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Assessment of Women Livelihoods within the Climate-Smart sector

Final report

April 2025

Open Capital

UKaid from the British people

Transforming Energy Access

Shell Foundation

Disclaimer: This material has been funded by UK aid from the UK government; however the views expressed do not necessarily reflect the UK government's official policies.

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List of abbreviations and acronyms

Abbreviation	Definition
AFAWA	Affirmative Finance Action for Women in Africa
AfDB	African Development Bank
Ag	Agriculture
BDS	Business Development Services
CBOs	Community-Based Organisations
E2W	Electric Two-Wheeler
E3W	Electric Three-Wheeler
E4W	Electric Four-Wheeler
EV	Electric Vehicle
FGD	Focus Group Discussion
GEAPP	Global Energy Alliance for People and Planet
GOGLA	Global Off-Grid Lighting Association
ICE	Internal Combustion Engine
IEA	International Energy Agency
LCV	Light Commercial Vehicle
LIW	Low-Income Women
ME	Microenterprises

Abbreviation	Definition
MFI	Microfinance Institution
MSME	Micro, Small, and Medium Enterprises
MSW	Municipal Solid Waste
Mt CO_2eq	Metric Tons of CO_2 Equivalent
NGO	Non-Governmental Organisation
OCA	Open Capital
OGS	Off-Grid Solar
PayGo	Pay-As-You-Go
PPE	Personal Protective Equipment
PUE	Productive Use of Energy
QC	Quality Control
SDG	Sustainable Development Goal
SF	Shell Foundation
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering, and Mathematics
TA	Technical Assistance
VSLAs	Village Savings and Loan Associations

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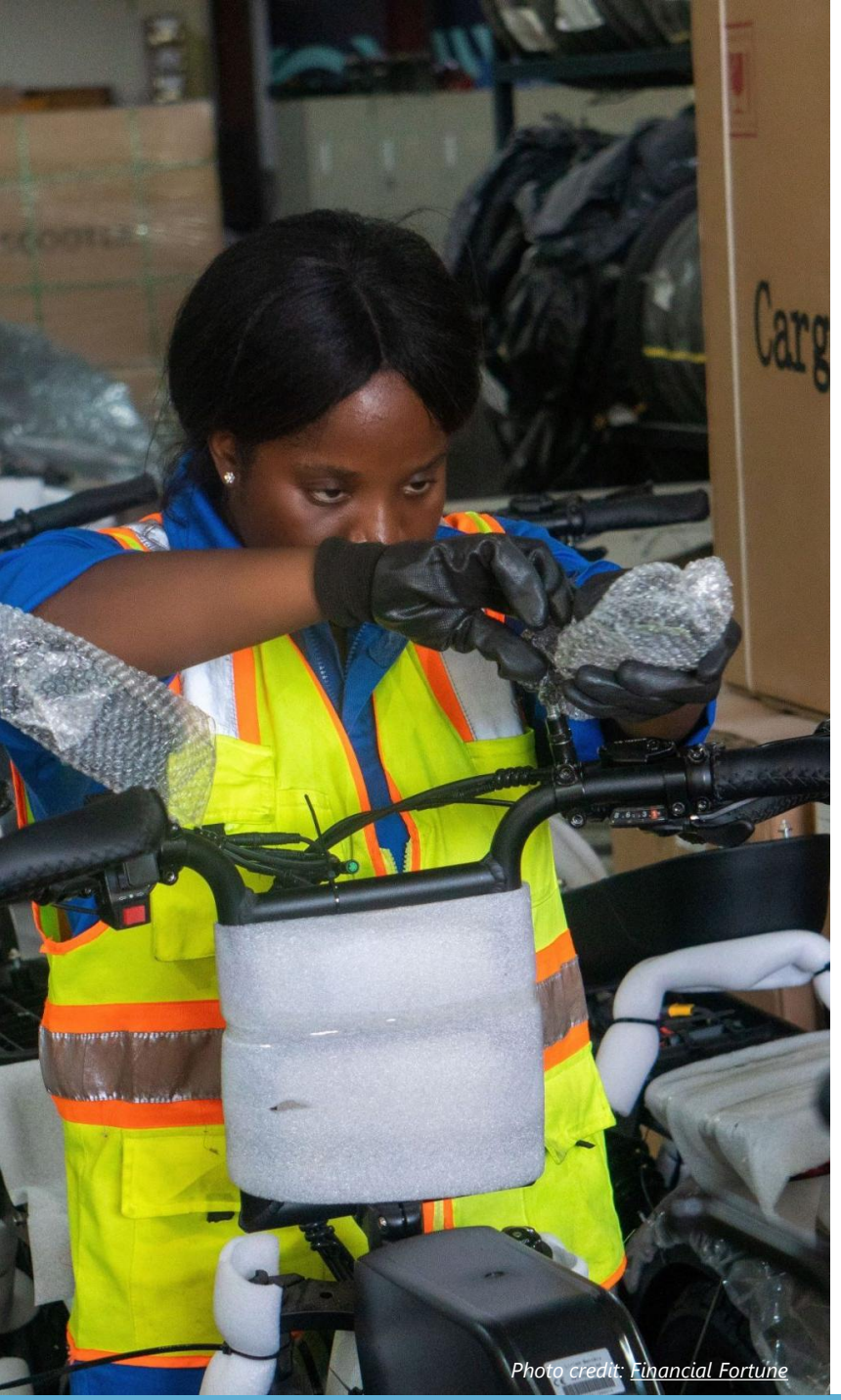

Photo credit: Financial Fortune

Executive summary

Women inclusion in the climate-smart sector can support climate resilience, reduce poverty and enhance productivity in the sector

Research objectives

SF engaged OCA to develop a market landscape report to identify and assess employment and entrepreneurship opportunities in the climate-smart sector for low-income women across SSA

Focus geography Sub-Saharan Africa

Target beneficiaries Low-income women

Introduction

- Although Africa **contributes just 4% of global greenhouse gas emissions**, it is among the **hardest hit by climate change**, facing severe threats from extreme weather events. These adverse effects place immense strain on economies and endanger lives, underscoring the urgent need for resilient, sustainable solutions[1]
- Low-income women **are currently underrepresented in climate smart livelihood jobs across SSA** due to barriers such as limited access to education, training, and resources
- Integrating women into climate-smart roles can drive **innovative solutions, boost income for low-income women, reduce poverty, and build resilience**
- This aligns with SF's strategy, targeting smallholder farmers, micro-entrepreneurs, and urban transporters with **initiatives that aim to increase their incomes by >20%**
- Addressing these barriers and supporting low-income women's participation in the climate-smart **sector enhances sectoral productivity, boosts local economies, and fosters more sustainable solutions,** enabling women to thrive, and strengthen SSA's overall climate resilience

4% *Africa's contribution to greenhouse gas emissions[1]*

80% *Women displaced by a climate crisis in SSA[2]*

32% *Full-time jobs in the renewable energy sector held by women[3]*

Definition of climate-smart livelihoods

Climate-smart livelihoods is defined as entrepreneurship and employment (including both formal and informal jobs) that contribute to climate change adaptation and mitigation

Sources: 1) Al Jazeera (2023), How much does Africa contribute to global carbon emissions?, link; 2) Interaction (2022), 5 Reasons Why the Climate Crisis Affects African Women More Than African Men, link; 3) AFDB & UN Women (2021), Green Jobs for Women in Africa, link

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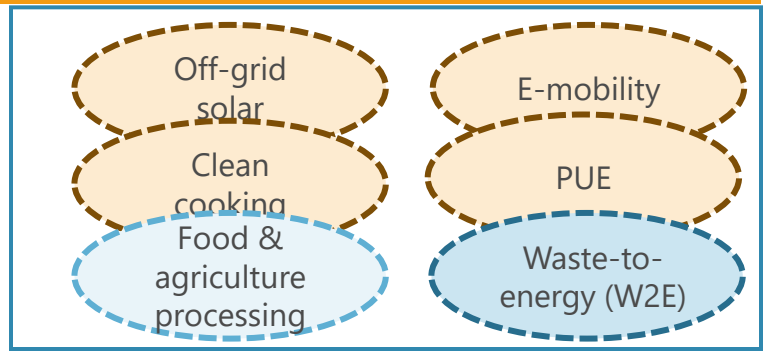
We prioritised value chains and activities based on scale, impact, preferences of low-income women and opportunity

Value chain mapping

Value chain mapping prioritisation

We prioritised the six value chains (as shown on the right) due a number of factors:

- Large current market size, or in some instances, such as e-mobility, the potential growth of the market
- Favourable policies and initiatives, fostering growth and opportunity in that value chain
- High impact on both the local community and on women end customers given the increased participation of women in these sub-sectors with these characteristics
- Other factors such as the high intensity of the workforce, providing more job opportunities, with often high informal sector which can be more accessible to low-income women



Value chain opportunities

Within these value chains, there are many opportunities for low-income women in both full-time jobs and entrepreneurship that have been prioritised*

Sales agents & customer service reps: across OGS, clean cooking, PUE and waste-to-energy women can play a critical role as sales agents and customer service representatives, particularly where women are the end customer, in hard-to-reach areas, and where the product requires limited training or education to sell

Operators and technicians: with the relevant training, low-income women can excel in technical roles, particularly for products that are less complex (e.g. OGS and clean cooking); women have anecdotally been found to be more productive and effective in these roles

Food vendors: these micro-enterprises (MEs) play a vital role and are attractive for women due to their flexible working hours increasing the ability to manage work around family and household responsibilities

Drivers: women are currently significantly underrepresented due to gender perceptions and safety concerns. There is opportunity to increase penetration from below 5% to above 10%, which has been seen by some employers with relevant training, sensitization and intentionality

Artisanal food processors: significant opportunities for low-income women given current presence in agriculture, provided they have access to funding for relevant energy assets and market linkages to end customers

Bio-waste collectors and sorters: as waste-to-energy continues to be a focus, there is an opportunity for women to be employed as collectors and sorters for bio-waste to be supplied to W2E companies, or can create MEs to become waste aggregators across multiple suppliers

*Notes: *Based on potential earnings, resilience of activity, interest from women, potential scale of activity, business case for a company to hire women, level of cultural hurdles and the level of training required*
Sources: OCA consultations

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We estimated 455K – 1.2M jobs for low-income women by 2030; countries prioritised based on scale, opportunity and policies

Market sizing

We estimated the potential total number of new formal and informal jobs for low-income women across the prioritised value chains by 2030

455K – 1.1M
Total new low-income jobs for women by 2030

- ***75K – 175K*** *In off-grid solar*
- ***10K – 40K*** *In PUE*
- ***65K – 125K*** *In clean cooking*
- ***30K – 175K*** *In e-mobility*
- ***120K – 250K*** *In food & ag processing*
- ***20K – 85K*** *In waste-to-energy*
- ***100K – 220K**** *In mini-grids*

- There is a large opportunity for low-income women in the informal sector given the low entry requirements and less-skilled roles
- Assumed opportunity for 32% of women, although expect that to be higher in some roles, such as artisanal food processors, and lower in other roles, such as EV drivers
- Large opportunity in clean cooking and a driver in waste-to-energy stems from the increase in access to clean cooking expected between now and 2030
  - Other drivers of W2E opportunity from collection of waste
- OGS, PUE and mini-grid sector opportunities driven by the large rural electrification goals across sub-Saharan Africa
  - PUE jobs consider solar water pumps and refrigerators with modest assumptions on growth of sales in these sub-sectors given the lack of affordability in the consumer base and slow uptake of these products
- E-mobility opportunity driven largely by the large increase of E2W expected in SSA, presenting opportunities for drivers of these e-vehicles. Note we applied a 5-10% female participation given gender perceptions and safety concerns which affect this sector
- Large opportunity in food and ag processing to be driven by the use of solar-power agro-processors and increase in solar powered street vendors

Country prioritisation

We prioritised five countries within SSA with the most potential for job opportunities for low-income women:

- **Kenya:** large scale of opportunity, favourable market opportunities across climate-smart sectors, relatively high SDG gender equality index & favourable gender inclusive, renewable and climate policies
- **Nigeria:** largest scale of opportunity, generally favourable market opportunities across climate-smart sectors and strong renewable & climate policies, however, low SGD gender equality index and gender inclusive policy score
- **Tanzania:** high scale of opportunity, favourable market opportunities across climate-smart sectors, strong climate & renewable policies and high SGD gender equality index despite low gender inclusive policy score
- **Ethiopia:** high scale of opportunity, strong potential in ag and waste-to-energy, although lower in OGS and clean cooking, strong renewable & climate policies, however, low SGD gender equality index and gender inclusive policy score
- **South Africa:** high scale of opportunity, strong potential in clean cooking, very strong SDG gender equality index & favourable gender inclusive, renewable and climate policies

*Notes: *Mini-grids not prioritised in value chain mapping, however, it was included in the market sizing at the request of Shell Foundation;*
Sources: OCA consultations

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Despite existing potential to create jobs for low-income women, there is a need to solve workplace and entrepreneurial challenges

While there is a large opportunity within the climate-smart sector to provide employment for low-income women, there are various ecosystem and workplace specific issues that need to be address to unlock this potential

Challenges in jobs

Outreach and pipeline: Women face limited access to job information, social stereotypes that discourage STEM careers, and insufficient employer outreach to skilled low-income women

Hiring: Gender biases in job descriptions, interview questions, and a lack of female representation hinder women's hiring

Workplace features: Insufficient support for women's needs, limited visibility, and security risks restrict women's participation in the workplace

Entrepreneurship challenges

Funding: Women struggle to secure funding due to lack of collateral, restrictive criteria, reliance on community savings, and limited awareness of funding options

Market access: Limited networks, logistical challenges, cultural biases, high transportation costs, and restricted mobility make it harder for women, especially in rural areas, to reach customers.

Access to Business Development Services: Limited access to essential business training restricts women's growth opportunities

Cross-cutting challenges

Social norms and self-perception: Cultural expectations, caregiving responsibilities, and self-doubt limit women's participation in technical roles and career advancement

Knowledge and skills: Lack of education, training, financial support, and practical training options, combined with family duties, restrict women's career entry and growth

Mentorship: Limited access to mentorship, few female role models, and scarce networking opportunities hinder women's development

Access to resources: Restricted access to market data, equipment, and land ownership impedes women's growth

Information asymmetry and data gaps: Misconceptions and poor information flow prevent women from accessing opportunities and companies from seeing the benefits of hiring women

Regulatory environment: Weak sexual harassment laws and restrictions on women's activities limit job access and career advancement for women

*Note: * Minigrids were not prioritised for the value chain mapping but are included in the market sizing*
Source: OCA analysis

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Effectively designing and implementing these programs can increasing women's participation and income generation

Recommended programmes

Training and partnership for talent offtake: Create strategic partnerships with private companies to co-design training programme that offers low-income women relevant skills and potential job opportunities

Company financial and TA support: Create a fund to provide impact linked funding to companies and provide gender mainstreaming support

Business financing: Partner with MFIs to increase access to finance for low-income women through creating relevant products credit risk assessment, guarantees and concessional financing

Awareness campaigns: Enhance awareness of SF programmes and broader employment opportunities through on the ground campaigns and working with local communities

Networking and collaboration: Foster collaboration between development and implementing partners to share learnings and enhance collaboration

Design recommendations

User-centric design: Understand and cater to the nuances and challenges of low-income women, considering that situational and cultural nuances may affect the outcome and impact

Accessibility: Consider access to the intervention, whether it be ensuring awareness events are in accessible locations or ensuring online training can be completed via SMS on a non-smart phone

Patience: Achieving normative and social change requires time, flexibility, and patience and behaviour change is required to occur among the stakeholders to witness large-scale impact

Involving men: Men play a key role in ensuring the success of women-targeted interventions by encouraging women's participation in the sector

Proactivity: Leveraging insights from more established sectors when designing programmes in new and expanding sectors

Data collection: Utilise data collection to prove the business case of increasing women in the climate-smart sector and tracking the successes and challenges of implemented programmes

Feedback loops: Create thought-through and human-centered feedback loops, allowing programme participants to share feedback and to allow for collection of baseline data

If designed and implemented effectively, these programmes could unlock significant opportunity for low-income women to participate in the climate-smart sector, increasing the scale of livelihoods and potential for income for these women, while contributing to climate resilience across SSA

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Proving the economic benefit, providing agency & choice and meaningfully engaging men can support gender inclusivity

Focusing on the business case for supporting women

- While donors see the intrinsic impact of supporting women in the climate-smart sector, businesses need it to make economic sense for these programs to survive beyond initial donor funding; therefore, proving the business case for different interventions is crucial. Donors and businesses must work together to achieve this:
  - Donors can (1) provide **technical assistance and financial support** to companies; (2) enable **skill development, confidence building and mentoring** for women; (3) create **networks and channels** between these two groups and (4) provide support to **prove, document and disseminate the business case** for hiring more women
  - **The private sector should provide input and support** (e.g. to develop training content) to ensure **interventions are designed correctly** to enable the economic benefit and that benefit is documented effectively as well as being intentional about hiring qualified women from these programmes

