also share its experiences in demonstrating such projects successfully across the globe and will share best practices with Indian MSMEs. The PMU will pursue collaboration and co-financing at the implementation stage as associations have expressed their willingness to provide the required support.

ANNEX B: ENDORSEMENT

GEF Agency(ies) Certification

GEF Agency Coordinator	Date	Project Contact Person	Telephone	Email

GEF Agency Coordinator	6/11/2024	Ganna Onysko		g.onysko@unido.org
Project Coordinator	6/11/2024	Ozunimi Iti		o.iti@unido.org

Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):

Please attach the Operational Focal Point endorsement letter(s) with this template.

Name of GEF OFP	Position	Ministry	Date (MM/DD/YYYY)
Mr. Neelesh Kumar Sah	Joint Secretary	Ministry of Environment, Forest and Climate Change	

ANNEX C: PROJECT RESULTS FRAMEWORK

Please indicate the page number in the Project Document where the project results and M&E frameworks can be found. Please also paste below the Project Results Framework from the Agency document. For the Integrated Programs' global/regional coordination child project, please include the program-wide results framework, inclusive of results specific to the coordination child project. For any country child project, please ensure that relevant program level indicators are included.

Project Development Objectives	**Indicators**	**Baseline**	**Targets for Midterm and End of Project**	**Sources of Verification**	**Assumptions and Risks**
Project objective: Facilitate and enable sustainability performance and elimination of hazardous chemicals in foreseen new industry investments and existing textile and apparel fashion manufacturing hubs	# CO_{2e} Greenhouse Gas Emissions Mitigated (direct) # Chemicals of global concern and their waste reduced (metric ton of toxic chemicals reduced) # POPs avoided in g TEQ # Area of landscapes under improved practices (hectare) & tons of pesticides avoided # People benefiting from GEF-financed investments disaggregated by sex (count)	• 15.20 million tCO_2/y in 320 factories • 4400 tons/y of hazardous chemicals in 320 factories • NA • NA • NA • 0	Mid-term targets • 10,000 tCO_{2e} (direct) • 1,170 tons of hazardous chemicals (direct) • 6 gTEQ avoided • 425,600 ha (256 tonnes of pesticides avoided) • 7000 (60% women) End-term targets • 147,000 tCO_{2e} (direct) • 10,530 tons of hazardous chemicals (direct)	Project progress reports including PIRs, Mid-term Review and Terminal Evaluation reports	Assumption: Willingness of industrial units to accept proposed interventions, capacity building. Risk: The industrial units may not be ready to invest the required co-financing in project duration

			• 12 gTEQ avoided (cumulative) • 2,128,000 ha (1277 tons of pesticides avoided) • 40,000 (60% women) (direct)		
Component 1: Design & Business Models – Designing innovative, regenerative products and utilizing circular business models					
Outcome 1.1: Designing of innovative, regenerative products and utilization of circular business models					
Output 1.1.1: Regenerative design implementation with four fashion/ textile houses completed					
Activity 1.1.1.1 Develop green procurement policy for the private sector (fashion houses, MSME units).	# Number of Green Procurement policy (GPP) for private sector and MSME developed	Weak GPP for many fashion houses GPP does not exist for MSME Garment Sector	Mid-Term: 1 GPP developed for MSME 1 GPP strengthened for Fashion Houses End of Project: Updated 1 GPP developed for MSME 1 GPP strengthened for Fashion Houses	GPP	Assumption: There is scope to revise and upgrade GPP for use by Fashion houses and formulate new ones for the MSME sector. Risk: Fashion houses may be driven by national/ international demands. The domestic MSME textile sector may be reluctant to accept GPP.
Activity 1.1.1.2. Develop and Promote Standards and certification for circular designs.	# Number of standards and certification for circular designs developed/revised # Number of industries adopted standards and certification	No standards and specifications for textiles products for domestic use[1]19.	Mid-Term: 1 set of draft standards (Ecocert, Indian Recycle Standard) and certificate developed. 10 factories adopted standards and certification End of Project: 100 factories adopted standards and certification	Report on standards and certificates formulation/revision and promotion Project progress Reports	Assumption: Fashion houses and MSME accept to promote the standards and certificates for domestic use. Risk: Fashion houses/MSME may be keener on market and may not implement the standards and certificates till buyer demand/authority's mandate

Output 1.1.2 Ecosystem building for circular business models carried out					
Activity 1.1.2.1 Develop policy to create enabling environment for circular business models and eco-designs	# Number of supportive (financial, digital, social innovation) policy for circular business models and eco-designs developed for fashion/ textile houses	No comprehensive policies to promote circular business and eco-designs	Mid-Term Target: 1 policy	Policy document on circular design models and eco-designs – reports	Assumption: Substantial number of fashion/textile houses are willing to adopt supportive policy for better CBM and Eco-designs. Risk: No risk is foreseen.
Activity 1.1.2.2. Develop Tax incentive models for encouraging adoption of circular business models.	# Number of tax incentives for circular business models issued # Number of fashion/ textile houses availed tax incentives	No tax incentives for sustainable textiles	Mid-term target: 1 set of Tax incentives formulated and issued for fashion/textile houses. End of the project: 20 fashion/ textile houses avail tax incentives as per the developed model	Circular on tax incentives issued by Government Report on progress made in availing tax incentives by factories	Assumption: Government agrees to the need for tax incentives to fashion/textile houses Risk: Government may not prioritize making expenditure on tax incentives during the project period.
Activity 1.1.2.3. Provide green credit/loan provided for circular business	# Number of fashion/ textile houses secured Eco mark # Number of credit institutions that provided green credit/loan to fashion/textile houses #Number of loans released	Green credit/loans have not yet been rolled out for CBM	Mid-term target: 10 fashion/textile houses obtain Ecomark 2 Banks provide green credit/loan to 20 fashion/ textile houses. 10 loans released End of the project (cumulative): 20 fashion/textile houses obtain Ecomark 4 banks provide green credit/loan to 20 fashion/textile houses. 30 loans released	Project progress reports based on information provided by the Fashion/textile houses.	Assumption: Fashion/textile houses have/are able to obtain Ecomark Risk: Banks may be reluctant to give green credit/loan to fashion/textile houses.
Activity 1.1.2.4. Develop capacity building modules developed and capacity building of	# Number of capacity building modules developed for the industry/designers	No capacity building modules in public domain	Mid-term target: 1 offline training module	Modules developed and uploaded on portal.	Assumption: Industry representatives/designers have need for

the industry/designers on regenerative design	on regenerative designs # Number of designers trained on regenerative designs		100 persons trained. End of project (cumulative): 1 offline training module 1 online training module 1000 persons trained (including fashion technology students)	Project progress reports	capacity building on regenerative designs Risk: The industry representatives do not depute designers to participate in training programmes.
Output 1.1.3 Systemic gender inequalities in workplaces reduced.					
Activity 1.1.3.1 Create awareness among women on decent work deficits and mobilized pay equity between men and women for similar work results	# Number of women made aware about decent work and deficits.	No decent work protocols or sensitization events	Mid-term: 2000 women End term: 2400 women	Attendance sheet in stakeholder events (online and offline)	Assumption: Women employees participate in sensitization events in large numbers in all project clusters Risk: Women employees may not get permission to participate.
Activity 1.1.3.2 Sensitize textile MSME, fashion houses and other stakeholders about benefits of implementing decent work protocols	# Number of sensitization workshops held in selected clusters	0	Mid-term 2 End-term 8	Minutes of meetings with industry associations, fashion houses about participation in sensitization events and in project-initiated surveys	Assumption: Industry associations welcome/allow the sensitization events as an agenda in their annual events and allot time for the same. Industry associations also access decent work sensitization content from the project website. Risks: Industry associations do not give adequate time nor attend the sensitization events in large numbers. Individual factory owners do not access this content from the website.

