Transforming the textile and garment sector in Afrika through circular economy approaches.

[This is an illustrative circular economy PIF prepared for the textiles and garment sector in a notional African country, here labeled 'Afrika,' loosely based on (but elaborated from) a project from Ethiopia to illustrate the types of information and detail expected in a convincing GEF-8 PIF. It should NOT be used as a simple template for other projects, nor is it all necessarily fully internally consistent.]

PROJECT SUMMARY

Provide a summary description of the project, including (i) what is the problem and issues to be addressed. (ii) what are the project objectives, and if the project is intended to be transformative, how will this be achieved? iii), how this will be achieved (approach to deliver on objectives), and (iv) what are the GEBs and/or adaptation benefits and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. The explanation and justification of the project should be in section B "project description". (max. 250 words, approximately 1/2 page)

The textile and garment sector contributes significantly to Afrika's economy and has experienced significant development, including more than 50% growth in recent years. However, the industry has several negative environmental impacts, including adverse effects of harmful chemicals such as HHPs and POPs used for pest management and manufacturing processes. Other impacts include waste generation, including fabric offcuts which usually end up in landfills or burnt, which emits greenhouse gases and uPOPs, and wastewater generation leading to soil and water pollution. These environmental impacts, and the consequent human health and gender inequality concerns, are expected to increase if the industry continues in the current business-as-usual situation. This project, therefore, seeks to "make the textile and garment sector in Afrika sustainable by promoting circular economy approaches, including ensuring coherence in government policies, facilitating new business and finance models, and encouraging BAT, BEP, and RECP to prevent chemical pollution and significantly minimize waste." To achieve this, the project will create an enabling policy and regulatory environment for implementing appropriate innovative circular solutions (including technologies, finance, and business models) and use knowledge resources from inside and outside the project to create awareness, build capacity, and facilitate replication and scale-up of outcomes. The project is expected to reduce chemical pollution, including avoiding 1.5 tons of HHP, 3.5 tons of PFOs, 7.5 gTEQ of uPOPs, and 3690 tons of POPs containing waste. It will also minimize greenhouse gas emissions and abate waste generation and freshwater contamination from the textile and garment sector. Expected socioeconomic benefits include improved human health, especially of women and youths, and enhanced economic benefits (job creation and increased income) from the industry.

A concise summary for public use…

…with a brief list of the main target benefits

A. PROJECT RATIONALE

Briefly 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. Describe the objective of the project, and the justification for it. (Approximately 3-5 pages).

The Textile and Garment Sector

The textile and garment industry is essential to economic activities providing innovation, entrepreneurship, low-skilled employment, and livelihood benefits in many countries. The sector constitutes a substantial share of total exports in many developing countries.[1] For example, it is Africa's second largest employer after agriculture, worth USD 31 billion.[2]

However, textile and garment production is associated with significant adverse environmental impacts. Its detrimental ecological effects include high energy, water, land, and other resource use, chemical pollution from production activities, the generation of wastes and microfiber during production, assembly, and use, and substantial greenhouse gas emissions throughout the lengthy supply chain, including during manufacturing and transportation.[3]

What is the global and regional significance of this system for people and nature? Give sources briefly.

The industry's greenhouse gas emission was estimated at about 1.2 billion tonnes of CO_2eq in 2015,[4] about 8-10% of global carbon emissions,[5] exceeding the combined emissions from the aviation and maritime sectors.[6] Textile production, including cotton farming, uses about 4% of global freshwater withdrawals annually (93 billion cubic meters), with manufacturing responsible for 66%.[7]

A significant volume and variety of chemicals are used in the textile and garment sector – more than 1900 types, with 165 classified as harmful, including highly hazardous pesticides (HHPs) and persistent organic pollutants (POPs).[8] Hence, the sector significantly contributes to toxic chemicals released into the environment. While it is difficult to estimate the volume of chemicals released due to inadequate data and lack of transparency, it is estimated that about 20% of industrial wastewater pollution can be attributed to textile manufacturing and processing activities, including dyeing and finishing.[9]

Apart from waste generated during production and finishing (e.g., offcuts and discards), a significant additional waste is generated further into the textile life cycle as only 1% of clothing is recycled into new garments, with the rest (worth some USD500 billion) ending up barely worn, unused, or in landfills.[10] More than 85% of total material resources input into clothing is incinerated or disposed of in landfills.[11] The incineration of textiles or open burning (as is the case in some developing countries) at their end of life results in emissions of greenhouse gases and dioxins and furans (i.e., unintended POPs - uPOPs), as well as air pollution.

Systems Description: the textile and garment sector in Afrika

The Afrikan textile and garment sector comprises several actors, including farmers (smallholder, medium-large commercial, and government-owned growers of cotton fibers, primarily dominated by men); processors of raw materials into textiles (including ginning, spinning, weaving, knitting, dyeing, and finishing, mostly comprised youth and women working in factories); and specific textile product manufacturers (factories producing finished fashion products, e.g., shirts, pants, sportswear, etc.), predominantly comprised of women and youths, including many from rural areas. Other actors in the sector include distributors, retailers, and local and foreign investors. The total area of land used for cotton farming is close to 84,000 hectares.[12] The more than 52,000 small-scale farmers make up more than 30% of national cotton farming,[13] cultivating close to 39,600 hectares annually, with the total area of land under cotton farming by privately owned enterprises adding up to 54,000 hectares and government-owned farms responsible for the rest.[14]

The sector contributes significantly to Afrika's economy, with an export of USD 171 million in 2019/20 FY.[15] The industry has experienced significant development, including over 50% growth in recent years. The country's annual textile and garment production is estimated to include 102,000 tons of yarn, 207 million meters of woven fabric, 50 million kg of knitted fabric, 63 million pieces of knitted garments, and 28 million pieces of woven garments. The country's Textile Industry Development Institute indicates that there are 25 government-owned and commercial cotton farms, 18 ginning factories, 31 integrated textile factories producing both textiles and garments and more than 70 garment industries operating in or outside the industrial parks, manufacturing only garments.

Although Afrika's textile sector provides substantial economic benefits, it has several negative environmental impacts. First is the adverse effects of poor cotton farming practices, especially the use of HHPs, including POPs, for pest management. Some efforts are being made, especially by NGOs such as Pesticide Action Network (PAN), to educate farmers and stakeholders on better pest practices.[16] However, there still needs to be more knowledge, including within government institutions. A new guideline on cotton production prepared by the country's Institute for Agricultural Research included many harmful chemicals (e.g., POPs), including DDT, endosulfan, methoxychlor, aldrin, dieldrin, endrin, heptachlor, lindane, organophosphate, etc., as possible chemical pest control options.[17] Therefore, the use of these chemicals is prevalent in the country with significant negative impacts on biodiversity and adverse health effects on farmers, as have been reported by PAN and others.[18] This emphasizes the need to intervene to change the status quo through this project.

Then explain the national situation and the problem to address. Show it is in GEF's mandate.

And weave in gender, stakeholders, baseline projects, and other relevant information, e.g., indigenous peoples and youths, into the project rationale.