Empowering women through agency and choice

- **Confidence building, skill development, mentorship and network access** should be combined to **provide agency and encourage women to try, and then support them to succeed** in roles that society may not ordinarily tell them they can do
- A practical way to do this is providing a training and network platform (*see Training & Partnership recommendation*) that offers **multiple different career paths where women can choose based on their skills and interests**, rather than providing them only one option to earn an income, increasing the likelihood of success in this chosen career path

Practical Action support women through agency / empowerment, mentorship & network access. They are seeing a shift in terms of the types of roles that women are participating in, with some of their trainees taking up important roles in the community

Meaningfully engaging men in gender projects

- Men and the broader family ecosystem can be barriers to implementing successful projects as **empowering females can often lead to a feeling of disempowerment for the men** in their lives
- These stakeholders can also be **enablers to encourage and provide agency** to women if they are integrated into the programme and can see its benefits in their life as well as their family's life
- Most projects focus on women as the ultimate beneficiary and there is an **opportunity to view men and the wider family as a beneficiary of the programme** as well, **onboarding and actively including them from the design phase of a programme**

40% of the female EV riders that interviewed as part of the focus groups were encouraged to join the role by a man in their lives

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This requires adapting jobs for women and sustained effort, investment and systems shifts to create long-term impact

Adapting jobs for women, not just women for the job

- Rather than only thinking about how to train women to have the right skills for a particular job, it is important to **adapt that particular job to attract and retain women**, who, anecdotally, work efficiently and effectively in these roles
  - This might include **adapting equipment** for women (e.g. having gloves for female sized hands or helmets that can fit over long braided hair) or adapting the work environment to mothers, for example **introducing a childcare program**, or enabling more **flexibility / working from home** (e.g. allowing a sales agent to take some units home so they can continue to sell past working hours or through digitisation)

An example of a company that has benefited from this mentality is Burn Manufacturing, who have women as over 50% of their production staff by providing a conducive working environment including childcare, recognition programmes, coaching and mentoring, maternity leave and flexible working for new mothers. This has been highly beneficial to BURN because women are quality conscious, diligent and have a higher retention rate[1]

Long-term, systemic change

- **There are many systemic issues** as to why low-income women are not more involved in the climate-smart sector
  - These issues include cultural perceptions and social stereotypes, family and household responsibilities, lack of education, training and financial support, limited mentorship and access to networks and gender biases in hiring and retention policies
- Stakeholders must recognise and appreciate that these challenges **require sustained effort, investment and systemic shifts** to create **long-term and resilient impact**
  - This might include intentionality from companies, effective training programmes, sensitisation and community outreach, additional funds to support women in this sector or advocating for policy change and these adjustments will take time to achieve the desired outcomes
- To combat these challenges and create impactful change, stakeholders should **articulate their long-term vision and objectives**, achieve **senior buy-in at the highest level** and approach the solutions with **flexibility and patience**
- When establishing visions and objectives, it is important to consider that increasing employment and entrepreneurship opportunities for low-income women should not only be about job creation but also **job quality and resilience,** which requires thoughtfulness on retention and career progression, income and growth potential as well as resilience of the industry

1. *wPower, link*

Photo credit: InfraCo AFRICA

Research objectives and methodology

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SF contracted OCA to understand the employment opportunities for low-income women in the climate-smart sector

Introduction and project objectives

Aim of research: This research has been co-funded with UK aid from the UK government through the Transforming Energy Access platform and aims to create knowledge that will support the Shell Foundation (SF) in structuring a programme that creates a pool of female-centric employment opportunities in the climate-smart sector, particularly focusing on low-income women as well as providing insights and recommendations for the broader sector

Shell Foundation has key objectives for this project:

- Identify the top 5 countries (in Sub-Saharan Africa) that provide opportunities for the growth of the climate-smart sector
- Identify value chains within the climate-smart sector that provide employment opportunities for low-income women
- Understand the current supply and demand of female workforce in the climate-smart sector within the identified value chains and the roles women are playing today
- Within the identified value chains, understand the scale of the opportunity and the range of incomes
- Understand both the opportunities and challenges in the supply and demand of employment in the climate-smart sector
- Identify what types of interventions are required to increase the participation of low-income women in the climate-smart sector

Scope of assessment

Region: Sub-Saharan Africa

Climate-smart sector: Climate-smart livelihoods is entrepreneurship and employment (formal and informal) that contributes to climate change adaptation and mitigation.

Low-income women: Women whose earnings fall below the living income, necessary to meet their basic living needs

Report audience: Donors, philanthropies, private sector and financiers

Type of employment: Full-time jobs and entrepreneurship

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We developed research questions to guide our work and will share our findings and recommendations in this report

Thematic areas	Key questions

Opportunity	• **Where is the most opportunity for low-income women to participate in the climate-smart sector?**
	• **What countries provide the most opportunity for low-income women to participate in the climate-smart sector?**
	• **What value chains provide the most opportunity for low-income women to participate in the climate-smart sector?**
	  • How resilient are these value chains from an economic and climate perspective?
	• **What activities provide the most opportunity for low-income women to participate in the climate-smart sector?**
	  • Why do low-income women gravitate towards these value chains or activities?
	• **What is that opportunity in terms of scale and income level?**

Challenges	• **What are the key challenges for low-income women in the workforce or in entrepreneurship?**
	  • What are the key challenges for low-income women entering and remaining in full-time employment?
	  • What are the key challenges for low-income women starting and succeeding in entrepreneurship?
	  • What are the key challenges that cut across both full-time employment and entrepreneurship?
	  • Do these challenges change in different scenarios?
	  • Rural vs Urban?
	  • Across countries? Religions?
	  • Across value chains and activities?

Interventions	• **What interventions can be implemented to support an increase in low-income female talent in the climate-smart sector?**
	  • Who are the key players that could implement these initiatives and what are their roles?
	  • What role does the Shell Foundation play?

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We conducted 22 stakeholder consultations and consulted 36 low-income women from Kenya in FGDs to inform our work

10 Private companies

6 Development partners

2 Investors

4 Industry experts

36
Low-income women consulted

Bomet:
- 8 participants in Bomet from Solar Sister
- Mostly involved in farming, solar sales, and clean cooking product sales.

Nairobi:
- 4 participants in Nairobi
  - 2 involved in solar installation
  - 2 involved in waste-to-energy

Nairobi (Kawangware):
- 18 participants in Kawangware
- Mostly involved in solar sales, and clean cooking product sales

Nairobi (Kilimani):
- 6 female participants in Kilimani
- Involved in the delivery of food and products as e-bike drivers

Special thanks to the Shortlist team, who also conducted a peer review on the final draft of the document

Sources: OCA consultations and FGDs

Photo credit: BURN

Country prioritisation

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We have used the following criteria to assess the green livelihood opportunities for women across 12 countries in SSA

Categories	Description	Criteria
Macroeconomic factors	• These factors determine a country's market potential, economic health and stability which provides the foundational economic conditions of a country that influence its suitability for climate-sector opportunities	• Population • Number of low-income women*
Market opportunity	• This category evaluates the potential scale of opportunity within each climate-smart sub-sector • We will leverage these criteria to identify and prioritise market opportunities, focusing on regions with high demand for climate-smart solutions and significant gaps in access to essential services	• Off-grid solar and appliance sales • Access to clean cooking • Size of ag, forestry & fishing • Total energy supply from bio-fuels and waste
Sociocultural indicators	• Social norms and cultural dynamics within a country influence gender equality and the participation of women in climate-smart sectors	• SDG gender equality index
Policy environment	• This category examines the regulatory and policy landscape of a country which influences the development, growth and success of climate-smart sectors • It can be assessed by evaluating climate-related policies and gender inclusive policies enacted by the government	• Gender-inclusive policies • Renewable energy policies

*Notes: *In this context, low-income women refer to those earning below a living income in a particular country*

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Proposed prioritised countries

We considered macro-economic, market opportunity, socio-cultural, and policy indicators to shortlist the top 5 countries

We have considered the potential markets across Eastern, Western, Southern, and Central Africa – *addition detail provided in the Appendix*

Country	Region	Macro-economic indicators	Market opportunity indicators	Socio-cultural indicators	Policy environment indicators	Total overall weighted score
Kenya	Eastern					3.67
Nigeria	West					3.48
Tanzania	Eastern					3.42
Ethiopia	Eastern					3.35
South Africa	Southern					3.16
Rwanda	Eastern					2.99
Uganda	Eastern					2.97
Ghana*	Western					2.88
DRC	Central					2.34
Senegal	Western					2.32
Zambia	Southern					2.22
Benin	Western					2.21
Cameroon	Central					2.11
Cote d'Ivoire	Western					2.07

Key:

- High
- Medium high
- Medium
- Medium low
- Low

Total weight allocation indicator:

25%	Macro-economic indicators
40%	Market opportunity indicators
15%	Socio-cultural indicators
20%	Policy environment indicators

*Notes: * Incomplete sales data; Sources: 1) World Bank (2023), Population, total - Sub-Saharan Africa, link; 2) World Bank (2023), Population, female - Sub-Saharan Africa, Low income link; 3) 2023 H2 + H1 calculated SHS system and appliance sales from the Global Off-Grid Solar Market Report Semi-Annual Sales & Impact Data, (GOGLA, 2023), link; 4) Calculated using the countries' 2022 clean energy access rate and population from ESMAP's Energy Progress Report, link, and the World Bank's population data for 2022, link; 5) Calculated using contribution of agriculture, forestry, fishing (Statista, 2022), link; and GDP in USD (World Bank, 2022), link; 6) International Energy Agency data on energy produced from bio-fuels and waste (2022), link; 7) SDG gender equality index (2022), link; 8) ESMAP gender inclusive policies data, link; 9) IRENA (2022), Policies and finance for renewable energy deployment, link; 10) ScienceDirect (2021), African climate change policy performance index, link*

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Photo credit: Alliance for Science

Value chain mapping

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We considered four main criteria to prioritise the climate-smart value chains with the most opportunities for low-income women

When prioritising sub-sectors we considered the following criteria:[1]

Size and growth potential

- Sectors with larger market size and strong growth potential are more likely to provide a higher number and wider range of job opportunities
- Many green sectors are expected to expand significantly, driven by increased financial investments, rising consumer demand, and technological advancements, stimulated by the global transition to a green economy[2]

Supportive policies and initiatives

- We also considered the supportiveness of the ecosystem for livelihood creation being driven by strong public or private sector stakeholders
- This includes policies, programs, or initiatives that address the effects of climate change and/or those aimed at promoting gender equality while addressing barriers to livelihood creation, particularly for low-income women

Impact on local communities

- Some sub-sectors have a more profound impact on local communities, especially when green jobs are created
- These sectors not only boost income for low-income households but also generate new opportunities in regions with limited economic prospects which enhances the economic resilience of communities, improves livelihoods and reduces vulnerability to external shocks such as climate change and economic instability

Gender of end consumers

- Sectors where women dominate purchasing decisions create significant livelihood opportunities for low-income women in last-mile distribution
- Programs in energy, health, and e-commerce show that empowering female distributors, especially in rural areas, is the most effective way to reach female consumers and boost economic empowerment[3]

Sources: 1) OCA analysis and consultations; 2) UN Women (2022), Green Jobs for Women in Africa Key Outcomes, link; 3) Mastercard Strive (2024), Women-centered models for last-mile distribution, link

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Prioritised value chains

Legend: High; Medium; Low

Climate-smart value chains were then assessed against these four criteria to identify the priority areas

Categories	Value chains	Prioritisation criteria*				Rank	Qualitative Factors *(if applicable)*
		Size and growth potential	Supportive policies and initiatives	Impact on local communities	Gender of end consumers		
Clean energy	Off-grid solar	🟢	🟢	🟢	🟢	High	Prioritised given high growth potential for roles within battery charging and absolute increase in drivers
	Clean cooking	🟢	🟢	🟢	🟢	High	
	PUE	🟢	🟡	🟢	🟢	High	
	E-mobility	🟢	🟢	🟡	🟡	Medium	
	Mini-grids	🟢	🟢	🟢	🟡	High	Deprioritised given majority of low-income roles are on long-term projects far from home which discourages participation from women
	Battery storage	🟡	🟡	🟡	🟡	Low	
	Solar generators	🟡	🔴	🟡	🟡	Low	
Nature based solutions	Food and agro processing	🟢	🟡	🟢	🟢	High	
	Ecosystem restoration	🟡	🟡	🟢	🟡	Low	
	Coastal / marine protection	🟡	🔴	🟡	🟡	Low	
	Water management	🟢	🟢	🟢	🟡	High	Deprioritised given limited private sector involvement. Note solar irrigation products (e.g. SWPs) covered in PUE value chain
	Forestry	🟢	🟡	🟢	🟡	Medium	
Circular economy	Waste to energy	🟢	🟡	🟢	🟢	High	
	Recycling	🟢	🟡	🟢	🟡	Medium	

** Prioritisation methodology is further covered in the appendices section*

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Suggested prioritised value chains

As a result, we identified six value chains with the highest opportunities for job creation for low-income women

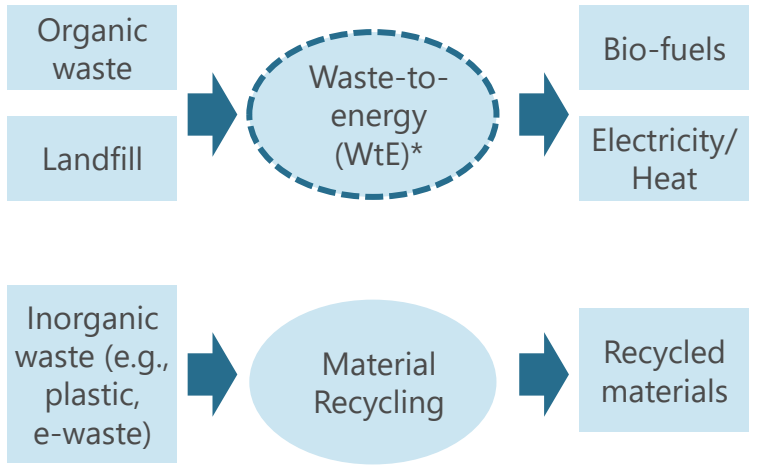
Clean energy

- Cooling
- Irrigation
- PUE
- Milling
- Appliances
- Clean cooking
- Off-grid solar
- E-mobility
- Mini-grids*
- Battery storage
- Solar generators

Nature based solutions

- Food & agriculture processing
- Ecosystem restoration
- Coastal / marine protection
- Water management
- Forestry

Circular economy



These priority value chains have many overlaps and interconnections as follows:

- **PUE and agriculture**: Some of the most common application of PUE are used in sustainable agriculture, such as solar-powered water pumps, mills, freezers, and fridges[2]
- **Waste-to-energy and clean cooking**: WtE plays a crucial role in providing fuel sources that can be used for clean cooking
- **Waste-to-energy and agriculture**: Agricultural waste plays a crucial role in the WtE process and one of the by-products of this process is fertiliser, which is used in agriculture[3, 4, 5]
- **Off-grid solar and clean cooking, PUE and e-mobility**: Energy generated through off-grid solar can powering electric cook stoves, PUE appliances, and can be used to charge electric vehicles and batteries[6, 7, 8]

**While mini-grid value chain has not been prioritised when doing the value chain analysis, mini-grids # of jobs has been included in the total # of jobs for low-income women in the OGS sector analysis*

Note: within waste-to-energy, the whole chain from organic waste collection to bio digestion to the sale of the by-products has been considered

Sources: 1) OCA analysis; 2) Africa Solar Industry Association (2023), Productive Use, link; 3) Environmental and Energy Study Institute (2017), Biogas: Converting Waste to Energy, link; 4) Rajendra et al. (2023), Socio-economic benefits of biogas for women in household cooking in Nepal, link; 5) Clean Cooking Alliance, Biodigesters, link; 6) ICLEI, (2021), Clean Cooking, link; 7) PV case (2023), Components of an off-grid solar power system, link; 8) SESA (2022), Sustainable e-mobility, link

