UN environment programme

switchafrica GREEN

Funded by the European Union

Green Manufacturing in Africa

Focus on Micro, Small and Medium Enterprises (MSMEs)

Green Manufacturing in Africa

Focus on Micro, Small and Medium Enterprises (MSMEs)

December 2020

First published by the United Nations Environment Programme in 2020

Layout and printing: UNON Publishing Services Section – ISO 14001-certified

UNEP promotes environmentally sound practices globally and in its own activities. Our distribution policy aims to reduce UNEP's carbon footprint.

Contents

Table of figures

Tables

Boxes

Acknowledgements

This report presents an analysis of the implementation and results of the SWITCH Africa Green programme in the manufacturing sector focusing on the participating countries Burkina Faso, Ghana, Kenya, Mauritius, South Africa and Uganda. It covers the strategic interventions, results realised, cross cutting thematic issues notably energy, water, eco-innovation, labels and standards, sustainable trade and markets, challenges, lessons learnt and presents a set of recommendations. The report is informed by a SWITCH Africa Green programme survey carried out in May 2018, grantee reports, case studies, peer reviews and regional stakeholder consultations including a regional sector meeting held on 26-27 September 2019 in Entebbe, Uganda. The report is one of four sector reports, one for each of the priority sectors of the programme: agriculture, manufacturing, tourism and integrated waste management (IWM).

Development of these reports was coordinated by Rhoda Wachira Programme Management Officer, UNEP and Patrick Mwesigye, Regional Resource Efficiency Sub - Programme Coordinator, Africa Office, UNEP with valuable inputs from Robert Wabunoha, Regional Environmental Governance Sub - Programme Coordinator, Africa Office, UNEP. Overall guidance was provided by Juliette Biao, Director and Regional Representative and Frank Turyatunga, Deputy Regional Director, Africa Office, UNEP. Programme support was provided by Norah Mugita, Sheila Karue, Carolyne Kilel and Sylvia Munuhe, Africa Office, UNEP. Administrative support was provided by Stephen Ndeti, Wycliffe Ogweno and Alice Kingoo.

UNEP would like to thank Dr. Dickson Khainga, the lead writer of the report as well as peer reviewers namely: Prof. Cleophas Migiro, Executive Director, Cleaner Production Centre of Tanzania; Lelissa Daba, Addis Ababa Ethiopia; and Dr. Johannes Fresner, Geschäftsführer, Managing Partner, STENUM GmbH who provided valuable inputs to the report. Substantive inputs were also provided by the members of the SWITCH Africa Green National Technical Coordination Committees (NTCCs) in the 6 countries through the chair of these committees:

Becquet Polycarpe Bationo, Ministre de l'Environement, de l'Economie Verte et du Changement Climatique (MEEVCC), Burkina Faso.

Peter Dery, Director, Environment, Ministry of Environment, Science, Technology and Innovation (MESTI), Ghana.

Dr. Charles Mutai, Director Climate change, Ministry of Environment and Forestry, Kenya.

Ms. Meeheelaul Sarita, Ministry of Environment Solid Waste Management and Climate Change, Mauritius.

Dr. Jenitha Badul, Senior Policy Advisor, Sustainability Programmes & Projects, Climate Change, Air Quality & Sustainable Development, Department of Environment, Forestry and Fisheries, South Africa.

Dr. Tom Okurut, Executive Director, National Environment Management Authority, Uganda.

Technical data and information provided by SWITCH Africa Green grantees and their partners, and grant management by Celia Marquez and Mercy Gatobu from UNOPS with overall guidance by Rainer Frauenfeld, Director, Kenya Multi - Country Office, UNOPS.

UNEP is grateful for the financial support provided by the European Union (EU) for the implementation of the SWITCH Africa Green programme. Continuous guidance by Thibaut Portevin, the Project Manager from the European Commission, made the implementation of SWITCH Africa Green programme possible.

Foreword

The African economies though highly diversified, are under constant pressure as the population increases and demand for the natural resources continues to escalate. African economies are highly dependent on natural resource sectors e.g. mining, tourism, agriculture, forestry and fishing, etc. and ensuring that these resources are sustainable is crucial for future generations.

On the other hand, there is increased growth in enterprises MSMEs. Today, these small enterprises create about 80 per cent of the region's employment creating the much-needed jobs for the youth as well as fuelling demand for goods and services.

Helping these MSMEs to flourish and grow in a sustainable way, protecting the environment, is crucial not only for Africa but for the global environment. Not only will it ensure the sustainability of the environment but also it creates a growing middle class with disposable income, in tandem with market opportunities for new investors both from the region and globally.

According to the World Bank, the continent's vast natural resources, the young population and growing economies will sustain high levels of foreign investments that will make Africa's rise inevitable.

The SWITCH Africa Green programme is working with African countries to grow green businesses in the region. It supports African countries in their transition to inclusive green economy and in promoting Sustainable Consumption and Production (SCP) practises and patterns.

The results of this report indicate that interventions of the programme in the manufacturing sector have triggered the envisaged change in behaviour and enterprise performance in social, economic and environmental pillars. The increased knowledge and capacity in green business including SCP practices has resulted in improved performance, increased turnover, higher productivity, increased profits, job creation, improved health as well as a cleaner and sustainable environment. Specifically, in the manufacturing sector, significant areas of improvement include water and energy efficiency, improved waste management including industrial symbiosis (IS) and enhanced management of inputs. The report further indicates that the region is already implementing circular economy (CE) albeit in various areas of production.

Specifically, 78 per cent of the surveyed enterprises reported that they had acquired new skills in areas such as water and energy management, occupational safety, waste management, recycling, record keeping, product development, marketing, and environmental conservation. Seventy-six per cent of the MSMEs recorded increased sales turnover as a direct result of the SWITCH Africa Green programme. Additionally, implementation of the projects generated new business opportunities. Fifty-nine per cent of the surveyed enterprises reported new opportunities arising through business expansion and new products.

On the social dimension, 58 per cent of the surveyed enterprises reported that new jobs had been created during the period of the implementation of the SWITCH Africa Green programme. On the environmental aspect, about 48 per cent of the enterprises implemented waste reduction and reuse measures involving recycling, reuse, and production of new products and 13 per cent implemented recycling interventions. Water-use and energy-use efficiency assessments and audits that were conducted in Uganda and Mauritius reveal that there are significant opportunities for investment in water and energy efficiency, with huge economic, social and environmental benefits.

Some of the challenges that need to be addressed to ensure green business is a success in the region include developing an enabling policy environment, improving the local infrastructure (roads, water, energy, etc.), enhanced marketing skills, continued capacity and knowledge exchange and supporting access to finance for the micro and small enterprises.

Dr. Juliette Biao-Koudenoukpo
Director and Regional Representative for Africa, UN Environment Programme (UNEP)

Acronyms and abbreviations

10YFP	10 Year Framework of Programmes
ARSCP	African Roundtable on Sustainable Consumption and Production
BDS	Business Development Services
DWRM	Directorate of Water Resources Management
DEVCO	EU's International Cooperation and Development
EPR	Extended Producer Responsibility
EU	European Union
GDP	Gross Domestic Product
GESIP	Green Economy Strategy and Implementation Plan
GHG	Greenhouse Gas
IGE	Inclusive Green Economy
IMF	International Monetary Fund
IPAP	Industrial Policy Action Plan
IS	Industrial Symbiosis
KAAA	Kenya Agribusiness and Agro-industry Association
KEPSA	Kenya Private Sector Alliance
KES	Kenya Shillings
MSMEs	Micro, Small and Medium Enterprises
MTP	Medium Term Plan
MUR	Mauritius Rupee
MVA	Manufacturing Value Addition
MTIC	Ministry of Trade, Industry, and Cooperatives
NDP	National Development Plan
NCPC	National Cleaner Production Centers
OECD	National Cleaner Production Centers
PNDES	National Plan for Economic and Social Development
PNEE	Programme National d'Efficiacité Energétique
RECP	Resource Efficient and Cleaner Production
RO	Reverse Osmosis
SCP	Sustainable Consumption and Production
SDGs	Sustainable Development Goals
SIG	Sector Indicator Guidance
SSA	Sub-Saharan Africa
UCPC	Uganda Cleaner Production Center
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNOPS	United Nations Office for Project Services
USD	United States Dollar
USSIA	Uganda Small Scale Industries Association
WAAPP	West African Agricultural Productivity Programme
WDI	World Development Indicators

Executive summary

This report presents an analysis and review of the implementation and results of the SWITCH Africa Green programme in the manufacturing sector. It covers the strategic interventions, results realized, cross-cutting issues, challenges, the lessons learnt, and a set of recommendations. The manufacturing sector is one of the key sectors of the economy in Sub-Saharan Africa (SSA), accounting for about 11 per cent of total employment and 10 per cent of GDP in 2018. While historically the manufacturing sector has contributed to rapid economic growth and transformation, SSA has experienced a decline in the share of manufacturing sector contribution to GDP from 15 per cent in 1995 to about 10 per cent in 2018, and accounts for only 1 per cent of the global manufacturing value-added. Most countries are undertaking measures to enhance the growth of the manufacturing sector but face challenges including low technological capability, low human capital, high input costs, and low productivity. Environmental challenges include water scarcity and stress.

The SWITCH Africa Green programme is funded by the EU to support governments and the private sector in African countries (Burkina Faso, Ghana, Kenya, Mauritius, South Africa, and Uganda) in the transition to an inclusive green economy (IGE). The programme is implemented by the United Nations Environment Program (UNEP) in collaboration with the United Nations Development Program (UNDP) and United Nations Office for Project Services (UNOPS). The overall objective of the SWITCH Africa Green programme is to support the countries to achieve sustainable development based on SCP patterns while generating growth, creating decent jobs, and reducing poverty.

The programme is being implemented in four priority sectors, namely: IWM, sustainable tourism, sustainable agriculture, and manufacturing. The sectors were identified based on the needs and priorities of national stakeholders in the respective countries during the inception phase of the programme. The SWITCH Africa Green programme supported the production of renewable energy, energy-use efficiency, water-use efficiency, green business and eco-entrepreneurship intended to reduce the environmental impact of the sector and enhance economic efficiency.

Approach and methodological framework

Mixed methods of data collection have been employed in the preparation of this report. They are survey questionnaires targeting MSMEs and grantees, desk reviews, on-site observations, case studies, expert peer review, and stakeholder validation of the report. The key stakeholders included national and local government representatives, regional economic communities (RECs), development partners, UN agencies, private sector, financial institutions, research institutions, academia, and non-state actors. The report draws heavily upon the results-based SWITCH Africa Green programme survey that was conducted, between 14-22 June 2018, and data collected through the other methods. The survey targeted at least ten per cent of the project beneficiaries and all 34 grantees. The survey team also conducted on-site visits to selected MSMEs to ascertain the accuracy of the data collected and to gain a better understanding of the programme implementation at the enterprise level.

In the manufacturing sector, the survey covered 198 enterprises spread across all six countries. The approach to analysis and reporting is consistent with the EU's Green Economy Sector results chain, the Green Economy Sector Indicator Guidance (SIG) Framework developed by the EU Commission's International Cooperation and Development (DEVCO).

Main findings

The findings in this report reveal that the programme is having a positive impact towards realizing the envisaged changes including economic, social and environmental benefits. The strategic interventions in capacity building and awareness creation have had a positive impact on staff capacity, business skills, and enterprise performance. MSMEs faced various challenges that the project has helped address including inefficient use of resources, lack of business management skills, marketing challenges, and improper waste management. Seventy-eight per cent of the surveyed enterprises reported that they had acquired new skills in areas such as water and energy management, occupational safety, waste management, recycling, record keeping, product development, marketing, and environmental conservation. Seventy-six per cent of the MSMEs recorded increased sales turnover as a direct result of the programme. Additionally, the implementation of the projects generated new business opportunities. Fifty-nine per cent of the surveyed enterprises reported new opportunities arising through business expansion and new products.

On the social dimension of development, the surveyed firms reported positive gains in terms of job creation, economic activity, and social cohesion, based on the survey data, 3,470 new jobs in the manufacturing sector. Fifty-eight per cent of the surveyed enterprises reported that new jobs had been created during the period of the implementation of the SWITCH Africa Green programme.

Sixty-one per cent of the surveyed enterprises reported to be implementing reduce, reuse and recycle (3R) interventions. About 48 per cent of the enterprises implemented waste reduction and reuse measures involving recycling, reuse, and production of new products and 13 per cent implemented recycling interventions. Water-use and energy-use efficiency assessments and audits that were conducted in Uganda and Mauritius reveal that there are significant opportunities for investment in water and energy efficiency, with huge economic, social and environmental benefits.

Experiences and lessons learnt

About one-third of the surveyed MSMEs indicated that they needed financial support to implement the SCP interventions. Other challenges include lack of resources, behavioral change, and marketing challenges. Most of the surveyed firms acknowledge the importance of the project interventions for their enterprises, including the importance of SCP adoption, quality, improved business process, and networking for enterprise performance.