Second is the use of several chemicals, e.g., per-fluorinated chemicals such as PFOS and PFAS, and potential sources of dioxin and furan precursors like chloranil, during manufacturing and processing, including for dyeing and finishing. The country's updated Stockholm Convention National Implementation Plans (NIPs) estimated 3.1 tons of PFOS, which includes consumption by the textile, carpets, hydraulic fluids, etc. A clear baseline of all chemicals used is currently unavailable. It will be further assessed during the PPG stage of the project and as part of the value chain analysis during the project implementation. The baseline analysis will build on the outcome of the National Implementation Plan update project carried out for the country and supported by the GEF.

Weave in baseline projects into appropriate parts of project rationale.

The effects of chemical use during manufacturing and processing include contamination of freshwater habitats and associated biodiversity[19] and adverse health effects on factory workers, mainly youth and women. A study of the environmental and health impacts of the textile industry in two regions of the country shows significant adverse effects on the local environment, people, and livestock.[20] Another study on health effects indicates that two-thirds of textile factory workers (comprising 60% of females) were diagnosed with respiratory diseases and musculoskeletal disorders.[21]

Fore-shadow co-benefits. (a good rationale description based on systems thinking should help identify possible co-benefits)

The third is the issue of factory waste, including fabric offcuts. Due to the absence of a national policy and strategy for managing industrial solid waste, there is no integrated system for recording data, treating, and disposing waste from the textile and garment industries. A survey of one of the industrial parks with 20 manufacturing sheds shows that about 1,500 tons of fabric offcuts are generated annually. While there is no data on the total amount of waste and offcuts, a conservative extrapolation based on South Africa suggests an estimate of up to 100,000 tons per year. Conservatively, more than 25% of the offcut wastes are expected to be landfilled or open-burned (also based on an analysis of South Africa), resulting in the loss of valuable resources and emission of uPOPs. The remaining offcuts are, in most cases, partly reused by small and medium enterprises (SMEs) for products such as mattresses, floor brushing (cleaning) materials, purses, wallets, belts, shoes, etc. However, the activities between the factories and the SMEs need to be better coordinated. It is, therefore, difficult to ascertain the volume and frequency in which wastes are received by SMEs and how they are used. This is another area of information to be developed during the PPG stage and through the value chain analysis.

Beyond the chemicals and waste impacts, the textile and garment industry in the country also contributes to global warming through cotton farming, energy use in manufacturing and processing, and other supply chain activities, including transportation and distribution. A 2011 estimate by UNDP indicates that the textile and leather sector is responsible for 17% of the total greenhouse gas emissions of the country.[22] Furthermore, water contamination risks from the industry are of concern. Studies suggest that water pollution from textile effluents is most likely the largest source of industrial soil and water pollution.[23] It should be noted that water availability is not a significant issue in the country, as the sector accounts for just 0.4% of the country's water use, which is met independently through groundwater resources.[24]

Envisage multiple GEBs (where applicable) and other environmental and socioeconomic co-benefits.

Key Systems Drivers

The major drivers of the current trends in Afrika's textile and garment sector include:

***Political*:** recent government policies have focused on growing the sector. The country has developed an ambitious "growth and transformation" plan to boost textile exports to USD 1 billion by 2025[25] and create up to 350,000 jobs.[26] Consequently, it is creating supportive policies for this ambition and investing in more than 12 industrial parks, most dedicated to textile and garment production activities.[27] On the other hand, the country's current legal and regulatory frameworks are either insufficient or weak to ensure the environmental sustainability of the desired sectoral growth and transformation. This underlines the need for coherent policies to promote economic growth that does not facilitate ecological degradation. Ongoing domestic conflict in some regions presents another political dimension, reducing production and causing sanctions that may prevent textile exports.[28] Responses may include environmental security considerations as to supporting peacebuilding.

Identify key system drivers (that create challenges and opportunities) and their potential future trends and uncertainties.

***Economic*:** prevailing economic drivers include low energy costs, cheap labor costs, low investment risk, and supportive bilateral trade agreements (e.g., AGOA – African Growth Opportunity Act by the USA), which have attracted several foreign investors, including from Europe, the USA, and South and East Asia, to the country.[29] Unfortunately, many of these investments only focus on the economic benefits with minimal consideration of the social and environmental dimensions. For example, an assessment of the country's flagship Industrial Park shows significant disillusion among workers due to their inability to afford decent housing, food, and transportation due to low base wages.[30] Also, environmental considerations are not prioritized in the sector's investment decisions or business models. In recognition of this concern, a recent UNIDO project aims to improve the country's textile sector's environmental, social, and labor standards.[31] This GEF project will collaborate with the previous project.

Weave baseline projects, activities, or actors into appropriate parts of the project rationale.

***Technology and capacity*:** A key reason for current practices (and the associated environmental impacts) in the sector is the lack of information, expertise, resources, and incentives for implementing the Best Available Techniques (BAT), Best Environmental Practices (BEP), and Resource Efficient and Cleaner Production (RECP). Many textile and garment factories in the country use outdated technologies for chemical formulations, dyeing, finishing, and other textile processing activities, releasing a large amount of dioxin- and furan-containing chemicals into the environment. Also, many factories rely on non-certified chemicals due to a lack of access or expertise to secure the appropriate chemicals. Furthermore, workers' lack of adequate knowledge has been noted as a significant reason for production inefficiency – as low as 15% in some textile factories in the country.[32] A recent GEF-supported project (GEF ID 3942[33]) has helped pilot some modern technologies for accurate chemical formulation and create access to certified chemicals, thus helping to reduce chemical usage, minimize waste, and improve efficiency, thereby reducing environmental and human health impacts.[34] This project will build on the success and lessons from the pilot project and establish regional cooperation and a network for information exchange and experience sharing with other projects, such as GEF ID 10523[35] and GEF ID 10543[36].

Weave baseline projects, activities, or actors into appropriate parts of the project rationale.

***Climate change and socio-cultural factors*:** The textile and garment sector, especially cotton production, is vulnerable to climate change. Global warming is expected to exacerbate the country's drought, flood, and soil erosion, with a consequent reduction in cotton yield – on average by 13%, but ranging from 0->20% (with a few regions having the potential for increased yields, although these are subject to potential conflict) by mid-century.[37] The negative impact of climate change on agricultural outputs is pushing rural dwellers to urban areas in search of alternative livelihoods in the industrial sectors, including textiles and garments. Climate change is thus driving conflicting trends of reduced cotton production but increased potential workforce for the textile and garment sector.

***COVID-19*:** The COVID-19 pandemic has impacted the sector negatively, causing supply chain disruption, and leading to cuts in production, revenue losses, and job losses, with women and youths disproportionally affected.[38] However, the pandemic has also provided opportunities to identify the sector's shortcomings and vulnerabilities and invest in necessary measures. Factories are now seeking alternative sources of input materials, including dyes and natural fibers, that are less vulnerable to global shocks. This trend provides an opportunity to embrace innovative solutions, including business models, to help make the textile supply chain greener and more resilient.