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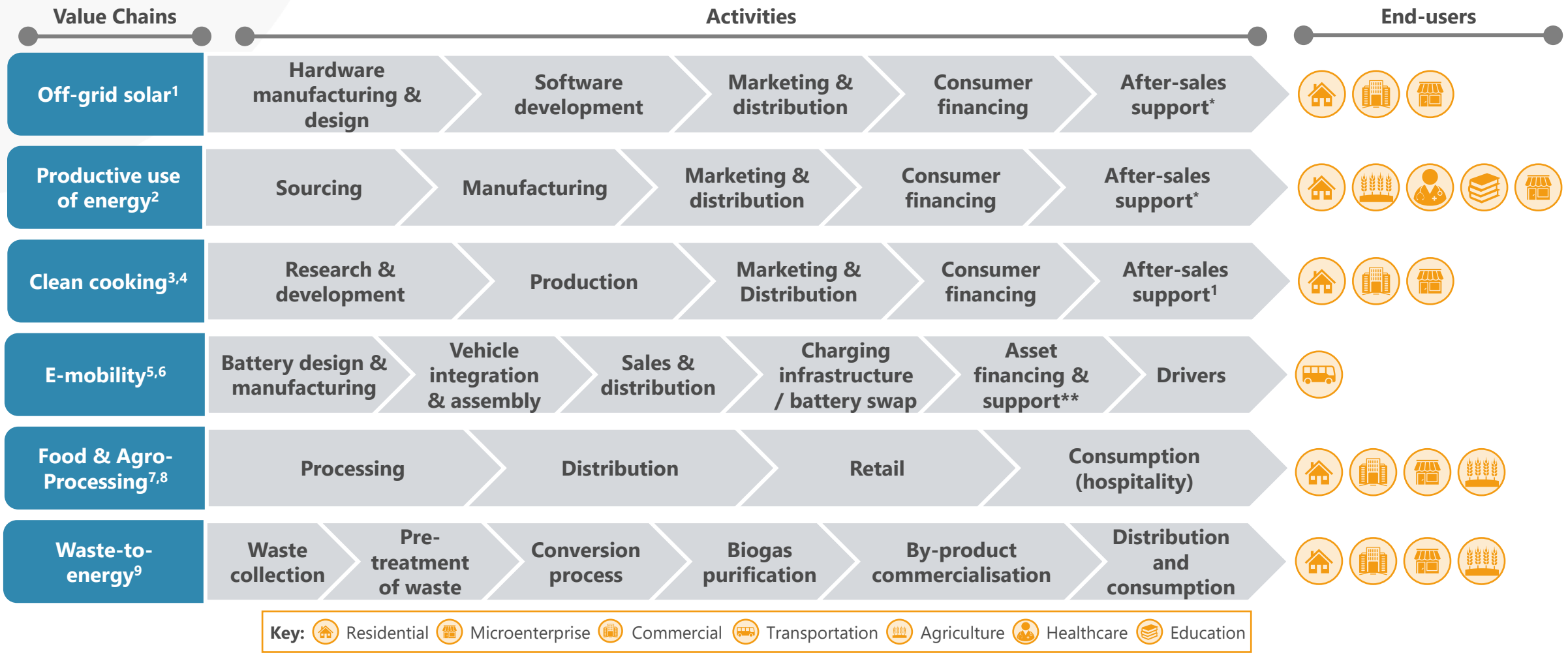
We then identified key activities in the selected climate-smart value chains to evaluate opportunities for low-income women



*Note:*Includes customer service, repair, maintenance, and payment collections **Includes servicing and maintenance, spare parts sales, EV rental, and ride-hailing*

Sources: 1) World Bank (2020), Off-Grid Solar Market Trends Report 2020 – link; 2) PREO (2021), Knowledge Guide: Equipment Procurement, link; 3) The State of the Global Clean and Improved Cooking Sector – link; 4) Unit Economics Framework and Analysis for the Clean Cooking Sector – link; 5) Dalberg (2023), Catalyzing investment in skills for Africa's electric mobility ecosystem, link; 6) Open Capital consultations; 7) Malhotra SK, Saran A et.al (2023). Protocol: Value chain interventions for improving women's economic empowerment: A mixed-method systematic review, link; 8) AGRA (2021), Women in agribusiness value chains in Africa; 9) GiZ (2017), Waste-to-Energy Options in Municipal Solid Waste Management, link

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Beyond employment in the value chains, climate-smart solutions can boost the business potential of women-led microenterprises

Research focus

- This research **focuses on employment opportunities for low-income women within the prioritised value chains, rather than the end customers**
  - However, for **food & agriculture processing, waste-to-energy and E-mobility** value chains, we have also considered some employment opportunities that emerge from the use of climate-smart products. For example, jobs created using solar milling machines within food & agricultural processing or the use of e-vehicles to create jobs for drivers
- While this research's primary emphasis is on employment created within the value chains, it is crucial to recognise that the use of **climate-smart products can also empower women-led microenterprises, improving their livelihoods** across various applications, as highlighted below:

Off-grid Solar

OGS products offer significant empowerment for women-led micro-enterprises in SSA by providing reliable and sustainable power, especially in areas with limited or non-existent grid connections, thus allowing them to generate income within service sectors that require power.[1,2] Research shows that 1 in 5 people utilise energy access to start or grow a business.[3] For example, a solar home system can be used by a female hairdresser with limited access to the grid, to serve customers consistently and grow her business

Productive Use of Energy

PUE appliances enable women-led micro-enterprises in SSA by enhancing their productivity and increasing income opportunities.[4,5] Appliances such as solar freezers and water pumps directly address critical business needs across sectors like agriculture, retail, and food services—for example, solar freezers can enable women to cool and sell soft drinks or beverages in their locality, while solar water pumps improve crop irrigation for small farmers, increasing yield and income potential

Clean Cooking

Clean cooking solutions empower women by reducing the time spent on cooking and collecting firewood, which can be over four hours a day, thus allowing more time to be spent on business activities.[6] For example, a female food vendor can utilise clean cooking to attend to more customers and increase her revenue. Furthermore, the less time women spend on household tasks such as cooking and collecting firewood, the more time they have to pursue livelihood opportunities

Waste-to-energy (WtE)

WtE solutions can improve the livelihoods of women-led enterprises, especially for women farmers in SSA by supplying bi-products that can be used as bio-digestate and bio-fertiliser. For example, utilising organic waste to create fertilisers from bio-digestion can reduce the amount women farmers need to spend on fertiliser as well as enabling them to engage in more sustainable farming

Sources: 1) OCA consultations and analysis; 2) European Investment Bank (2022), Solar power for rural Africa, link; 3) 60 Decibels (2024), Why Off-Grid Energy Matters 2024, link; 4) CrossBoundary Advisory (2024), Landscape Analysis & Market Sizing Report Results Based Financing for Productive Use Appliances to Promote Gender Outcomes, link; 5) Sun-Connect, (2023), PUE at the BoP: Three Approaches To Making Productive Uses Of Energy Accessible To All, link; 6) UNDP (2023), Empower women with clean, affordable cooking energy, link

Off-grid solar (OGS)

The OGS value chain is growing rapidly in SSA, driven significantly by the need for increased electricity access throughout the region

Key statistics

600M

Number of people without access to electricity in SSA[1]

60%

of the world's most effective solar resources are in Africa[2]

~50%

Percentage of employment opportunities in DRE come from off-grid solar[8]

Sector overview

- In Sub-Saharan Africa (SSA), around **53%** of the population **lacks access to electricity** equating to over 600 million people[1]
- However, Africa holds the highest solar energy potential globally, **having 60% of the world's best solar resources,** thus making solar energy a highly attractive and viable electricity solution[2,3]
- Due to its accessibility, affordability and decentralised nature, the **OGS sector in SSA has been growing**, providing a sustainable solution for meeting the energy needs of underserved areas with limited access to reliable grid electricity[4,5]
- This growth has been further **fueled by pay-as-you-go (PayGo) consumer financing models**, enabling bottom-of-the-pyramid consumers to afford OGS products[6,7]
    - It is estimated that over 40% of OGS lighting sales in SSA are made via PayGo[7]
- The growth of the OGS sector in SSA poses significant job creation opportunities; it was estimated in 2020 that roughly **half of the employment opportunities in the renewable energy sector** in SSA stem from the OGS photovoltaic (PV) sector[8]
- As of 2019, around **27% of full-time equivalent jobs** in the OGS sector **were held by women**, significantly higher than the representation of women in other climate-smart sectors[9]

Focus sub-sectors

Pico Solar: Portable solar-powered products, such as lanterns, light bulbs, radios, fans and mobile phone chargers. *We have seen many female MEs selling these products given they are most affordable*

Solar Home Systems: Off-grid standalone solar energy systems designed to provide electricity for typically for home appliances, and consist of solar panels and batteries

Note, minigrids have not been considered as part of OGS for the value chain mapping

Sources: 1) UNCTAD (2023, Commodities at a Glance, Special issue on access to energy in sub-Saharan Africa, link; 2) IEA (2022), Africa Energy Outlook 2022, link; 3) World Economic Forum (2022), Africa is leading the way in solar power potential, link; 4) RatedPower (2023), Solar energy in Sub-Saharan Africa: 5 trends driving the growth, link; 5) European Investment Bank (2021), Solar power for rural Africa, link; 6) Lucy Baker (2022), New frontiers of electricity capital: energy access in sub-Saharan Africa, link; 7) Power for All (2022), Off-grid PayGo: Unlocking Affordable Energy Access and Financial Inclusion in SSA, link; 8) IFC Energy2Equal (2022), Women's participation in the renewable energy workforce in Sub-Saharan Africa, link; 9) GOGLA (2019), Energizing job creation: employment opportunities along the off-grid solar value chain, link

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Priority employment roles for low-income women

OGS can provide employment opportunities for low-income women, particularly in last-mile distribution & after-sale services

Off-grid solar (OGS) value chain[1, 2]

Hardware manufacturing & design	Software development	Marketing & distribution	Consumer financing	After-sales support
Product designer	Software engineer	Sales Agent	Microfinance specialist	Customer service rep
Assembly Line Worker	Product manager	Wholesaler	Loan officer	Warranty administrator
Quality Control Specialist	User Interface (UI)/User Experience (UX) Designer	Transporter / Driver	Collections officer	Maintenance technician
Engineer	Data Analyst	Installer		

Installers & maintenance technicians: There is limited participation of low-income women in these roles versus non-technical positions, due to the higher barriers to entry in terms of skills, employer biases, personal job preferences, and restrictive gender norms[1]

- However, there are opportunities for low-income women in technical roles for less complex products, such as in installing solar home systems, if they are provided the right training[1]

Sales agents, collection officers & customer service representatives: Women also play a crucial role as sales agents and after-sales support agents of OGS products due to their deep understanding of household energy needs and ability to connect with female customers - a study found that female sales agents who received the right training, achieved 45% more sales by volume and 52% higher revenues than their male counterparts[3,4]

- However, these roles have high churn and are generally commissioned based which can lead to undignified salaries for women

Assembly line workers: Most companies in this sector in SSA import their products from abroad and therefore do not manufacture locally. This means there are limited opportunities for lower-skilled labour in manufacturing within SSA, and hence none of these jobs have been prioritised

Transporter or driver: While women can work as drivers within the value chain, the opportunity can be limited in scale for drivers who focus solely on transporting OGS products and should be considered more widely with other transportation opportunities

"We [women] are open to climbing roofs to install solar panels if there are safety programs "

Sources: 1) OCA analysis and consultations; 2) ESMAP (2022), Gender Equality in the Off-grid Solar Sector, link; 3) GOGLA (2019), Energizing job creation: employment opportunities along the off-grid solar value chain link; 4) GOGLA, Celebrating Women Leaders in the Off-Grid Solar Energy Industry, link

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Productive use of energy (PUE)

PUE in SSA is nascent, though there exists an opportunity for growth, given the region's energy challenges and the benefit of PUE

Key statistics

~30,000

Solar water pumps and solar refrigerators reported to be sold in 2023 in SSA and South Asia[10,11]

~1%

Potential market reached for solar water pumps and refrigerators globally in 2024, posing a huge opportunity to build this market[5]

~$11.3 Bn

Potential PUE addressable market in SSA in 2019[7]

Sector overview

- Per capita electricity consumption in Sub-Saharan Africa (excluding South Africa) is just 124 kWh per year—**a fraction of high-income countries' rates and just enough to power three light bulbs for a month**[1,2,3]
  - This rate falls significantly short of a recommended 1,000 kWh per person per year needed for productivity, limiting substantial economic activities and growth in the region[1,4]
- Given the energy access challenge in SSA, decentralised solutions, like off-grid solar are helping to power productive activities, **driving the demand for PUE appliances;** as a result, **more PUE companies are emerging across the region to meet this growing need**[1]
- The PUE market is **still in its early stages**, with GOGLA reporting 23,000 solar water pumps and 7,000 solar refrigerators sold in SSA and South Asia in 2023—in stark contrast to the 9.5 million traditional solar kits sold in 2022 alone.[6,10,11] It is estimates that both markets have only reached 1% of their market potential over the last five years; however, **this poses a significant growth opportunity**, as the PUE sector in SSA has a potential addressable market of USD 11.3 Bn[5,7]
  - The limit in achieving scale is **attributed to factors such as affordability and limited consumer awareness**; however, due to the benefits of PUE, there is strong support from programmes and donors to grow the market and address consumer challenges[1,8,9]
- It is noteworthy to reiterate that this analysis focuses on employment opportunities for low-income women within the PUE value chain, rather than the end customers using PUE

Focus sub-sectors

Cold storage: Primarily used in the food retail sector for perishable food commodities e.g. cold rooms, fridges, freezers and ice machines

Solar water pumps: predominantly used for land irrigation in the agriculture sector

Sources: 1) OCA analysis and consultations; 2) WRI (2024), A New Solution to Power Africa, link; 3) Africa Energy Portal (2018), Sub-Saharan Africa Power 2018, link; 4) Energy for Growth Hub (2020), The Modern Energy Minimum: The case for a new global electricity consumption threshold, link; 5) Energy for Access (2024), Leave No One Behind Bridging the Energy Access Gap With Innovative Off-grid Solar Solutions, link; 6) Next Billion (2024), Under-Leveraged Best Practices for Scaling PUE appliances: Part 1 – Sales Support and Market Access, link; 7) IFC (2019), The Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa, link; 8) GOGLA (2022), Off-Grid Solar Market Trends Report 2022: State of the Sector, link; 9) BGFA (2023), Scaling productive use of energy solution in Africa, link; 10) GOGLA Global Off-grid solar market data Jan-June 2023, link; 11) GOGLA Global Off-grid solar market data June-Dec 2023, link

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Priority employment roles for low-income women

The PUE sector provides job opportunities for low-income women and is important for increasing revenues for micro-entrepreneurs

Productive use of energy (PUE) value chain[1, 2]

Sourcing	Manufacturing	Marketing & distribution	Consumer financing	After-sales support
Raw material procurement specialist	Product designer	Distribution manager	Microfinance specialist	Customer service rep
Supply chain manager	Assembly Line Worker	Wholesaler	Loan officer	Warranty administrator
Transport and logistics coordinator	Quality Control Specialist	Sales Agent	Collections officer	Maintenance technician
	Engineer	Transporter / Driver		

Sales agents, collection officers & customer service representatives: The potential activities for low-income women's participation within PUE are similar to the OGS value chain

- Women play a significant role in the agriculture sector across Sub-Saharan Africa and given that PUE appliances are often sold within this sector, coupled with women's effectiveness in selling to and engaging other women in the climate-smart space, they are well-positioned to excel in PUE consumer-facing roles[1,3]

Maintenance technicians: It is noteworthy though, that some of the PUE technologies have higher technicality, leading to higher barriers to entry in the more technical jobs

Assembly line workers: Most PUE products are produced outside SSA, so while local manufacturing jobs are relevant, they present limited opportunities due to the absence of domestic production opportunities[1]

"While selling PUE products can be technical, with the right training, regular salespeople, including low-income women, can successfully become skilled PUE sales agents and thrive in this role"

Sources: 1) OCA analysis and consultations; 2) PREO (2021), Knowledge Guide: Equipment Procurement, link; 3) IFC Energy2Equal (2021), Women's participation in the renewable energy workforce in Sub-Saharan Africa, link

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Clean cooking

Clean cooking sales in SSA are currently very low but growing, presenting major job creation potential

Key statistics

950M

Number of people without access to clean cooking in SSA (2021)[1]

~20%

Clean cooking access rate in SSA (2021)[3]

900 Mt CO_2eq

Potential CO2 savings from achieving clean cooking access in SSA by 2030[6]

Sector overview

- SSA has the **world's lowest clean cooking access rate** at **20%,** with over **950 million people** relying on traditional biomass and inefficient stoves[1,2,3]
  - Between 1990 and 2022, the clean cooking access deficit in SSA **increased more than two-fold** mainly due to rapid population growth outpacing necessary investment[1,2]
- Traditional cooking methods poses severe health risks, especially for women, who spend significant time gathering fuel, reducing their opportunities for education and income generation[4,5]
  - These challenges, among others, are expected to **drive the demand for clean cooking products**[1]
- Achieving universal clean cooking access can significantly impact climate goals, potentially reducing up to 900 million tons of CO_2 emissions in SSA by 2030—out of the global 1.5 billion tons; **as a result, there is strong support from the development sector to help companies in this space grow and expand supply**[6]
- Given the push for increased clean cooking access across SSA, the sector has the potential to significantly contribute to job growth within the region[1]