Conclusion and recommendations

The evidence from this report reveals that embracing SCP practices has economic, social, and environmental benefits but challenges such as financing, capacity, enabling business environment, and marketing need to be addressed. Based on the analysis and review of the implementation of the programme, the following set of recommendations is presented:

- financing of the transition to sustainable manufacturing should be given priority, including investment in green technologies, and water and energy efficiency;
- capacity building and knowledge sharing is required on relevant SCP principles including adoption and adaptation of relevant technologies, health and safety, resource efficiency and clean production (RECP) techniques;
- strengthen regional and national mechanisms to support SCP in the manufacturing sector including the African Roundtable on Sustainable Consumption and Production (ARSCP) and National Cleaner Production Centers (NCPCs); and
- an integrated approach is needed to align the policy and regulatory environment to support the greening of the manufacturing sector including fiscal incentives to support investments in water and energy efficiency, promote markets for green manufactured goods and technologies including through green procurement, support MSMEs to comply with product quality and environmental standards, implement extended producer responsibility (EPR) measures, and develop an enabling policy environment to exploit the opportunities presented through IS and CE.

1. Introduction

The manufacturing sector is one of the key sectors of the economy in Sub-Saharan Africa (SSA). The sector accounted for about 11 per cent of total employment and 10 per cent of GDP in 2018. Between 2000 and 2018, the sector grew by 3.8 per cent compared to the global average growth of 2.1 per cent. However, SSA accounts for only 1 per cent of the global manufacturing value-added, implying that there is greater scope to expand the manufacturing sector. According to the United Nations Conference on Trade and Development (UNCTAD) in 2012, Africa has experienced de-industrialization, as evidenced in the fall in the share of manufacturing in GDP that declined from 15 per cent in 1990 to about 10 per cent in 2008. The manufacturing sector provides opportunities for the diversification and transformation of the economy but can be a source of environmental pressure, including increased material, water- and energy-use, and pollution. Consequently, issues of sustainability and competitiveness of the manufacturing sector are gaining increasing attention.

The SWITCH Africa Green programme was developed by the EU to support the governments and the private sector in African countries, namely: (Burkina Faso, Ghana, Kenya, Mauritius, South Africa, and Uganda) in the transition to an inclusive green economy. The overall objective of the SWITCH Africa Green programme is to support six countries in Africa to achieve sustainable development by engaging in the transition towards an inclusive green economy, based on sustainable consumption and production patterns, while generating growth, creating decent jobs and reducing poverty.

The specific objective is to support the development of green businesses and eco-entrepreneurship and use of SCP practices by having in place (i) MSMEs and business service providers that are better equipped to seize opportunities for green business development, (ii) better-informed public and private consumers, and (iii) enabling conditions in form of clear policies, sound regulatory frameworks, incentives structures, tax, other fiscal and market-based instruments influencing key sectors. To realize this goal, SWITCH Africa Green programme has three inter-connected components: policy support; green business development; and a network facility component. The policy support component aims to create an enabling environment for green business development that allows for private sector-led inclusive green growth; the green business development component aims to support MSMEs through grants to intermediary organizations to enable them to start and develop green businesses and apply or adopt SCP practices and patterns, and the networking facility aims to distil and share knowledge, lessons learnt and best practices on green business and SCP, creating broader awareness and a greater understanding of green business development in the region.

The programme is focusing on four priority sectors and a set of cross-cutting issues that were identified based on the needs and priorities of national stakeholders in the participating countries during the inception phase of the programme. The four priority sectors are IWM, sustainable tourism, sustainable agriculture, and manufacturing. The cross-cutting issues include the promotion of energy efficiency, labelling, and standards, promotion of water-saving initiatives, eco-innovation to develop and promote environmentally sustainable industrial growth and identifying and harnessing sustainable trade opportunities. Accordingly, the national priority sectors and cross-cutting issues were determined based on specific country context, including the potential for advancing green business development and SCP practices. Table 1.1 summarizes the priority sectors for each country.

Table 1.1: Country priority sectors

Country	IWM	Agriculture	Manufacturing	Tourism
Burkina Faso	✓		✓	✓
Ghana	✓		✓	✓
Kenya		✓	✓	✓
Mauritius		✓	✓	✓
South Africa	✓	✓	✓	
Uganda		✓	✓	✓

The first phase of the SWITCH Africa Green programme that started in March 2014 benefitted more than 3,000 MSMEs that were supported in the uptake of SCP practices across the four priority sectors and the five cross-cutting themes. The interventions on the ground have focused on capturing market opportunities for green products and services that consider resource efficiency across the life cycle and developing green business opportunities for local entrepreneurs in the priority sectors. The other programme interventions included awareness creation, networking, and capacity building for MSMEs to apply and scale-up SCP practices.

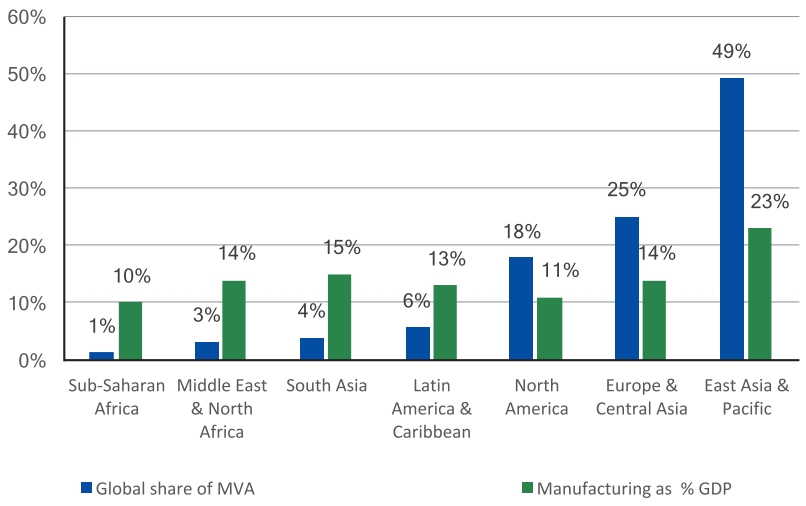
2. Sector context

The manufacturing sector plays an important role in economic activity in terms of forward and backward linkages with other sectors, job creation, contribution to GDP, and export receipts. The sector accounts for 11 per cent of employment and about 10 per cent of GDP and 42 per cent of the industrial sector[1] GDP in SSA. The export of manufactures accounts for about 27 per cent of merchandise exports. However, the manufacturing sector share of GDP declined from 15 per cent in 1990 to about 10 per cent in 2008 (UNCTAD 2012), thus suggesting that deindustrialization has been taking place. The region accounted for 1 per cent of global manufacturing value-added compared to the Middle East and North Africa 3 per cent, South Asia 4 per cent and East Asia and Pacific 49 per cent. SSA is thus the least industrialized region globally (Figure 2.1).

Based on the 2018 statistics from the world development indicators, the contribution of the sector to GDP varies from 5 per cent in Burkina to 12 per cent in South Africa. Between 2000-2018, the manufacturing sector in Burkina Faso declined by 9.3 per cent. This is attributed to weak growth in the agro-industrial sector and uncompetitive industries (IMF, 2018). The share of manufacturing in GDP in Burkina Faso, Kenya and Uganda are below the SSA average (Figure 2.2).

The sector's exports as a share of total merchandise exports vary from 5.5 per cent in Ghana to 60.8 per cent in Mauritius. The share of manufactures in total merchandize in Ghana, Burkina Faso, and Uganda is below the SSA average (Figure 2.3). The low share of manufactures in Ghana is largely explained by

Figure 2.1: Share of global manufacturing value addition and manufacturing as percentage of GDP (2018)

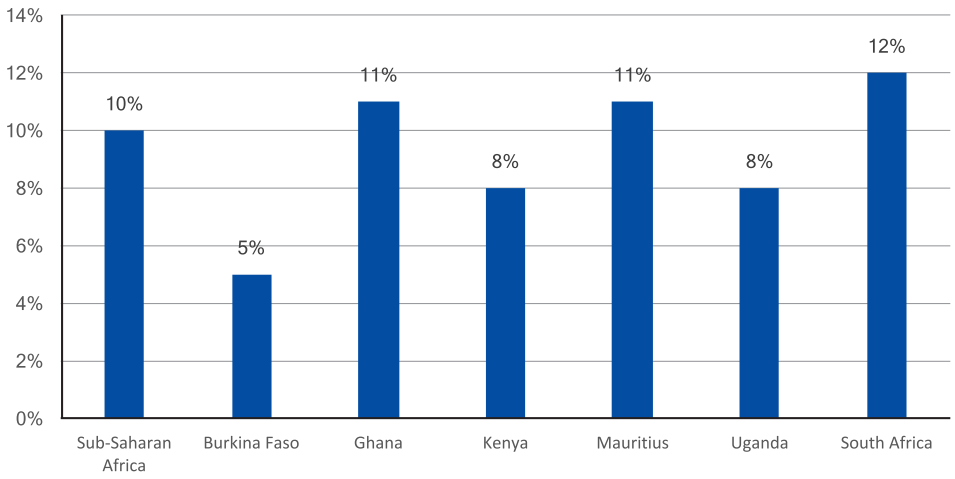


Data Source: world development indicators, http://wdi.worldbank.org/table

The contribution of the manufacturing sector to economic activity in terms of the contribution to GDP varies considerably across the six countries. the large export share of food and fuels that account for about 88 per cent of merchandise exports. In Burkina Faso, food and agricultural raw materials account for roughly 73 per cent of merchandise exports.

[1] Industrial sector comprises mining, manufacturing, construction, electricity, water, and gas.

Figure 2.2: Manufacturing sector percentage of GDP (2018)



Data Source: world development indicators, http://wdi.worldbank.org/table

The region's commitment to global and continental frameworks underpin the national policy agenda on the industrial sector development. The 2030 Agenda for Sustainable Development (Agenda 2030) on Sustainable Development Goals (SDG) 9 commits UN member states to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. The Agenda 2063 Framework Document: ***The Africa We Want,*** envisages transformed economies where manufacturing, industrialization, and value addition play a greater role. Burkina Faso, Ghana, Mauritius, South Africa, and Uganda have national SCP Plans that are at different levels of implementation. RECP is one of the cross-cutting priority action areas for the Regional African Roadmap for the 10 Year Framework of Programmes (10YFP) 2018-2023[2] and calls for scaling-up of NCPCs. Four[3] of the six countries participating in the SWITCH Africa Green are mainstreaming cleaner production and had established NCPCs by 2015. While the role of NCPCs has evolved, broadly, they advance resource-efficient and cleaner production methods and techniques in development (UNIDO 2015).

The six countries are implementing country policy strategies that prioritize the manufacturing sector. In 2016, Burkina Faso adopted a National Plan for Economic and Social Development (PNDES) which prioritizes manufacturing among other sectors. The PNDES targets the share of manufacturing in GDP to reach 12 per cent by 2020 (IMF 2018). As noted above, the share of manufacturing in GDP stood at 5 per cent in 2018, implying that this target is quite ambitious. According to PAGE[4], in 2018, Burkina Faso was in the process of finalizing a green economy strategy whose focus included sustainable consumption and production, sustainable trade, green finance, and combatting climate change.

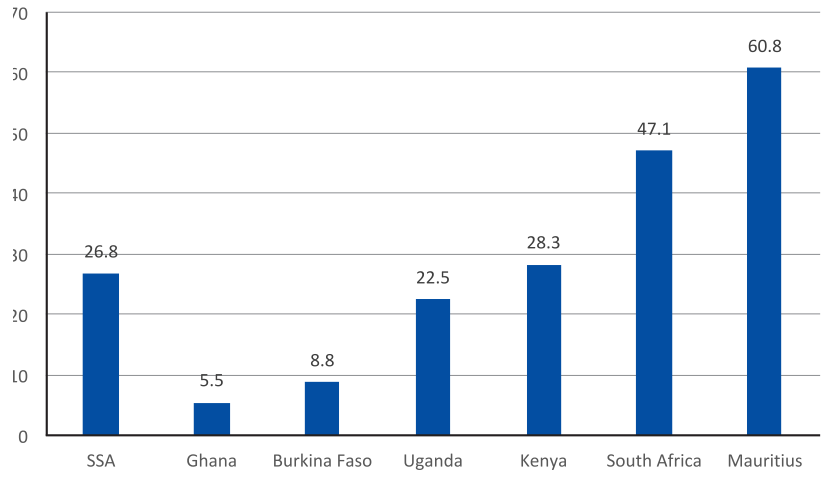
Kenya's third Medium Term Plan (MTP III) 2018-2022 prioritizes industrialization, manufacturing, and agro-processing among the four Kenya development agenda for the period. The key challenge is that the sector has stagnated for many years. The target is to grow the share of manufacturing in GDP to 15 per cent of GDP by 2022. Kenya launched the Kenya Green Economy Strategy and Implementation Plan (GESIP) 2016-2030 in 2017, it outlines the measures to be pursued to realize an inclusive low carbon development pathway.

[2] http://arscp.org/wp-content/uploads/2018/09/Final-Review-of-the-African-Regional-Roadmap-on-10YFP_SCP1.pdf

[3] Burkina Faso and Mauritius did not have an NCPC by 2015.