Narratives of plausible futures

Based on the understanding of trends and interactions between the key drivers in the textile and garment sector, the following baseline futures are plausible:

Use the description of the baseline future to illustrate key uncertainties to which the project must be robust.

***Plausible Future I*:** Government policies continue to support the growth of the textile sector over the next 20 years, but contradictory policies and conflict result in a failure to strengthen the existing regulatory framework to address the environmental and social impacts. Conflict and associated sanctions reduce the demand for Afrikan textiles and garments, while climate change and conflict reduce cotton production. This drives more rural-to-urban migration, providing a potential textile workforce, but textile production continues using old technologies with inadequate capacity.

Economic drivers, especially foreign investments, provide only weak support for the growth of the textile sector without adequate consideration for the environmental and social dimensions (including gender and youth concerns) of these investments. The lack of coordinated policies means that COVID-19 impacts on alternative supply chains are poorly mitigated. The outcome of this baseline scenario is continued but weak growth of the textile sector, with increased chemical pollution, waste generation, greenhouse gas emissions, freshwater contamination, and poor working conditions.

***Plausible Future II*:** In the second likely future, government policies weakly support the growth of the textile sector over the next 20 years, and the existing regulatory framework to address the environmental and social impacts is somewhat strengthened. Conflict is resolved, so there is significant growth in demand for Afrikan textiles and garments, engaging with many foreign partners. Economic drivers, especially foreign investments, greatly support the growth of the textile sector, but there are only moderate improvements in consideration of environmental and social dimensions (including gender and youth concerns) in investments. Modern textile production technologies are slowly introduced, but with weak incentives for the domestic industry to take them up. Climate change reduces textile production in some regions, but this is more than offset by positive impacts in other regions; this creates population movements and rising inequality despite the net increase in production and demand. People still migrate from rural areas to work in industrial parks, providing cheap labor for the textile sector, but further inequality in the absence of strong social policies. COVID-19 impacts are mitigated with alternative supply chains that are less vulnerable to global shock, further enabling the growth of the industrial textiles sector. The outcome of this scenario is strong growth of the textile sector, but with only slow improvements in the management of chemicals and waste, reduced greenhouse gas emissions, and overall reduced environmental degradation.

These futures highlight that any GEF-funded intervention not only needs to address challenges in the policy, production, and value chain social and environmental aspects of the textiles sector, but needs to do so in ways that will be *robust* to whether that sector is weakened or shows strong growth in coming years as a result of the combination of interactions among drivers related to conflict, climate change, and the capacity of the central government.

Project Objective

To achieve a sustainable textile and garment sector within any of the plausible futures as described above, this project aims to:

> *"Make Afrika's textile and garment sector sustainable by promoting circular economy approaches, including ensuring coherence in government policies, facilitating new business and finance models, and encouraging BAT, BEP, and RECP to prevent chemical pollution and significantly minimize waste."*

During the stakeholder consultation meetings held in the country to develop this proposal, the textile and garment sector emerged as a priority for achieving the country's economic growth, but also a major source of POPs and hazardous chemicals use, waste and wastewater generation, freshwater contamination, as well as water and energy consumption. Without a GEF intervention, there is a high likelihood that the sector's continued growth will follow the current business-as-usual path with significant continued environmental degradation and consequent social, especially health and inequality, impacts. The need for GEF support to advance the circular economy agenda to address the findings of the NIPs update and curb growing natural resources demand and the health effect of unsustainable textile and garment sector growth was emphasized by the national government during discussions with the country's Environment, Forest and Climate Change Commission and industry stakeholder. The proposed response will encourage the emergence of a more sustainable industry regardless of the strength of demand, creating a premium for the products in the event of reduced demand, as well as many co-benefits for the nation in terms of reduced pollution, improved health outcomes, and decent work for many.

Hence, the project objective and why this response is robust given future uncertainty.

B. PROJECT DESCRIPTION

This section asks for a theory of change as part of a joined-up description of the project as a whole. 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, the 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 PIF guidance document. (Approximately 3-5 pages) see guidance here.

Intervention pathways

The theory of change for the proposed alternative scenario is depicted in Figure 1. It is built on the premise that if the enabling policy and regulatory environment are in place, appropriate innovative circular solutions (including technologies and finance and business models) are introduced for textile and garment production and waste management, and efforts are made to harness the knowledge gained for awareness-raising, capacity building, replication, and scaling; then it is possible to transform the sector to become circular, thereby contributing a reduction in chemical pollution, especially HHPs and POPs, greenhouse gas emissions, freshwater contamination, and waste generation. The theory of change is based on foundational *assumptions* that there are no delays in funds mobilization (GEF and co-finance), funds are well managed, required expertise is secured and on time, and there is continued political support and stability in the country.

The transformation of the textile and garment sector will be achieved via three pathways: the enabling environment pathway, the techno-economic demonstration pathway, and the monitoring, knowledge curation and dissemination, replication, and scaling pathway.

The first pathway involves creating an enabling environment in the country for adopting circular economy approaches. This includes implementing activities such as analysis of policy gaps and identifying any incoherence across relevant government institutions to inform the strengthening of regulatory and institutional frameworks. The expected short-term outcome of this pathway is an enabling policy and institutional environment for a circular textile and garment sector. Achieving this outcome *assumes* that all stakeholders adopt and implement new policies created through the project and that there is continued political commitment to the project's overarching objective. This will be facilitated by engaging policy and industry stakeholders.