Activity 1.1.3.3 Initiate dialogues and discussions leading to consensus building among relevant stakeholders about pay equity between men and women for similar work.	# Number of such events held and participation in the same.	No precedent of discussions or dialogues on pay parity between men and women in the sector in India	Mid-term One dialogue/discussion about pay parity moderated by an expert held in each cluster (activity completed by mid-term)	Minutes of the meeting in each cluster.	Assumption: The expert moderator makes a strong case for pay parity between men and women and there is no objection to adopting the same Risk: There would be resistance and lack of enthusiasm in conducting formal discussions on wage gaps/pay parity.
Activity 1.1.3.4 Mid-term and end-term survey carried out on reduction in decent work deficits, pay parity and women moving to higher job categories.	# Number of women move to higher job categories and achieve pay parity	Report on MoT website shows higher movement of women into supervisory positions in some textile sectors but without pay parity	Mid-term 400 women across T&A sectors move into higher job categories and achieve pay parity. End-term 2400 women across T&A sectors move into higher job categories and achieve pay parity	Mid-term and end-term survey report	Assumption: Women access required skills and expertise to move to higher job categories where wage gaps are lower. Risks: Fewer women move to higher job categories but at a lower income compared to men in the same job category
Component 2: Innovative Materials-Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials					
Outcome 2.1: Substitution non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials					
Output 2.1.1: Enabled ecosystem through soft support and pilot/demos for innovative, nature-based materials promoted					
Activity 2.1.1.1. Develop guidelines for sourcing innovative materials developed.	# Number of guidelines developed for sourcing innovative materials	No such guidelines exist	Mid-term: 1 End of project: 1 updated guideline	Guidelines developed and uploaded on portal	Assumption: At present no guidelines exist for use innovative material Risk: No risk foreseen

Activity 2.1.1.2. Develop supplier reporting tools/self-assessment methods for sustainable/innovative textiles.	# Development of self-assessment tool # Number of suppliers use reporting/self-assessment method developed for sustainable/innovative textile	No such tool exists. No such practice exists.	Mid-term: 1 self-assessment tool developed 10 of 40 supplier industries implement self-assessment methods. End of project: 40 project factories	Tool launched. Self-assessment reports by the target industry/cluster. Project progress reports	Assumption: Self-reporting practice can enhance visibility of use of innovative materials by the suppliers and hence they will adopt. Risk: Suppliers may be afraid of delicacy and losing confidentiality.
Activity 2.1.1.3. Fashion brands/garment industry engage with MSME/FH in extraction of natural/viscose fiber from waste biomass (banana, areca, etc.)	# Number of MSME/supplier engaged in producing natural fibers # Quantity of natural fibers extracted at MSME/supplier # Number of FH engaged in producing viscose fiber # Quantity of viscose fibers extracted at FH	No MSME is engaged in producing natural fibers No FH is producing viscose fiber from biomass waste	Mid-term: # 10 MSME units produce natural fibers # 250,000 tons natural fibers produced # 1 FH produces viscose fibers # 2% viscose fibers production is met from biomass waste End-term (cumulative): # 30 MSME units produce natural fibers # 750,000 tons natural fibres produced # 1 FH produces viscose fibers # 5% viscose fibers are met by biomass waste	Progress reports	Assumption: MSME/FH engages in producing natural fibers from banana/areca and viscose fiber from biomass waste. Risk: All back-end support is leveraged by MSME/FH in procuring raw material. The cost of fabric is feasible. Garments industry and Brands may not show adequate interest in extracted natural fibers.
Activity 2.1.1.4. Develop guidelines for sustainable/innovative investment criteria and leverage lending	# Number of guidelines developed for sustainable/innovative investment criteria	No green credit line exist	Mid-term: 1 End of project: 1 updated.	Report consisting of investment criteria. Project progress reports	Assumption: Criteria will help industry to leverage investment for innovative materials. Risk: Banks may not prioritize on investment for innovative materials.

Activity 2.1.1.5. Engage credit institutions for providing green credit/loans	# Number of credit institutions for green credit/loan engaged # Number of loans provided by the banks to MSME/FH	No green credit for innovative materials exist	Mid-term: # 2 banks engaged for green credit # 5 loans leveraged End of project (cum): # 4 banks provide green credit/loan. # 20 loans leveraged.	Inputs from lending Banks and/or factories on credit/loans. Project progress reports	Assumption: Credit institutions share the credit/loan information. Risk: Credit institutions are not willing to share the credit/loan information with other entities.
Activity 2.1.1.6. Encourage buyers to purchase innovative materials products at higher premiums from suppliers/industry	# Number of buyers buy innovative materials product at a higher premium # Number of events supported to set up stalls by manufacturers.	No comprehensive efforts No such efforts exist	Mid-term: 100 2 End of project: 1250 6	Reports by suppliers. Project progress reports	Assumption: Buyers are aware of innovative materials, products, and benefits. Risk: Buyers may go by market trends and do not get attracted to innovative products.
Output 2.1.2. Innovative prototypes developed, piloted and scaled up					
Activity 2.1.2.1. Implement innovative prototypes and use of existing knowledge	# Number of innovative prototypes implemented	No such pilots/ demos exist	Mid-term: 2 prototypes on innovative materials End of project (cum): 10 prototypes on innovative materials	Progress reports	Assumption: Industries cooperate in implementing prototypes on using innovative materials. Risk: Prototype may not be accepted if demand is not coming by.
Activity 2.1.2.2. Implement pilot/ demonstrations on innovative materials	# Number of pilot/ demos on innovative materials	No such pilots/ demos exist	Mid-term: 5 End of project: 10	Project progress reports.	Assumption: Industries cooperate in implementing pilot/demos on using innovative materials, scale them up and/or increase capacity. Risk: Industries may not readily cooperate due to lack of proof of interventions.
Component 3: Cleaner production - Substituting non-renewable materials in products with sustainably sourced, innovative, responsibly managed and recycled (and recyclable) materials					
Outcome 3.1. Shifting to production and manufacturing processes that require less water, energy and chemicals and produce less pollution and waste generation.					

Output 3.1.1. Coherent policies on resource management (chemicals, energy, water) in fashion/textile supply chains developed.					
Activity 3.1.1.1. Review of schemes and guidelines of different central ministries/ state departments for cleaner production	# Number of reports on review of existing schemes and guidelines for cleaner production	No such comprehensive review report/s exist	Mid-term: 1	Review reports. Updated on portal.	Assumption: No coherent policy on resource management for the supply chain exists. The current regulations/law/permit requires review from the perspectives of cleaner production. Risk: No risks foreseen.
Activity 3.1.1.2. Build the capacity of government officials on cleaner production	# Module developed for training on cleaner production # Number of government officials trained on cleaner production	No such trainings	Mid-term: 1 module developed and uploaded on the portal. 100 persons End of project (cum): 250 persons	List of participants (including men and women), proceedings of training programs Project progress reports	Assumption: There is a need to enhance enforcement capacity in cleaner production for government officials. Risks: No risk foreseen.
Activity 3.1.1.3 Provide support for supplier reporting (reporting tools or self-assessment)	# Number of self-assessment tool including disclosure parameters # Number of suppliers reporting	No such tool exist	Mid-term: 1 tool launched. 100 suppliers End of project: 320 suppliers	Tool launched. Uploaded on portal and app Voluntary disclosure reports by the target industry/cluster on their website. Project progress reports	Assumption: Self-assessment method developed for products through cleaner production gains acceptance by suppliers. Self-reporting practice can enhance visibility of use of cleaner production by the suppliers and hence they will adopt. Risk: Suppliers may be afraid of delicacy and losing confidentiality.
Output 3.1.2. Investment criteria developed and sustainable lending promoted					
Activity 3.1.2.1 Develop criteria for sustainable lending and investments	# Report developed on criteria to promote sustainable lending/investment # Sensitise financing institutions on	No such criteria on cleaner production exist	Mid-term: 1 report consisting of criteria. 80 End of project: 1 updated report 500	Report of criteria to promote sustainable lending/investment. Proceedings of sensitization events	Assumption: There is a need for criteria to promote sustainable lending/ investment. Risk: No risk.