[4] https://www.un-page.org/burkina-faso-national-strategy-green-economy-validated

Figure 2.3: Export of manufactures as percentage of total merchandise exports (2018)



Data Source: world development indicators, http://wdi.worldbank.org/table

South Africa's National Development Plan (NDP): Vision 2030 aims to support a transition to environmentally sustainable, climate-change resilient, low-carbon economy and just society. South Africa aims to become a zero-waste society through investments in areas such as consumer awareness, green products and services, and recycling infrastructure. The manufacturing policy agenda is outlined in the Industrial Policy Action Plan (IPAP) 2018/19 – 2020/21. According to the IPAP, the contribution of manufacturing to GDP has been declining over the years yet it remains a key sector of South Africa's economy. The plan outlines targeted interventions to grow the sector focusing on the sub-sectors including automotive, agro-processing, chemicals and clothing, textiles, leather & footwear.

According to the Mauritius Voluntary National Review Report (2019), manufacturing remains one of the key pillars of the economy, but it is facing stiff competition from low cost producing countries. According to the Republic of Mauritius (2016), the sector is a major consumer of electricity accounting for 24 per cent of the energy consumed in 2013 and the Programme National d'Efficiacité Energétique (PNEE) had been initiated to support energy efficiency in the sector. Also, the Mauritian authorities are implementing various measures to grow the sector, including speed-to-market to promote exports.

Uganda formulated a National Programme on Sustainable Consumption and Production in 2011 that promotes the adoption of SCP practices in the manufacturing sector including capacity building and eco-labelling. The Uganda Vision 2040 and the National Development Plan (NDP 2010-2020) prioritizes the development of the manufacturing sector. The economy is projected to grow by 6.8 per cent in 2019/2020 with the manufacturing sector accounting for 25 per cent of growth. Uganda's 2008 National Industrial Policy targeted that by 2018 the manufacturing sector would be accounting for about 25 per cent of GDP. This compares unfavourably with the 8 per cent recorded in 2018. Uganda has a Green Growth Development Strategy – for the period 2017/18 – 2030/31 with five priority areas, among them, focus on renewable energy. According to the industrial policy, some of the key challenges facing manufacturing in Uganda include access to international markets constrained by lack of capacity to comply with international market standards, inadequate infrastructure including electricity, financial constraints, and low agricultural productivity that adversely impacts agro-processing industries.

As noted above, SSA has experienced de-industrialization in the recent past as evidenced in the reduced and stagnated share of manufacturing in GDP. Its share of global manufacturing value addition has also stagnated. A review of various policy and

strategy documents reveals that SSA is facing various challenges that include low technological capability and low human capital, and the weak performance in the past has partly been blamed on policy failure. The environmental challenges include water scarcity and stress (UNCTAD 2012) and Africa needs significant investments in green technologies and renewable energy United Nations Economic Commission for Africa (UNECA) 2016). Other challenges include high input costs, low competitiveness of manufactured exports, and the sector is dominated by small and informal sector enterprises with low productivity, and lack of policy coherence.

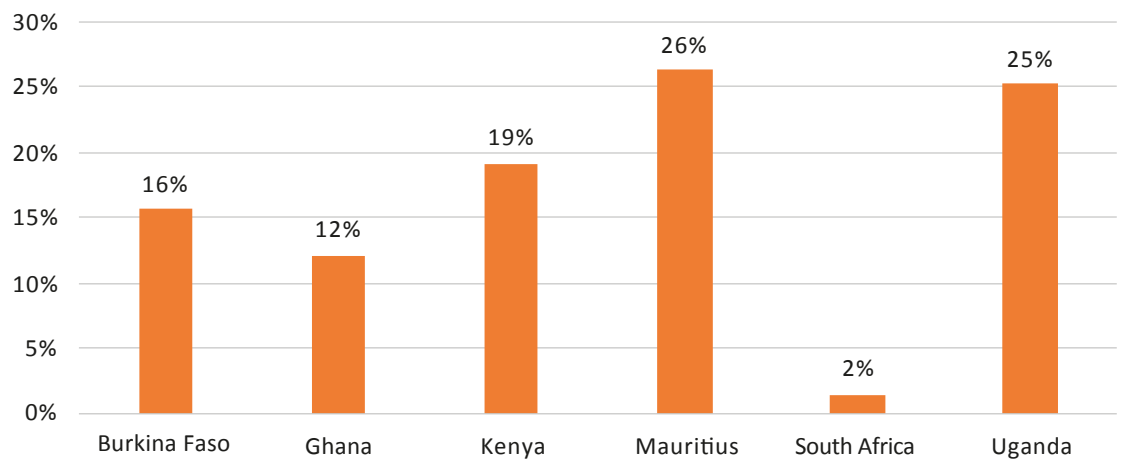
3. Approach and methodology framework

The SWITCH Africa Green supported projects in the manufacturing sector were implemented in all six countries. The beneficiary enterprises in the sector are diverse and include community-based organizations, limited companies, partnerships, cooperatives, sole proprietorships, and self-help groups. Forty-nine per cent of the enterprises are start-ups having been in operation for less than 5 years. One hundred and ninety-eight[5] out of 1,406 enterprises were surveyed. They are distributed as summarized in Figure 3.1.

The data used in the preparation of this report has been collected through mixed methods including survey questionnaires targeting MSMEs and grantees, desk review, on-site visits, case studies, expert peer reviews, and stakeholder consultations and validation of this report. The report was discussed and validated during a regional sector meeting on green manufacturing held on 26-27 September 2019. The key stakeholders included national and local government representatives, RECs, development partners, UN agencies, private sector, financial institutions, research institutions, academia, and non-state actors (Annex II).

A results-based SWITCH Africa Green programme survey was conducted between 14 May -22 June 2018, to collect relevant data from the project beneficiaries and grantees through questionnaires targeting at least 10 per cent of the project beneficiaries and all 34 grantees. Before administering the questionnaires, six national workshops were held, one in each country, to brief and discuss with grantees and MSMEs the questionnaires. Some smaller MSMEs were clustered into groups to keep data manageable. The enterprise questionnaire was designed to obtain data on a wide range of issues including data before and after SWITCH Africa Green interventions, and qualitative and quantitative data on achievements, challenges, and lessons learnt. The grantee questionnaires covered issues such as grantee interventions, challenges, and lessons learnt. The main objective of the survey was to establish the impact of SWITCH Africa Green programme interventions on the beneficiary MSMEs and the uptake of SCP practices. The survey data thus covers project implementation and results and qualitative data on impacts.

Figure 3.1: Distribution of MSMEs' manufacturing by country



[5] Several MSMEs were clustered together especially those operating under business associations.

During the survey period, there were on-site field visits to selected MSMEs to verify the

data collected and to help gain first-hand information on the programme. The review of documents was undertaken at the global, regional, country, and programme level. Data on programme actions and results are obtained from programme documents and information collected through the SWITCH Africa Green survey. A case study data collection methodology was adopted to complement the other methods. It provides in-depth information on the activities and achievements at the enterprise level and how they relate to the programme interventions.

The approach adopted in the analysis and reporting is consistent with the EU's green economy sector results chain, the SIG framework6 developed by DEVCO. The SIG framework reflects the underlying logic or causal chain on how the project objectives are to be realized running through activities and interventions, outputs, outcomes, and the impact. The framework, therefore, helps to explain why and how the results are to be achieved.

Conceptually, the SIG framework reflects the underlying theory of change underpinning the actions undertaken under the SWITCH Africa Green programme. The drivers of change being sustainable consumption and production practices. The activities implemented under SWITCH Africa Green are expected to create an enabling environment and empower key stakeholders to adopt and implement SCP practices, which in turn contribute to sustainable development. Figure 3.2 below summarizes the framework.

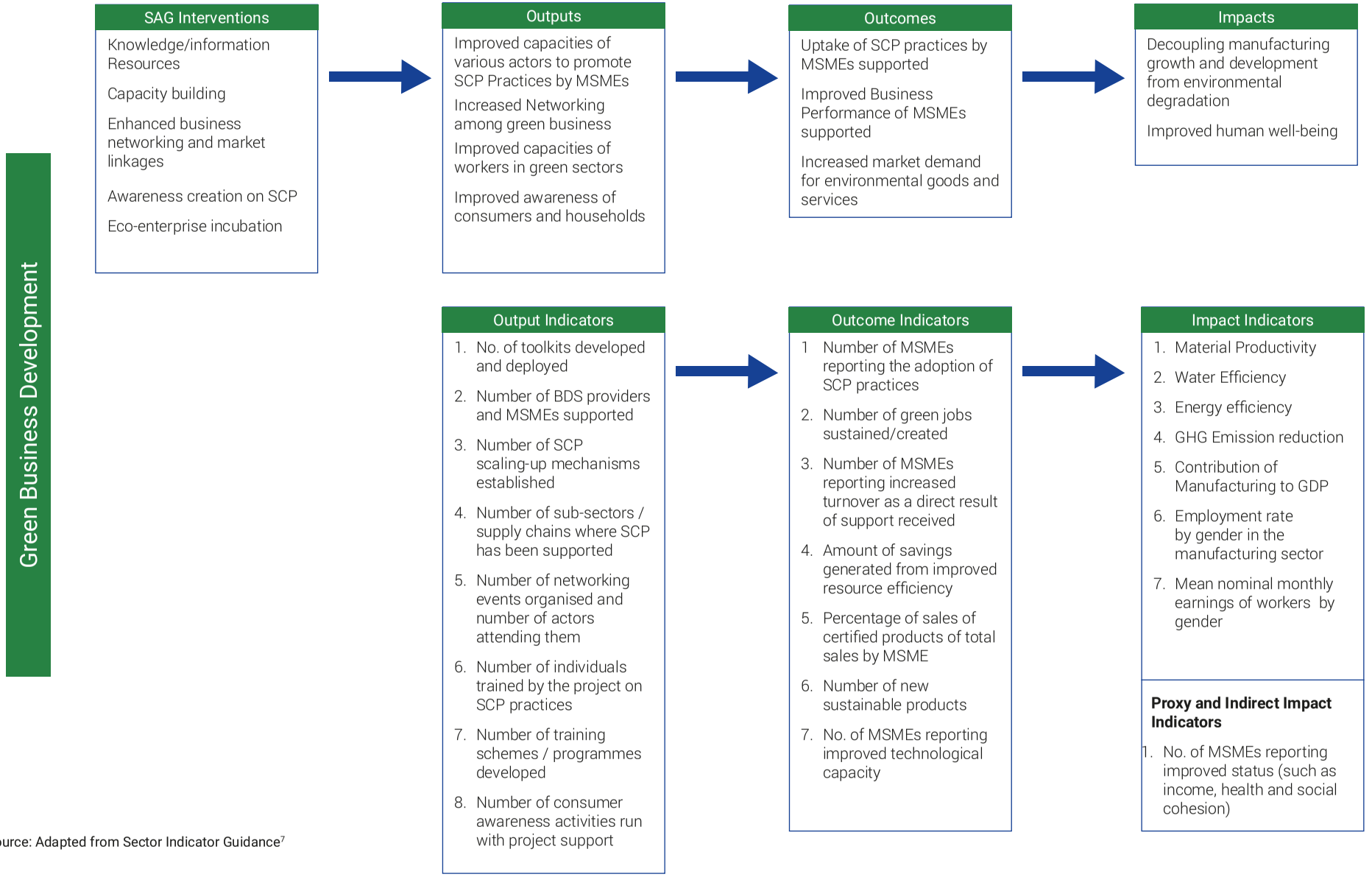
Under the green business development component, the actions target enterprises, consumers, households, and workers in the specific sectors. The programme interventions or actions undertaken under the SWITCH Africa Green business development component broadly fall under five categories namely: development and deployment of knowledge/information resources such as training materials and toolkits; capacity building including mentorship and training; incubation of green-enterprises; raising awareness of SCP; and enhancing collaboration between different actors in the value chain and the policy arena.

The results indicators in Figure 3.2 are presented at three levels: outputs, outcomes, and impact. The impact refers to the goal that the programme aims to achieve, namely: decouple industrial growth from waste generation and adverse environmental effects, and contribute to improved human wellbeing. The outcomes measure the effectiveness of SWITCH Africa Green interventions in inducing a change in behavior towards the application of SCP practices. These are captured through policy, institutional capacity changes, and performance induced through the programme outputs. The outputs provide information about the implementation of SWITCH Africa Green interventions in the specific sector towards influencing the adoption and implementation of SCP practices. While impact indicators measure broad medium-to long-term change due to various interventions, in the SIG context presented here, impact reflects an attempt to measure the contribution attributable to the project or programme.