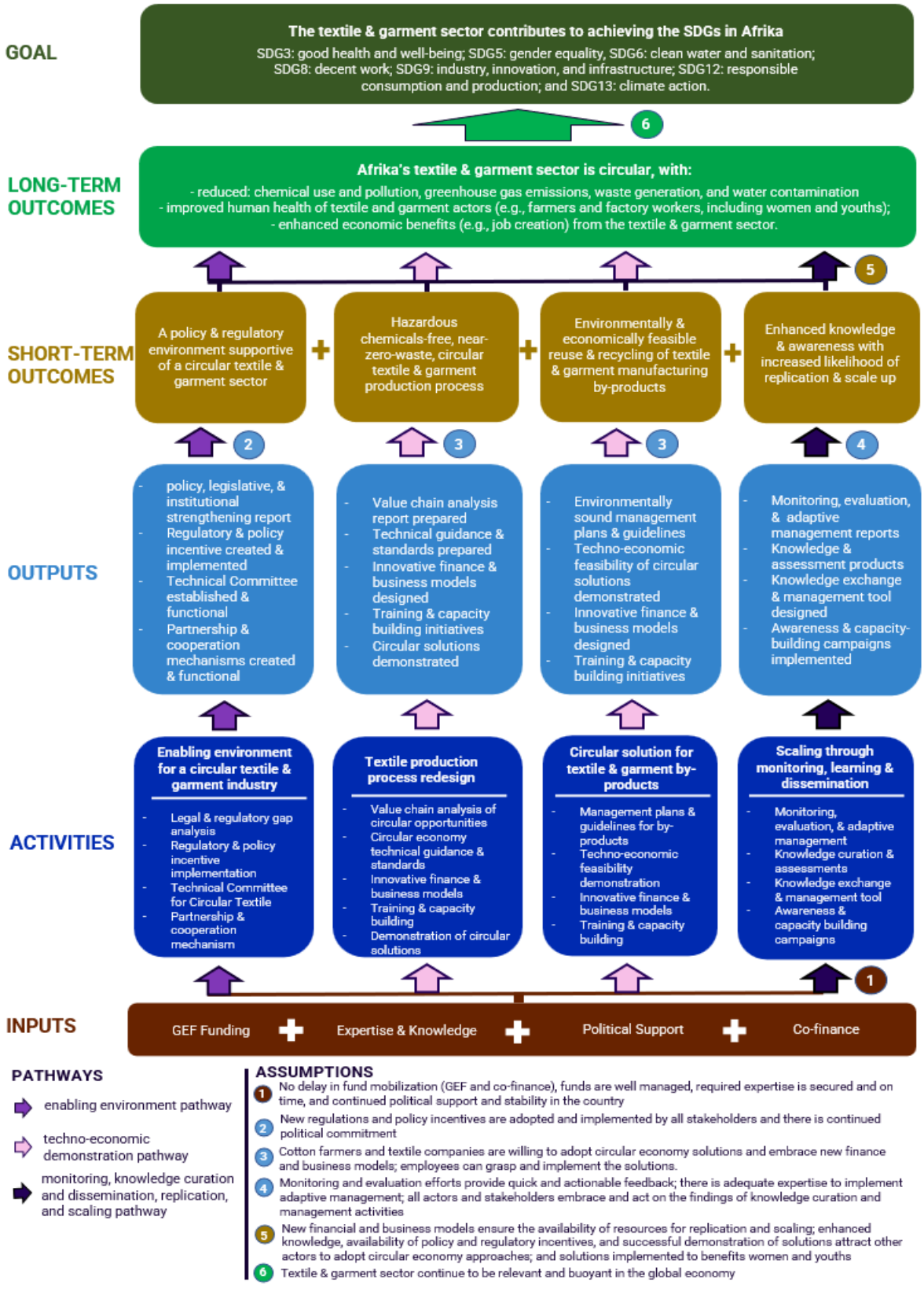
The techno-economic pathway focuses on redesigning the textile and garment production process across the life cycle, including cotton farming, textile processing and manufacturing, garment (finished products) production, and textile and garment by-products management. Activities include value chain analysis to identify alternative chemicals for textile production and reuse and recycle options for by-products, development of technical guidelines and standards, and design and trial of innovative technological solutions and financial and business models for the textile and garment sector. These activities are expected to result in a hazardous-chemicals-free, near-zero-waste, circular textile and garment production process in the short term. This outcome assumes that cotton farmers and textile companies (government-owned and private sector) are willing to adopt the BAT/BEP/RECP solutions and embrace the finance and business models developed by the project. Also, employees are *assumed* to grasp and implement the solutions designed through the project. This will be assisted by appropriate outreach (see pathway 3) and incentives from value chain market access.

The third pathway (monitoring, knowledge curation and dissemination, replication, and scaling pathway) aims to strengthen the project implementation and curate knowledge for the replication and scale-up of solutions. To achieve this, activities will include assessing replication and scaling opportunities, developing knowledge curation, management, and exchange tool, creating awareness among relevant stakeholders and actors, and project monitoring, evaluation, and adaptive management. These activities are expected to lead to short-term outcomes of enhanced knowledge and awareness that promotes the likelihood of enduring benefits and project scaling. It is *assumed* that the monitoring and evaluation effort will provide quick and actionable feedback, there will be adequate expertise to implement adaptive management, and that all actors and stakeholders will embrace and act on the findings of the knowledge curation and management activities.

Use the ToC as a clear logical structure for the project description.

The ToC narrative explains the main logic pathways and related outcomes and outputs; as well as weaving in assumptions – these are critical for internal monitoring of progress for adaptive management.

Theory of Change Summary



Theory of Change diagram (but note that the ToC narrative is equally important, to enrich the explanation of interactions among pathways, and of assumptions)

The combination of the shorter-term outcomes is expected to lead to longer-term impacts, including transforming the country's textile and garment to become circular with the benefits of reduced resource use, chemical pollution, greenhouse gas emissions, freshwater contamination, and waste generation. The longer-term outcomes also include improved health of textile and garment stakeholders, including farmers and factory workers, especially women and youths, and enhanced economic benefits (job creation and increased income) from the sector. These co-benefits are anticipated to help ensure enduring support for the changes from all stakeholders. Achieving this longer-term outcome is reliant on the following *assumptions*: the new financial and business models ensure the availability of resources for replication and scaling; enhanced knowledge, availability of policy and regulatory incentives, and successful demonstration of solutions attract other actors to adopt circular economy approaches; and solutions are implemented in a way that benefits women and youths. The three pathways are sufficient to achieve the intended outcomes providing these assumptions are also met through linked projects and activities by others with whom the project will coordinate (see below.)

Explain how the ToC pathways are *necessary & sufficient*, with implications for coordination with others to fill in aspects NOT covered in the project (or GEF) scope.

By implementing, replicating, and scaling up the interventions, the textile and garment sector will contribute to the achievement of the Sustainable Development Goals (SDGs) in the country, including SDG3 on good health and well-being; SDG5 on gender equality, SDG6 on clean water and sanitation; SDG8 on decent work; SDG9 on industry, innovation, and infrastructure; SDG12 on responsible consumption and production; and SDG13 on climate action. Achieving this large-scale impact will depend on the continued relevance and buoyancy of the textile and garment sector in the global economy.

Project Components

The project proposes to achieve its objective by strengthening the sound management of chemicals and wastes in the textile and garment sector through circular economy approaches, including introducing BAT/BEP/RECP practices. Four project components and associated activities will deliver the theory of change pathways.

Now elaborate explicitly on the activities and outputs that will deliver these pathways, weaving in stakeholders as well as the roles of women, youths, indigenous peoples, local communities, private sector, etc., where relevant, and what will ensure the outcomes are enduring.

Component 1: enabling environment for circular textile and garment industry.

The goal of Component 1 is to create the enabling policy and institutional environment and technical resources and capacity for implementing circular economy principles in the whole value chain of the textile and garment sector of the country. Activities will include:

- *Activity 1.1. Analysis of legal and regulatory gaps, coherence in existing policies, and institutional capacities*. The aim is to understand how current regulations and policies support a circular economy in the sector and the needed improvements. This will be a foundation for proposing appropriate legislation and institutional strengthening and capacity-building initiatives. Activities would include desktop reviews and focus group engagement of stakeholders, including government ministries and departments, legislative arms, the private sector actors, industrial associations (e.g., Afrikan Textile/Garment Manufacturers' Association and Afrikan Cotton Producers, Ginners, and Exporters Association), the academia and research institutions, gender-related departments and associations, civil societies, etc. The review and analysis will address relevant legislation and policies across the life cycle of textile production and use, from cotton growing to the end of life of final products, to produce a "policy, legislative, and institutional strengthening" report with recommendations to address gaps and ensure policy coherence.