	benefits of cleaner production				
Activity 3.1.2.2. Brands provide financial incentives to suppliers with cleaner production technologies	# Number of suppliers received incentives from brands to promote cleaner production technologies	No such incentives are provided by brands to suppliers to promote cleaner production technologies	Mid-term: 50 suppliers receive incentives from brands End of project: 200 suppliers receive incentives from brands	Report from brands on incentives to the suppliers. Project progress reports	Assumption: Brands are keen to promote cleaner production. Risk: Brands may hike product cost.
Activity 3.1.2.3. Credit institutions provide green credit/loan to manufacturers/suppliers engaged in cleaner production	# Number of credit institutions for green credit/loan engaged # Number of loans leveraged by factories	No green credit for cleaner production exist	Mid-term: 2 banks engaged for green credit. 20 loans leveraged End of project (cum): 4 banks provide green credit/loan. 100 loans leveraged	Inputs from lending banks and/or manufacturers on credit/loans. Project progress reports	Assumption: Credit institutions share the credit/loan information. Risk: Credit institutions are not willing to share the credit/loan information with other entities.
Output 3.1.3. Implementation of sustainable chemicals and cleaner production demonstrated					
Activity 3.1.3.1. Implement clean energy interventions	# Number of factories adopted EE/RE # Percentage of energy efficiency enhanced # kW rooftop/ ground mounted solar installed with net metering # Square meter of Concentrating Solar Heat installed # GHG emissions reduced	No pilot/demo	Mid-term: 50 Up to 10% 8,00 kW [8 installations] 1,600 m^2 [8 installations] 14,000 tCO_2 End of project: 100 Up to 10% 1600 kW [16 installations] 3200 m^2 [16 installations] 147,000 tCO_2 (project period)	Energy audit/ assessment reports Post-implementation reports Project progress reports	Assumption: Factories will be interested in investing in energy-related interventions Risk: Factories may not make decisions to invest on the following grounds: they have other priorities for investment; the economy may go through turmoil; may not have sufficient rooftop/ground space.

Activity 3.1.3.2: Pilot/demonstrate alternative non-hazardous chemical use	# Number of factories piloted/demonstrated using alternatives to per- and poly fluoro alkyl sulfonates (PFAS)-free specialty finishes in MSME # Tons of toxic chemicals reduced	Not available No such quantification available	Mid-term: # 80 units # 2625 tons End of project (cum): # 320 units # 10,500 tons	Post implementation reports	Assumption: Fashion brands/factories allow chemicals-related interventions in the larger interest of environment and health. Risk: Since chemicals use may often lead to changes in product quality, the factories may be hesitant to readily adopt the interventions. Agencies with adequate capability to bring in chemical change may not be available readily.
Activity 3.1.3.3. Carry out cleaner production pilots/demonstrations carried out to reduce chemicals, water and energy.	# Number of Ultrasonic Technology (Retrofit) in Textile MSME units # Number of Cold Pad Batch Dyeing Machines in MSME dyeing units # Number of Soft-flow (air-Flow)-Jet dyeing machines in MSME dyeing units # Number of SC-CO_2 technology in MSMEs	No quantification available	Mid-term: 2 nos. Ultrasonic Technology retrofitted 10 nos. Cold Pad Batch Dyeing Machines installed in dyeing units 10 nos. Soft-flow (air-Flow)-Jet dyeing machines in dyeing units 1 no. SC-CO_2 technology at 1 MSME unit End of Project (Cum) 10 nos. Ultrasonic Technology retrofitted 40 nos. Cold Pad Batch Dyeing Machines installed in dyeing Units 40 nos. Soft-flow (air-Flow)-Jet dyeing machines in dyeing units 3 nos. SC-CO_2 technology at 2 MSMEs	Baseline/post-implementation reports	Assumption: Factories allow, invest and adopt cleaner production interventions in the larger interest of the environment. Risk: Since cleaner production interventions may often require minor changes in processes (such as use of hot water, retrofitting, etc.), the factories may be hesitant to readily adopt the interventions.

Activity 3.1.3.4. Capacity building to implement cleaner production in the textile sector	# Development of modules # Number of textile MSME owners sensitized # Number MSME units technicians trained # Number of consultants (Chartered Engineers, Chartered Accountants, etc.) supporting MSME units trained # Government officers involved in inspection/ facilitation trained	Samarth programme of GOI trains on various items, however, does not include cleaner production	Mid-term project: 4 sets of modules for different target groups 320 640 60 20 End-term project: 960 1920 120 40	Progress reports	Assumption: MSME units and advisors, particularly owners, find cleaner production methods as value addition in their factories. Risk: The target audience allocates time to go through the training programmes.
Activity 3.1.3.5. Upgrade procedures, practices and infrastructure pertaining to Environment, Social, Health and Safety (ESHS) aspects	# No of Project Activity Plans reviewed and strengthened from ESHS angle # No of ESHS Strengthening Plans developed, approved and implemented # Number of clusters adopting management system developed for tracking and maintaining records of lifecycle completion of solar PV and other equipment is for ensuring proper E-waste disposal at end of lifecycle	None at beginning of Project implementation None at beginning of Project implementation None at beginning of Project implementation	Mid-term: 160 End-term: 320	Reviewed and Strengthened Activity Implementation Plans ESHS Strengthening Plans developed and submitted by industries E-waste tracking management systems developed and adopted by clusters	Assumptions: Textile unit owners or managements are open to investing on enhancing ESHS aspects. Risks: ESHS may be perceived to decrease profitability. Textile unit owners may not invest on improving ESHS performance.
Output 3.1.4 Capacity of women to participate in cleaner production improved					
Activity 3.1.4.1. Conduct familiarization sessions for men and women workers on technological innovations and	# Number of men and women participated	There has not been any such initiative in the sector in India.	Mid-term: 1000 women and 1000 unskilled migrant men benefit from	Proceedings of sessions with list of people participated	Assumptions: Factories customize the content developed by the project and share information, display posters, and

services adopted by textile units			familiarization sessions. End of project: 1200 women and 1200 unskilled migrant men benefit from the sessions.		disseminate through social media. Risks: Factory workers do not show interest in the familiarization sessions.
Activity 3.1.4.2 Develop curriculum for technical skill and training on cleaner production for women and migrant men	# Number of women and migrant men participate in skill development programs and subsequently move up in job categories.	150,000 people imparted skills under the MoT Samarth program with 85% women participants.	Mid-term 3000 women and 1000 migrant men participate in skill development courses; 500 women and 200 men move up in job categories. End-term 4800 women and 1800 unskilled migrant men participate in skill development courses. 1800 women and 900 unskilled migrant men move up in job categories.	Project initiated mid-term and end-term survey reports	Assumptions: Women participate in free skilling programs developed by the project and offered by the MoT Risks: Women do not show any interest in acquiring technical skills and are reluctant to work with/around machines. Factories are reluctant to hire trained women for technical, skilled positions.
Activity 3.1.4.3 Gender perspective included into the project supported cleaner production intervention in factories	# Number of women benefit from cleaner and safer workspaces.	No studies conducted to establish the health impacts.	Mid-term 3060 women and 2400 migrant men benefit from cleaner, safer workspaces. End-term 10,200 women and 8000 men benefit from cleaner, safer workspaces.	Progress report	Assumptions: ESI hospitals and health centers maintain data on the number of textile workers visiting them and the symptoms. Men and women experience better health and well-being. Risks: Health assessments may not be measurable and immediately felt. Workers do not experience safer, healthier workspaces in the short term.
Output 3.1.5. IOT solutions to enhance cleaner production introduced and scaled up.					