The analysis and reporting faced several challenges. These include data availability and limitations; heterogeneity of enterprises, products, and the business environment across the six countries, and the development of the appropriate results indicators. Regarding the baseline, the survey questionnaire included several questions that sought to establish the status of variables before (in 2014) and after (in 2017) SWITCH Africa Green interventions. The variables include annual production, unit and total cost of production, raw material use, energy and water use, and waste generated. However, many firms did not provide consistent solid data to facilitate the quantitative assessment of the change and development of quantitative indicators based on survey data. Data on similar variables were also presented in numerous units of measurement, perhaps reflecting the heterogeneity of the firms and products thus rendering the data aggregation rather difficult and tedious. Additionally due to data limitations, especially lack of data on control groups and household characteristics before and after SWITCH Africa Green interventions, a rigorous

[6] https://www.switchtogreen.eu//wordpress/wp-content/uploads/2018/07/SIG-sector-Green-R_final.pdf

Figure 3.2: Results chain diagram for manufacturing sector



Source: Adapted from Sector Indicator Guidance[7]

[7] https://www.switchtogreen.eu//wordpress/wp-content/uploads/2018/07/SIG-sector-Green-R_final.pdf

impact evaluation could not be conducted (Khandker, S.R., Koolwal, G.B. and Samad, H.A. 2010). These challenges related to data have been overcome using data captured in grantee reports, case studies and technical monitoring reports. Qualitative indicators that reflect the beneficiary's perception or sense of well-being have also been used in the report. SWITCH Africa Green programme survey collected data on employment for youth and non-youth. However, the reported data on youth employment is not disaggregated by gender. Without additional data, it is assumed that the existing gender employment structure holds for the youth.

4. SWITCH Africa Green interventions

4.1 Interventions

The overall goal of the SWITCH Africa Green programme is to contribute to sustainable development and poverty reduction in Africa by promoting SCP practices. During the first phase of the SWITCH Africa Green programme which covered the period March 2014 to February 2020, grants were awarded to 34 successful grantee applicants to support MSMEs in the uptake of SCP practices in the priority sectors in Burkina Faso, Ghana, Kenya, Mauritius, South Africa, and Uganda. The overall funding from the EU during the first phase was EUR19,000,000 .

The programme was implemented through a call for proposals. Grantee applications were evaluated based on a selection and award criteria that included the financial and operational capacity of the applicant, the quality of the proposal regarding consistency with programme objectives, the feasibility of proposed actions and cost-effectiveness. The grantees are the intermediaries and select the beneficiary MSMEs. Consequently, the distribution of successful grantees and beneficiary MSMEs varies across countries and sectors.

Table 4.1 summarizes the key projects implemented in the manufacturing sector. The support aimed at enhancing the capacity of MSMEs through interventions such as capacity building and mentoring, development and deployment of knowledge and information resources, awareness creation, and fostering partnerships and market linkages.

Table 4.1: SWITCH Africa Green supported projects in the manufacturing sector

Country	Project Title	Budget (USD)
Burkina Faso	Enabling Burkinabe MSMEs to start producing solar energy	200,000.00
	Revaluing waste from cashew waste as a renewable energy source for MSMEs in Burkina Faso	169,888.00
Ghana	Promoting and installation of biomass improved cook stoves in small and medium agro industries in Ghana	250,000.00
Kenya	Greening MSMEs in leather clusters and leather tanning industry	248,508.00
	Capacity enhancement for green business development and eco-entrepreneurship	249,966.73
Mauritius	Developing capacity amongst Rodriguans to adopt green businesses	250,000.00
	PNEE	250,000.00
Uganda	Promoting sustainable product innovation and energy efficiency practices among small scale industries in Uganda	200,000.00
	Demand-side management of energy use in MSMEs in Uganda	200,000.00
	Demand-side management of water use in MSMEs in Uganda	200,000.00
Multi-country	Promoting eco-entrepreneurship in Africa (SEED)	1,500,000.00
Multi-country	Enhancing resource productivity and environmental performance of MSMEs in 6 African countries through the concept of IS	1,500,000.10

Manufacturing was identified as a priority sector in all six participating countries. In Burkina Faso, the focal areas were to promote the consumption and production of solar energy for the MSMEs and reduction of the use of conventional fuels such as wood and charcoal by substituting renewable sources of fuel such as cashew nut waste.

In Ghana, the project titled "Promoting and Installation of Biomass improved Cook Stoves in Small and Medium Agro Industries in Ghana" supported the introduction of improved biomass stoves among gari processors in Adaklu District, pito brewers in Nandom District and fish smokers in Ekumfi Narkwa District.

There were two projects in Kenya's manufacturing sector, 'Greening MSMEs in leather clusters and leather tanning industry' and 'Capacity enhancing for green business development and eco entrepreneurship.' Its main objectives were to contribute to the production processes, sustainable consumption, and eco-entrepreneurship. The project was implemented in 7 counties namely; Nairobi, Kiambu, Machakos, Tharaka Nithi, Kisii, Migori, and Nyandarua.

In Mauritius, the focus was on supporting existing and new entrepreneurs in the adoption of green business strategies, and energy auditing and training. The energy auditing and training project was based on a public-private partnership between the Ministry of Energy and Public Services, and Business Mauritius[7] .

Three projects were implemented in Uganda under SWITCH Africa Green in the manufacturing sector. One of the projects was 'Promoting sustainable product innovation and energy efficiency practices among small scale industries in Uganda'. The key stakeholder was Uganda Small Scale Industries Association (USSIA). It focused on promoting best practices in product innovation and energy efficiency in the districts of Arua, Fort Portal, Hoima, Gulu, Kampala, and Masaka. The other two projects that were implemented in Uganda focused on demand-side management of energy use and water use in MSMEs. The main stakeholders were the Ministry of Trade, Industry, and Cooperatives (MTIC); the Directorate of Water Resources Management (DWRM) ;and Uganda Cleaner Production Center (UCPC).

Promoting eco-entrepreneurship in Africa is a multi-country project that was implemented by SEED hosted at Adelphi Research Gemeinnutzige GmbH. The key focus areas included capacity building of business development service (BDS) providers, promoting the incubation of new eco-enterprises, and promoting the replication of eco-enterprises. It was implemented in all six countries and benefitted 724 MSMEs. A summary of interventions, outputs, and results of the programme in the manufacturing sector consistent with the SIG results framework is provided in Annex I.

4.2 Results of SWITCH Africa Green

This section discusses how the implementation of SWITCH Africa Green programme activities in the manufacturing sector has triggered changes in the development conditions or behavior of the beneficiaries towards the realization of the underlying goal of the programme.

At the broad sector level, several strategic interventions were implemented. These include:

- development and deployment of knowledge and information resources including toolkits, manuals, and guidelines;
- capacity building events and MSMEs' support including coaching and incubation activities, training on green business solutions, eco-labelling, and certification;
- awareness creation; and
- fostering partnerships and market linkages.

The short-term and medium-term effect of the interventions is to realize the change in behavior and institutional performance, especially in the uptake of SCP practices, improved business performance, and increased awareness of SCP. The application of SCP is expected to contribute to the decoupling of manufacturing

[8] SWITCH Africa Green provided 60 per cent subsidy for MSMEs participating in PNEE.

growth from environmental degradation and provide opportunities for social and economic improvement.

The results of the programme are discussed along three dimensions of sustainable development, namely: economic, social, and environmental. The selected economic indicators include SCP policy up-take, the capacity of MSMEs, new business opportunities, and turnover. On the social dimension, the key indicators include job creation, gender inclusion, and working conditions. The environmental dimension is analyzed based on the implementation of 3R, energy, and water use efficiency.

4.3 Economic results

4.3.1 Staff capacity

As part of the capacity building interventions, several knowledge and information resources were developed and used for training purposes. They include toolkits, manuals, and guidelines. Ninety-one per cent of the surveyed enterprises confirmed that toolkits had been provided, of this 42 per cent indicated that resource efficiency toolkits were most useful (Figure 4.1). Thirty-three per cent of the surveyed enterprises considered the green business toolkits as most useful. The business administration tool kit was reported as the most useful by 16 per cent of the MSMEs. These interventions are intended to enhance capacity and increased uptake of SCP practices by the beneficiary firms.

As expected, the use of toolkits helped address various issues at the enterprise level. Forty per cent of the enterprises noted that the toolkits helped address issues related to inefficient resource use, especially energy and water. The other key issues include waste management, lack of business management skills, marketing challenges, and product development and quality (Figure 4.2).

On staff capacity, 78 per cent of the surveyed enterprises reported staff capacity improvement, of this 51 per cent indicated that staff had acquired technical and production skills, 27 per cent noted improved business and resource management skills (Figure 4.3). Some of the specific skills indicated include water and energy management, occupational safety, waste management, recycling, record keeping, product development, marketing, and environmental conservation.

Figure 4.1: Toolkits used in manufacturing sector

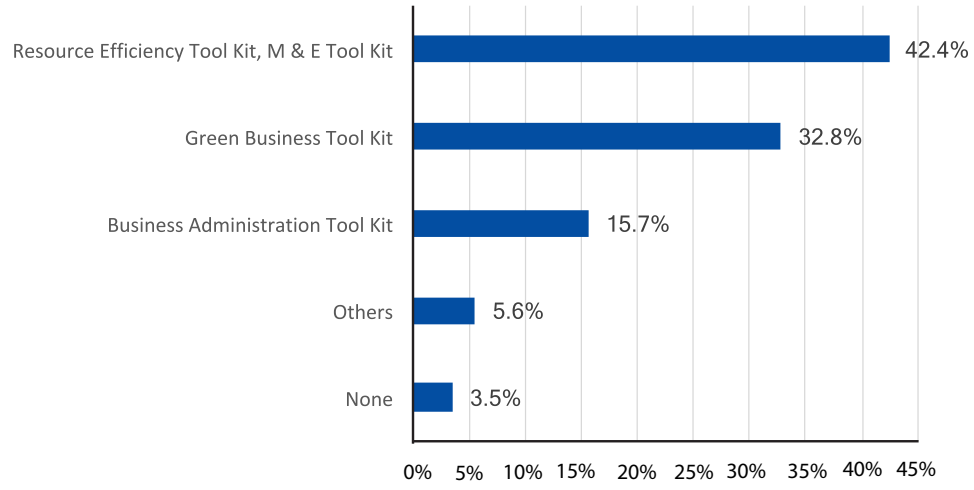
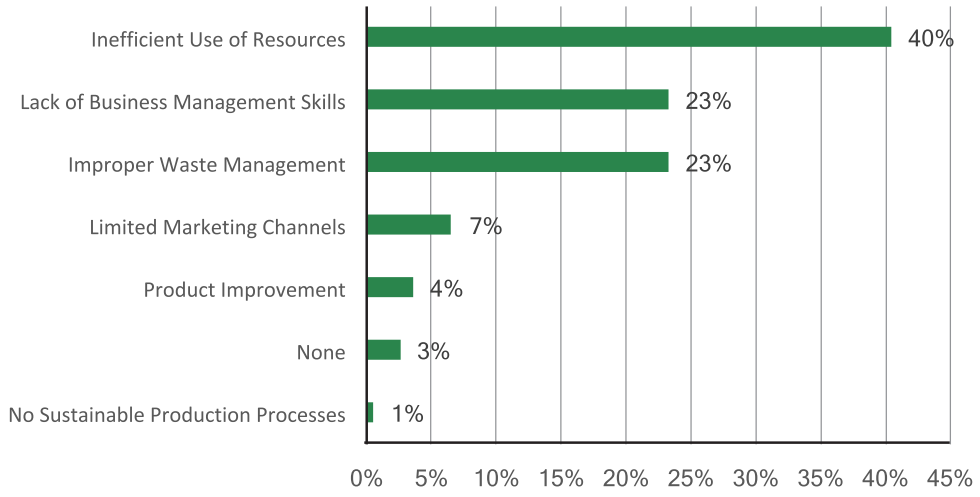


Figure 4.2: Issues addressed through toolkits



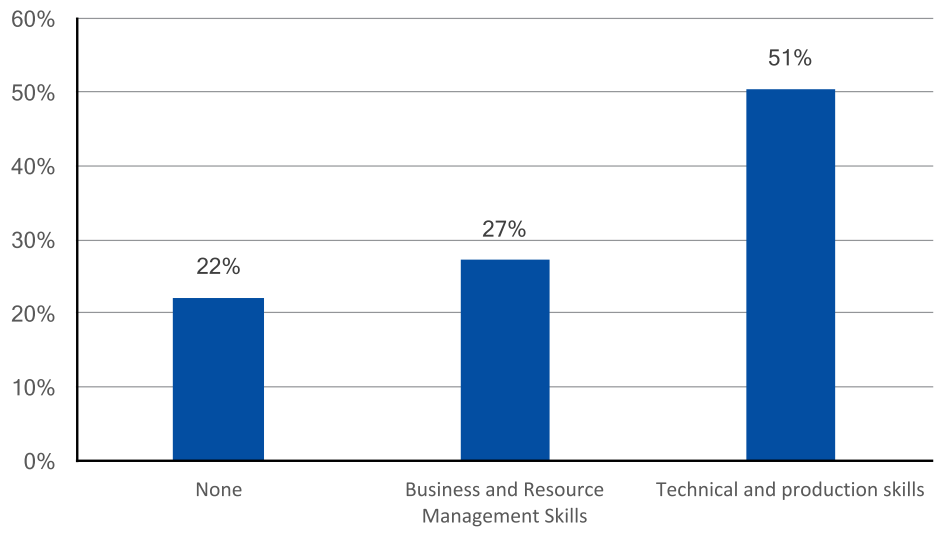
"The priority issue addressed during the implementation in the enterprise is the recycling of wastepaper to produce decorative marketable products."

Zamir Marie Clairette, Mauritius.