- *Activity 1.2. Introduction and adoption of regulatory and policy incentives for circular textiles*. This activity will focus on implementing the recommendations of Activity 1.1. This will include enacting new legislation and capacity-building activities for effective implementation and enforcement. New policies will include incentives for behavior change of industry actors. The engagement of all relevant stakeholders in Activity 1.1 will enable the quick implementation of recommendations. The output from this activity is the regulatory and policy incentives.

- *Activity 1.3. Technical Committee for Circular Textile*. A multi-sectoral technical committee will be legally established and made operational. The committee will comprise relevant stakeholders from the government, farmers, private sector, trade associations, gender representatives, academia, civil societies, etc., bringing environmental, economic, and social (e.g., gender and health) perspectives into the operations of the textile and garment sectors. The committee will establish coordination mechanisms, targeted training, and engagement actors outside of Afrika, including relevant environmental conventions (e.g., Stockholm, UNFCCC, etc.) and international brands, investors, and partners. The technical committee would lead the policy gap and coherence analysis (activity 1.1). It would also establish a "regulatory sandbox"[39] to enable real-life testing of innovative solutions and facilitate their compatibility with legal and regulatory frameworks.

Show how relevant stakeholders, gender issues, etc., will be incorporated into the interventions.

- *Activity 1.4. Partnership and cooperation mechanism for textile and garment supply chain management*. This activity will establish partnerships and cooperation with global fashion brands, suppliers, and textile organizations. This will extend current collaborations, which focus mainly on meeting contractual obligations and commitments, to create mutually beneficial corporate social responsibility (CSR) programs. This activity will facilitate such cooperation, focusing on embedding circularity principles as a mindset across these stakeholders. This stronger cooperation aims to encourage textile and garment producers to sign up for circular economy approaches and solutions and to motivate fashion brands to provide the necessary support to these producers, thereby creating an enabling environment for the effective adoption and implementation of solutions under components 2 and 3.

Component 2: redesigning textile production across the life cycle (cotton farming and textile manufacturing)

Component 2 will demonstrate different circular economy approaches and models across the textiles and garments life cycle. It will focus on cotton growing and textile manufacturing, aiming to achieve low-carbon, energy-efficient fabric production devoid of hazardous chemicals and reduced fresh and wastewater pollution. Its success will underpin Component 3 by eliminating harmful substances at the early phases of the life cycle. Activities will include:

- *Activity 2.1. Value chain analysis of circular opportunities in Afrika's textile and garment sector*. This activity will identify opportunities for implementing circular economy solutions in the textile and garment sector. It will identify where harmful chemicals are used in the textile value chain, including POPs, and assess existing green and sustainable alternatives. For example, alternative pest control for cotton farming outside of HHPs will be evaluated, building on existing knowledge and previous projects (e.g., TRAID, UK project implemented by Pesticide Action Network[40]). The activity will build on existing baseline analysis and NIPs already developed on POPs use in Afrika. It will identify opportunities for implementing renewable energy and energy-efficiency measures through improved chemical use. It will also address how green and sustainable chemical alternatives can reduce wastewater discharge and pollution and facilitate water reuse and recycling. Relevant BAT/BEP/RECP solutions, including those articulated by the Stockholm Convention, will be tailored to the country's specific context. It will also consider the economic feasibility of circular opportunities in the context of Afrika and the gender dimensions of potential circular solutions. Stakeholders such as government research departments and institutes, academia, civil societies, and industry representatives will be engaged in the analysis to review and provide inputs. The output of this activity is a report of the value chain analysis.

Show how baseline projects would be considered in the planned interventions.

- *Activity 2.2. Develop technical guidance and standards for implementing circular economy approaches*. Based on the value chain analysis, this activity will develop technical guidance and standard operating procedures for applying circular economy solutions in different parts of the textile value chain, including in cotton farming and manufacturing processes such as spinning, dyeing, and finishing. The guidance will also detail process improvement strategies and resource-efficient and cleaner production techniques for production efficiency, waste minimization, and pollution prevention.

- *Activity 2.3. Develop innovative finance and business models for the circular economy approach.* This activity will develop financial mechanisms and business models to make circular economy solutions feasible in the textile and garment sector, such as introducing cotton certification programs to encourage hazardous chemicals-free cotton farming and supporting crowdfunding investment access for sustainable smallholder cotton farmers. Circular chemical use models, such as "chemical leasing" and "pay as you use," will also be explored as options for providing more affordable access to green and safer chemicals. Where solutions require capital equipment, the project may support industries to access circular business models such as "equipment-as-a-service." The project will also reach out to actors interested in sustainable investment to develop novel financial mechanisms for Afrika's circular textile and garment sector.

- *Activity 2.4. Training and capacity building in circular economy approach*. This activity will build the capacity of relevant stakeholders, including farmers and industrial personnel, on identified circular economy solutions. Training materials will be developed based on the outputs of previous activities. Stakeholders such as government research institutes, academia, civil societies, industry and farmers' associations, and gender and youth representatives will be involved in developing the training materials. Training materials will be in Afrikan languages to increase accessibility.

- *Activity 2.5. Demonstration of circular economy solutions*. This investment element will demonstrate the identified circular economy approaches across the textile and garment value chain. This could include agroecological practices and ecological-based integrated pest management in cotton farming, production process modifications, equipment retrofitting and replacement, and related capacity building and training. Demonstration of solutions that promote multiple benefits will be prioritized, such as combining POPs use elimination with renewable energy and energy-efficiency measures or wastewater discharge minimization.

  Potential sites for the demonstration activities have already been identified during consultation with the government and industry actors. Selection criteria include national government priorities; size, production capacity, and current production processes; connection to international fashion brands; willingness to participate in the project; readiness to implement recommendations for process improvement; and disposition to provide co-financing to complement GEF resources. Some specific technical criteria include the volume of products and waste generated, parks with significant environmental impacts, and ease of providing support facilities, e.g., waste collection, separation, and transfer. The project will collaborate further with the cotton farmers association to identify appropriate sites for agroecological practices interventions during the PPG stage.

Component 3: circular solutions for textile and garment production by-products

Component 3 parallels component 2 but focuses on introducing and demonstrating circular economy approaches and models for textile and garment production by-products. It will introduce eco-design techniques to minimize waste generation, including off-specs and off-cuts in the production process, reuse and recycling options for by-products, and application of BET/BEP for the sustainable management of contaminated wastes. International brands such as Nike, Puma, ASOS, Adidas, etc., are already implementing some of these activities under their CSR programs, individually and in cooperation with other players in their supply chains. This project will strengthen and coordinate existing cooperation, especially for garment makers supplying more than one global brand. Activities will include:

- *Activity 3.1. Development of environmentally sound management plans and guidelines for by-products*. Building on the analysis in Activity 2.1, this will identify opportunities for the reuse, alternative uses, and recycling of by-products, including relevant technological solutions. It will assess current waste management practices, benchmark the findings, and evaluate how by-products can serve as inputs to other products and economic sectors. From the analysis results, it will develop planning tools, such as life cycle assessment tools, waste management modeling, intelligent management systems, monitoring and evaluation tools, chemical tracking and labeling,

emission estimation tools, and decision support systems. The goal is to identify appropriate circular solutions and develop dynamic and modern environmentally sound by-product and waste management plans that work in the Afrikan context, accompanied by guidelines for the sector.