Activity 3.1.5.1. Implement Digital Twin with IoT systems	# Number of digital twin with IOT systems installed	Such systems are installed in other sectors, while in textile proof testing is done, scale up is required	Mid-term: 2 nos. End-term: 8 nos.	Progress reports	Assumption: Industry is open to accepting IOT systems for science-based data to allow for course correction and report best practices. Risk: Industry may not be ready to invest.
Activity 3.1.5.2. Implement IOT solutions for POP measurements in textiles	# Number installed	No such systems installed for textiles sector	Mid-term: 1 unit installed	Commissioning report Progress reports	
Activity 3.1.5.3. Implement Digital Twin IOT system using AI/ML (Artificial Intelligence and Machine Language) for water measurement	# Number of IOT-based water measurement systems installed		Mid-term: 4 nos. installed End-term: 16 nos. installed	Progress reports	
Component 4: Sustainable consumption - Creating markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity					
Outcome 4.1. Creation of markets for innovative products and behavior change away from unnecessary consumption and toward increased longevity.					
Output 4.1.1 Green public procurement policies for apparel fashion/textile houses/MSME promoted.					
Activity 4.1.1.1. Develop sustainable public procurement templates	# Number of sustainable public procurement templates developed # Number of public purchasers adopt SPP template	No such template exists	Mid-term: 1 (please repeat the 'what') 1 2 End of project: 1 updated. 3 5	SPP template uploaded on portal Progress reports	Assumption: SPP will streamline public procurement process Risk: Non readiness of supply chain to provide hazardous chemicals-free apparel
Activity 4.1.1.2. Revise, develop and promote ecolabels and consumer information	# Number of ecolabels revised/developed # Number of factories/ outlets promoting ecolabels	No such label exist for apparel.	Mid-term: 1 50 retailers End of project: 1 updated. 200 retailers	Revised/developed Ecolabel launched. Survey of retailers adopting ecolabels	Assumption: Ecolabels may bring in transparency of sustainability steps initiated by the industry.

					Risk: apparel/textile sectors as per the associated brand requirement may opt for other ecolabels.
Activity 4.1.1.3. Prepare advisory for potential trade controls on POPs treated materials	# Number of Advisory reports prepared	No trade controls in India on POPs treated textile materials.	Mid-term: 1	Advisory in the form of Report	Assumption: GOI is interested in considering POPs related policy for trade controls. Risk: No risk foreseen in preparing advisory note
Output 4.1.2. Sustainable fashion practices promoted by fashion/textile houses/brands.					
Activity 4.1.2.1. Facilitate fashion houses/brands to provide incentives to retailers for selling sustainable apparel.	# Number of retailers given financial incentives by fashion houses/ brands.	No incentives exist	Mid-term: 10 End of project: 100	Progress report	Assumption: Substantial number of retailers are promoting/selling sustainable apparels. Risk: Retailers' competition may ensue demanding more allocation of financial incentive.
Output 4.1.3. Advocacy on sustainable fashion undertaken.					
Activity 4.1.3.1. Develop IEC modules and promote public education on textile using no hazardous chemical and sustainable consumption.	# Number of IEC (Information, Education and Communication) packages developed. # Number of seminars conducted for fashion/ other relevant institutions educating students on sustainable fashion and consumption	No such IEC packages targeting sustainable consumption exist. No such seminars designed for fashion/ other institutes	Mid-term: 1 set IEC modules online and offline 100 (3000 students) End of project: 1 set updated 1000 (30,000 students)	IEC package uploaded on portal. Report on the number of seminars conducted.	Assumption: There is a need for public education on sustainable consumption. Risk: No risk foreseen. Assumption: Consumers in the age group 15–30 years will have substantial interest in sustainable consumption Risk: No risk foreseen.
Activity 4.1.3.2. Develop modules and build capacity built for retailers on marketing sustainable products	# Number of modules developed including A-V modules	No such activity exist	Mid-term: 1 set (online) 40 End of project: 1 set updated.	Capacity building modules uploaded on website. Proceedings of events	Assumption: Substantial number of retailers with interest in marketing of sustainable products exist.

	# Number of retailers trained (capacity building) on marketing of sustainable products		100		Risk: Retailers may have little interest in deputing their marketing people as it may put HR pressure on them temporarily.
Activity 4.1.3.3. Conduct consumer-focused campaigns	# Develop tools for campaign (etc. material, marathon, digital campaign, trade show, fashion show, World Environment Day). # Announce World/ National Sustainable Textile Day # Number of consumer-focused campaigns carried out	No comprehensive campaign material available No campaigns being conducted	Mid-term: 1 set of tools developed. World/National Sustainable Textile Day announced. 3 campaigns End of project: 1 set of tools updated. 6 campaigns	Campaign material developed and uploaded on the portal. Announcement of World/National Sustainable Textile Day Reports on campaigns	Assumption: Local brands/celebrities promoting healthy consumerism may be willing to join the campaigns. Risk: No risk
Output 4.1.4. Women-led behavior changes in sustainable fashion and reduced consumption promoted					
Activity 4.1.4.1 Engage women influencers for triggering behavior change towards sustainable fashion	Names of the women influencers and their social media posts/hits/ followers	There is no such initiative yet in the sector in India	Mid-term: 10 End of project: 50	Record of the social media messages sent by women influencers and aimed at women consumers	Assumptions: Influential women agree to publicly support the project initiative and are active on social media. Risks: It would be difficult to measure the impact of the contribution of influential women on sustainable fashion.
Component 5: Post-use 9Rs - Implementing a reverse logistics process which moves products and materials back to the manufacturers to reuse or recycle					
Outcome 5.1. Implementation of a reverse logistics process to move products and materials back to the manufacturers to reuse or recycle					
*Output 5.1.1. P*ost-use collection promoted and implementation of 9Rs enabled.					
Activity 5.1.1.1. Develop a comprehensive policy on waste management	# Number of policy/ies developed	No policy on textile waste management exist	Mid-term: 1 policy developed End of project:	Policy document	Assumption: MoT/TC/CPCB will consider project inputs and float a policy for regulating textile waste in India.

			1 updated policy document		Risk: No risk foreseen in developing the policy. However, the new policy may impact the economy of waste import businesses by 9R units in India and hence some businesses may resist the policy.
Activity 5.1.1.2. Develop EPR (Extended Producer Responsibility) guidelines and prepare textile MSME to implement EPR	# Number of EPR guidelines developed for textile sector # Number of units establishing EPR infrastructure (regulatory compliances, life cycle and end of cycle, collection, and recycling) for textile waste in India	No textile waste specific EPR guidelines exist.	Mid-term: 1 5 nos. of 9R units End of project: 1 updated. 10 nos. of 9R units	Textile-specific EPR guidelines for Textile sector. Reports on establishing textile waste specific EPR infrastructure. Progress reports on 9R units	Assumption: EPR exists only in export-oriented in 9R units. A similar infrastructure does not exist for domestic consumption of textile waste. Risk: Since several of 9R units are engaged in recycling, upcycling, down cycling processes using textile waste as raw material source, further emphasis on adapting EPR infrastructure may deter interest of the 9R units.
Activity 5.1.1.3. Engage credit institutions for green credit to develop reverse logistics/collection infrastructure	# Number of credit institutions for green credit engaged # Number of 9R units leveraged green credit	No such initiative exists for reverse logistics/collection infrastructure. No 9R units have leveraged green credit	Mid-term: 2 credit institutions engaged. 5 nos. of 9R units leveraged Green Credit End of project: 4 credit institutions engaged. 10 nos. of 9R units leveraged green credit	# Reverse logistics/collection infrastructure # Progress reports by the credit institutions/9R units	Assumption: Credit institutions may have interest in supporting businesses engaged in reverse logistics/collection infrastructure. Risk: If the updated reverse logistics/collection infrastructure does not accrue economies it may deter interest of 9R units.
Activity 5.1.1.4. Carry out pilots/ demonstrations on reverse logistics for post-consumer waste	# Number of pilots/demonstrations on reverse logistics (post-consumer waste) # Quantity of textile waste processed	No such effort exists	Mid-term: # 20 units # 200,000 tons End-term: # 400,000 tons (cumulative)	# Progress reports on pilots/demos	Assumption: Textile waste to textiles implies substantial waste reduction. Risks: If reverse logistics-based pilots are too complex and cost intensive, they

					may face resistance during the implementation stage.
Activity 5.1.1.5. Create a database or platform connecting value chain actors for waste repurposing	# Number of database/platform (digital) created	No such initiative exists.	Mid-term: 1 database/platform created.	# Database or platform # User feedback	Assumption: The concerned value chain actors are interconnected functionally. Risks: Value chain actors may refuse to divulge information on the developed platform.
Output 5.1.2. Emergence of women's leadership in new business opportunities in 9Rs improved.					
Activity 5.1.2.1 Established women-led 9R enterprises	# Number of women-led startups in 9Rs. # Number of women employees in startups	No such initiative exists for women-led 9R start-ups in India	Mid-term: 5 women-led start-ups 400 women and 200 men End-term 20 women-led startups 1200 women and 400 men	Registration of new women-led businesses in 9R. Annual filings of the start-ups with govt. depts. Project initiated survey	Assumption: There is scope for women's leadership in 9R activities and allied businesses. Risks: Women may not find the unorganized 9R sector adequately remunerating.
Component 6: Knowledge management and Learning					
Outcome 6.1. Creation of knowledge products, as well as generation and management of knowledge.					
Output 6.1.1. India textile child project portal for knowledge management and exchange conceptualized, launched and managed.					
Activity 6.1.1.1. Conceptualize, launch and manage India Textile Child Project portal for project period	# Number of digital portals developed	No portal exists	Mid-term: 1 digital portal	Portal launched	Assumption: The knowledge products will motivate the project stakeholders to implement interventions and help scale up. Risk: No risk foreseen
Activity 6.1.1.2 Develop and upload e-newsletters	# Number of quarterly newsletters to exchange best practices and updates	No newsletters exist	Mid-term: 12 End of project: 24	Newsletter published (digital)	Risk: No risk foreseen