4.3.2 Business skills

The SWITCH Africa Green programme provided training activities to enhance the business skills of MSMEs, including record keeping, business planning, and management. The majority, 82 per cent, of the surveyed enterprises indicated they had acquired new business skills. Fifty-nine per cent of the MSMEs indicated that they had acquired general business management skills like bookkeeping, record keeping, monitoring resources, communication, costing, digital marketing, and networking skills. Twenty-three per cent had acquired technical skills, which

Figure 4.3: Enhanced capacity of existing staff



"Industrial symbiosis is an effective strategy for industries to improve on management of waste as it results in economic, social and environmental benefits for the company."

Sky Fat Tannery Limited, Uganda.

Box 4.1: Realizing economic, social and environmental benefits through IS

Sky Fat Tannery Company Ltd is a mid-sized organization in leather tanning which processes hides/skins into wet blue leather for export. Hides and skins are procured locally through company agents located in various regions of the country. The company was selected to implement project activities because it had a lot of challenges in the management of waste including hides/skins offcuts and fleshing. Poor management of the waste would result in an unpleasant smell leading to lots of complaints from neighbors, thus the company used to operate on a close/open schedule. The company also had a high level of top management commitment to the implementation of project activities.

The company was a beneficiary of capacity building on IS and RECP and implemented synergies and material exchanges. It also received technical support in the implementation of IS from UCPC.

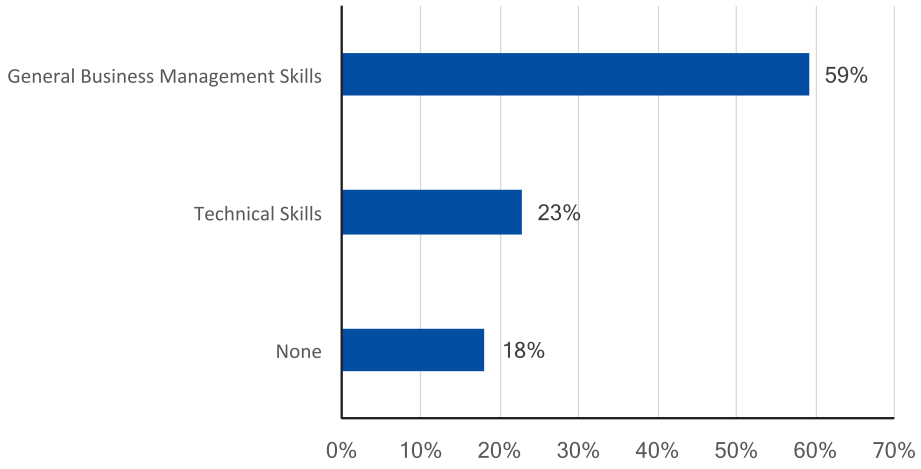
Benefits:

- diversion of waste from landfill for other purposes as hides, offcuts, and splits;
- the company has generated an income of USD1,080,800 annually from the sale of hides, offcuts, and splits;
- the company eliminated solid waste management costs of USD 1,120 per day (USD380,800 annually) that used to be spent in transporting waste to landfill;
- before implementing the interventions, leather splits were dumped in the environment; and
- creation of green jobs for 250 youth (100 male and 150 female)

Resource Efficient and Cleaner Production (RECP) triggered investment at Sky Fat Tannery Company Ltd

- Saving from RECP and Industrial Symbiosis has triggered a further investment of USD 6 Million in gelatin production to increase value of resources in the productive cycle.
- The installed gelatin plant processes about 50 tons of waste (splits and off cuts) to produce 10 tons of gelatin per day. Sky Fat Tannery no longer exports the waste (off cuts and splits) to South Africa and China. Instead, all this waste is processed internally into gelatin.

Figure 4.4: Improved business skills



include solar installations, mastery of hybrid plants, hair mask production, quality control, product design, soft toy making, and food processing technical skills (Figure 4.4).

4.3.2.1 Emerging business opportunities

The implementation of the SWITCH Africa Green supported projects generated new business opportunities for the beneficiary enterprises. The survey results reveal that 59 per cent of the surveyed enterprises reported new opportunities with potential for business expansion, including: new product lines, expanding business networks and partnerships, waste exchange through IS, improved resource management, market opportunities including export markets, improved quality, and access to new technologies (Figure 4.5). Box 4.1 illustrates some of the business opportunities arising from implementing IS.

Figure 4.5: New business opportunities

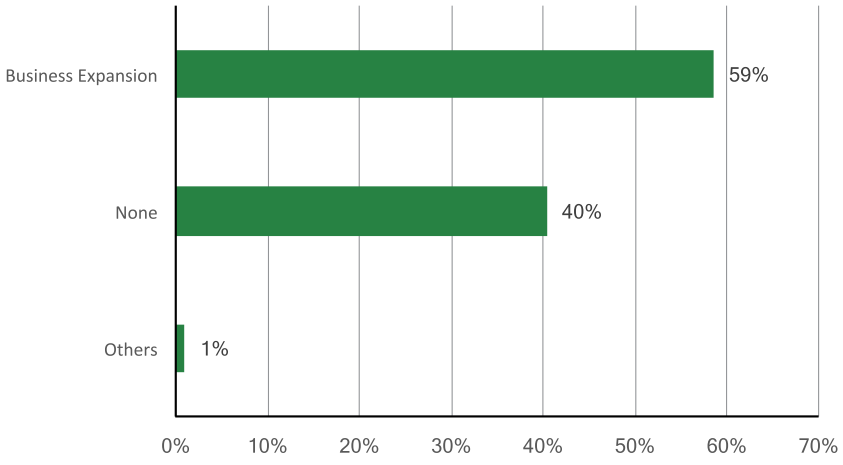
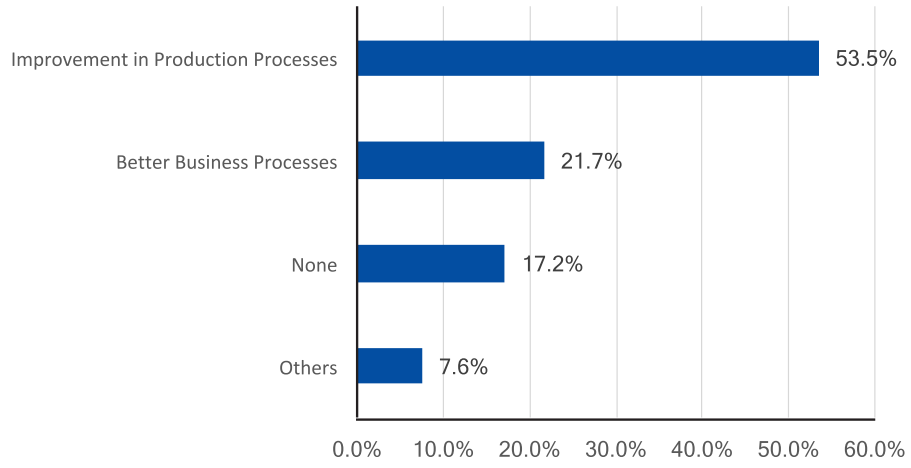


Figure 4.6: Increase in sales



4.3.2.2 Change in sales and MSMEs' achievements

The percentage of the surveyed enterprises that reported increased sales turnover as a direct result of the SWITCH Africa Green programme is 76 per cent (Figure 4.6). Fifty-four per cent of the enterprises attribute the improvement in sales to improvements in the production process, and 22 per cent to improved business processes including marketing strategies.

Participating MSMEs reported various achievements during the project implementation. Table 4.2 presents a cross tabulation between change in sales and MSMEs achievements during the project implementation. Ninety-five per cent of the surveyed firms reported

Table 4.2: Change in sales and MSMEs' achievements

Changes in Sales (Rows)	MSMEs Achievements (Columns)				
	Improvements in Business Processes	Improvements in Resource Management and Production Processes	None	Others	Total
Better Business Processes	5%	15%	1%	1%	22%
Improvement in Production Processes	16%	37%	1%	0%	54%
None	4%	11%	2%	1%	17%
Others	1%	7%	0%	0%	8%
Total	**26%**	**70%**	**4%**	**2%**	**100%**

"I now have a lot of confidence in my business and can talk about my products anywhere."

Pauline, PAMAT Foods, Kenya.

Box 4.2: PAMAT Foods: Generating Income for rural farmers through organic and healthy foods

Pamat Foods Enterprises was registered in 2014 but became fully operational in February 2015.

Pauline started by milling banana flour and thought she was doing perfectly well until she joined the SWITCH Africa Green programme through KAAA (Kenya Agribusiness and Agroindustry Alliance). Through the SWITCH Africa Green programme, Pauline was facilitated to attend several training events ranging from green business solutions and SCP principles to bookkeeping, marketing, and business planning which were very relevant to her business. As a result of the training, Pauline introduced several changes to her business.

Pamat Foods Ltd: Branded packaging paper bag

First, she started with the diversification of the products and added cassava, sweet potatoes, arrowroots, finger millet, sorghum, and terere (traditional vegetables) to banana flour processing. Secondly, she made changes to bookkeeping and financial accounting where she changed from manual to quick book then computerized all transactions of the Pamat Foods. Thirdly, it was not until the SWITCH Africa Green programme team visited her business that Pauline realized a lot more needed to be done:

"We used to take water to the enterprise by using a hosepipe and a lot of water was going to waste through leakages" Pauline narrates. "I was advised to install proper piping which I have done as you can see. They found out that my household shares one water meter with the enterprise making it hard for me to determine how much water the business was consuming. The team advised me to separate the meters which I have since done". Through proper piping and meter separation, Pamat Foods has seen a reduction in water costs and able to monitor what is consumed by the enterprise.

Pamat Foods Ltd: Packed banana flour ready for the market-Date of manufacture and expiry date, batch number visible.

Fourthly, the packaging was without proper branding and labelling but this has changed after advice from project staff during site visits. "We never used to indicate the manufacturing and expiry dates in the packaging of our products, but this has now been done as you can see on each of the packets", says Pauline.

From the humble beginning of the enterprise and the journey with the SWITCH Africa Green programme, Pauline's business now boasts over 90 outlets dealing in her products and profits have been soaring upwards as Pauline confirms: "Imagine in 2015, we used to make only KES 250,000 per month but we are now talking of KES 1.2 million and I attribute all these to SWITCH Africa Green as they have mentored me to the person I am today. I now have a lot of confidence in my business and can talk about my products anywhere."

an improvement in business processes and improvements in resource management and production processes.

4.4 Social Results

4.4.1 Employment

There were about 35,489 persons employed in the sampled enterprises at the time of the survey. The percentage of youth employment ranges from 16 per cent in Mauritius to 45 per cent in Kenya. The data suggests that the percentage of women participating in the manufacturing sector ranges from 14 per cent in Ghana to 75 per cent in Burkina Faso (Table 4.3).

According to the survey data, about 58 per cent of the enterprises reported that new jobs had been created in the manufacturing sector during the period of the implementation of the SWITCH Africa Green programme (Table 4.4) – a total of 3,470 new jobs .

While 75 per cent of the surveyed enterprises reported increased production, 11 per cent reported only a partial increase in production (Table 4.4). About one third of the enterprises that reported increased production did not increase employment, which might suggest higher productivity. The data reveals that only 9.6 per cent of the surveyed enterprises recorded no increase in job creation and no increase in production.

Table 4.3: Existing employment in manufacturing sector (in 2018)

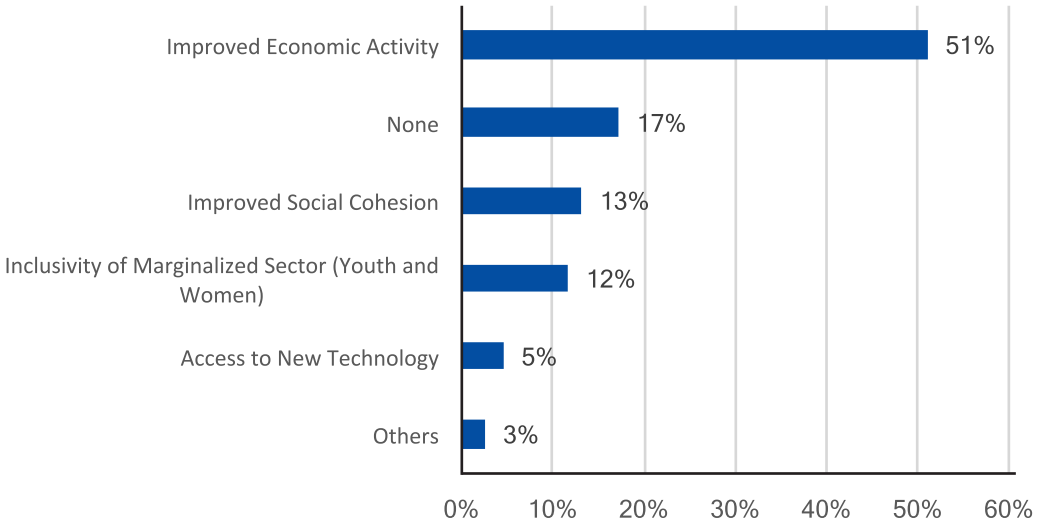
Country	Female Employees		Youth Employees
Employees by gender and youth composition (per cent country total)			
Burkina Faso	75%	25%	31%
Ghana	14%	86%	38%
Kenya	54%	46%	45%
Mauritius	35%	65%	16%
South Africa	54%	46%	40%
Uganda	26%	74%	34%
Total	**30%**	**70%**	**34%**

Table 4.4: Job creation and change in production

Job Creation (Rows)	Increased Production (Columns)			
	No	Partially	Yes	Total
Increased Number of Staff	4.4%	4.4%	49.3%	58.1%
None	9.6%	6.6%	25.0%	41.2%
Others	0.0%	0.0%	0.7%	0.7%
Total	**14%**	**11%**	**75%**	**100%**

On other social impacts, 51 per cent of the surveyed enterprises indicated that they had experienced improved economic activity, and improved social cohesion was reported by 13 per cent of the responding MSMEs (Figure 4.7).