- *Activity 3.2. Techno-economic feasibility demonstration of circular economy solutions*. Building on the achievements of Activity 2.5, this will focus on demonstrating the identified circular economy approaches and assessing their technical feasibility and economic viability. The outcome will help develop innovative financial and business models (Activity 3.3). Interventions will demonstrate BAT/BEP options involving process modifications, technology/equipment transfer, equipment retrofitting, and installation of new equipment to show the reuse, recycling, and environmentally sound management of textile and garment waste.

- *Activity 3.3. Develop innovative finance and business models for the circular economy approach*. Building on Activities 2.3, 3.1, and 3.2, this will create and implement finance and business models for the circularity of textile and garment manufacturing by-products. Models to be explored include public-private partnerships, certification of products, and impact investing. This activity will also support entrepreneurial opportunities, especially among women and youths, by creating new products from textile and garment production wastes. It will also test whether international brands' CSR programs can be used to facilitate new business models.

- *Activity 3.4. Training and capacity building*. This component will develop training and capacity-building programs for the key stakeholders on the interventions and models identified and demonstrated in Activities 3.1, 3.2, and 3.3. Training manuals and courses covering all aspects of circular economy solutions, including eco-design, green chemistry, waste minimization, waste management, and business models, will be developed to help create enduring new capacity in the sector.

Component 4: Scaling through monitoring, evaluation, knowledge curation, learning, and dissemination.
Component 4 aims to ensure that the projects' outputs are enduring, replicated, and scaled at the national, regional, and global levels. This component will collaborate with similar GEF and non-GEF projects for synergy, including the GEF project on the textile sector in three other African countries and the regional project in Asia. The outcome will be achieved through knowledge curation and sharing, capacity building, awareness raising, and active south-south exchanges. Activities will include:

- *Activity 4.1. Monitoring, evaluation, and adaptive management.* Periodic tracking of project impact indicators and the ToC assumptions, then evaluating progress, will support adaptive management corrections where necessary. Beyond reporting requirements, monitoring and evaluation will serve as a tool for learning, continuous improvement, and achieving project outcomes; lessons will feed into Activity 4.2. The evaluation frequency will be decided at the PPG stage but will be connected to specific project milestones. Gender issues and other safeguards will be fully integrated into the monitoring and evaluation activities. Independent mid-term review and terminal evaluation will also be conducted in accordance with established procedures.

- *Activity 4.2. Knowledge curation and assessments.* This activity will focus on continuously curating emerging knowledge from the project and other relevant sources at the regional and global levels. The goal is to have a bank of knowledge resources for supporting the project, and the broader implementation of circular economy approaches in the sector. Outputs from components 1, 2, and 3, such as technical guidelines and standards, will be incorporated. An assessment of socioeconomic benefits (i.e., co-benefits beyond environmental sustainability) from the project will be made at various times to reinforce enduring stakeholder support, including looking into the value add of a circular textile and garment sector to the national economy and its social outcomes such as on gender, improved health and well-being, and issues such as rural-urban migration. Engaging women will highlight chemical safety issues, workplace rights, violence, and access to training and jobs in the industry. Another assessment will evaluate opportunities and potential for

replication and scaling the project's outcome, with the goal of developing strategies for this as lessons are learned from project implementation. This will also include modeling to understand the effects of replication and scaling of the project activities, including environmental and socioeconomic, considering the various drivers of change.

- *Activity 4.3. Knowledge exchange and management tool.* A knowledge management and exchange tool will be developed to be accessible to various users globally. The tool will include a database for the curated knowledge resources (Activity 4.2). It will facilitate regulators to meet international reporting obligations, for example, to the Stockholm Convention and UNFCCC. The tools will have open-access data collection systems for internal and external users to update data, with a corresponding data quality control system. It will include incentives to encourage users to update data, for example, advertising space or chat function to connect with new opportunities. The knowledge management and exchange tools will be linked to other chemicals and waste knowledge databases (e.g., SAICM Knowledge Management Platform, from GEF project 9771).

- *Activity 4.4. Awareness and capacity-building campaigns.* This activity will disseminate the output and outcomes of this project widely to encourage replication and scaling. Activities include national workshops, consultation with sector groups and regulators, and national and international conferences. Other activities will consist of training modules and teaching resources developed in collaboration with academia, research institutes, and think tanks (local and international, e.g., Ellen MacArthur Foundation and Zero Discharge of Hazardous Chemicals Program), and multimedia sensitization campaigns targeting various demographics (e.g., decision-makers, industry, ministries, local governments, community leaders, recycling companies, informal sectors, women and youth group associations, NGOs, academia, media, etc.).

Global Environment Benefits and co-benefits.

While this project is focused on chemicals and waste, it will generate multiple GEBs in the chemicals and waste, climate change mitigation, and land degradation focal areas. The project is also expected to deliver other environmental co-benefits, including wastewater and freshwater pollution reduction and air quality improvement. Socioeconomic benefits include improved health and the creation of jobs and livelihoods. A preliminary estimate of GEBs is presented below. Because several baselines still need to be established, including the volume of chemical use in cotton farming and processing and textile manufacturing, as well as tonnage of offcut wastes, a detailed estimate will be done at the PPG stage.

Provide information on the expected GEBs, including brief information on how they were estimated.

Why applicable, also highlight the environmental and socioeconomic co-benefits.

The project will reduce chemical use across the value chain as follows:

- 1.5 tons of HHP use in cotton farming would be avoided by introducing ecologically friendly cotton farming. This estimate assumes the project would work with 1500 smallholder farmers through cooperatives, each with an average of a one-hectare farm (i.e., 54,000 hectares under smallholder cotton farming divided between 52,000 smallholders). It is estimated that about one kg of HHP is used per hectare of a cotton farm.[41] Hence, supporting 1500 farmers would avoid 1500 kg (1.5 tons) of HHP.
- 3.5 tons of PFOS will be avoided in textile and garment manufacturing through demonstration activities in component 3. This figure is based on the initial assessment of PFOS used in textile production in Afrika. Further indirect benefits are expected through information exchange and experience sharing with other industries and the co-financing to be mobilized by the Government and other counterparts.
- 3,690 tons of POPs contaminated waste will be avoided. This assumes that 1,200 tons and 25,000 tons of the 100,000 tons of generated waste are recycled and incinerated, respectively, leaving 73,800 tons to be disposed of in open sites. If 5% of these are contaminated, 3,690 tons of POPs contaminated materials would be avoided.
- The project will reduce 7.5 grams of toxic equivalent (gTEQ) of emissions of uPOPs. This estimate is based on the estimated amount of textile and garment wastes burned, incinerated, or dumped

in landfills, which is preliminary estimated at 25,000 tons. Based on UNEP's uPOPs emission toolkit for open burning of wastes operation and using an emission factor of 300 µg TEQ/tons of wastes. The emission is 300 µgTEQ/tons * 25,000 tons of wastes = 7,500,000 µg TEQ/1,000,000 = 7.5 g TEQ. This estimate is, however, expected to be higher as this value is based on only a few industrial sites.