Activity 6.1.1.3 Develop best practices packages for chemical management developed for the textile sector in India	# Number of A-V modules developed from national/international best practices for promotion amongst Indian fashion/textile houses and supply chain industries (regenerative design, innovative material, Cleaner Production, 9Rs) # Compendium of best practices prepared	No such communication product exists	Mid-term: 5 5 10	A-Vs, Compendium prepared and uploaded on portal	Risk: No risk foreseen
Activity 6.1.1.4. Develop best practices from India Child Project	# Number of A-V modules developed on interventions, results and GEBs of India Child Project for different categories of interventions for scaling up # Number of fact sheets/brochures prepared # Number of case studies/best practices prepared	No such outreach exists	End of project: 5 10 10	A-Vs, brochures/fact sheets, best practices uploaded on the portal	Risk: No risk foreseen
Activity 6.1.1.5 Study initiated on health issues of women textile workers	# Number of study report	No such study	Mid-term: 1 study report	Study report	Assumption: Textile MSME is open to such study Risk: Factory owners may not permit and workers may not participate in survey
Output: 6.1.2. Supply chain Integrated Programme (IP) knowledge is curated and applied					
Activity 6.1.2.1 National knowledge management (KM) for MoT (in Hindi and English) – for national outreach	Compilation of published project-initiated information on cleaner production	No such initiative in the sector in India	Mid-term 10 articles in newspapers/ magazines/other digital platforms, 50 social media messages End-term	Review of published material and messages	No assumptions and no risks perceived

			50 articles in newspapers/ magazines/other digital platforms, 200 social media messages		
Output 6.1.3. Value chain actors are engaged through information dissemination and outreach and apply knowledge.					
Activity 6.1.3.1. Establish platforms connecting value chain actors	# Number of App developed for knowledge sharing with community to scale up project interventions # Number of industries adopting project interventions # Number of factories received social media messages on project interventions # Number of buyers received social media messages on project interventions # Number of factories reached out to implement project interventions	No such App exists.	Mid-term: 1 10 2000 20000 End of project: 1 [updated] 100 5000 100000	Launched App on mobiles. Survey report	Assumption: Outreach through social media will motivate potential industries to consider production of sustainable textile through project interventions and create behavioral change among the public Risk: Social media may act as fad and may not create the required impact
Output 6.1.4. Opportunities for collaboration and exchange among governments and stakeholders to act through partnerships are facilitated and fostered.					
Activity 6.1.4.1. Facilitate/participate in international events, meetings and workshops, capacity building, knowledge exchange for key project team members, industry and industry association representatives, R&D institutes representatives to	# Number of international events participated	No such comprehensive efforts exist	Mid-term: 3 6 End of project: 6 12	Reports of lessons learnt; business collaboration potential explored	Assumption: The participating factories can participate and spread the knowledge gained to others Risk: Unless a structured system to disseminate knowledge, it may not take place

learn from best practices – International travel					

[1] Standards & Certification for exports are met by 4 fashion houses (GOTS, ZDHC (MRSL), Bluesign, etc.).

ANNEX D: STATUS OF UTILIZATION OF PROJECT PREPARATION GRANT (PPG)

Provide detailed funding amount of the PPG activities financing status in the table below:

Project Preparation Activities Implemented	GETF/LDCF/SCCF Amount ($)		
	Budgeted Amount	Amount Spent To date	Amount Committed
Consultants	55,000.00	14,871.15	40,128.85
Local travel	20,080.68	8,259.08	11,821.60
National Consultants	27,571.87	26,213.59	1,358.28
Contractual Services	89,348.45	80,904.24	8,444.21
Assessing capacity of executing partner	8,000.00	867.07	7,132.93
Total	**200,001.00**	**131,115.13**	**68,885.87**

ANNEX E: PROJECT MAP AND COORDINATES

Please provide geo-referenced information and map where the project interventions will take place

Location Name	Latitude	Longitude	GeoName ID
Ahmedabad	23.0225	72.5714	1,279,233

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Bhiwandi	19.2813	73.0483	1,275,901

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Ichalkaranji	16.6886	74.4593	1,269,834

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Kolkata	22.5726	88.3639	1,275,004

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Ludhiana	30.9010	75.8573	1,264,728

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Panipat	29.3909	76.9635	1,260,476

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Surat	21.1702	72.8311	1,255,364

Location Description:

Activity Description:

Location Name	Latitude	Longitude	GeoName ID
Tiruppur	11.1085	77.3411	1,254,348

Location Description:

Activity Description:

Please provide any further geo-referenced information and map where project interventions are taking place as appropriate.

ANNEX F: ENVIRONMENTAL AND SOCIAL SAFEGUARDS DOCUMENTS INCLUDING RATING

Attach agency safeguard datasheet/assessment report(s), including ratings of risk types and overall project/program risk classification as well as any management plans or measures to address identified risks and impacts (as applicable).

Title
Annex 5 GEB- Calculations Revised - 10-2-2024
ANNEX G - Project Budget Table
Appendix 1 - Tables Referenced under Project Outline- Project Justification
Annex F- GEF 11178 - ESMP
Annex B - OFPsLetterofEndorsementCountryname_IP 11 - India - LoE
Annex 4 - GEF 11178 - ESMP
Annex 3 - Gender Analysis and gender action plan
Annex 2 - GEF 11178 - Knowledge Management Strategy
Annex 1 - GEF 11178 - Stakeholder Engagement Report
ANNEX D - Status of utilization of PPG Grant
ANNEX E - PROJECT MAP AND COORDINATES

ANNEX G: BUDGET TABLE

Please upload the budget table here.

UNIDO-GEF-MOT
India Textiles

Expenditure Category	Detailed Description	Component (USDeq.)									Total (USD eq.)	Responsible Entity (Executing Entity receiving funds from the GEF Agency)[1]
		Component 1	*Component 2*	*Component 3*	*Component 4*	*Component 5*	*Component 6*	*Sub-Total*	*M&E*	*PMC*		
		Outcome 1.1	*Outcome 2.1*	*Outcome 3.1*	*Outcome 4.1*	*Outcome 5.1*	*Outcome 6.1*					
Contractual Services – Company	Activity 1.1.1.1. Develop green procurement policy for the private sector(fashion houses, MSME units)	30 000,00						30 000,00			30 000,00	MoT
	Activity 1.1.1.2.Develop and Promote Standards and certification for circular designs	50 000,00						50 000,00			50 000,00	MoT
	Activity 1.1.2.1. Develop policy to create enabling environment for circular business models and eco-designs	30 000,00						30 000,00			30 000,00	MoT
	Activity 1.1.2.2. Develop Tax incentive models for encouraging adoption of circular business models	50 000,00						50 000,00			50 000,00	MoT
	Activity 1.1.2.3. Provide Green credit/ loan provided for Circular business	40 000,00						40 000,00			40 000,00	MoT
	Activity 2.1.1.1. Develop guidelines for sourcing innovative materials		20 000,00					20 000,00			20 000,00	MoT
	Activity 2.1.1.2.Develop supplier		40 000,00					40 000,00			40	MoT

reporting tools/self-assessment methods for sustainable/innovative textiles.										000,00	
Activity 2.1.1.3. Fashion brands/garment industry engage with MSME/FH in extraction of natural /viscose fiber from waste biomass (banana, areca, etc.)		300 000,00					300 000,00			300 000,00	MoT
Activity 2.1.1.4. Develop guidelines for sustainable/innovative investment criteria and leverage lending		25 000,00					25 000,00			25 000,00	MoT
Activity 2.1.1.5. Engage credit institutions engaged for providing green credit/loans.		15 000,00					15 000,00			15 000,00	MoT
Activity 2.1.2.1. Implementing innovative prototypes and use of existing knowledge		50 000,00					50 000,00			50 000,00	MoT
Activity 2.1.2.2. Implement pilot demonstrations on innovative materials		200 000,00					200 000,00			200 000,00	MoT
Activity 3.1.1.1.Review of schemes and guidelines of different central ministries/ state departments/ for cleaner production			20 000,00				20 000,00			20 000,00	MoT
Activity 3.1.1.3. Provide Support for supplier reporting(reporting tools or self-assessment)			40 000,00				40 000,00			40 000,00	MoT