Focus sub-sectors

Clean cookstoves: Cookstoves designed to reduce the amount of harmful fuels used in cooking and the emissions released into the air, and include electric stoves and improved biomass stoves

Clean cooking fuel: Fuels such as liquefied petroleum gas (LPG), natural gas, biogas, electricity, and solar, used to power clean cooking stoves

Sources: 1) OCA analysis and consultations; 2) World Bank (2024), Tracking SDG7: The Energy Progress Report, link; 3) ESMAP (2022), Energy Progress Report, link; 4) Bailey E. Glenn et al (2022), Ambient air pollution and non-communicable respiratory illness in sub-Saharan Africa: a systematic review of the literature, link; 5) SDG Action (2023), The lack of gender targets for clean energy is harming women and girls, link; 6) IEA (2021), SDG7: Data and Projections- Access to clean cooking, link; 7) IEA (2023), A Vision for Clean Cooking Access for All, link

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Priority employment roles for low-income women

Clean cooking provides employment opportunities for low-income women across each stage of the value chain

Clean cooking value chain[1, 2, 3]

Research & development	Production	Marketing & distribution	Consumer financing	After-sales support
Product designer	Production manager	Distribution manager	Microfinance specialist	Customer service representative
Product development specialist	Assembly line worker	Transporter / Driver	Loan officer	Warranty administrator
	Engineer	Wholesaler	Collections officer	Maintenance technician
	Local artisan	Sales agent		

Sales agents, collection officers & customer service representatives: Women are the primary end-users of clean cooking technology, making them highly effective sales and after-sales agents; their ability to connect with customers has been demonstrated in studies, which show that women sell nearly three times more stoves than men[2,4,5]

- Women are reliable promoters for household products within their communities and can access hard-to-reach households, particularly in conservative cultures, thus significantly expanding their influence and market reach[4]

Assembly line workers and local artisans: Women's participation in technical roles within production is low, due to the labour intensity of technical tasks. While there is limited cookstove production in SSA currently, there have been some government and company initiatives engaging women in local cookstove production and promoting local production, creating potential employment opportunities for low-income women[1,2,6]

Maintenance technicians: With the right training, low-income women can excel in more technical jobs, such as maintenance technicians, given the specialised knowledge needed and their underlying knowledge of the product[1]

Product designers: Women could also play a key role in product research and design, given their proximity to and understanding of the needs of the predominantly female end-users[2]

"Women play a great role as sellers of clean energy products, including clean cooking appliances, given the practicality of their marketing strategies and their ability to connect with their buyers through personal stories"

Sources: 1) OCA analysis and consultations; 2) Chih-Jung Lee et al (2021), Powering jobs: the employment footprint of clean cooking solutions in Kenya, link; 3) Global Alliance for Clean Cookstoves, Gender and Livelihoods World Bank BBL, link; 4) Global Alliance for Clean Cookstoves (2015), Gender and Women's Empowerment in the Clean Cooking Sector, link; 5) Global Alliance for Clean Cookstoves (2015), Understanding Impacts of Women's Engagement in the Improved Cookstove Value Chain in Kenya, link; 6) Livelihoods (2023), In defence of clean cookstoves, link

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E-mobility

E-mobility is rapidly growing in SSA, driven by emission concerns, renewable energy adoption, and demand for sustainable transport

Key statistics

27%
Growth of transport emissions in SSA[1]

27M
Number of ICE** 2&3W in SSA[2]

USD 25.4B
Estimated electric vehicle market in SSA by 2029[4]

Sector overview

- Emissions from transportation in SSA **increased by nearly 30% between 2010 and 2019, significantly surpassing the global average** growth rate of 16% during the same period[1]
  - **Efforts to decarbonise the sector are accelerating** to address the growing need to mitigate the impacts of climate change[1]
  - This has driven the shift to electric vehicles (EVs), particularly in SSA, where **urbanisation, rapid** population **growth, increased electrification, and rising financial investments** are reshaping the transportation landscape[5]
- There are almost 30 million internal combustion engines (ICE)** two- and three-wheelers (2W and 3W) in Africa and as of 2020 those that were **electric made up less than 1%[2]**
  - The expected rise in electric two- and three-wheelers (E2W and E3W) presents **opportunities for sustainable green livelihoods within the e-mobility value chain**
  - Start-ups in SSA are at the forefront of this exponential growth but still **face challenges in covering the cost** of purchasing electric vehicles and setting up charging points[6]
- Jobs related to **vehicle assembly, sales, battery charging attendants, maintenance/repair, and driving** are expected to grow significantly but cultural barriers such as gender stereotypes and societal expectations make these roles challenging for women[6]

Focus sub-sectors

Electric two- and three-wheelers (E2/3Ws): Affordable and efficient means of transport for short to medium distance in dense urban areas and remote rural areas

Electric four-wheelers (E4Ws) and Light Commercial Vehicles (LCVs): Carry heavier loads and, offer sustainable public transport options and are cost-effective in the long run

Electric buses: Offer sustainable public transport options and are cost-effective in the long run

*Note: *The estimated number of e-mobility jobs per FSD/Shortlist report on green jobs only considered E2Ws, E3Ws and charging stations – buses were not accounted for in this range; **Internal Combustion Engine vehicles are powered by engines that burn diesel or other fossil fuels to generate energy for motion.*
Sources: 1) SLOCAT, Africa Regional Overview, link; 2) UNEP (2023), Electric two-and three-wheelers: Global Emerging Market Overview, link; 3) FSD Africa, Shortlist (2024), Forecasting Green Jobs in Africa, link; 4) Mordor Intelligence (2024), EV Market in Africa Size & Share Analysis - Growth Trends & Forecasts (2024 - 2029), link 5) Dalberg (2024), How Investment in Skills Can Power Africa's Electric Mobility Transformation, link; 6) OCA analysis and consultations;

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Priority employment roles for low-income women

While transport is shaped by gender dynamics, e-mobility provides a significant opportunity for low-income women

E-mobility value chain[1,2]

Battery design & manufacturing	Vehicle integration & assembly	Sales & distribution	Charging infrastructure	Asset financing & support	Consumption
Engineers (electrical, mechanical, software)	Operations specialist	Marketing specialist	EV charging station / battery technician	Customer service representatives	Fleet manager
Researchers	Quality control inspector	EV charging station installer	Charging station manager	Field service technicians	Driving instructor
Product developers	EV machine operator	Sales representative	Mechanic (repairs)	Loan officers / debt collector	Transporter/drivers
	EV assembler			Collection officer	

EV assembler, EV technicians, and mechanics: Low-income women hold fewer technical jobs in e-mobility as at least half of these e-mobility jobs require certification or vocational training, which are difficult to access due to insufficient practical training programs and limited course offerings. This is exacerbated by less exposure to this emerging sector and lower levels of formal education[2,5,7]

- Women can still take advantage of these opportunities but given EVs require fewer repairs compared to Internal Combustion Engine (ICE) vehicles, growth in these jobs may be capped[5,6]

Sales representatives, customer service representatives and collection officers: This sector is rapidly expanding with projected growth of EVs, battery and charging infrastructure, which presents opportunities for women in sales and customer service roles[3]

Transporter/driver: Women are significantly underrepresented in transport services due to gendered perceptions and norms, women's perception of safety on the roads, inappropriateness of the design of the vehicle and relevant equipment, conservative views on the appropriateness of women riding motorcycles and the inability for women to get a loan for the vehicle[3,4]

- Sensitisation, additional training on safety and support to provide relevant financing products to women could lead to significant opportunities for women as drivers in urban to transport goods and people, and rural areas for moving agricultural produce[2,3]
- In addition, these roles often pay on a weekly or bi-weekly basis, which requires some level of budgeting training for the women

"I like the flexibility being a driver gives me, but I prefer operating an electric bicycle over an electric motorbikes which tend to be heavier for us"

Sources: 1) Dalberg (2023), Catalyzing investment in skills for Africa's electric mobility ecosystem, link; 2) OCA analysis and consultations; 3) UKAID (2023), Women's economic empowerment and electric vehicles in Kenya, link; 4) Durham University (2020), Transport as gendered employment practice in Sub-Saharan Africa, link 5) Dalberg (2024), How Investment in Skills Can Power Africa's Electric Mobility Transformation, link; 6) FSD Africa, Shortlist (2024), Forecasting Green Jobs in Africa, link; 7) Impact Alpha (2024), Preparing Africa's workforce for a green future, link;

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Food & Agro-processing

Food and agro-processing in SSA has significant potential to improve livelihoods and enhance food security

Key statistics

257,000
Projected number of solar-powered agro-processing units by 2030[1]

87%
Projected unmet food demand by 2050 in a business-as-usual scenario[2]

60%
Estimated SSA labour force partially involved in small-scale food processing[3]

Sector overview

Food and agro-processing considers green jobs in the value chain from processing harvested produce to retail and consumption

- Agriculture remains the backbone of economies across SSA but historically, **raw produce has been primarily exported** with minimal, local small-scale processing[4]
  - However, a shift is underway toward increased **local processing to enhance food security**—a priority highlighted during the COVID-19 pandemic when trade disruptions and halted imports underscored its necessity[5,6,7]
- Additionally, **growing populations are driving higher food demand**, while efforts to reduce food waste, such as through processing methods like tomato drying[6]
  - An estimated **60% of Africa's labor force is at least partially involved in small-scale processing, with women making up the majority**. The growing availability of renewable energy tools presents a significant opportunity to boost productivity and incomes, particularly for women[3]
- However, as **agro-processors adopt these technologies to enhance efficiency**, labor demand may decline, potentially reducing job opportunities and resilience in the sector[6]
- Further downstream, urbanization and rising wages have led to diverse diets and **boosted food demand, expanding green livelihood opportunities** for street vendors, and restaurants, that offer sustainable goods or using clean energy[8]

Focus sub-sectors[7]

Food and agro-processing:
Refers to the transformation of raw agricultural materials to either consumable products e.g., packaged snacks, juices, oil extraction among others in the case of food processing or value-added products in agro-processing through milling, drying, hulling etc

Retail and consumption:
Refers to activities by street vendors, micro-retailers, and restaurant chefs involving the sale of packaged or fresh food produced using sustainable technologies

Sources:) Lighting Global (2019), The Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa, link; 2) UN (2014), Despite climate change, Africa can feed Africa, link 3) Rural21 (2012), Large-scale agro-processors in Sub-Saharan Africa: A catalyst for pro-poor growth?, link; 4) AfDB (2017), Transforming Africa's Agriculture through Agro-Industrialization, link; 5) AfDB (2023), COVID-19, Agricultural Growth, and Food Insecurity in Africa, link; 6) OCA analysis and consultations; 7) Future Africa Forum (2021), The New Age of Agro-Processing in Africa, link; 8) Wageningen (2017), Dynamics of food systems in Sub-Saharan Africa. Implications for consumption patterns and farmers' positions in food supply chains

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Priority employment roles for low-income women

There is significant opportunity for low-income women across the food & agriculture value chain, particularly in processing & retail

Food and agro-processing value chain[1,2]

Processing		Distribution	Retail	Consumption (hospitality)
Factory worker (Large processor)	Artisanal food processors	Warehouse managers	Street vendors	Waitresses
Quality control specialist	Packagers / Floor workers	Transporter / driver	Shop-owners (micro-retailers)	Cooks
Production manager		Wholesalers		

Artisanal food processors, packagers / floor workers and transporters / drivers: These relatively labour-intensive and low-skilled roles offer opportunities for women. As small-scale agro-processors, female entrepreneurs often struggle with linking to end markets but they can leverage Village Savings and Loan Associations (VSLAs) and cooperatives to negotiate prices for sustainably sourced products collectively

- As agro-processors expand and adopt advanced machinery to boost productivity, demand for low-skilled labour will likely decline, posing challenges for low-income women, although the market in SSA is relatively far from this posing an issue

Street vendors and shop-owners (micro-retailers): These microenterprises play a vital role in the provision of goods particularly in urban and peri-urban areas at the community level. Their relatively flexible nature allows women to earn primary or supplementary income which can grow with the right support i.e., access to affordable credit, market linkages, business development support, etc.,

- Given the growth of the sector underpinned by rapid population growth and urbanisation, it's unlikely that this form of trading will be eradicated in the short- or medium-term

Waitresses: Service-based hospitality roles build transferrable skills that can enhance employability across sectors for other service-based roles. Additionally, most hospitality businesses offer pathways of advancement to supervisory or specialised roles often with some certification gained in parallel

"In rural areas where opportunities are few, business skill training makes a difference to female micro-retailers compared to most tech-enabled solutions. The use of solar power enables them to run their businesses effectively"

*Notes: *Note: Although production and harvesting are key stages in the agricultural value chain where many women participate, we have excluded it from the scope here*

Sources: 1) Malhotra SK, Saran A et.al (2023). Protocol: Value chain interventions for improving women's economic empowerment: A mixed-method systematic review, link; 2) AGRA (2021), Women in agribusiness value chains in Africa, link; 3) Radimin, E.N (2014), The Roles and Activities of Women in the Six Selected Agricultural Projects in Thulamela Local Municipality, link; 4) Johnson A. Adebayo, Steven H. Worth (2023), Profile of women in African agriculture and access to extension services, link 5) OCA analysis and consultations; 6) Challenge Fund for Youth Employment (2022), Green Jobs for Youth in Africa, link; FSD Africa, 7) Shortlist (2024), Forecasting Green Jobs in Africa, link; 8) UN Women (2021), Green Jobs for Women in Africa, link

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Waste-to-energy

Waste to energy is recognised as a vital element of climate resilience, unlocking value from waste while reducing emissions

Key statistics

76%

Estimated waste in SSA that is disposed in open dumps and unsuitable locations[1]

8%

Contribution of GHG emissions from the waste sector in Africa[2]

100 – 254 kWh

Estimated per capita electricity generation from MSW in SSA, 2025 - 2060[3]

Sector overview

- SSA's **rapid population growth, shifting consumption habits and increased economic activity** are driving a surge in waste generation, with only 55% of waste being collected[4,5,6]
  - Across the continent, **only 24% of waste is disposed of in landfills**, while most of it is discarded in open dumps, streets, rivers, and other unsuitable locations.[1] WtE solutions can reduce the waste pollution and provide additional income for e.g. farmers disposing of waste
- With energy access still low, the waste to energy (WtE) sector offers an **opportunity for SSA countries to almost double the current per capita electricity generation** up to 254kWh by 2060. This is particularly relevant in rural areas where agricultural waste can be converted to heat and power
- Waste-to-energy also supports the uptake and access to clean cooking through by-products such as clean cooking fuels and briquettes
- **Finally, agricultural and municipal solid waste contribute significantly to carbon emissions** with the waste sector in SSA accounting for 8% (vs 2% in the US and 3% in China) that can instead be **converted into energy and valuable by-products** such as cooking gas, briquettes, and organic fertilizer through bio-digestion tech[2,7]

Focus sub-sectors

Agricultural and municipal solid waste (MSW): Agricultural waste includes crop residues, livestock waste, and post-harvest food losses, reflecting Africa's extensive farming. Municipal solid waste (MSW) comprises household and institutional waste, predominantly organic, along with plastics, paper, and glass from urban and rural areas.