- The project will also reduce greenhouse gas emissions through improved and more efficient industrial processes and reduced consumption of chemicals. The estimate of the emissions reduction will depend on adopted technologies. A detailed assessment will be done at the PPG stage.
- Direct beneficiaries from this project include cotton farmers, processors, and textile factory workers. Based on initial discussions with stakeholders, it is expected that 1500 (1100 men and 400 women) smallholder farmers will benefit from interventions related to chemicals-free cotton farming. Also, based on information gathered during initial site visits, about 4000 people (2800 women and 1200 men) involved in cotton processing and textile and garment production will directly benefit through reduced exposure to harmful chemicals and consequently improved health. Many more people will benefit indirectly from the project through reduced air pollution and less freshwater contamination.

Innovation and scaling toward broader transformation.

This project incorporates several novel solutions, including technology, business, finance, and policy innovations. Regulatory sandboxes represent a novel approach to developing supportive legal and policy frameworks to facilitate the deployment and quick scaling of the new technological, finance mechanism, and business model solutions to be developed through the project. By including all stakeholders in the process, regulatory sandboxes would also help facilitate policy coherence and provide a novel institutional framework for policy development.

Innovative technological solutions in the project in the context of Afrika include deploying agroecological practices and ecological-based integrated pest management in cotton farming, use of green and safer chemicals for cotton and textile processing, implementing solutions that combine energy efficiency with POPs use elimination, and use of intelligent chemical tracking, management, and decision support systems.

Examples of finance innovation include exploring crowdfunding and impact investment to leverage finance for small-scale holder farmers and supporting circular solutions for textile and garment waste. Business innovation includes deploying circular chemical use models, such as chemical leasing and pay-as-you-use, and capital equipment purchase options, such as equipment-as-a-service.

Creating the enabling environment for a circular textile and garment sector (component 1) is expected to facilitate behavioral change among critical stakeholders toward sustainability, ensure the durability of the project outcomes, and help push the industry toward transformational change. The successful deployment of new business models would also facilitate behavior change across the value chain actors and transformational change. Furthermore, by embedding training and capacity building across all project components, developing industry standards and guidance, working with leading brands that cut across the globe, and specifically targeting textile actors outside Afrika with the knowledge management, learning, and dissemination component of the project, it is envisaged that the project would scale and help facilitate transformational change in the sector across the region.

What is innovative about this project and how transformational change would be achieved?

This could be technology, institutional, business, finance, policy, or other forms of innovations.

Risks to Project Preparation and Implementation

Summarize risks that might affect the project preparation and implementation phases and what are the mitigation strategies the project preparation process will undertake to address these (e.g., what alternatives may be considered during project preparation- such as in terms of consultations, role and choice of counterparts, delivery mechanisms, locations in country, flexible design elements, etc.). Identify any of the risks listed below that would call in question the viability of the project during its implementation.

Please describe any possible mitigation measures needed. (The risks associated with project design and Theory of Change should be described in the "Project description" section above). The risk rating should reflect the overall risk to project outcomes considering the country setting and ambition of the project. The rating scale is: High, Substantial, Moderate, Low.

NOTE THAT THE RISKS PRESENTED BELOW ARE ONLY ILLUSTRATIVE

Risk Categories	Rating	Comments
Climate	Low	***Risks:*** Extreme climate events such as floods and drought could impact project implementation, especially demonstration activities. ***Mitigation measures:*** To mitigate this, climate consideration will be included in the selection criteria for demonstration activities. Further, training on managing climate impacts will be included in the capacity-building aspects of the project.
Environment and Social	Low	***Risks:*** (1) Traditions and cultural factors could prevent the inclusion of circular solutions and gender objectives into the project design and hinder the implementation and achievement of desired project outcomes, including on gender; (2) occupational health and safety issues at demonstration project sites could create risks of harmful exposure to workers. ***Mitigation measures:*** This project addresses the environmental and social issues related to the textile and garment industry. Hence, interventions will consider these concerns from the onset. Further, relevant stakeholders, including decision-makers, gender representatives, community leaders, industrial actors, farmers, etc., will be engaged in the design of solutions, and cultural and traditional factors will be considered to ensure adequate buy-in.
Political and Governance	Moderate	***Risks:*** (1) Ethnic tensions, especially the Tigray conflict, could disrupt project implementation; (2) Political support is insufficient to drive strong engagement of relevant sector actors; (3) changes in government and country personnel could adversely impact project implementation and continuity. ***Mitigation measures:*** The Tigray conflict will be considered at the PPG stage in selecting sites for demonstration activities. A mechanism for closely monitoring the Tigray conflict and its potential impact on the project will be established during the PPG stage and implemented throughout the project. Further, the engagement of government personnel during project preparation will include a project continuity plan that addresses actions to facilitate project continuity. Furthermore, continuity plans will be an essential factor in selecting personnel to be involved in project coordination and the training and capacity-building activities. Also, the project will engage with government stakeholders throughout the PPG and implementation phase to ensure that the countries' political buy-in and national priorities are considered.
Macro-economic	Low	***Risks:*** Afrikan government decides to change its prioritization of the textile and garment sector for economic development, thereby affecting commitment to the project. ***Mitigation measures:*** The likelihood of this happening is relatively low. However, this project will start generating knowledge on the socio-economic benefits of implementing a circular textile and garment sector, which will continue to strengthen the understanding of the sector's importance to the country's economy.
Strategies and Policies	Moderate	***Risks:*** Bureaucratic and logistical hurdles could delay project preparation and implementation.

		Mitigation measures: A milestone and timeline will be agreed upon with the country's stakeholders at the PPG stage, which considers the bureaucratic and logistical hurdles specific to the country. With this, the project will seek the commitment of the stakeholders to these milestones and timelines.
Technical design of project or program	Moderate	***Risks:*** (1) Required expertise for design and implementation not secured (or delayed); (2) Difficulty in acquiring required data, which could affect the design and implementation of the project. ***Mitigation measures:*** The identification and engagement of expertise for the project has already begun and will go into top gear immediately after approval. The project will collaborate with relevant ongoing GEF projects to tap into existing expertise, including data collection. The data challenge is already recognized and will be part of the project's Activities 1.1, 2.1, and 3.1.
Institutional capacity for implementation and sustainability	Low	***Risks:*** Project partners do not sustain the project activities and benefits. ***Mitigation measures:*** The monitoring, knowledge curation and dissemination, replication, and scaling pathway of the project are specifically designed to address the sustainability and durability of project outcomes. Further, effective stakeholder engagement from the onset will ensure adequate buy-in.
Fiduciary: Financial Management and Procurement	Low	***Risks:*** (1) Project funds are not adequately managed (2) delay in the mobilization of co-finance ***Mitigation measures:*** GEF fiduciary guidelines, as well as that of the agency, will be followed in fund management. This will also be part of the frequent monitoring and evaluation activity of the project.
Stakeholder Engagement	Low	***Risks:*** (1) Stakeholders do not engage appropriately, leading to inadequate project design and implementation, adversely impacting project outcomes; (2) sudden drop out of important stakeholders. ***Mitigation measures:*** The risk of stakeholder disengagement will be prevented through effective frequent communication with all identified stakeholders and developing and agreeing on a stakeholder engagement plan. Further, the project will ensure that all stakeholders have specific roles to ensure continued involvement. The Technical Committee for Circular Textile would also comprise all relevant stakeholders ensuring their continued engagement.
Others		Not applicable
Financial Risks for NGI projects		Not applicable
Overall Risk Rating	Moderate	The overarching risk to this project is low-moderate. Close monitoring of the identified risks and effective implementation of mitigation measures will ensure that the risks do not adversely impact the success and durability of the project.