Figure 4.7: Other social impacts of MSMEs



Box 4.3: Gari Processing: improved institutional cookstoves become the best practice

Gari is one of the staple foods in Ghana made from cassava. It is a major contributor to food security and livelihood in rural areas. Cassava is normally processed to flour using thermal energy before it is consumed or traded. Also, the consumption of this product in schools, urban and rural areas across the country coupled with high demand in other West African countries, makes the product a viable business venture. The community in Adaklu produces and processes cassava (gari) for their consumption and sale.

SWITCH Africa Green introduced more efficient community stoves to replace the less efficient traditional ones. As part of the interventions, training was provided to local artisans and processors on the construction of improved cookstoves, and 26 MSMEs benefited as a result. The benefits include: gari processing time was reduced, better quality gari was produced and increased income to beneficiaries since it cut down on fuel costs and time.

Significantly, this cooking stove has made an impact leading to replication by the West African Agricultural Productivity Programme (WAAPP) programme funded by the World Bank.

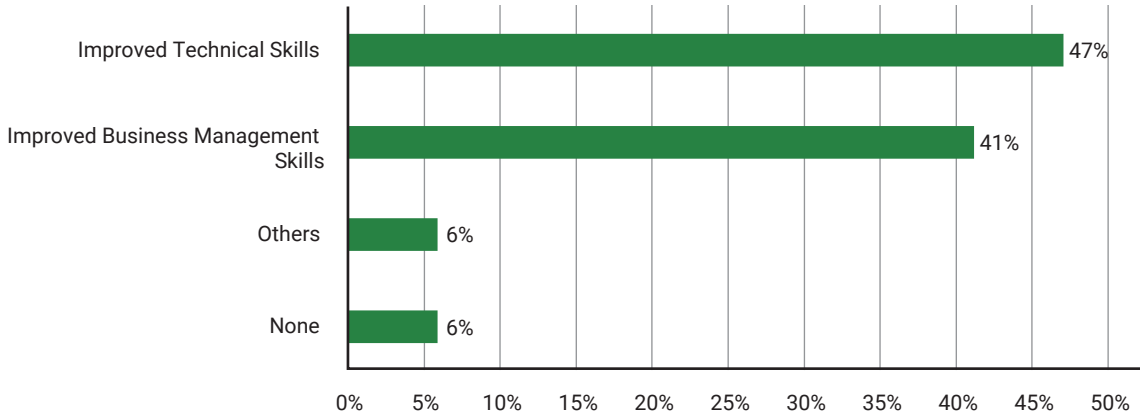
Traditional Stove and Improved Institutional Stove

4.4.2 Environmental Results

The projects implemented in the sector focused on interventions aimed at enhancing water and energy efficiency, material efficiency and improved waste management. The energy interventions that were carried out include the use of energy-efficient technologies and practices such as the use of LED bulbs and efficient motors, the use of solar energy and steam, introduction of biogas, and installation of translucent sheets. Data on water use interventions suggest that the surveyed enterprises implemented measures such as water storage, replacement of cisterns, use of condenser recovery systems, metering, elimination of leakages, regular monitoring and repair, and rainwater harvesting. Box 1.4 presents the case study of the Century Bottling Co Ltd Mbarara Plant in the implementation of water efficiency interventions as part of the SWITCH Africa Green programme involving demand-side water management.

On the 3R interventions, the surveyed enterprises reported that 61 per cent implemented 3Rs measures. Of these, about 48 per cent of the enterprises implemented waste reduction and reuse measures involving recycling, reuse, and production of new products and 13 per cent implemented recycling interventions (Figure 4.8).

Figure 4.8: Implementation of 3Rs



Box 4.4: Century Bottling Co Ltd Mbarara Plant: water efficiency interventions enhance competitiveness

Century Bottling Company Ltd is a franchise of Coca Cola Sabco with a range of Coca Cola products including Minute Maid, Coca Cola, Fanta, Stoney, Krest and Sprite. The main raw materials include syrup, water, and imported sugar. The company was selected to implement project activities because it had a high commitment to compliance with national environmental policies and regulations. The plant consumes large quantities of water.

SWITCH Africa Green interventions implemented include capacity building on IS, resource-efficient and cleaner production, environmental legal framework, occupational health, and safety and material flow analysis. Technical support was provided in terms of reviewing, monitoring and advising on implementation. Some of the measures implemented and the associated benefits are summarized in the table below.

Measures implemented	Investment USD	Annual savings (USD)	Other benefits
• Leakages at the pre-soak water pump sealed off; • A conductor installed to synchronize the spray of water in bottle washer inside the bottles according to the motion of drive for conveyors line as opposed to a continuous spray of water; • Overflow of tanks in the bottle washer and leakages in the final rinse were eliminated; and • Reverse Osmosis (RO) reject water is clarified and reclaimed for re-use in the RO Plant.	1,757	24,402	Reduced water indicator from 3.06L/L of beverage to 2.3L/L of beverage: • 17 per cent decrease in water demand by the company despite a 7 per cent growth in production volume. • Water bills reduced by more than 15 per cent compared to the situation before SWITCH Africa Green.

Century Bottling Company Ltd is a franchise of Coca Cola Sabco with a range of Coca Cola products including Minute Maid, Coca Cola, Fanta, Stoney, Krest and Sprite. The main raw materials include syrup, water, and imported sugar. The company was selected to implement project activities because it had a high commitment to compliance with national environmental policies and regulations. The plant consumes large quantities of water.

SWITCH Africa Green interventions implemented include capacity building on IS, resource-efficient and cleaner production, environmental legal framework, occupational health, and safety and material flow analysis. Technical support was provided in terms of reviewing, monitoring and advising on implementation. Some of the measures implemented and the associated benefits are summarized in the table below.

Backwash water which used to be sent to drain is now being recovered and reused

The results of SWITCH Africa Green projects implemented in the manufacturing sector reveal that the application of a combination of supply-side and demand-side management of water and energy approaches to green the sector has great potential for economic, social and environmental benefits to the society as illustrated in Box 4.1, Box 4.3 and Box 4.4. The project titled "Demand-Side Management of water use in Micro, Small and Medium-Sized Enterprises in Uganda through the promotion of water use efficiency techniques and practices" projected an annual water saving potential of 14,024 m^3 by 24 MSMEs involved in the project. The enterprises that successfully implemented the proposed water-saving initiatives achieved an average annual water saving of about 29,282 m^3 equivalent to an average annual saving of $ 40,776 per MSME against an average investment of $36,823. The other associated benefits include increased water productivity (Table 4.5) and quality of effluent which on average BOD_5 (biochemical oxygen demand)has reduced by 68.25per cent, COD (chemical oxygen demand) has reduced by 68.75 per cent and pH has reduced from alkalinity towards neutrality by 12.8 per cent per MSME.

Table 4.5: Water productivity in MSMEs in Uganda (before and after)

No	Name of the Company	Before SWITCH Africa Green	After SWITCH Africa Green	% increase in water productivity
1	Century Bottling Co Ltd Namanve plant	3.487L of water/L of beverage produced.	1.923L of water/L of beverage.	44.85
2	Century Bottling Co Ltd Mbarara plant	3.06L/L of beverage.	2.3L/L of beverage.	24.84
3	AK Oils and Fats (U) Ltd	4m^3/ton of product.	2m^3/tone of product.	50
4	Brookside Dairy Ltd	4m^3/ton of product	2m^3/ton of product.	50
5	Igara Growers Tea Factory Ltd	4L/Kg of made tea.	3L/Kg of made tea.	25
6	Reco Industries Ltd	4.1m^3/ton of processed food.	2.5m^3/ton of processed food	39.02
7	Lakeside Dairy Ltd	5L of water/L of milk processed	3L of water/L of milk processed	40
8	Crown Beverages Ltd	3.02L of water/L of beverage.	2.70L of water/L of beverage.	10.60

Similarly, a review of the PNEE implemented in Mauritius as part of the SWITCH Africa Green project reveals large potential energy savings from the implementation of the proposed interventions. In 96 audits conducted under PNEE, the estimated gains stood at almost MUR 400 million per year.

The findings discussed in this section suggest that the programme contributed to the capacity of personnel in the surveyed firms as well as business skills. About three-quarters of the firms recorded improved sales turnover that they attribute to the project, and 3,470 new jobs were created during the project implementation period. About 60 per cent of the firms are implementing environmentally friendly practices involving reuse, recycling, and reducing waste generation. Demand-side energy and water efficiency interventions have great potential to contribute to the competitiveness of MSMEs while providing environmental benefits.

5. Opportunities, challenges, and lessons learnt

The application of SCP practices offers multiple opportunities such as job creation, income generation, new business opportunities, and environmental benefits through ecologically friendly practices. However, the surveyed enterprises experienced various challenges during the implementation of the programme. Diverse and multiple challenges were reported, which are summarized in Figure 5.1.

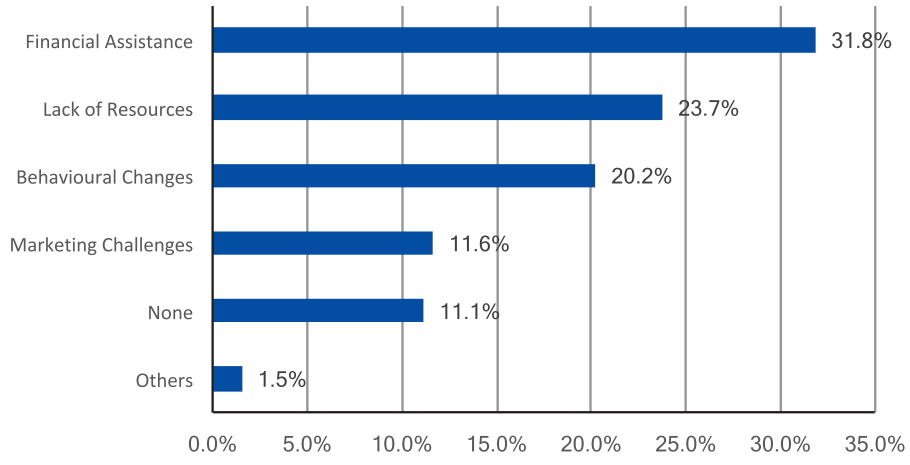
During the regional sector meeting on green manufacturing held on 26-27 September 2019, stakeholders discussed and validated this report, thereby providing additional information on the challenges, lessons, and opportunities in green manufacturing. The key challenges relate to the need for financial assistance, lack of resources, behavioral change, marketing challenges, and the need for a supportive policy environment.

The needs for financial support are diverse and include assistance to access raw materials, improved equipment and tools, adopt improved technology and lack of enough and appropriate workspace. Several MSMEs also identified access and cost of borrowing from the financial system as a key challenge.

2. Lack of resources

Lack of resources is reported by almost one-quarter of the enterprises as the key challenge. A closer examination of the challenges raised indicates a diverse range of issues. Some of the challenges are related to infrastructure, logistics, and working capital. The recurrent issues on infrastructure include lack of access to water and affordable power. Some firms lack access to appropriate technology and tools and

Figure 5.1: Challenges faced by MSMEs



1. Financial assistance

About one third of the MSMEs indicated that they needed financial support to implement some of the SCP interventions that were identified.

equipment. Therefore, enhancing efficiency in the use of water, energy, and other resources, and promoting the use of more efficient technologies is a clear challenge for any efforts to a transition to sustainable manufacturing.

3. Behavioural challenges

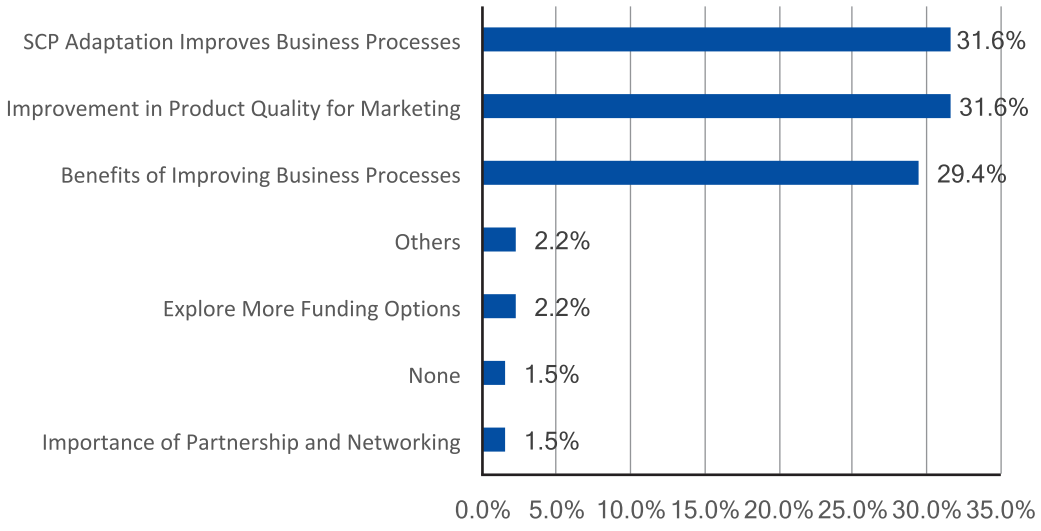
Multiple responses by the surveyed enterprises point to challenges related to behavioral change. The responses that were noted include initial resistance to implement identified options, lack of management support, lack of commitment from staff, and it took too long for staff to be able to apply the acquired skills — 20 per cent of the surveyed enterprises reported behavioral challenges to the application of SCP practices.