Briquettes: Refers to blocks made from biomass waste such as agricultural residues, sawdust, or municipal solid waste that serve as an alternative fuel source offering a sustainable solution for energy needs while reducing waste

Note: The sale of clean cooking fuels is covered under the clean cooking value chain

*Notes: *This report focuses on the largest opportunities in SSA, particularly in agricultural waste, municipal solid waste and bio-digestion, both small and large-scale*

Sources: 1) Africa Energy Portal (2023), Africa: From Trash to Power - How to Harness Energy From Africa's Garbage Dumps, link 2) Climate Chance (2023), In Africa, greenhouse gas emissions from the waste sector increase, despite efforts from various actors, link; 3) Resources, Conservation & Recycling Advances (2023), Mitigating greenhouse gas emissions from municipal solid waste in Sub-Saharan Africa via sustainable waste management, link; 4) Challenge Fund for Youth Employment (2022), Green Jobs for Youth in Africa, link; 5) UN Habitat (2022), Common Challenges in SWM in Africa learned from survey by JICA, link; 6) Solutions for Youth Employment (2023), Jobs in the Circular Economy, link; 7) OCA analysis and consultations

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Priority employment roles for low-income women

As a rapidly growing sector, waste-to-energy is poised to offer new and additional green jobs for low-income women

Waste-to-energy value chain[1]

Waste collection	Pre-treatment of waste	Conversion process	Biogas purification	By-product commercialisation	Distribution and consumption
Waste collectors	Local waste handler (sorter)	Engineer	Production manager	Technician	Sales representative
Transporter/driver	Machine operators	Machine operators	Quality control specialist		Customer service representative
		Floor workers			

Waste collectors, sorters, and floor workers: Women play a vital role in waste management within upstream activities at household level and beyond

- Outside the home, they often engage in waste collection and separation which are less lucrative informal roles, while men dominate higher-paying positions, such as drivers and scrap dealers
- There are opportunities to grow these informal part-time roles to semi-formal micro-entrepreneurship ventures or more formal roles within circular economy companies
- Women's strong relationships within farming communities needing waste management services offer unique livelihood opportunities especially as many of these roles **do not require specialised skills** making them more accessible to them
- However, stigmatisation of the industry which is seen as "too dirty or women", limited awareness of available job opportunities, the underdeveloped WtE ecosystem in some countries across SSA, and workplace safety concerns continue to hinder women's full participation and advancement in the field

Machine operators, QC specialists and technicians: With access to upskilling initiatives, women have substantial opportunities to take on technical roles in the waste value chain as technology adoption expands in the medium to long-term

Sales representatives: This admin role is available in a few companies that operate in the waste management sector but the number of jobs could be limited due to the few mature players

"Women who run waste collection enterprises are more reliable, responsible and effective compared to their male counterparts"

Sources: 1) Malhotra SK, Saran A et.al (2023). Protocol: Value chain interventions for improving women's economic empowerment: A mixed-method systematic review, link; 2) Radimin, E.N (2014), The Roles and Activities of Women in the Six Selected Agricultural Projects in Thulamela Local Municipality, link; 3) AGRA (2021), Women in agribusiness value chains in Africa, link; 4) Johnson A. Adebayo, Steven H. Worth (2023), Profile of women in African agriculture and access to extension services, link 5) OCA analysis and consultations; 6) FSD Africa, Shortlist (2024), Forecasting Green Jobs in Africa, link; 7) Challenge Fund for Youth Employment (2022), Green Jobs for Youth in Africa, link

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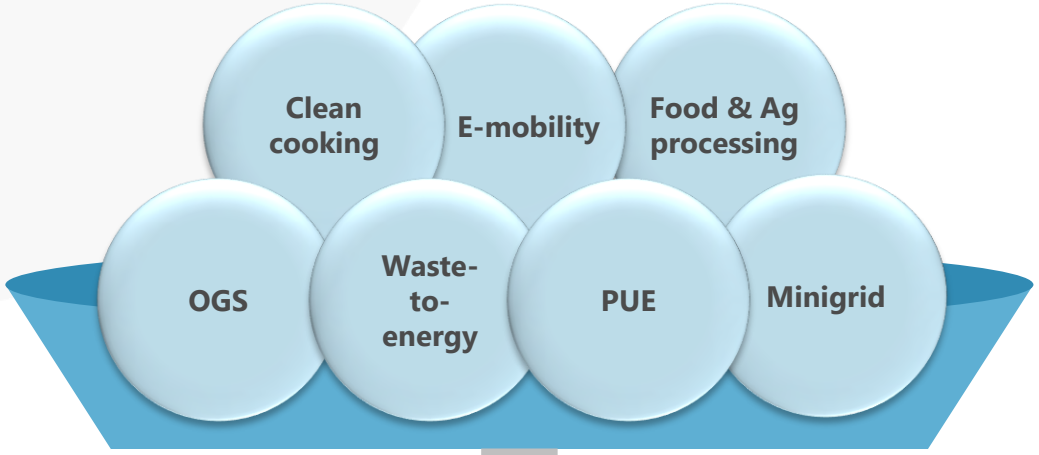
Cross cutting

We applied a top-down approach to estimate the number of job opportunities for low-income women across SSA



Total job opportunities in SSA

Low-income jobs in SSA

Low-income jobs for women

Key assumptions used across all key value chains

Market sizing considers total new jobs in the relevant value chains by 2030

Calculated formal jobs using published data from companies and applied a ratio of 1:1.5 (lower bound) to 1:3 (upper bound) of formal to informal jobs*,[3]

Assumed that low-income individuals will access 100% of unskilled jobs, 50% of semi-skilled jobs and 25% of admin jobs[1]

Assumed 32% of low-income jobs are accessed by women across all value chains, excluding E-mobility drivers, where we have considered that low-income women access 5-10% of jobs**,[2,3]

Low-income jobs assumptions:

- We have assumed that semi-skilled jobs such as installers and technicians are available to low-income and less-skilled individuals but jobs such as microfinance specialist and operations manager are not
- In addition, we have assumed that admin jobs such as production and logistic managers are available to low-income and skilled individuals, but engineer roles are not

The market sizing for new jobs in the relevant value chain methodologies are explained in the appendix

*Notes: *Formal jobs are those where a company formally employs someone full time or part time on a formal contract, informal are people that are hired as contractors or microentrepreneurs, **Research, consultations and FGD's conducted reveal low participation of women in driver roles due to safety issues, and lack of driving skills.*
Source: 1) OCA analysis; 2) SEforALL (2024), Improving energy data to enhance gender equality, link; 3) OCA Consultation

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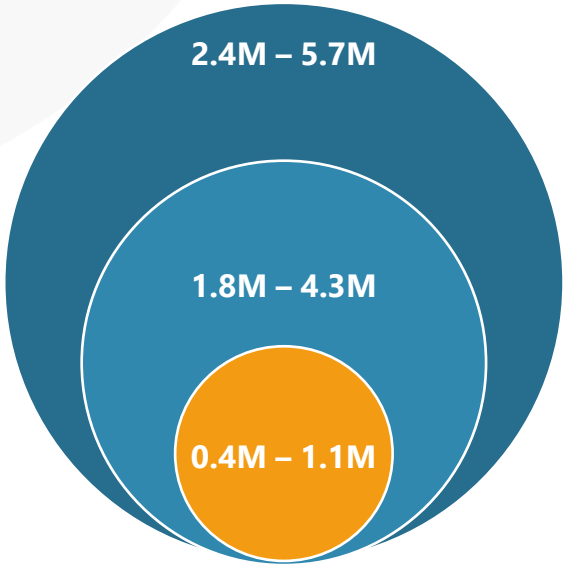
We applied a top-down approach to estimate 425K – 1.1M job opportunities for low-income women across SSA

Estimated jobs for low-income women in SSA



- **Total job opportunities in SSA:** Potential job opportunities for both men and women in the value chains
- **Low-income jobs in SSA:** Potential job opportunities for both low-income men and women in the value chains
- **Low-income jobs for women:** Potential job opportunities for low-income women in the value chains

Value chain	Low-income jobs for women	
	Lower bound	Upper bound
OGS	75K	175K
PUE	10K	40K
Clean cooking	65K	125K
E-mobility	30K	175K
Food and Ag processing	120K	250K
Waste-to-energy	20K	85K
Minigrids	100K	220K

Not included in the value chain mapping but included in market sizing at SF request

Source: OCA Analysis

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Based on criteria and insights from consultations, we identified 7 focus activities to create employment for low-income women

Criteria considered

1. **Potential earnings**
   Potential earnings that can be made, in relation to the recommended living income
2. **Resilience of activity**
   The sustainability of the activity and its ability to adapt to and withstand changes
3. **Interest from women**
   The level to which women are interested in engaging in the activity
4. **Potential scale**
   Potential number of job opportunities that can be created from the activity
5. **Business case**
   The potential business benefits that can be derived from engaging women in the activity
6. **Level of cultural hurdles***
   The amount of cultural hurdles needed to be addressed to enable women to engage in the activity
7. **Level of training required***
   The level of training required to equip women with the skills to engage in and thrive within the activity

* **Learnings from consultations**
We have also applied qualitative learnings from consultations with companies and FGDs with women to prioritise activities

Recommended priority activities*	Applicable value chains
Customer Service Representatives	OGS, PUE, clean cooking, waste-to-energy, EV
Operators and technicians	OGS, PUE, clean cooking, EV
Drivers	EV, Food and agriculture processing
Artisanal Food Processors	Food and agriculture processing
Food vendors	Food and agriculture processing
Sales Agents	OGS, PUE, clean cooking, waste-to-energy, EV
Bio-waste collectors	Waste-to-energy

Some activities provide a higher level of resilience but have higher barriers to entry / lower potential scale, and vice versa. When choosing priority activities, the rankings for each criteria should be considered against the objective of the specific programme*

** Prioritisation methodology is further covered in the appendices section and considers insights from consultations presented in the previous sections; *Level of cultural hurdles and training required based on preferences from Shell Foundation*

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Photo credit: Catalyst Fund

Challenges

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We identified a framework for understanding the key challenges in the market

Employment

Jobs

- Outreach and pipeline
- Hiring
- Workplace features

Entrepreneurship

- Funding
- Market access
- Access to Business Development Services

Cross-cutting challenges

- Social norms and self-perception
- Mentorship
- Information asymmetry and data gaps
- Knowledge & skills
- Access to resources (e.g., digital tools and mobility)
- Regulatory environment

Sources for framework: 1) Shortlist framework for considering the drivers for gender inequality in the clean energy workforce, link; 2) InPower Coaching (2023), Replacing Tropes for Mentoring Women with the Truths They Deserve, link; 3) MoniePoint (2024), 5 Challenges Women Entrepreneurs Face in Starting and Growing Their Businesses in Nigeria, link; 4) Value for Women (2018), A Business-first Approach to Gender Inclusion, link

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Limited knowledge of opportunities and hiring biases are key factors that limit women's access to climate-smart jobs

Overview	Key challenges	Solutions	Importance for women	Relevance for SF
 **Outreach and pipeline** Limited pipeline of low-income women due to a lack of exposure to opportunities and lower technical education	**Limited awareness:** The climate-smart sector is male-dominated and exposure to job advertisements often rely on word of mouth within male networks and may not be promoted through women-focused channels, therefore women tend to have limited knowledge of opportunities[1,2,3]	Increase job networks and dissemination of job opportunities to women's groups, and promote on the ground awareness of the available roles in the climate-smart sector		
	Level of education: Many women do not pursue an education in STEM fields due to social stereotypes, affecting the number of women in the pipeline within the sector[4,5,6]	Increase sensitisation and roles models in STEM and increase govt programmes to encourage female participation		
	"Companies don't know how to reach low-income women to recruit them for roles and the low-income women also do not know about the available roles"			
 **Hiring** Hiring processes can be biased against women, affecting their ability to gain employment in climate-smart companies	**Unconscious bias:** Biases hinder women from successfully gaining climate-smart roles such as job descriptions may be framed in a gender-neutral way and interview processes may have limited female representatives throughout[2,3,7,8]	Provide gender TA for companies to review their hiring policy and implement gender inclusive practices throughout the process		
	Gender intentionality: Lack of intentionality of gender targets impact women's entry into the sector. E.g. technical jobs tend to have more male representation, often attributed to lack of pipeline or skills mismatch despite evidence suggesting that many qualified women are available if the company is intentional[7]	Provide gender TA to companies and / or impact linked financing to encourage intentional target setting and hiring of low-income women into the climate-smart sector		

Sources: 1) OCA analysis and consultations; 2) Shortlist (2024), Empowering Women in Clean Energy: Advancing and Retaining an Equitable Workforce, link; 3) Shortlist (2023), Bottlenecks & Breakthroughs: Advancing Gender Equity in African Clean Energy, link; 4) USAID, Advancing Gender in The Environment: Making The Case for Women In the Energy Sector, link; 5) UN Women (2021), Green Jobs For Women in Africa, link; 6) CFYE (2022), Green Jobs For Youth in Africa, link; 7) IFC (2022), Women's participation in the renewable energy workforce in Sub-Saharan Africa, link; 8) ESMAP (2022), Gender Equality in the Off-grid Solar Sector, link

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Unfavourable workplace conditions limit the ability of women to retain jobs and advance in roles within the sector

Overview	Key challenges	Solutions	Importance for women	Relevance for Shell
Workplace features Unfavorable workplace designs, gender disparities, and security risks limit women's participation and career advancement	**Workplace support:** The absence of supportive workplace structures, such as flexible hours and childcare facilities, often hinders women's effective participation at work, as they typically bear the majority of domestic responsibilities. These responsibilities also limit their career advancement, particularly when senior roles require relocation[1]	Provide gender support to companies to implement family-friendly workplace policies including flexible work hours, remote work options, and on-site or subsidised childcare		
	"When the jobs are away from their locations, you are likely not to have women participating due to several reasons"			
	Gender disparities: Gaps in pay and promotions persist due to normative barriers, with the gap widening as careers advance. Societal expectations of women's domestic roles often require them to prioritise family responsibilities, limiting their ability to progress professionally[1,2,3,4]	Set up mentorship programs, flexible work options, and clear criteria for career progression. Providing support for work-life balance, such as family leave policies		
	"Women tend to prefer the "easier" jobs like customer care and sales attendant, which have less intensity than technical roles"			
	Safety risks: Women face security risks, including sexual harassment and gender-based violence, which impact their participation, job satisfaction, and effectiveness across various roles, from field sales agents to drivers. These challenges, encountered both in the workplace and at home, affect their well-being and ability to carry out their duties effectively[1]	Provide gender TA to companies on harassment-free workplace training, clear reporting channels, and strong anti-harassment policies can enhance safety		

Sources: 1) OCA analysis and consultations; 2) Shortlist (2024), Empowering Women in Clean Energy: Advancing and Retaining an Equitable Workforce, 2024, link; 3) CFYE (2022), Green Jobs For Youth in Africa, 2022, link; 4) Harvard Business Review (2014), Why Women Don't Negotiate Their Job Offers, link

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Women entrepreneurs face limited access to funding, due to gender-biased social norms and limited technical assistance

Overview	Key challenges	Solutions	Importance for women	Relevance for SF
Funding Limited access to business funding due to a lack of awareness of opportunities and insufficient qualifications	**Limited access to credit:** Many women rely on community savings groups or expensive microfinance institutions, as more affordable capital is often inaccessible due to social and cultural norms restricting land and asset ownership, further restricting their funding opportunities[1,3,4,5]	Partner with microfinance institutions (MFIs) to extend affordable financing to female entrepreneurs by providing guarantees and using inclusive risk assessment criteria	●	◔
	Lack of financial literacy and training often leaves low-income women without skills to run a business such as proper record-keeping, making it difficult to demonstrate business viability under traditional financing assessments and impacting their borrowing costs and access to credit[1]	Provide targeted business education and skills training for low-income women, focusing on essential skills like record-keeping, financial management, and business planning	◔	◔
	"Women sometimes focus on selling pico-solar so that they can gain funds to afford the more expensive solar products with higher margins to sell. Higher access to financing would allow them to purchase stock in bulk or set up a shop" *"Loans take a long time to be approved and arrive when the need has elapsed"*			
Market access Limited networks and logistics has made accessing market challenging	**Networks and norms:** Restrictions on women's mobility and networks limited to their immediate social circles hinder market access, especially in remote and rural areas. Additionally, cultural biases favoring male workers in roles like installation further restrict women's market opportunities[2,3]	Facilitate market linkages between female entrepreneurs and private-sector buyers committed to gender-inclusive sourcing	◔	●
	"Rural women within agriculture lack access to well-paying markets, thus they are compensated poorly for their efforts"			

Sources: 1) OCA analysis and consultations; 2) ENERGIA (2019), Supporting last-mile women energy entrepreneurs: What works and what does not, link; 3) ENERGIA (2019), Women's Energy Entrepreneurship: A Guiding Framework and Systematic Literature Review, link; 4) UN Women (2021), Green Jobs For Women in Africa, link; 5) CFYE (2022), Green Jobs For Youth in Africa, link; 6) ESMAP (2022), Gender Equality in the Off-grid Solar Sector, link

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Limited access to business development services combined with social norms, hinders women's engagement and growth

Overview	Key challenges	Solutions	Importance for women	Relevance for Shell
Access to Business Development Services (BDS) Limits women's ability to scale their businesses and grow	**Business support:** Lack of training in customer management, bookkeeping, and digital marketing limits low-income women entrepreneurs by preventing them from effectively managing and scaling their businesses, hindering growth and access to opportunities[1]	Offer affordable or subsidised training programs in key areas while ensuring flexibility and being inclusive of women's time demands etc.	●	◔
	"Rural distribution is expensive; thus the lack of funding affects women's ability to carry out their businesses"			
Social norms and self-perception Negative self-perception limits women's participation often leading to underrepresentation	**Normative barriers:** Women's self-limiting perceptions, often shaped by social norms, can hinder their career progression in male-dominated fields. This can lead to self-doubt, causing some women to leave their careers prematurely, despite their potential for success[1,3,4,5]	Offer mentorship and create supportive networks and providing role models within male-dominated fields can help women recognise their potential	◔	◗
	"Between male and female founders, men may move on to start their business without having every box ticked but women tend to want to tick all boxes, due to their limited perception of their capabilities" *"Cultural norms differ by locality. For example, in some areas, norms hinder women from accessing loans, in some they are limited from engaging in business, while in some others, they are prevented from climbing roofs"*			