	Activity 3.1.2.1.Develop criteria for sustainable lending and investments			50 000,00				50 000,00			50 000,00	MoT
	Activity 3.1.2.2. Brands provide financial incentives to suppliers with cleaner production technologies			10 000,00				10 000,00			10 000,00	MoT
	Activity 3.1.2.3. Credit institutions provide green credit/loan to manufacturers/suppliers engaged in cleaner production.			15 000,00				15 000,00			15 000,00	MoT
	Activity 3.1.3.1.Implement clean energy interventions			598 222,00				598 222,00			598 222,00	MoT
	Activity 3.1.3.2. Pilot/demonstrate alternative non hazardous chemical use			700 000,00				700 000,00			700 000,00	MoT
	Activity 3.1.3.3. Carry out cleaner production pilots/demonstrations carried out to reduce chemicals, water and energy			1 000 000,00				1 000 000,00			1 000 000,00	MoT
	Activity 3.1.3.5. Upgrade procedures, practices and infrastructure pertaining to Environment, Social, Health and Safety (ESHS) aspects			300 000,00				300 000,00			300 000,00	MoT
	Activity 3.1.4.3. Gender perspective included into the project supported cleaner production intervention in factories			20 000,00				20 000,00			20 000,00	MoT
	Activity 3.1.5.1. Implement			48 000,00				48 000,00			48	MoT

Digital Twin with IoT systems										000,00	
Activity 3.1.5.2. Implement IOT solutions for POP measurements on textiles			50 000,00				50 000,00			50 000,00	MoT
Activity 3.1.5.3. Implement Digital Twin IOT system using AI/ML (Artificial Intelligence and Machine Language) for water measurement			32 000,00				32 000,00			32 000,00	MoT
Activity 4.1.1.1. Develop sustainable public procurement templates .				30 000,00			30 000,00			30 000,00	MoT
Activity 4.1.1.2.Revise develop and promote ecolabels and consumer information				50 000,00			50 000,00			50 000,00	MoT
Activity 4.1.1.3. Prepare advisory for potential trade controls on POPs treated materials				15 000,00			15 000,00			15 000,00	MoT
Activity 4.1.2.1. Facilitate Fashion houses/brands provide incentives to retailers for selling sustainable apparel.				15 000,00			15 000,00			15 000,00	MoT
Activity 4.1.4.1. Engage women influencers for triggering behavior change towards sustainable fashion				70 000,00			70 000,00			70 000,00	MoT
Activity 5.1.1.1. Developed a comprehensive policy on waste management					20 000,00		20 000,00			20 000,00	MoT
Activity 5.1.1.2.					50 000,00		50 000,00			50	MoT

	Develop EPR (Extended Producer Responsibility) guidelines and prepare textile MSME to implement EPR										000, 00	
	Activity 5.1.1.3. Engage credit institutions for green credit to develop reverse logistics/collection infrastructure .					15 000,00		15 000,00			15 000, 00	MoT
	Activity 5.1.1.4. Carry out pilots/demonstrations on reverse logistics for post-consumer waste					200 000,00		200 000,00			200 000, 00	MoT
	Activity 5.1.1.5. Create a database or platform connecting value chain actors for waste repurposing					50 000,00		50 000,00			50 000, 00	MoT
	Activity 5.1.2.1. Estblish women lead 9R enterprises					300 000,00		300 000,00			300 000, 00	MoT
	Activity 6.1.1.1. Conceptualize , launch and manage India Textile Child Project portal for project period						50 000,00	50 000,00			50 000, 00	UNIDO
	Activity 6.1.1.2. Develop and upload e-newsletters						50 000,00	50 000,00			50 000, 00	UNIDO
	Activity 6.1.1.3. Develop best practices packages for chemical management developed for the textile sector in India						50 000,00	50 000,00			50 000, 00	UNIDO
	Activity 6.1.1.4. Develop best practices						100 000,00	100 000,00			100 000, 00	UNIDO

from India Child Project											
Activity 6.1.1.5. Study initiated on health issues of women textile workers.						40 000,00	40 000,00			40 000,00	UNIDO
Activity 6.1.2.1. National knowledge management (KM) for MoT (in Hindi and English) – for national outreach						50 000,00	50 000,00			50 000,00	UNIDO
Activity 6.1.3.1. Establish platforms connecting value chain actors						50 000,00	50 000,00			50 000,00	UNIDO
Baseline, mid-point and final monitoring of GEF Core Indicators/GEBs							-	30 000,00		30 000,00	UNIDO
Yearly Project Implementation Review (PIR) to UNEP and GEF							-	30 000,00		30 000,00	UNIDO
Yearly Co-financing Report							-	30 000,00		30 000,00	MoT
Quarterly progress and financial reports							-	30 000,00		30 000,00	MoT
Monitoring of Environmental and Social Safeguards (ESS) Risks							-	36 000,00		36 000,00	MoT
Semi-annual Progress/ Operational Reports to UNEP							-	30 000,00		30 000,00	MoT
Final Project Operational Completion Report							-	40 000,00		40 000,00	MoT
Promotional material							-	42 550,00		42 550,00	MoT
Mid-term review (MTR)							-	40 000,00		40 000,00	UNIDO
Project Terminal Evaluation (TE)							-	40 000,00		40 000,00	UNIDO

	1.1.3.4. Mid-term and end term evaluation carried out on reduction in decent work deficits, pay parity and women moving to higher job categories	30 000,00						30 000,00			30 000,00	MoT
International Consultants	Expert on natural fibres		12 000,00					12 000,00			12 000,00	MoT
	Expert on textile chemicals			12 000,00				12 000,00			12 000,00	MoT
	Expert on 9Rs					12 000,00		12 000,00			12 000,00	MoT
	Expert on behavioural change				12 000,00			12 000,00			12 000,00	MoT
	Expert on global best practices in textiles						12 000,00	12 000,00			12 000,00	UNIDO
	Expert on Standards, Certification and Ecolabel	12 000,00						12 000,00			12 000,00	MoT
National Consultants	National Project Manager							-		320 000,00	320 000,00	MoT
	National Knowledge Management Coordinator									40 000,00	40 000,00	UNIDO
	Finance administrative Associate							-		86 400,00	86 400,00	MoT
	Component Resource Person 1	36 000,00	36 000,00		36 000,00	36 000,00		144 000,00			144 000,00	MoT
	Component Resource Person 2			144 000,00				144 000,00			144 000,00	MoT
	Textile Expert	6 000,00	6 000,00	6 000,00	6 000,00	6 000,00	6 000,00	36 000,00			36 000,00	MoT
	Chemicals Expert	6 000,00	6 000,00	6 000,00	6 000,00	6 000,00	6 000,00	36 000,00			36 000,00	MoT
	Gender Expert	4 800,00		4 800,00	4 800,00	4 800,00	4 800,00	24 000,00			24 000,00	MoT
	Energy Expert			24 000,00				24 000,00			24 000,00	MoT
	ESMP expert			24 000,00				24 000,00			24	MoT