4. Marketing challenges

Thirteen per cent of the surveyed enterprises identified market-related challenges, particularly lack of market for the products as a major issue. Other market-related challenges include stiff competition, lack of affordable inputs, ensuring high standards and quality, packaging for the market, and customer awareness of the green products is low.

The lessons learnt from the implementation of the project are summarized in Figure 5.2. The lessons learnt suggest that SCP practices are beneficial and relevant in the sector. From the analysis above, the adoption of SCP practices provides social, economic and environmental benefits. Thirty-two per cent of the surveyed enterprises reported that SCP adaptation improves business processes, another 32 per cent indicated improvement in the quality is important for marketing, and 29 per cent note that there are benefits associated with improved business processes (Figure 5.2).

Figure 5.2: Lessons learnt from the implementation of the project



6. Conclusion and recommendations

The findings indicate that the application of SCP in manufacturing has economic, social, and potential environmental benefits and therefore instrumental to the realization of SDGs. The results also suggest that the interventions of the SWITCH Africa Green have triggered the envisaged change in behavior and enterprise performance as reflected in the improved capacity of MSMEs and performance. The findings in this report provide a basis for the following set of recommendations.

1. Financing a transition to sustainable manufacturing

MSMEs need finance to support the application of SCP practices and patterns. Some of the key issue areas include financing for efficient technologies, capacity building, and up-scaling operations. Most firms indicated that they need financial support to implement the identified SCP options that enhance material, water, and energy efficiency. Access and cost of borrowing from financial institutions have been indicated as challenging. There is, therefore, a need to use innovative financing mechanisms for MSMEs leveraging both local and international sources of finance to support investment in material, water, and energy efficiency practices and technologies.

2. Capacity building and knowledge sharing

Experience from the implementation of the programme suggests that there are skills and knowledge gaps and the need for awareness creation to support the adoption of SCP practices. Capacity-building should also embrace support on adoption and adaptation of relevant technologies, health and safety, RECP techniques, and knowledge about certification and relevant product standards.

3. Policy and regulatory framework for greening the manufacturing sector

SWITCH Africa Green programme implementation reveals the need for appropriate policy and regulatory frameworks to support sustainable manufacturing from the supply-side and demand- side. Experience from Uganda and Mauritius on the demand-side reveals that there are significant benefits associated with investments in water and energy efficiency. Likewise, the other projects point to the importance of eco-innovation, the use of more efficient technologies and the shift to renewable energies.

The projects implemented as part SWITCH Africa Green in the manufacturing sector reveal that there is huge unexploited potential in IS. On this basis, an enabling policy and regulatory environment to support investment in sustainable manufacturing is required. Key areas include: programmes and fiscal incentives to support investment in water and energy efficiency; implementation of Extended Producer Responsibility (EPR) measures; promotion of markets for green products and technologies; support of MSMEs to comply with regulatory and environmental standards; and a policy framework to support the development of IS.

4. Supportive mechanisms

Strengthen regional and national mechanisms to support SCP in the manufacturing sector including the ARSCP and NCPCs.

7. References

AUC (2015), The Agenda 2063 Framework Document: The Africa We Want
https://www.nepad.org/publication/agenda-2063-framework-document

International Monetary Fund (2018), Burkina Faso: IMF Country Report No. 18/85, March 2018
https://www.imf.org/en/Publications/CR/Issues/2018/03/23/Burkina-Faso-Economic-Development-Documents-45751

International Monetary Fund (2012), Burkina Faso: Strategy for Accelerated Growth and Sustainable Development 2011–2015, https://www.imf.org/external/pubs/ft/scr/2012/cr12123.pdf
Khandker, S.R., Koolwal, G.B. and Samad, H.A. (2010). Handbook on impact evaluation: quantitative methods and practices. Washington, DC, World Bank, 2010
https://openknowledge.worldbank.org/bitstream/handle/10986/2693/520990PUB0EPI11101Official0Use0Only1.pdf?sequence=1&isAllowed=y

Republic of Mauritius (2017), Innovative and Globally Competitive. Mauritius Vision 2030 Foreign Affairs

Republic of Mauritius (2016), Country Implementation Plan: SWITCH Africa Green.

Ministry of Social Security, National Solidarity, and Environment and Sustainable Development

Republic of Uganda (2015), Second National Development Plan (NDP II) 2015/16-2019/20.
https://consultations.worldbank.org/Data/hub/files/consultation-template/materials/ndpii-final11.pdf

Republic of South Africa, Industrial Policy Action Plan (IPAP) 2018/19 – 2020/21 Department of Trade and Industry
https://www.gov.za/sites/default/files/gcis_document/201805/industrial-policy-action-plan.pdf

Republic of Kenya (2018), Third Medium Term Plan (MTP III) 2018-2022: Transforming Lives: Advancing socio-economic development through the "Big Four"

Republic of Uganda (2017), SWITCH Africa Green: Review of Laws, Policies, and Business Environment, Country Implementation Report and Plan October 2017

Republic of Uganda (2008), National Industrial Policy: A Framework for Uganda's Transformation, Competitiveness and Prosperity 2008

Republic of Uganda. (2017), Uganda Green Growth Development Strategy - 2017/18 –2030/31

SWITCH Africa Green (undated). Review of laws, policies, and business environment: Country Implementation Report and Plan. Republic of South Africa: Department of Environmental Affairs,

SWITCH Africa Green (2018). Review of laws, policies, and business environment:. Country Implementation Report and Plan. Republic of Kenya: Ministry of Environment and Forestry.

SWITCH Africa Green (2016). The country Implementation Report and Plan. Republic of Mauritius: Ministry of Social Security, National Solidarity, and Environment and Sustainable Development.

United Nations Economic Commission for Africa 2016, Economic Report on Africa 2016: Greening Africa's Industrialization
https://www.un.org/en/africa/osaa/pdf/pubs/2016era-uneca.pdf

United Nations Industrial Development Organization (2015), National Cleaner Production Centres 20 Years of Achievement: towards decoupling resource use and environmental impact from manufacturing growth.
https://www.unido.org/sites/default/files/2015-10/NCPC_20_years_0.pdf

United Nations Economic Commission for Africa (2016-03). Inclusive green economy policies and structural transformation in Burkina Faso. Addis Ababa

United Nations Conference on Trade and Development (2012), The Economic Development in Africa Report 2012

World Bank, World Development Indicators, http://wdi.worldbank.org/table

8. Annex I: Selected SWITCH Africa Green interventions

SWITCH Africa Green Strategic Interventions	Output	Outcomes
Knowledge Resources and Tools	• Business Administration Tool Kit • Green Business Tool Kit • Resource Efficiency Tool Kit, • M & E Tool Kit • SWITCH Africa Green-SEED BDS+ • SWITCH Africa Green-SEED Starter • SWITCH Africa Green-SEED Catalyser • SWITCH Africa Green-SEED Replicator • Others	• 3,470 new jobs created • 86 per cent of MSMEs of reported production increase • 83 per cent of MSMEs recorded an increase in sales • 61 per cent of MSMEs implemented 3R project-related interventions
Capacity Building	• 8 processors (beneficiaries) were trained on the proper usage of the cookstoves, job safety analysis and maintenance (sustainability) of the cookstoves to prolong its life span. • 6 female processors in the Nandom district and two (2) male artisans were trained on the construction of the improved institutional cookstoves for the sustainability of the project. • 54 improved institutional cookstoves were installed by the project: nine (fully subsidized by the project) 25 cookstoves were subsidized 25 per cent by the beneficiaries and 20 cookstoves were subsidized 75 per cent by the beneficiaries. • 26 MSMEs out of 48, benefitted from biomass cookstoves for the agro process project. • 15 people including local artisan and processors were trained on the construction of improved cookstoves • 42 shop floor workers (artisans) were trained in footwear production skills. The training was offered to shop floor workers because the profiling study showed that the shop floor workers had limited production skills. • 42 shop floor workers from 35 MSMEs were trained in quality improvement and production skills; • 70 MSMEs were trained in cluster designing and implementation; • 39 MSMEs managers and owners from 76 MSMEs were trained in technical production management and quality improvement	• 84 per cent of MSMEs recorded reduced costs • 45 per cent of MSMEs introduced new policies • 58 per cent of firms reported increased no. of jobs • 87 per cent reported social impact (including increased economic activity, and social cohesion. • 78 per cent reported improved staff capacity • 82 per cent reported enhanced business skills • 62 per cent reported improved health and safety • 59 per cent of MSMEs reported emerged new business opportunities • 7 tanneries reported that they are using chemicals compliant with REACH;

SWITCH Africa Green Strategic Interventions	Output	Outcomes
Capacity Building	• 18 technicians drawn from tanneries and MSMEs were trained on international environment standards and REACH; • 3 Regional training workshops were conducted which attracted a total of 94 participants from different institutes • A total of 23 enterprises trained; from Western Uganda, South-western Uganda, Northern Uganda, and the Central region • At least 20 MSMEs trained on the concept of demand-side energy management • Technical support has been provided to 20 MSMEs and implementation plans have been developed for 17 MSMEs • 21 enterprises provided energy consumption data and baseline operational information • 31 SWITCH Africa Green-SEED award winners received SEED catalyzer support • 962 participants trained using 12 replicator workbooks • SEED developed 4 sectoral business condition model training for conducting green business • 21 actors trained on briquettes. (Burkina Faso) • 20 policy markers trained (Burkina Faso). • 180 MSMEs have been sensitized on the production and consumption of solar energy (Burkina Faso) • 20 electricians trained in the installation of photovoltaic solar systems (Burkina Faso) • 528 MSME's trained (Mauritius) • 4 regional training workshops conducted (Uganda) • 28 MSMEs underwent in-house training (Uganda) • 8 processors (beneficiaries) trained (Ghana) • 2 policy makers trained (Uganda) • 114 MSEs trained (Uganda)	

SWITCH Africa Green Strategic Interventions	Output	Outcomes
Capacity Building	• 8 regional coordinators benefitted from the ToT(training of trainers) training in SPIN and EE (energy efficiency) practices (Uganda) • 70 participants trained (Kenya) • 42 shop floor workers were trained in production skills (Kenya) • 18 representatives of enterprises trained (Kenya) • 18 technicians trained (Kenya) • 23 enterprise trained (Kenya) • 16 selected MSMEs received targeted training events to incorporate sustainable production and consumption practices into their business models. (Kenya) • 94 participants were trained through 3 regional training workshops (Kenya) • 96 companies were audited (Mauritius) • 88 energy audits were delivered (Mauritius)	
Awareness Creation and networking	• An outreach database developed to announce all project activities. • 9 networking events implemented for 1,325 participants. • 2 major workshops were organized to create awareness on the improved institutional cookstoves, promotion, benefits, and adoption of the cookstoves in all the three project regions, Adaklu in the Volta region, Ekumfi Narkwa in the central region and Nandom in the upper west region. • Banners and pull-ups were also displayed in the local communities where the demonstrational stoves were constructed, while flyers were shared out to sensitize the processors about the new technology. • Logos of EU, SWITCH Africa Green and partners are part of the exhibits in banners and brochures. • One publication was produced and published in an international journal. • Brochures, banners and a pull-up used for awareness raising (Uganda).	