Sources: 1) OCA analysis and consultations; 2) Global Alliance for Clean Cookstoves, (2013), Scaling Adoption of Clean Cooking Solutions through Women's Empowerment, link; 3) Shortlist, (2023), Bottlenecks & Breakthroughs: Advancing Gender Equity in African Clean Energy, link; 4) ENERGIA, (2019), Supporting last-mile women energy entrepreneurs: What works and what does not, link; 5) ENERGIA, (2019), Women's Energy Entrepreneurship: A Guiding Framework and Systematic Literature Review, link; 6) Shortlist, (2024) Empowering Women in Clean Energy: Advancing and Retaining an Equitable Workforce, link

Women's career advancement is often impacted by the limited access to training and mentorship to aid their growth

Overview	Key challenges	Solutions	Importance for women	Relevance for SF
 **Knowledge & skills** Entry and advancement in climate-smart roles are often impacted by skill limitations, affecting access to opportunities	**Limited training**: Limited education & training opportunities, particularly in STEM-related fields, limit women's participation in the climate-smart sector, predominantly in technical roles[1,2,3]	Provide training programs to equip women with relevant skills to participate in climate-smart roles		
	Practicality: Training opportunities can be impractical for women due to travel demands and a lack of consideration for their social responsibilities thus discouraging their participation[1]	Design training programs to be flexible, considering women's social roles, like childcare, and limited mobility flexibility		
	Cost: The cost of training contributes to women's skills limitations within the climate-smart sector, as they often lack the finances to participate in training programs[4]	Provide subsidised training programs or offer need-based financial support to make training more accessible		
	"There are a lot of jobs that need specific training, but you can create interventions to bring low-income women into the fold by upskilling women on these specialised areas that only require brief training"			
 **Mentorship** Career advancement is affected by limited access to mentorship opportunities to support career growth	**Limited mentorship**: Women face limited career mentorship opportunities to aid their growth and change their limiting perceptions, and with limited female role models in the sector, women often struggle to see career growth opportunities[1,5]	Establish mentorship programs pairing women with leaders in the sector, focusing on career growth and mindset development		
	Networking opportunities: Women struggle with limited networking opportunities and are also often excluded from informal professional networks that could help them excel in their careers[1,2,3]	Organise women-focused networks and integrate women into existing professional networks through partnerships with industry associations		

Sources: 1) OCA analysis and consultations; 2) Shortlist, (2024), Empowering Women in Clean Energy: Advancing and Retaining an Equitable Workforce, link; 3) Shortlist, (2023), Bottlenecks & Breakthroughs: Advancing Gender Equity in African Clean Energy, link; 4) "Ashden, (2023) Understanding the Energy Access Skills Landscape, link; 5) New Energy Nexus, (2022), What challenges do women face to become clean energy entrepreneurs?, link

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Limited access to resources, including work materials and mobility support, impacts women's success in climate-smart roles

Access to resources
Lack of access to resources, including mobility, can hinder success in a job or for an entrepreneur

Overview	Key challenges	Solutions	Importance for women	Relevance for Shell
	Resources: Limited access to necessary resources to carry out their tasks—such as work materials, vehicles, and personal protective equipment—can affect women's ability to do their jobs effectively and their active role in the sector[1]	Advocate for the provision of necessary work materials for women and work with MFIs to create favourable asset-financing products for women		

"A lack of and inadequate female-specific PPE is an example of the issues women face in carrying out their duties, as some of the PPE fit men more than women"

	Mobility: Women in field roles face mobility challenges, such as limited transportation access, a lack of driving skills, and limited finances to cater for their transportation costs, which limits their ability to carry out their duties and influences their preference for working near their homes[2]	Facilitate driving training for women, partner with ride-sharing platforms for subsidies or shared transportation in field roles, and work with companies to enable women to sell products locally from home		

"Transport modalities are sometimes very traditional, such as walking on hills or having to use motorbikes, which discourages women from active involvement in field roles"

	Difficult logistics: Logistics involved in the transportation of goods affects women in sales, as the products can be bulky and hard to transport, thus limiting how much they can carry and sell at different points in time[1,2]	Set up local distribution hubs to reduce women's transport burdens and partner with logistics providers to support women in moving products		

Sources: 1) OCA analysis and consultations; 2) Global Alliance for Clean Cookstoves, (2013), Scaling Adoption of Clean Cooking Solutions through Women's Empowerment, link

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Other factors which affect women's participation in the climate-smart sector include information gaps & unsupportive legislation

Overview	Key challenges	Solutions	Importance for women	Relevance for SF
 **Information asymmetry and data gaps** Misconceptions and a lack of information flow between employers and women	**Mistaken beliefs**: Misconceptions, such as the belief that starting a climate-smart business requires significant technical expertise in manufacturing or repair, often deter women from participating in the climate-smart sector[1,2]	Run sensitisation and awareness campaigns showcasing women with diverse skill levels succeeding in climate-smart roles		
	Information gaps: There is a lack of information about employment opportunities in the climate-smart sector reaching low-income women, and this fosters a disconnect with companies assuming there are no qualified women for available roles and women believing no jobs exist	Implement targeted outreach and communication initiatives to share information on available roles and career pathways in the climate-smart sector.		
 **Regulatory environment** Legislation is often insufficient and not cognisant of women's needs, limiting their workplace entry and advancement	**Regulatory insufficiency**: Gender biases in national laws and insufficient legislation, such as limited sexual harassment laws and the prohibition of women's engagement in certain activities, can restrict women's access and retention in climate-smart jobs[1,3,4]	Advocate for stronger legal protections against gender discrimination and workplace harassment, to promote inclusive policies for women		
	"Regulations from the City Council's officers are unfavourable. They charge us money daily to sell our solar or clean cooking products in their areas of jurisdiction"			
	Education policies: Government policies often fail to address the compounded barriers low-income females face in accessing education, such as economic constraints and cultural norms, leaving gender gaps in education largely unaddressed	Work with governments to develop inclusive educational policies to ensure low-income females have access to quality education		

Sources: 1) OCA analysis and consultations; 2) New Energy Nexus, (2022), What challenges do women face to become clean energy entrepreneurs?, link; 3) UN Women, (2021), Green Jobs For Women in Africa, link; 4) CYFE, (2022), Green Jobs For Youth in Africa, link

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Photo credit: Clean Choice Energy

Recommendations

SF can focus on five key areas to increase jobs for low-income women in the sector while addressing some sectoral challenges

Key Challenges	Recommended programmes	Targeted participants
Limited linkage opportunities between employers / buyers and low-income women / entrepreneurs	**Training and partnership for talent offtake:** Leverage company partnerships to understand their needs, co-create training and facilitate employment placements, equipping low-income women with essential skills to succeed and providing pathways to employment	Private companies & Low-income women
Lack of relevant skills within low-income women to participate in the sector and limited training opportunities	**Company financial and TA support:** Create a fund to provide impact linked funding to companies and provide gender mainstreaming support	Private companies
Lack of data detailing the business case for low-income women's inclusion	**Business financing:** Partner with MFIs to co-create a suitable credit risk assessment and provide funds through guarantees and concessional financing to increase access to finance for women entrepreneurs to expand their business	Low-income women
Limited financing options available to low-income women to advance entrepreneurship	**Awareness campaigns:** Enhance awareness of SF programmes and broader employment opportunities through on the ground campaigns and working with local communities	Low-income women
Socio-cultural norms on gender roles create barriers for women's participation in technical roles and career growth	**Networking and collaboration:** Foster collaboration between development and implementing partners to share learnings and foster collaborate	Development & implementing partners & low-income women

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SF can design a training programme to upskill women for employment and entrepreneurship in the sector (1/2)

Training and Partnerships for Talent Offtake

Current situation: Low-income women face significant barriers to accessing opportunities in the climate-smart sector, largely due to a lack of relevant skills and limited access to relevant training programs essential for employment and entrepreneurship in this field. In addition, while demand and supply exists today, there is a gap in bridging skilled women and private sector companies that can provide opportunities in employment and entrepreneurship.

Expected impact: Increased skill levels and employment participation / entrepreneurship opportunities of low-income women in this sector

Programme details

Develop a training program to bridge skill gaps of low-income women, guided by targeted skills needs assessment

- To address the skill gap issue faced by low-income women, SF can develop a training program to equip women necessary skills to participate in the climate-smart sector, both within employment and entrepreneurship
- Before starting the training, SF needs to perform skills needs assessment, engaging companies to understand their employment needs and identifying women's skill gaps; this will enable SF to co-create a curriculum that equips women with relevant skills

Create tailored training modules covering value-chain-specific and cross-cutting skills, and applicable to employment and entrepreneurship

- Leveraging the insights gained from the skills needs assessment, SF can develop targeted training modules to guide the training programme
  - The module would cover value chain-specific skills focused on the prioritised activities, and cross-cutting skills that cover essential topics such as safety (including self-defence), marketing and financial literacy
- The training program would apply to two paths: employment in companies and entrepreneurship within the climate-smart sector
  - **Employment**: Women who complete this path will have an opportunity to be placed in partner companies *(see next slide for details)*
  - **Entrepreneurship**: Women who complete this path could receive grant funding to launch climate-smart businesses; their responsible management of the initial grant could unlock additional funding for them covered under the "business financing" programme *(see slide 61)*

Leverage training partners to deliver in person and online training to ensure maximum reach

- The training should leverage partnerships with existing training providers or companies in the sector that can effectively provide the training
- Training can be provided in person and online, to increase the potential reach of beneficiaries
  - Training programs offered in person must be designed based on the geographical needs and accessibility of participants, considering the challenges women face attending training
  - SF can also work with relevant players to provide supplementary modules online or via SMS (e.g., through Arifu)

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SF can partner with private-sector players to provide job placements or partnerships for women post-training (2/2)

Programme details *(continued)*

Post-training, the companies can offer opportunities to the trained women

- To increase the likelihood of gaining employment after the training, SF can partner with private-sector players to provide the successful training participants with either job placements or partnership opportunities for entrepreneurs

SF can provide incentives to companies to encourage their participation in the program

- Although companies have expressed interest in collaborating on initiatives to increase women's roles in the climate-smart sector, these programmes must align with their economic and strategic goals. Examples of these incentives include:
  - **Providing impact-linked funding and gender TA**: SF can provide subsidised funding to partner companies, depending on the number of low-income women they hire from the programme, alongside gender-focused technical assistance *(see slide 60 for more detail)*
  - **Subsidising salary costs**: SF can cover the women's salaries for a period of 3-6 months, after which the company can decide whether to retain the employee. This could be a straight subsidy, or SF can use the capital to offset other workforce barriers, such as purchasing PPE or training development costs for women, to ensure the programme supports job improvement as well as creation

Potential Partners

OGS: d.light, ENGIE, sun king

E-mobility: eBee, AMPERSAND

PUE: SunCulture, D&S DAVIS & SHIRTLIFF (know HOw through experience)

Waste-to-energy: SISTEMA.bio (CREATING VALUE FROM WASTE), Cambridge Industries

Clean cooking: burn (life · saving · stoves), Vuma BIOFUELS

Food and agro: FARM AFRICA

Training partners: EMA, Practical ACTION, Shortlist, SOLAR SISTER, The African Talent Company, Arifu

Existing Programs[1,2]: Shortlist, Global Energy Alliance for People and Planet (GEAPP), mastercard foundation

Value chain nuances

The programme could cover a broad range of sectors or could be specific to one value chain. Some sectors will require specific skills as follows:

OGS, clean cooking and PUE: Training should cover technical skills within the OGS, clean cooking and PUE, going into the technicalities of each product

E-mobility: Training should cover specific skills such as safety, and requires an in-person element

Sources: 1) GEAPP (2022), GEAPP and Shortlist Introduce 'Women for Green Jobs' Initiative Across Six Countries in Africa, link; 2) Mastercard Foundation, Women at Work, link

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SF can create a new fund that invests in green enterprises to generate livelihood opportunities for low-income women

Company financial and TA support

Current situation: Many companies have expressed an interest in increasing their female workforce and partnerships, however, there is a lack of financial incentive to intentionally increase the employment of women and interaction with female entrepreneurs. This is driven by the lack of understanding and data supporting the economic benefits, rather than solely being for impact. While financial incentives are not sustainable, they are required in the short term for the business case to be proven

Expected impact: Increase in employment and retention of women through gender-inclusive policies and hiring practices

Programme details

Design and implement a fund that provides impact-linked financing

- In partnership with donors or impact investors, SF can establish a fund that provides concessional debt to private sector companies with impact linked interest rates, tied to gender specific milestones e.g., number of jobs created, number of women employed, female supplier contracts signed etc.
- In the design phase, is important to align on the objectives of the fund and impact metrics covered to ensure specificity in incentives

Build capacity to mainstream gender to boost female worker retention

- There would also be a grant-funded technical assistance (TA) facility providing companies with gender mainstreaming support to reduce retention challenges and focus on upgrading workplace features that could be detrimental to women

Leverage the fund to incentivise participation in other SF programmes

- This fund would be available to the companies that SF has partnered with under its partnership & training programme *(see slide 58)*, further incentivising participation in those programmes

Potential Partners – Companies

Ecobank The Pan African Bank; Women's World Banking; African Guarantee Fund; Value for Women; Global Energy Alliance for People and Planet GEAPP; Acumen; Open Capital

Potential Partners - Existing Programs

- **Acumen's Hardest to Reach initiative:** With support from other funders, Acumen launched a $250M blended finance facility targeting OGS companies in countries with low electrification rates to activate clean energy access[1]
- **AFAWA Guarantee for Growth:** AfDB's AFAWA initiative and AGF set up a $250M risk-sharing instrument to unlock financing for women-led businesses through extension of funding to FIs and provision of TA support both to FIs and female MSMEs[2]

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Sources: 1) Acumen (2023), Acumen Launches New Hardest-to-Reach Initiative to Achieve Universal Energy Access, link; 2) African Business (2024), AFAWA fast-tracks lending to women-led businesses, link

Enhance loan access by partnering with MFIs to develop a credit risk assessment and provide guarantees to cover collateral needs

Business financing

Current situation: Low-income women have limited access to collateral, fuelled by the gender gap in asset ownership, and a lack of, if any, formal credit history. This restricts their ability to access finance for business set up, working capital or asset purchases, limiting entrepreneurship opportunities

Expected impact: Increased affordable funding for low-income women to launch or expand their businesses in the climate-smart sector

Programme details

Partner with MFIs to design specific loan products for women and a suitable credit risk assessment

- SF can collaborate with MFIs and understand women's demand for financial products to design affordable loan products for women. These might include:
  - Savings-backed loans where women save in a micro-savings account and can access low-interest loans after reaching set savings milestones;
  - Loans that provide women with interest rate bands based on their sales success;
  - Flexible repayment structures of loans, based on the sales cycles of their value chain
- SF can further work with MFIs to develop a suitable credit risk assessment leveraging information from programmes (e.g. Solar Sister) and employers
  - The existing programmes or employers could provide information about the women and their business history to support creditworthiness

Provide guarantees and financing to MFIs to increase access and affordability of loans for women

- To ensure MFIs are incentivised to create these products, SF could set up a partial guarantee programme to cover the collateral requirements and provide concessional financing to the MFIs so they can reduce interest rates to the female borrowers at a more affordable price
  - The guarantee would need to be carefully structured and designed to ensure that it is providing appropriate incentives while avoiding moral hazard and market distortion

Provide relevant training to female business owners on the documents required to access credit

- Many low-income women, particularly in rural areas do not know what is required (e.g. documentation) to access credit. SF can support training for the women to enhance this knowledge

Potential Partners - MFIs

Juhudi Kilimo; KWFT Banking on Women; AFAWA; musoni Next Generation MicroFinance; FINCA Microfinance Bank Limited

Potential Partners - Programmes

Solar Sister; Elles Solaire Women's Entrepreneurship Initiative

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SF can spread awareness of opportunities to ultimately increase women's participation in the climate-smart sector

Awareness campaigns

Current situation: The climate-smart sector is male-dominated and exposure to job advertisements in informal communities often relies on word of mouth within male networks and may not be promoted through women-focused channels, therefore women tend to have limited knowledge of opportunities. In addition, cultural norms and a lack of role models discourage women from applying for jobs even if they are aware

Expected impact: Increased women's knowledge of opportunities and awareness that they can thrive to ultimately increase women's participation in the sector