											000,00	
Trainings, Workshops, Meetings	Training and validation workshops	270 000,00	30 000,00	285 000,00	360 000,00			945 000,00	84 000,00		1 029 000,00	MoT
Travel to meetings, project sites, workshops etc	Activity 6.1.4.1. Facilitate/participate in international events, meetings and workshops, capacity building, knowledge exchange for key project team members, industry & industry association representatives, R&D institutes representatives to learn from best practices - International travel						100 000,00	100 000,00			100 000,00	MoT
	National Travel, includes NPM - 24, FA - 12, CRP 1 24 each, CRP2 24 Experts: Text -24, Chem - 24, Gender - 24, Energy - 24, ESMP -24)	14 000,00	18 000,00	82 000,00	28 000,00	18 000,00	14 000,00	174 000,00	36 000,00		210 000,00	MoT
Office Operation	Office operation (stationeries, internet, office transportataion costs, & other utilities, etc) for the project							-		108 000,00	108 000,00	MoT
Office	Communication equipment (cameras, palmtops, etc)	2 000,00	2 000,00	2 000,00	2 000,00	2 000,00	2 000,00	12 000,00		2 000,00	14 000,00	MoT
	Printers & Photocopier	3 000,00	3 000,00	3 000,00	3 000,00	3 000,00	3 000,00	18 000,00		3 000,00	21 000,00	MoT
	Desktops	1 000,00	1 000,00	1 000,00	1 000,00	1 000,00	1 000,00	6 000,00		1 000,00	7 000,00	MoT
	Office furniture	5 000,00	5 000,00	5 000,00	5 000,00	5 000,00	5 000,00	30 000,00		5 000,00	35 000,00	MoT
	Laptops	2 000,00	2 000,00	6 000,00	2 000,00	2 000,00	2 000,00	16 000,00		2 000,00	18	MoT

											000,00	
Grand Total		591 800,00	771 000,00	3 488 022,00	645 800,00	730 800,00	545 800,00	6 773 222,00	468 550,00	567 400,00	7 809 172,00	

Please explain any aspects of the budget as needed here

ANNEX I: RESPONSES TO PROJECT REVIEWS

From GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF.

Germany Comments

Germany approves the following PIF in the work program but requests that the following comments are taken into account: Germany requests that the following requirements are taken into account during the design of the final program proposal:

Comment & Response	Reference
Comment 1: Germany appreciates the foreseen transparency of material contents and awareness raising for workers on the health risks of the chemicals and products they work with.	Noted
Comment 2: Introducing more sustainable materials and processes is regarded as very challenging in both supply chains. The final proposal shall explain which activities can be targeted in an integrated manner and how actors in both sectors might learn from each other.	Comment for PFD level
Comment 3: The PFD states that the empowerment and inclusion of vulnerable groups will be prioritized and further specifies individual cooperation partners. The final proposal shall outline relevant factors and concrete objectives for successfully empowering women and indigenous groups throughout the project.	Comment for PFD level, Response: The project has identified all women and unskilled, male migrants as vulnerable groups deserving prioritized attention by the project. The textile sector attracts a lot of unskilled migrant workers (both men and women) from distant locations. The CEO endorsement document has included outputs and activities in four of the six project components to uplift these vulnerable people. These are: (i) awareness creation among women textile workers, especially women and migrants about decent work deficits (ii) sensitization of textile stakeholders and fashion houses about benefits of implementing decent work protocols (iii) conduct familiarization sessions about technological innovations and reduction in the knowledge gap between skilled and unskilled workers (iv) design and offer free skilling courses for migrant men

	and women to enable them to move up into higher categories of employment (from shop floor to supervisors for example) (v) highlight the situation regarding systemic inequalities, pay equity for similar work especially at the lowest level of employment through dialogues and discussions with various stakeholders (vi) ensure that gender perspectives are included into cleaner production activities (vii) ensure that women benefit equally from the project's intervention relating to cleaner production and (viii) enable and support women to be employed in and lead new, emerging business opportunities in 9R and circular economy. Indigenous people in India are mostly tribals living in the northeast and forests of central part of India and these regions are outside the scope of the identified project locations.
Comment 4: Germany appreciates the planned establishment of a shared knowledge repository. The final proposal shall include a strategy for covering diverse local contexts and solutions, also considering knowledge by local and national governments as well as development agencies and NGOs beyond the UN system.	Comment for PFD level
Comment 5: Component 4 – behavior change: The proposal explains that consumers for global textile supply chains are predominantly high-consumption markets largely in the Global North. We request a more detailed clarification on i) which the mechanisms deploying international consumer markets are, and ii) how the selected transformation levers may influence these consumer markets (refer as well to recent market trends such as the European due diligence act as well as the upcoming Carbon Border Adjustment Mechanism).	Comment for PFD level Response: The CEO ED has taken cognizance of different existing practices in handling post-consumer and post production waste. It has identified post-consumer waste as end-of-life garments discarded by consumers and post production waste as waste generated in factories / processing units. The PPG team has observed that both these types of wastes are picked up by rag pickers and recycled (not completely and not professionally) by them. The project would create opportunities for rag pickers and others to become entrepreneurs contributing to circular economy. It would partner with sustainable business incubators to set up sustainable 9R enterprise which would (i) ensure that postproduction waste is picked up separately and recycled in a manner required by the buyers. The incubated enterprises would put in place different procedures like setting up collection center for consumer waste for recycling.
Comment 6: Component 5 – reverse logistic: post-consumer and post-production waste are either mixed up or used as synonyms. Clearly differentiate these two strategies and review if post-consumer waste is correctly placed under component 5 or rather should be moved under component 3.	Comment for PFD level

Japan Comments

Comment & Response	Reference

Comment 1: As the PDF document seems like not complete yet, updating the document is required as soon as possible. Thus, the below comments are preliminary.	Comment for PFD level
Comment 2: Country selection: While the construction industries exist in any country, textile industries are concentrated in certain countries. Justifications are not adequately provided in terms of country selection on textile supply chains.	Comment for PFD level
Comment 3: Structure: While some private investments are envisaged, they are very vague, and all project components are technical assistance. Justifications are not adequately provided to achieve the project objective.	Comment for PFD level
Comment 4: Components: Although 9Rs are mentioned, more enhanced resource efficiency and circularity along with value chains should be highlighted more from design to recycling, to reduce pollution, GHG emissions, and biodiversity loss.	Comment for PFD level
Comment 5: GEBs: Given that the project structure is based on TA, the expected GEBs (direct) seem very ambitious. Better to explain the rationale more clearly that this program can achieve such outcomes.	Comment for PFD level

Switzerland Comments

Comment & Response	Reference
Comment 1: The theory of change, it is not understandable or logic how the program components are contributing to the goal of the program and how they are linked with each other. Activities 25 planned are missing. Indicators and the predicted amount of savings are not really justified and plausible and the stakeholder analysis is missing/weak. Could you provide more information?	Comment for PFD level

United Kingdom Comments

Comment & Response	Reference
Comment 1: While it is valuable to reference the triple planetary crises of climate change, pollution, and biodiversity loss in reference to the IP on “Eliminating Hazardous Chemicals from Supply Chains”, it is also helpful to underscore these interlinkages throughout the other Integrated Programs (and indeed, focal areas). Adding a short line to that effect in the introduction to the work program, or under the section on the IPs (paras 38 – 39) could be helpful in this regard.	Comment for PFD level

United States Comments

Comment & Response	Reference
Comment 1: India: We believe the Ministry of Chemicals and Fertilizers should be incorporated into this proposal.	The Ministry of Chemicals and Fertilizers was included into the PSC meeting, as stakeholder.