[1] https://www.ilo.org/legacy/english/intserv/working-papers/wp054/index.html; https://reliefweb.int/report/world/how-textile-industry-can-help-countries-recover-covid-19

[2] https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Fashionomics_creative_industries_executive_summary_brochure.pdf

[3] Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., and Gwilt, A. 2020. The environmental price of fast fashion. Nat. Rev. Earth Environ. 1, 189–200. doi:10.1038/s43017-020-0039-9; Ellen MacArthur Foundation, A new textiles economy: redesigning fashion's future. https://ellenmacarthurfoundation.org/a-new-textiles-economy; European Parliament 2021. The impact of textile production and waste on the environment (infographic). Brussels: European Parliament. https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic; Ellen MacArthur Foundation 2017. Fashion and the circular economy. Available at: https://archive.ellenmacarthurfoundation.org/explore/fashion-and-the-circular-economy

[4] Ellen MacArthur Foundation, "A new textiles economy: redesigning fashion's future. https://ellenmacarthurfoundation.org/a-new-textiles-economy
[5] European Parliament 2021. The impact of textile production and waste on the environment (infographic). Brussels: European Parliament. https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic
[6] Ellen MacArthur Foundation 2017. Fashion and the circular economy. Available at: https://archive.ellenmacarthurfoundation.org/explore/fashion-and-the-circular-economy; European Parliament 2021. The impact of textile production and waste on the environment (infographic). Brussels: European Parliament. https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic
[7] Ellen MacArthur Foundation, "A new textiles economy: redesigning fashion's future. https://ellenmacarthurfoundation.org/a-new-textiles-economy
[8] Sajn, N. 2019. Environmental impact of the textile and clothing industry: What consumers need to know. Briefing. European Parliamentary Research Service. https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf.
[9] Ellen MacArthur Foundation, "A new textiles economy: redesigning fashion's future. https://ellenmacarthurfoundation.org/a-new-textiles-economy
[10] https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente
[11] https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente
[12] https://land.igad.int/index.php/documents-1/countries/ethiopia/investment-1/165-ethiopian-investment-agency-investment-opportunity-profile-for-cotton-production-and-ginning/file
[13] https://www.tandfonline.com/doi/full/10.1080/23311932.2019.1691812; https://europa.eu/capacity4dev/led/file/109655/download?token=yY69CWG8
[14] https://land.igad.int/index.php/documents-1/countries/ethiopia/investment-1/165-ethiopian-investment-agency-investment-opportunity-profile-for-cotton-production-and-ginning/file
[15] https://www.theafricareport.com/222138/can-ethiopias-textile-industry-weave-its-way-back-to-its-former-glory/; https://ethiopianmonitor.com/2021/07/03/ethiopia-earns-140mln-from-textile-garment-export/
[16] For example, the a project led by Pesticide Action Network and supported by TRAID, UK is helping to introduce Integrated Pest Management techniques to cotton farmers in the southern region of Agimandia. https://www.pan-uk.org/cotton-in-ethiopia/#
[17] http://publication.eiar.gov.et:8080/xmlui/bitstream/handle/123456789/3642/Cotton%20Production.pdf?sequence=1&isAllowed=y; see also: http://publication.eiar.gov.et:8080/xmlui/bitstream/handle/123456789/416/Cotton%20manual%20handbook.pdf?sequence=1&isAllowed=y
[18] https://www.pan-uk.org/cotton-in-ethiopia/#
[19] https://www.scirp.org/html/3-6702659_58686.htm
[20] https://link.springer.com/article/10.1007/s10661-016-5694-4; https://scialert.net/fulltext/?doi=rjes.2014.422.434
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[32] https://issuu.com/nyusterncenterforbusinessandhumanri/docs/nyu_ethiopia_final_online?e=31640827/69644612
[33] Capacity Strengthening and Technical Assistance for the Implementation of Stockholm Convention National Implementation Plans in African Least Developed Countries of the Common Market for Eastern and Southern Africa and Southern African Development Community sub-regions.
[34] https://semonegna.com/reducing-persistent-organic-pollutants-emissions-ethiopia-textile-industry/
[35] Reducing uses and releases of chemicals of concern, including POPs, in the textiles sector, UNEP (GEF ID 10523)
[36] Promotion of circular economy in the textile and garment sector through the sustainable management of chemicals and waste in Lesotho, Madagascar, and South Africa, UNIDO (GEF ID 10543)
[37] https://www.cabdirect.org/cabdirect/abstract/20173357536
[38] https://www.reuters.com/article/us-ethiopia-garment-workers-feature-trfn/pay-cuts-and-forced-overtime-covid-19-takes-heavy-toll-on-ethiopias-garment-workers-idUSKBN28W1B5; https://ethiopia.un.org/en/135859-achieving-equal-future-during-covid-19-women-garment-and-textile-industry; https://theexchange.africa/africa/ethiopias-textile-sector-down-on-closure-of-retail-stores/; https://www.sciencedirect.com/science/article/pii/S0305750X20303065
[39] "A regulatory sandbox is a regulatory approach, typically summarized in writing and published, that allows live, time-bound testing of innovations under a regulator's oversight. Novel financial products, technologies, and business models can be tested under a set of rules, supervision requirements, and appropriate safeguards. A sandbox creates a conducive and contained space where incumbents and challengers experiment with innovations at the edge or even outside of the existing regulatory framework. A regulatory sandbox brings down the cost of innovation, reduces barriers to entry, and allows regulators to collect important insights before deciding if further regulatory action is necessary." See: https://www.unsgsa.org/sites/default/files/resources-files/2020-09/Fintech_Briefing_Paper_Regulatory_Sandboxes.pdf and https://www.bmwk.de/Redaktion/EN/Dossier/regulatory-sandboxes.html
[40] For example, a project led by Pesticide Action Network and supported by TRAID, UK is helping to introduce Integrated Pest Management techniques to cotton farmers in the southern region of Agimandia. https://www.pan-uk.org/cotton-in-ethiopia/#
[41] https://ejfoundation.org/resources/downloads/the_deadly_chemicals_in_cotton.pdf