Programme details

Identify current primary channels that women use to access information

- Assess existing climate-smart programs and how they reached target beneficiaries with varying levels of age, education, geography, sectors etc
- Develop key messaging that 'hooks' target beneficiaries – particularly women - to learn more about green livelihoods

Test and scale awareness campaigns through diverse channels

- In other programs SF can test the channels identified including showcasing success stories and testimonials from women in the sector in collaboration with media partners to make these opportunities relatable and inspire participation
- Provide on-the-ground awareness leveraging community-based organisations (CBOs), existing programmes, religious institutions and community leaders to gather women for events and spread information effectively
- SF can also engage local media, such as radio and TV, to ensure desired reach
  - It is important for the messages to be in the local languages of the targeted low-income women, to ensure accessibility
- The programme can ensure ongoing access to information on sectoral opportunities by SF partnering with telecommunication companies to send SMS updates on opportunities periodically

Potential programme partners

Telecommunications

MTN, Safaricom, airtel

Local Media

ktn, Citizen Television, NTV, KBC Channel

CBOs

KICOBO, PAMOJA, WRAPA

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Foster collaboration amongst ecosystem players through stakeholder working groups and peer-to-peer learning

Overview: Networking and collaboration

Current situation: There is a lack of collaboration among stakeholders working on similar interventions which can leads to fragmented and duplicated efforts to address climate resilience and create climate-smart jobs for women and youth

Expected impact: Tangible impact in creating sustainable climate-smart livelihoods and more effective partnerships across the sector

Programme details

Collaboration could unlock the following key outcomes:

- **Increased synergy:** By aligning the efforts of development and implementing partners, collaboration can reduce duplicating efforts in working with the private sector / development programmes and ensure that resources are focused on complementary solutions
- **Enhanced knowledge sharing:** Regular quarterly working groups would create a platform for sharing progress, lessons learned, and insights, particularly around working with the private sector (and what incentives are working) and cultural or situational nuances within the women that should be considered
- **Identifying collaboration opportunities for climate-smart job creation:** Define best practices, engage in co-funding initiatives, and build on each other's programs, including key introductions beyond the working group, to drive innovative, scalable solutions that expand green job opportunities for low-income women

Potential Partners – Companies

mastercard foundation; Global Energy Alliance for People and Planet GEAPP; IFC; giz; Acumen; UNEP; International Labour Organization; Open Capital

Potential Partners - Existing Programs[1,2]

- **GOGLA Working Groups:** Spread across thematic areas such as finance and climate, these working groups convene to discuss key market challenges in energy e.g. policy-related, investment
- **IEA's Global Electric Mobility Working Groups**: Aim to accelerate the adoption of electric mobility worldwide (including Africa) focusing on policy development sharing best practices etc.

Sources: 1) GOGLA (2024), Working groups, link; 2) GEF (2021), Accelerating the shift to electric mobility, link

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While designing programmes, SF can consider various key overarching factors to maximise impact and success

User-centric design: Programmes should fully understand and cater to the realities and challenges of low-income women, considering cultural, social, and situational factors, as tailored solutions are more likely to resonate and succeed at having a greater impact on the beneficiaries

Accessibility: Ensure interventions are accessible for low-income women, including planning awareness events in accessible locations or providing online training via SMS on non-smartphones, to reduce the mobility and technological barriers that can hinder participation in employment

Flexibility and patience: Recognizing that normative and social change is a gradual process, design programmes with ample time, flexibility, and patience so the intervention can sustain momentum, adapt as needed, and enable meaningful progress to take root and unfold

Involving men: Actively include men in programme design and implementation, given their influential role (within households and communities) in enabling women's participation in the sector, and to reduce their resistance to gender-focused initiatives and achieve better program outcomes

Proactivity: Consider designing programmes in new and growing sectors, while leveraging insights from more established ones. By drawing on lessons learned, SF can establish best practices, ensuring a solid foundation for new markets and increase the success and impact achieved

Data collection: Prioritise data collection to demonstrate the business case for employing women in this sector. Learnings from programme successes and challenges can support to refine initiatives and educate the broader ecosystem on the economic benefits of integrating women into its workforce

Feedback loops: Establish well-designed, human-centred feedback loops that enable programme participants to share their insights while also collecting baseline data to drive continuous improvement

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Appendices

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Appendix 1: Existing relevant programmes

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Programme focus: Women only | Clean energy | Broader climate-smart sector | Sector agnostic

Several development partner programmes in SSA aim to enhance women's livelihoods, including in climate-smart sectors (1/7)

Name	Funder / Implementer	Summary	Location	Status*
Employment promotion for women for the green transformation in Africa (WE4D)[1,2]	BMZ, European Union, Norad, and GIZ	WEA4D aims to enhance employment and economic opportunities for women in SSA, focusing on green sectors such as renewable energy, sustainable agriculture, and waste management. The program addresses high unemployment and underemployment among women by expanding training, improving the transition to the labor market, and creating more jobs in green industries. It also supports women-led businesses and boosts the competitiveness of women-led SMEs in environmental sectors through multiple partnerships, including with vocational schools and business associations	Cameroon, Kenya, Malawi, Mozambique, Senegal, South Africa, Tanzania, Togo, Uganda	Ongoing (2023 – 2027)
Youth employment and entrepreneurship (YEE)[3,4]	SNV	YEE is a portfolio of programmes aimed at creating employment and entrepreneurial opportunities for youth, focusing on climate adaptation technologies, nature-based solutions, and nutritious food development. Applying the Pull-Match-Push-Enable (P-M-P-E) market-oriented framework which facilitates linkages between the labour market (demand side) and skilled youth (supply side) to stimulate employment opportunities, YEE connects youth with businesses, markets, finance, and training while advocating policies that support youth-led enterprises. To date, it has reached 230,000+ young people and supported the creation of about 180,000 jobs	Over 10 SSA countries	Ongoing

*Notes: *Specific programme timelines have been added where they are available*
Sources: 1) GIZ, Employment Promotion for Women for the Green Transformation in Africa, link; 2) Promoting Women's Employment for Africa's Green Transformation (WE4D) Fact Sheet, link; 3) SNV, Youth employment and entrepreneurship, link; 4) SNV (2024) Youth Employment And Entrepreneurship Learnings, link

Programme focus: Women only | Clean energy | Broader climate-smart sector | Sector agnostic

Several development partner programmes in SSA aim to enhance women's livelihoods, including in climate-smart sectors (2/7)

Name	Funder / Implementer	Summary	Location	Status*
Women for Green Jobs (W4GJ)[1]	GEAPP, Shortlist, and The Rockefeller Foundation	W4GJ is a multi-year program aimed at creating 750 green jobs for women. It seeks to scale up employment opportunities for young women by partnering with employers and community organizations. By offering targeted wage subsidies, job try-outs, and gender-focused advisory services, the initiative hopes to create pathways for women into roles traditionally dominated by men, such as installation engineers, while also expanding their presence in roles where women are already more common, like customer service and data analysis	Nigeria, Uganda, Sierra Leone, Ethiopia, Kenya and Malawi	Ongoing (started in 2022)
Energy2Equal Africa (E2E)[2,3,4]	IFC and the Government of Canada	E2E is a multi-year initiative aimed at closing gender gaps in SSA's renewable energy sector by increasing women's access to jobs, leadership, and entrepreneurship. In partnership with leading private sector players (such as ENGIE, SunKing and Schneider Electric), the program provides research, peer learning, and mentorship to equip companies with gender-smart strategies. A component of the program is the Women in Renewable Energy in Africa Network, which fosters networking, mentorship, and leadership training to support female professionals in the sector	SSA	Ongoing (started in 2019)

*Notes: *Specific programme timelines have been added where they are available*
Sources: 1) GEAPP (2022), GEAPP and Shortlist Introduce 'Women for Green Jobs' Initiative Across Six Countries in Africa, link; 2) IFC, Energy2Equal Africa Program, link; 3) IFC (2020), IFC Launches Energy2Equal To Increase Opportunities for Women in Renewable Energy, link; 4) OCA Consultations

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Programme focus: Women only | Clean energy | Broader climate-smart sector | Sector agnostic

Several development partner programmes in SSA aim to enhance women's livelihoods, including in climate-smart sectors (3/7)

Name	Funder / Implementer	Summary	Location	Status*
Challenge Fund for Youth Employment (CFYE)[1,2]	Netherlands Ministry of Foreign Affairs, Palladium, Randstad, and VSO	CFYE supports private sector initiatives to create, match, and improve jobs for youth, with a strong emphasis on gender equality, ensuring that 50% of those reached are women (to ensure this, CFYE requires implementing partners to develop project strategies that actively benefit women). It provides co-investment or technical assistance or both to implementing partners, supporting market-based, innovative, and scalable solutions. Over seven years, CFYE aims to impact 230,000 youth through productive employment, and has so far supported 100,000 jobs as of 2021	Middle East, North Africa, Sahel/West Africa and the Horn of Africa	Ongoing (started in 2019)
Women and clean energy in West Africa – WOCEWA[3,4]	IDRC, ECOWAS Center for Renewable Energy and Energy Efficiency	WOCEWA aims to close the gender gap in West Africa's energy sector in line with ECOWAS' gender mainstreaming policy. Targeting women-led SMEs in clean energy, the initiative focuses on evaluating current strategies, identifying gender-specific barriers, testing innovative approaches, and developing gender-inclusive financing programs to support women entrepreneurs. Key activities include organising training workshops for women entrepreneurs, organising networking events to facilitate partnership building between private sector project developers or financiers and women SMEs, creating gender-responsive policies, and raising awareness to promote women's leadership and entrepreneurship in clean energy	West Africa	Ongoing (2024 – 2027)

*Notes: *Specific programme timelines have been added where they are available*
Sources: 1) CFYE, The Fund Explained, link; 2) LinkedIn (2023), ImpactFuel - The CFYE Update, link; 3) ECREEE (2024), Women and Clean Energy in West Africa (WOCEWA), link; 4) IDRC.CDRI, Women and clean energy in West Africa – WOCEWA, link

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Programme focus: Women only | Clean energy | Broader climate-smart sector | Sector agnostic

Several development partner programmes in SSA aim to enhance women's livelihoods, including in climate-smart sectors (4/7)

Name	Funder / Implementer	Summary	Location	Status*
Future Female Leaders in Energy[1]	Transforming Energy Access (TEA), African Management Institute (AMI), and University of Cape Town (UCT)	The programme aims to equip young women in entry-level roles in the energy access sector with the skills, knowledge, and confidence needed for future senior leadership positions. Through online courses and workshops, it focuses on developing leadership, supporting women to pursue energy careers, building a community of emerging female leaders, and inspiring them to pursue leadership roles. Training modules covered by the program include risk management, introduction to finance and leadership skills, and project management	SSA	Ongoing
Off-Grid Talent Initiative (OGTI)[2,3,4]	TEA, AMI, University of Cape Town, Carbo Trust, and Shortlist	OGTI aimed to improve the skills and expertise of Africans in the off-grid energy access sector, covering work placements with clean energy companies and training for managers in the sector. The program supported about 900 young professionals in 100+ energy companies with entry level placements and mid-management development and had a 55% female participation rate	23 countries across SSA	Completed (2019 – 2021)

*Notes: *Specific programme timelines have been added where they are available*
Sources: 1) AMI, Future Female Leaders in Energy, link; 2) AMI (2023), Shortlist and African Management Institute to Power-up Clean Energy Careers Across Africa with support from UK government, link; 3) AidStream (2019), Off-Grid Talent Initiative, link; 4) Shortlist, Futures Programs, link

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Programme focus: Women only | Clean energy | Broader climate-smart sector | Sector agnostic

Several development partner programmes in SSA aim to enhance women's livelihoods, including in climate-smart sectors (6/7)

Name	Funder / Implementer	Summary	Location	Status*
Energy Access Talent Initiative (EATI)[1]	Transforming Energy Access (TEA) platform, Shortlist, and African Management Institute (AMI)	EATI aims to train and place 1,600+ African youth, with a strong focus on women, in clean energy jobs. The program tackles the skills gap in the clean energy sector by providing on-the-job training, leadership development, and career placement. The program works by Shortlist working with clean energy companies to identify talent gaps and provide work opportunities, while AMI delivers professional skills training and leadership programs, particularly supporting women and middle managers to advance in the sector	SSA	Ongoing
Women's Empowerment through Climate-Resilient Agriculture Value Chains[2,3]	UN Women	Combination of programmatic action and policy advocacy to tackle barriers limiting women's participation in agriculture value chains. The focus is on improving women's access to land and finance, providing climate-smart information, developing skills, and facilitating access to higher-value markets. As of 2021, the program had achieved significant results, including supporting 13,500 women in accessing land for agriculture, educating 4,800 women on their land right, and improving women entrepreneurship ecosystem by institutionally strengthening 200+ women cooperatives and women-led SMEs	SSA	Ongoing (started in 2017)

*Notes: *Specific programme timelines have been added where they are available*
Sources: 1) AMI (2023), Shortlist and African Management Institute to Power-up Clean Energy Careers Across Africa with support from UK government, link; 2)UN Women (2021), Empowering Women Through Climate-resilient Agriculture In West And Central Africa, Key Results Of Un Women's Flagship Programme, link; 3) UN Women, Women's Empowerment Through Climate-smart Agriculture, link

Programme focus: Women only | Clean energy | Broader climate-smart sector | Sector agnostic

Several development partner programmes in SSA aim to enhance women's livelihoods, including in climate-smart sectors (7/7)

Name	Funder / Implementer	Summary	Location	Status*
BRIDGES[1,2]	First Consult and Mastercard Foundation	BRIDGES aimed to support job creation and foster the growth of micro, small, and medium enterprises (MSME) for young people, with a focus on empowering women. The programme comprised four key "bridges" to tackle youth employment: (1) Enterprise Development equipped unemployed youth with entrepreneurial skills and BDS** to establish their MSMEs; (2) Employment Linkage created efficient recruitment, screening, and training systems for industrial park workers; (3) Access to Finance addressed the financing gap for MSMEs through policy reform, capacity building, innovation, and linkage efforts; (4) Enterprise Competitiveness focused on enhancing local enterprises' ability to compete for foreign direct investment. The programme supported 438,502 young women in employment.	Ethiopia	Completed (2019 – 2024)
Employment and Skills for Development in Africa (E4D)[3]	GIZ	E4D aimed to promote local employment and address skills gaps across seven countries by enhancing the capacities of jobseekers, employees, enterprises, and training institutions. With a focus on women, youth, and green jobs (including in energy efficiency, resource and waste management), E4D achieved its goals by offering technical training, linking jobseekers with employers, facilitating internships, and strengthening vocational institutions. As of 2022, E4D had supported 40,000+ people in gaining employment (34% of which were women) and had enhanced the business capacities of 43,000+ enterprises (of which 42,024 were micro-sized enterprises and smallholder farmers)	Ghana, Kenya, Mozambique, Nigeria, South Africa, Tanzania, Uganda	Completed (2015 – 2023)

*Notes: *Specific programme timelines have been added where they are available; **business development services*
Sources: 1) First Consult, The BRIDGES Programme, link; 2) First Consult (2024), Creating Jobs for Young Women Can Be Challenging but Doable: A Mixed Approach, link; 3) GIZ, Employment and Skills for Development in Africa (E4D) Fact Sheet, link

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Appendix 2: Value chain prioritisation methodology

Size and growth potential of the value chains was considered to understand the broader market opportunity

Clean energy	Score
Off-grid solar: High existing penetration and growth potential due to increasing demand in remote areas for energy access	🟢
Clean cooking: Significant push for increased clean cooking access across SSA, as clean cooking addresses widespread health and environmental issues, thus influencing significant product demand and scalability	🟢
Productive Use of Energy (PUE): While there is a relatively small existing market given lack of affordability, there is significant growth potential driven by the need for energy in agricultural and industrial activities	🟢
E-mobility: While current size is not large, there is significant traction and growing demand due to urbanisation, increasing focus on reducing emissions, and the increasingly better affordability of e-vehicles	🟢
Mini-grids: Projected to be a major contributor to rural electrification, as costs decrease and policies support off-grid systems	🟢
Battery storage: Growing demand with the expansion of renewable energy sources, though adoption costs remain a barrier	🟡
Solar generators: Moderate demand owing to affordability, niche applications, and competition with other renewable energy solutions	🟡

Nature-Based Solutions	Score
Food and agriculture processing: High potential due to the high importance of the value chain in SSA and the demand for sustainable and locally sourced food production within the region	🟢
Ecosystem restoration: Moderate potential owed to the growing focus on restoration due to climate initiatives and its reliance on government and NGO support to scale	🟡
Coastal/marine protection: Relevant in coastal regions and typically relies on specific environmental or tourism funding and policy support	🟡
Water management: Essential due to water scarcity and climate challenges in parts of SSA, posing significant growth potential	🟢
Forestry: High growth, supported by carbon credits and reforestation programs, boosted by global climate goals and conservation funding	🟢
Circular Economy	
Waste-to-energy: Offers high growth potential for waste management and energy production, especially in agricultural and urban waste settings	🟢
Recycling: Fast growing sector, particularly in urban areas, given regulatory framework tightening and consumer awareness growing	🟢