11169 - STAP Comments

Comment	How these comments will be addressed during the PPG
Consider developing a narrative of plausible futures that considers the potential effects drivers of change and their associated uncertainties on achieving the project's goal and use this to inform intervention options across the value chain and the different national child projects. See STAP's primer on future narratives for more guidance.	During the PPG, it will be ensured that the rational section in each child project will include a narrative of plausible futures that considers the potential effects drivers of change and their associated uncertainties on achieving the project's goal. Each child project will use this to inform intervention options across the value chain.
Ensure that all child projects address each aspect of the supply chain with appropriate actions toward achieving the transformational levers.	During the PPG, each child project will ensure action under each supply chain stage, targeting the transformational levers.
Recognize gender, Indigenous Peoples and Local Communities, and youths in the ToC, including in the overall project impacts and the example of activities. Pay extra attention to how to incorporate ILK into the child projects, where engagements take time and sensitivity.	Gender, Indigenous Peoples and Local Communities, and Youths aspects will be recognized in child project ToCs. The PPG will pay attention to the engagement of Indigenous Peoples so that Indigenous learning and knowledge can be adequately incorporated into relevant child projects.
We encourage all child projects to analyze policies across the various sector within their countries to understand where conflicting policies can hinder the achievement of the expected outcomes and ensure these are addressed appropriately. See STAP's paper on policy coherence for more guidance.	Each child project will analyze policies in its selected sector(s) to understand where conflicting policies can hinder the achievement of the expected outcomes and ensure that these are addressed appropriately in the project intervention. One of the selection criteria for the EoIs was the willingness of submitting country to address these conflicting and hindering policies
Undertake a detailed analysis of the innovation in the program. Also, consider how the child projects can demonstrate the many innovations highlighted in the PFD. Also, ensure that the global child project incorporates these innovations in its capacity building, technical assistance, knowledge management and learning aspects, awareness-raising, and advisor activities to help disseminate these solutions within the program and to countries outside the program. This will be essential for transformational change.	Each child project will actively identify innovations during PPG and engage partners relevant to ensure their demonstration during the project implementation. The global child project will actively liaise with the other child projects during PPG so that its proposed intervention will serve the child projects, their identified innovations, and disseminate these best practices and lessons learnt inside and outside the program.
We encourage the program to follow through in tracking the transformational change impact of the program using the selected indicators.	The monitoring and Evaluation activities to be developed for the program will utilize the program indicators designed to track transformational change
Provide more information on how the GEBs across the IP were estimated, including the underlying assumptions.	During the PPG, the program GEB methodology will be further refined and applied uniformly among child

	projects. The child projects will provide a detailed description of their GEB calculations in their project proposals, including underlying assumptions.
Recognize the local environmental benefits that can be generated through the project and put in place provisions to track, measure and report these and the socioeconomic co-benefits. Please see STAP's paper on incorporating co-benefits in GEF's investments for guidance.	The program and child projects will identify further co-benefits during the PPG and ensure provisions are put in place to track, measure and report these and the socioeconomic co-benefits.

Deviation in CEO ED Vs PIF

The project was designed in full accordance with the PIF/ Concept note with some necessary adjustments to the project components, outcomes, outputs, co-financing and budget. Key changes with the project design with the original PIF is as given below:

Table 2. Justification for deviations in budget

Components	Budget as per PIF	Proposed at PPG	Difference	Reason for deviation
Component 1. Design & Business Models	900,000	591,800	308,200	The budget is reduced from PIF to CEOED stage due to (i) Generic knowledge activities are moved to KML, (ii) project required resources for a new component on KML and small increase in budget for Cleaner Production, M&E and PMC.
Component 2. Innovative materials	900,000	771,000	129,000	Same reason as in Component 1.
Component 3. Cleaner production	3,000,000	3,488,024	-488,024	The budget is increased from PIF to CEO stage, due to the assessment at PPG stage indicating the budget for Technical Assistance and incentives is higher than the initial estimate.
Component 4. Sustainable consumption	1,400,002	645,800	754,202	Same reason as in Component 1.
Component 5. Post-use 9R's	900,000	730,800	169,200	Same reason as in Component 1.
Component 6. Knowledge Management & Learning (KML)		545,800	-545,800	Component 6 was not included in PIF. However, during PPG phase it was felt necessary to include it (i) for learning from the project with many components to scale up in other clusters in India and share knowledge globally, (ii) knowledge material needs to be developed in Hindi & other local languages, (iii) generic knowledge products for different components are also included in KML.
M & E	337,307	468,550	-131,243	Budget is increased from 4.32% to 5.99% due to increased cost of M&E and also the GST (Goods and Services Tax) in India.

PMC	371,865	567,400	-195,535	Budget is increased from 4.76% to 7.31%. This was found as an absolute necessity even to hire just one Project Manager and one Finance & Administrative Associate.
Total	**7,809,174**	7,809,174	0	

Table 3. Deviation CEO Doc vs PIF

SN	Description at PIF stage	Adjustments in CEO Endorsement stage	Justification
1	Project components, outcomes, outputs	One component on Knowledge Management and Learning has been added. No change has been made with the rest of five Components. Outcome/ Outputs have been revised added, which are presented in Project Results Framework	The consultations revealed a Knowledge Management and Learning component is essential for the India Child Project for reaching out to various stakeholders for knowledge exchange and contributing to scale up. This component will be executed by UNIDO. Outcomes, Outputs and activities have been revised/formulated after extensive discussion with key stakeholders – Ministry of Textiles, Textile Committee, Industry representatives/associations and expert agencies/experts.
2	Co-financing (i) The type of Co-financing by Ministry of Textiles included 8,000,000 USD in Grant and 2,500,000 in-kind (ii) Impact investment funds, angel investors, CSR funds provide equity of 8,000,000 USD.	Revisions are made in the type of co-financing. (i) The type of Co-financing provided by the Ministry of Textiles has been revised to include 4,000,000 USD in-kind and 6,500,000 USD in Grant. (ii) The equity is transferred to the Private sector - Textile industry through associations. Thus, the total private sector co-financing for investment mobilized is 23,000,000 USD.	(i) The Ministry of Textiles will provide significant manpower, logistics support. In addition, the schemes to provide in-grant support are low. Thus, the in-kind Co-financing has been enhanced. (ii) Impact investors, Angel investors, CSR showed interest and in-principle support. The CSR guidelines indicate a maximum project duration of 3 years. However, these entities expressed keenness to collaborate with project at the time of

			implementation. PMU will pursue collaboration and co-financing at the implementation stage. However, the Associations expressed their willingness to provide the required support, which fulfilled the gap in co-financing.
3	Budget	Budgets have been revised and the revised budget is presented in the Table below.	At the time of PIF, outcome/output/activity level budgets were not provided. Stakeholder consultations, field visits, and the analysis resulted in detailing out activities and budgets, which resulted in changes in component-level budgets. A new component, namely Knowledge Management and Learning has been included. Budgets for activities under different outputs/outcomes/ components have been drawn after deliberation with experts, vendors, consultants, industry representatives and other relevant entities.
4	Core indicators ● Greenhouse Gas Emissions Mitigate: 30,000 tCO_{2e} (direct); 60,000 tCO_{2e} (indirect) ● Chemicals of global concern and their waste reduced (metric ton of toxic chemicals reduced): 10,500 ton (Direct); 21,000 ton (indirect) ● Persistent organic pollutants to air reduced (grams of toxic equivalent gTEQ): 12 Over 6-year project period	Core Indicators ● Greenhouse Gas Emissions Mitigate: 147,000 tCO_{2e} (direct); 294,000 tCO_{2e} (indirect) ● Chemicals of global concern and their waste reduced (metric ton of toxic chemicals reduced): 10,530 ton (Direct); 21,060 ton (indirect) ● Persistent organic pollutants to air reduced (grams of toxic equivalent gTEQ): 22 ● Area of landscapes under improved management to benefit biodiversity (ha): 2,128,000 Over 6-year project period	During the PPG phase, baseline data was procured from primary survey in eight clusters. Based on the survey, measurement and analysis of baseline and energy interventions, a conservative estimate has been arrived at. The estimates made at PPG phase are more refined and with accurate data and measurements and mitigation measures. For example, though energy efficiency potential in factories is over 10% with small to medium investments, only 5% is considered for Core indicator calculations on GHG mitigation. Additionally, to align with the Integrated Programme Core Indicator 4 was added – area of landscapes under improved management to benefit biodiversity. In Component 2, innovative material use – promotes use of arecanut and banana fibres in textiles production. This inclusion is expected to cause secondary impact

			in terms of cotton substitution/replacement and thus the biodiversity by bringing area of landscapes under improved farm management practices (avoidance/lesser use of pesticides).