Annex II: List of participants SWITCH Africa Green Regional Sector Meeting on Green Manufacturing				
26-27 September 2019				
Entebbe, Uganda				
No.	**Name**	**Country**	**Designation**	**Organisation**
1	Becquet Polycarpe Bationo	Burkina Faso	Director of Promotion of Entrepreneurship and Green Investments	Ministry of the Environment, Green Economy and Climate Change
2	Pierre Sawadogo	Burkina Faso	Entrepreneur	CREDO
3	Ezona Bazye	Burkina Faso	Member	Chamber of Commerce and Industry
4	Collette Kabore	Burkina Faso	Director of the promotion of climate change resilience actions.	Ministry of the Environment, Green Economy and Climate Change
5	Albert Compaore	Burkina Faso	National Coordinator	SWITCH Africa Green Programme
6	Felicite Yameogo	Burkina Faso	Manager	NKI enterprise
7	Hortense Kagambega/ Traore	Burkina Faso	Programme Manager	Women Environmental Programme Burkina
8	Ismael Sawadogo	Burkina Faso	Director	Maison De L'Entreprise
9	Rose Baky Guissou	Burkina Faso	Manager	ECOPRIX enterprise
10	Sansan Ferdinand Pooda	Burkina Faso	President	Association of Solar Energy Professionals
11	Sévérin Tora	Burkina Faso	Program Director	Christian Relief and Development Organization (CREDO)
12	Wolfgang Sanou	Burkina Faso	Regional Coordinator	Christian Relief and Development Organization (CREDO)
13	Zenabou Segda	Burkina Faso	President	Women Environmental Programme Burkina
14	Eshete Gejen Dresilign	Djibouti	AG. Program Manager, Environment Protection	Intergovernmental Authority on Development (IGAD)
15	Katema Tolosa Tekle	Ethiopia	Director	Cleaner Production Directorate, Ethiopian Standard Agency.
16	Addisu Tibebu Kumsa	Ethiopia	Senior Expert Manufacturing institutions Compliance monitoring and regulation	Ministry of Industry
17	Elias Kallore Misgana	Ethiopia	National Coordinator, SWITCH Africa Green programme	UNEP Liaison Office in Addis Ababa
18	Gebremiikael Gebrekidan	Ethiopia	Ministry of Trade and Industry	Ministry of Trade and Industry

No.	Name	Country	Designation	Organisation
19	Lelissa Daba	Ethiopia	Consultant	Ethiopian Cleaner Production Centre
20	Nebiyeleul Gessese	Ethiopia	Consultant	United Nations Environment Programme (UNEP)
21	Daniel Tesfaye	Ethiopia	Project Manager	Solidaridad Ethiopia
22	Tolosa Yadessa Terfa	Ethiopia	Director Environmental and Social Impact Assessment	Environment, Forest, and Climate Change Commission (EFCCC)
23	Wubie Mengestu	Ethiopia	Ethiopia Chamber of Commerce and Sectoral Associations	Greening Ethiopian Manufacturing (GEM)
24	Belinda Anorkor Lawson	Ghana	Manager	Niche Cocoa
25	Edmund Nana Owusu-Nyarko	Ghana	Assistant Program Oficer	National Cleaner Production Centre (NCPC)
26	Emmanuel Ankomah-Appiah	Ghana	Environment Occupational Health and Safety Manager	Pioneer Food Cannery Ltd
27	Emmanuel Atsu Ladzaglah	Ghana	Chair Person	Gari Processors Association
28	Janet NIYEL	Ghana	Entrepreneur	Pito Brewers Association
29	Kingsley Bekoe Ansah	Ghana	SWITCH Africa Green national coordinator	United Nations Development Programme (UNDP)
30	Lambert Faabeluon	Ghana	Director	National Cleaner Production Centre (NCPC)
31	Lawrence Amaning	Ghana	Lead consultant	Association of Ghana Industries
32	Letitia Nyaaba	Ghana	Principal Programme Officer	Environmental Protection Agency
33	Selina Amoah	Ghana	Green Economy Coordinator	Environmental Protection Agency
34	Seth Twum-Akwabuwah	Ghana	CEO	Association of Ghana Industries
35	Andrew Omariba	Kenya	Project Officer	Kenya Agribusiness and Agroindustry Alliance (KAAA)
36	Augustine Kenduiwo	Kenya	Deputy Director, Climate Change & Green Growth/ LECRD Program Coordinator,	Ministry of Environment and Forestry
37	Dickson Khainga	Kenya	Consultant	United Nations Environment Programme (UNEP)
38	Fauz Abdul Wahab Salim	Kenya	Manager	Nakuru Tanners

No.	Name	Country	Designation	Organisation
39	George James Onyango	Kenya	Head of Monitoring and Evaluation	Kenya Leather Development Council
40	Godfrey Nyairacha Njihia	Kenya	Entrepreneur	Leemax Shoes
41	James Mwaura	Kenya	Managing Director	Champion Shoes and General Clothing Ltd,
42	Jane Nyakang'o	Kenya	Director	National Cleaner Production Centre (NCPC)
43	Kamala Ernest	Kenya	Programme Management Officer	United Nations Environment Programme (UNEP)
44	Norah Mugita	Kenya	Legal Associate	United Nations Environment Programme (UNEP)
45	Patrick Mwesigye	Kenya	Regional Sub-Programme Coordinator Resource Efficiency and SCP	United Nations Environment Programme (UNEP)
46	Pauline Mugoiri Kimani	Kenya	Director	Pamat Foods Ltd
47	Peter Ohon	Kenya	Technical Officer	African Roundtable on Sustainable Consumption and Production (ARSCP)
48	Rhoda Wachira	Kenya	Programme Management Officer	United Nations Environment Programme (UNEP)
49	Robert Wabunoha	Kenya	Regional Sub-Programme Coordinator Environmental Governance	United Nations Environment Programme (UNEP)
50	Steve Onserio Nyamori	Kenya	Deputy Director	National Cleaner Production Centre (NCPC)
51	Sylvia Munuhe	Kenya	Programme Management Assistant	United Nations Environment Programme (UNEP)
52	Isiah Otieno	Kenya	Programme Management Assistant	United Nations Environment Programme (UNEP)
53	Celia Marquez	Kenya	Project Manager	United Nations Office for Project Services (UNOPS)
54	Mercy Gatobu	Kenya	Project Support Associate	United Nations Office for Project Services (UNOPS)
55	Vivianne Njogu	Kenya	Project Support	United Nations Environment Programme (UNEP)
56	Thomas Ojiambo	Kenya	Assistant General Manager	Wondernut International
57	Desiree Anne Eloise Albert	Mauritius	Project Officer	SME Mauritius
58	Vivianne Moutou	Mauritius	Entrepreneur	Pom d'Or Ltd.

No.	Name	Country	Designation	Organisation
59	Jean Patrick Ramdally	Mauritius	Project Officer	Ter Mer Rodriguez Association
60	Joseph Samuel Evenor	Mauritius	Entrepreneur	Banana fiber products enterprise
61	Marie Lourdes Raphael Robertson	Mauritius	Project Manager	Commission for Environment, Rodrigues Regional Assembly
62	Marie Noël Sam-Yue	Mauritius	Entrepreneur	Banana fiber products enterprise
63	Leonardo Candido Caliche GUIRRUTA	Mozambique	Director	National Cleaner Production Centre (NCPC)
64	Job Nelson Kisaka	Namibia		
65	Jenitha Badul	South Africa	Senior Policy Advisor	Department of Environment, Forestry & Fisheries
66	Ms. Mariana Lamont	South Africa	Executive Director	Clay Brick Association
67	Victor Manavhela	South Africa	Regional Manager	National Cleaner Production Centre (NCPC)
68	Prof. Cleophas Migiro	Tanzania	Executive Director Cleaner Production Centre of Tanzania	National Cleaner Production Centre (NCPC)
69	Hon. Michael Kafabusa Werikhe	Uganda	Minister of State for Trade	Ministry of Trade, Industry and Cooperatives (MTIC) of Uganda
70	Aaron Werikhe	Uganda	Planner Environment and National Resources	National Planning Authority
71	Abaho Remmy	Uganda	Environment Officer	Buhweju Tea Factory Ltd
72	Adongo Florence Grace	Uganda	Director, DWRM	Directorate of Water Resources Management
73	Aidah Tumuheirwe	Uganda	Director, United Innovations Development Centre (UIDC)	AFRIBANANA
74	Aisha Nakasujja	Uganda	Executive Director	Aloesha Organic Natural Health Products-Beneficiary/ Exhibitor
75	Akankwasa Tomson	Uganda	Officer	National Cleaner Production Centre (NCPC)
76	Arnold Waiswa	Uganda	Director Monitoring and Compliance	National Environmental Management Authority
77	Birungi Kafuba Sarah	Uganda	Environment Officer	Lakeside Dairy Ltd
78	Caroline Aguti	Uganda	Head Health Safety and Environment Unit	Ministry of Energy and Mineral

No.	Name	Country	Designation	Organisation
79	Clare Kaweesa	Uganda	Manager Legal and Compliance	Uganda Free Zones Authority
80	David Kiyingi Nyimbwa	Uganda	Commissioner Procurement Policy	Ministry of Finance, Planning and Economic Development
81	Dickson Musasizi	Uganda	Production Manager	Kazire Heath Products Ltd - Beneficiary/Presentation
82	Edson Twinomujuni	Uganda	officer	Uganda Cleaner Production Centre
83	Emmanuel Mubangizi	Uganda	Executive Director	AFRIBANANA
84	Evelyn Lutalo	Uganda	Environmental Safeguards Specialist	Ministry of Agriculture, Animal Industry and Fisheries
85	Fred Onyai	Uganda	International Monitoring and Evaluation Manager	National Environmental Management Authority
86	Hussein Wasswa	Uganda	Environment Officer	Southern Range Nyanza Textiles Ltd- Beneficiary/Exhibitor
87	Idro Phillip	Uganda	Executive Director	Upland Rice Millers (U) Ltd
88	Innocent Akampurira	Uganda	Technology Manager	Uganda National Council of Science and Technology (UNCST)
89	Isingoma Christopher	Uganda	Environment Officer	SkyFat Tannery Ltd
90	Ivan Masembe	Uganda	Membership Officer	Uganda Small Scale Industries Association
91	James Ludigo	Uganda	Technical Officer	National Cleaner Production Centre (NCPC)
92	Joshua Mutambi	Uganda	Commissioner, MSMEs Processing and Marketing	Ministry of Trade Industry and Cooperatives-
93	Jude Adrian Kabanda	Uganda	Managing Director	J.K Biomass and Machinery
94	Kabirizi Justine	Uganda	Programme Assistant	United Nations Development Programme (UNDP)
95	Kassim Semanda	Uganda	Senior Officer, MSMEs	Ministry of Trade Industry and Cooperatives
96	Kiberu George	Uganda	Production Manager	Sanatos Foods (U) Ltd
97	Kwamya Wilson	Uganda	Assistant Resident Representative	United Nations Development Programme (UNDP)
98	Lwanga Kamulegeya Bashir	Uganda	Environment Officer	Century Bottling Co Ltd
99	Margaret Kyamulabi	Uganda	Director , Masupa Enterprises	AFRIBANANA

No.	Name	Country	Designation	Organisation
100	Mike Nsereko	Uganda	Director Policy, planning and Information	National Environmental Management Authority
101	Muturi Kimani	Uganda	Managing Director, Afribanana	AFRIBANANA
102	Muwonge Timothy	Uganda	Environment Officer	Sugar Corporation of (U) Ltd
103	Nathan Mununuzi	Uganda	Senior Environment Officer	Ministry of Water and Environment
104	Nellie Ssali	Uganda	Managing Director	Makika Sylze
105	Osinde Silver	Uganda	Environment Officer	East African Packaging Solutions Ltd
106	Otim John	Uganda	Environment Officer	Ogur Millers Ltd
107	Patrick Kashaki	Uganda	Director, Abakashaki Ecofriendly Ltd	AFRIBANANA
108	Prossie Kikabi	Uganda	Ag. Deputy Director, Business Development, Investment promotion and Development	Uganda Investment Authority
109	Regan Nkwisina	Uganda	Environment Officer	Igara Growers Tea Factory Ltd -Beneficiary/Exhibitor
110	Richard Mugambwa Mukasa	Uganda	Project Manager	National Environment Management Authority (NEMA)
111	Robert Waiswa Mpakibi	Uganda	Assistant Commissioner, Cooperatives Development	Ministry of Trade Industry and Cooperatives
112	Robert Zaali	Uganda	Environment Officer	Kayonza Growers Tea Factory Ltd-Beneficiary/ Presentation
113	Samuel Musoke	Uganda	Managing Director	Noah's Ark Worldwide
114	Samwel Kasaato	Uganda	Director, Maama Heat Ltd	AFRIBANANA
115	Simon Nabyama	Uganda	Senior Procurement Officer	Ministry of Finance, Planning and Economic Development
116	Ssebagala Silver	Uganda	Executive Director	National Cleaner Production Centre (NCPC)
117	Ssekajja Peter	Uganda	Officer	National Cleaner Production Centre (NCPC)
118	Stella Komukama	Uganda	Officer	Directorate of Water Development, Ministry of Water and Environment
119	Tom Okurut	Uganda	Executive Director	National Environmental Management Authority

No.	Name	Country	Designation	Organisation
120	Twine Teddy	Uganda	National Coordinator, SWITCH Africa Green programme	United Nations Development Programme (UNDP)
121	Veronica Namwanje	Uganda	Executive Director	Uganda Small Scale Industries Association (USSIA)
122	Chikumbi Chungu	Zambia	Technology Audit and Validation Specialist	National Cleaner Production Centre (NCPC)

Sustainable Tourism

Integrated Waste Management

Sustainable Agriculture

United Nations Environment Programme (UNEP)
Africa Office,
NOF Block 2, Level 1, South Wing
P.O. Box 30552- 00100
Nairobi, Kenya

SWITCH Africa Green
Website: https://www.unep.org/switchafricagreen
Facebook: switchafricagreen
Twitter: @switchafrica
Email: info.switchafricagreen@un.org

UN environment programme

switchafrica GREEN

Funded by the European Union