🟢 Large market or high potential, significant scalability, and growing market demand

🟡 Moderate market size or growth potential, some barriers to scalability

🔴 Limited market size or growth potential and market saturation

Note: The rankings are qualitative and based on consultations and our internal knowledge of the value chains

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Policies and initiatives can influence growth in the sector and the ability to create employment and entrepreneurship opportunities

Clean energy	Score
Off-grid solar: Strong policy support in many regions to promote renewable energy access[1]	●
Clean cooking: Strong support, backed by health and environmental policies focused on reducing indoor pollution[1]	●
PUE: Supported in agricultural policies, though often lacking targeted initiatives[1]	●
E-mobility: Growing policy interest, especially in urban areas focused on reducing vehicle emissions[1]	●
Mini-grids: Strong support to due to their importance in achieving electrification goals in SSA[2,3]	●
Battery storage: Moderate direct support, related to the broader renewable energy support in the region[4,5]	●
Solar generators : Limited direct support, though indirectly benefited by broader renewable energy support in the region[1]	●

Nature-Based Solutions	Score
Food and agriculture processing: Strong support due to alignment with food security and rural development policies[6]	●
Ecosystem restoration: Generally supported through environmental and conservation policies[6]	●
Coastal/marine protection: Targeted support in certain regions focused on marine conservation and coastal resilience, although limited enforcement capacity in many regions[6]	●
Water management: Strong consistent policy support given water is a key resource, particularly in areas with water scarcity issues[7,8]	●
Forestry: Backed by policies promoting reforestation and carbon sequestration efforts[9]	●

Circular Economy	
Waste to energy: Growing policy support in waste management and environmental health policies in many regions as governments focus on circular economy principals[10]	●
Recycling: Growing policy support, especially in urban areas focused on reducing landfill waste[11,12]	●

● Strong policy support and incentives, with local, national, or international initiatives actively promoting growth and development

● Moderate policy support, with some incentives available but not widespread or consistently implemented

● Minimal policy support, with few or no specific policies encouraging growth, making it challenging for the value chain to develop without private investment or external support

Note: The rankings are qualitative and based on consultations and our internal knowledge of the value chains. Sources: 1) IRENA (2024), Sub-Saharan Africa: Policies and finance for renewable energy deployment, link; 2) World Bank, (2022), Mini Grids for Half a Billion People, link; 3) World Bank, (2023), Solar Mini Grids Could Sustainably Power 380 million People in Africa by 2030 – if Action is Taken Now, link; 4) Electricity Lawyer, (2023), SSA Battery Energy Storage Systems Toolkit, link; 5) Bowmans Energy Report, (2024), SSA, The Energy Industry, link; 6) WRI (2022), Nature-Based Solutions in Sub-Saharan Africa for Climate and Water Resilience, link; 7) AFDB, (2021), Policy On Water, link; 8) GW.MATE, (2011),; Sustainable Groundwater Management, link; 9) CIFOR (2021), Forest-based bioeconomy in sub-Saharan Africa: Looking at benefits, barriers and burdens from a social sustainability standpoint, link; 10) Urban Africa Risk Knowledge (2016), Solid Waste Management Policies in Urban Africa: Gender and Life-course Considerations in Nairobi and Mombasa, link; 11) JUST2CE (2024), Circular Economy (CE) in African countries, link; 12) Circular economy.Earth (2020), Policy Approaches for Accelerating the Circular Economy in Africa, link

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The impact of the value chain on the local community was considered with a preference for higher impact

Clean energy	Score
Off-grid solar: High impact by providing electricity access, improving quality of life in remote communities	●
Clean cooking: Strong positive impact on health and safety for households, especially for women and children	●
PUE: Enables local economic activities, boosting productivity and income for small businesses	●
E-mobility: Reduces urban pollution, improving air quality and community health, though there still exists more broadly used fossil fuel alternatives	●
Mini-grids: High impact by providing electricity access, improving quality of life in remote communities	●
Battery storage: Moderate impact, supporting energy reliability but mainly indirectly through renewables	●
Solar generators: Moderate direct impact, as they are typically used as supplementary energy sources with the availability of a viable fossil fuel alternative	●

Nature-Based Solutions	Score
Food and agriculture processing: High community impact by supporting local food systems and boosting rural economies	●
Ecosystem restoration: Restores local habitats, improving livelihoods, biodiversity, long-term environmental health, and resilience to climate change	●
Coastal/marine protection: Benefits coastal communities through ecosystem conservation and climate adaptation, although impact is currently limited	●
Water management: Strong impact on water availability and quality, crucial for community health and agriculture	●
Forestry: Supports income and provides long-term benefits through ecosystem preservation and climate resilience	●
Circular Economy	
Waste-to-energy: High impact on waste reduction and energy access, especially beneficial in rural and urban waste management	●
Recycling: Positively impacts urban environments by reducing waste, though more limited in rural areas	●

● High positive impact on local communities, providing significant social, economic, or environmental benefits

● Moderate community impact, with some benefits but limited in reach or depth, often dependent on specific community needs or settings

● Limited or indirect community impact, with benefits that may not directly affect the local population or require additional factors to have a meaningful impact

Note: The rankings are qualitative and based on consultations and our internal knowledge of the value chains

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Value chains addressing female-specific needs or issues and over-proportionately supporting women were prioritised

Clean energy	Score
Off-grid solar: While there are broad impact across genders, women benefit from improved safety, economic activities and enabling education at an affordable price	🟢
Clean cooking: Primarily benefits women, reducing exposure to harmful smoke and easing cooking burdens	🟢
PUE: Impacts both genders but empowers women micro-entrepreneurs engaged in retail, and women small-holder farmers, who make up a significant portion of farmers in SSA	🟢
E-mobility: Benefits are generally gender-neutral, focusing on public health and environmental improvement	🟡
Mini-grids: Gender-neutral impact, providing energy access to entire communities	🟡
Battery storage: Neutral impact, as it supports energy needs across genders without specific targeting	🟡
Solar generators: Neutral impact, used broadly without a gender-specific focus	🟡

Nature-Based Solutions	Score
Food and agriculture processing: Significant impact on women who are often involved in small-scale food production	🟢
Ecosystem restoration: Gender-neutral, though it benefits community resilience which supports both genders	🟡
Coastal/marine protection: Neutral, with broad benefits for communities without a specific gender focus	🟡
Water management: Often benefits women more directly in rural areas where they are responsible for water collection	🟡
Forestry: Gender-neutral, though community-focused programs can indirectly support women's livelihoods	🟡

Circular Economy	
Waste-to-energy: Benefits both genders, though often more impactful for women in waste management roles	🟡
Recycling: Gender-neutral, though roles in recycling often involve low-income women in urban areas	🟡

🟢 Primarily benefits women, addressing gender-specific needs or issues, or offering solutions that improve women's quality of life

🟡 Gender-neutral or moderate impact on women, with benefits that apply broadly across genders but may have some indirect positive effects on women's lives

🔴 Minimal or no specific impact on women, generally serving both genders equally without a focus on addressing women's particular needs

Note: The rankings are qualitative and based on consultations and our internal knowledge of the value chains

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Appendix 3: Country prioritisation framework

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We leveraged research and conducted consultations to develop the country prioritization criteria in Africa

1. **Brainstormed, conducted desk research and consultations**
   - Brainstormed prioritization criteria and aligned on data points of research
   - Conducted desk research to get the data points
   - Conducted targeted consultations to sense check the indicators we choose and close research gaps
2. **Data analysis**
   - Fed the data in MS Excel and cleaned it
   - Sorted the data and analysed it to extract insights from the data
3. **Scored the data**
   - Developed a framework for scoring the data
   - Applied the scoring to the data and sorted the data after this
4. **Weighted the scores**
   - Assigned weights to the data to sharpen the prioritization criteria
   - Sorted the data and shortlisted the top five countries in SSA

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Proposed prioritised countries

We added weights per indicator while shortlisting the top five SSA countries across the sub-sectors (1/2)

Country	Region	Total population[1]	Total number of low-income women[2]	OGS sales[3]	Population with access to clean cooking[4]	Agriculture, fishing and forestry[5]	Energy supply from bio-fuels and waste[6]
Kenya	Eastern	3	3	5	4	3	2
Nigeria	West	5	5	3	3	3	3
Tanzania	Eastern	4	4	3	3	4	4
Ethiopia	Eastern	5	5	2	2	5	4
South Africa	Southern	4	4	2	5	1	1
Rwanda	Eastern	1	1	4	2	4	4
Uganda	Eastern	3	3	4	1	4	5
Ghana*	Western	3	3	1	4	3	1
DRC	Central	4	4	1	1	2	5
Senegal	Western	1	1	2	4	1	1
Zambia	Southern	2	2	5	2	1	3
Benin	Western	1	1	4	1	5	2
Cameroon	Central	2	2	3	3	2	3
Cote d'Ivoire	Western	2	2	1	5	2	2
Weights per indicator		**10%**	**15%**	**10%**	**10%**	**10%**	**10%**

Total weight allocation indicator:

25%	Macro-economic indicators
40%	Market opportunity indicators
10%	Socio-cultural indicators
25%	Policy environment indicators

Indicator representation:

- Macro-economic indicators
- Market opportunity indicators
- Socio-cultural indicators
- Policy environment indicators

*Notes: * Incomplete sales data; Sources: 1) World Bank's total population data for 2023, link; 2) World Bank's total low-income women data for 2023, link; 3) 2023 H2 + H1 calculated SHS system and appliance sales from "Global Off-Grid Solar Market Report Semi-Annual Sales & Impact Data, (GOGLA, 2023), link; 4) Calculated using the countries' 2022 clean energy access rate and population from ESMAP's Energy Progress Report, link, and the World Bank's population data for 2022, link; 5) Calculated using contribution of agriculture, forestry, fishing (Statista, 2022), link; and GDP in USD (World Bank, 2022), link; 6) International Energy Agency data on energy produced from bio-fuels and waste for 2022, link; 7) SDG gender equality index for 2022, link; 8) ESMAP gender inclusive policies data, link; 9) Policies and finance for renewable energy deployment (IRENA, 2022), link; 10) African climate change policy performance index (ScienceDirect,2021), link;*

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Proposed prioritised countries

We added weights per indicator while shortlisting the top five SSA countries across the sub-sectors (2/2)

Country	Region	SDG gender equality index[7]	Gender inclusive policies[8]	Renewable energy policies[9]	Climate policy score[10]	Total overall weighted score
Kenya	Eastern	4	4	5	3	3.67
Nigeria	West	1	2	5	5	3.48
Tanzania	Eastern	4	2	3	5	3.42
Ethiopia	Eastern	2	1	5	3	3.35
South Africa	Southern	5	3	5	5	3.16
Rwanda	Eastern	4	5	3	3	2.99
Uganda	Eastern	1	4	3	3	2.97
Ghana*	Western	5	3	5	5	2.88
DRC	Central	1	3	1	1	2.34
Senegal	Western	3	3	3	5	2.32
Zambia	Southern	2	3	2	3	2.22
Benin	Western	3	3	2	3	2.21
Cameroon	Central	3	1	1	1	2.11
Cote d'Ivoire	Western	2	3	1	1	2.07
Weights per indicator		**10%**	**10%**	**10%**	**5%**	

Total weight allocation indicator:

- **25%** Macro-economic indicators
- **40%** Market opportunity indicators
- **10%** Socio-cultural indicators
- **25%** Policy environment indicators

Indicator representation:

- Macro-economic indicators
- Market opportunity indicators
- Socio-cultural indicators
- Policy environment indicators

*Notes: * Incomplete sales data; Sources: 1) World Bank's total population data for 2023, link; 2) World Bank's total low-income women data for 2023, link; 3) 2023 H2 + H1 calculated SHS system and appliance sales from "Global Off-Grid Solar Market Report Semi-Annual Sales & Impact Data, (GOGLA, 2023), link; 4) Calculated using the countries' 2022 clean energy access rate and population from ESMAP's Energy Progress Report, link, and the World Bank's population data for 2022, link; 5) Calculated using contribution of agriculture, forestry, fishing (Statista, 2022), link; and GDP in USD (World Bank, 2022), link; 6) International Energy Agency data on energy produced from bio-fuels and waste for 2022, link; 7) SDG gender equality index for 2022, link; 8) ESMAP gender inclusive policies data, link; 9) Policies and finance for renewable energy deployment (IRENA, 2022), link; 10) African climate change policy performance index (ScienceDirect,2021), link;*

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Appendix 4: Focus activities prioritisation methodology

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Recommended priority activity

Legend*: Highly favourable for women's involvement; Moderately favourable for women's involvement; Low favourability for women's involvement

We selected 8 of the priority activities across the value chains for SF to focus on in creating employment for women (1/4)

Value chains	Prioritised activities	Prioritisation criteria							Priority
		Opportunities					Challenges		
		Potential earnings	Potential scale	Interest from women	Resilience of activity	Business case	Level of cultural hurdles	Level of training required	
Off-grid solar	Sales agent	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Transporter / Driver**	🟡	🟢	🟡	🟢	🟡	🟡	🟡	High
	Collections officer	🟡	🟡	🟡	🟡	🔴	🟡	🟡	Medium
	Customer service rep.	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Operator and technician	🟢	🟢	🟡	🟢	🟡	🟡	🔴	High
Productive use of energy	Sales agent	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Transporter / Driver**	🟡	🟢	🟡	🟢	🟡	🟡	🟡	High
	Collections officer	🟢	🟡	🟡	🟡	🔴	🟡	🟡	Medium
	Customer service rep.	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Operator and technician***	🟢	🟢	🟡	🟢	🟡	🟡	🔴	High

*Note: The rankings are qualitative and based on consultations and our internal knowledge of the sector and its activities; *High favorability means high for the opportunities and low for the challenges and vice versa; **Considering only EV transporters given the priority on green jobs; ***PUE tends to be somewhat more technical than other value chains such as OGS and so this should be considered*

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Recommended priority activity

Legend*: Highly favourable for women's involvement; Moderately favourable for women's involvement; Low favourability for women's involvement

We selected 8 of the priority activities across the value chains for SF to focus on in creating employment for women (2/4)

Value chains	Prioritised activities	Prioritisation criteria							Priority
		Opportunities					Challenges		
		Potential earnings	Potential scale	Interest from women	Resilience of activity	Business case	Level of cultural hurdles	Level of training required	
Clean cooking	Local artisan	🟡	🔴	🟡	🟢	🟡	🟡	🔴	Medium
	Transporter / Driver**	🟡	🟢	🟡	🟢	🟡	🟡	🟡	High
	Sales agent	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Collections officer	🟡	🟡	🟡	🟡	🔴	🟡	🟡	Medium
	Customer service rep.	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Operator and technician	🟢	🟢	🟡	🟢	🟡	🟡	🔴	High
E-mobility	EV assembler	🟢	🟡	🟡	🟡	🟢	🟡	🔴	Medium
	Sales agent	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Operator and technician	🟢	🟢	🟡	🟢	🟢	🟡	🔴	High

*Note: The rankings are qualitative and based on consultations and our internal knowledge of the sector and its activities; *High favorability means high for the opportunities and low for the challenges and vice versa; **Considering only EV transporters given the priority on green jobs*

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Recommended priority activity

Legend*: Highly favourable for women's involvement; Moderately favourable for women's involvement; Low favourability for women's involvement

We selected 8 of the priority activities across the value chains for SF to focus on in creating employment for women (3/4)

Value chains	Prioritised activities	Prioritisation criteria							Priority
		Opportunities					Challenges		
		Potential earnings	Potential scale	Interest from women	Resilience of activity	Business case	Level of cultural hurdles	Level of training required	
E-mobility	Customer service rep.	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Field service technician**	🟢	🟢	🟡	🟢	🟢	🔴	🔴	Medium
	Collection officer	🟡	🟡	🟡	🟡	🔴	🟡	🟡	Medium
	Transporter / driver	🟡	🟢	🟡	🟢	🟡	🟡	🟡	High
Food & Agro-processing	Factory worker	🔴	🟡	🟡	🟡	🟢	🟡	🟢	Medium
	Quality control specialist	🟡	🟡	🟡	🟡	🟢	🟡	🟡	Medium
	Artisanal food processor	🟢	🟡	🟢	🟢	🟡	🔴	🟡	High
	Packager / Floor worker	🔴	🟡	🟡	🟡	🟢	🟡	🟢	Medium
	Transporter / driver	🟡	🟢	🟡	🟢	🟡	🟡	🟡	High
	Street (food) vendor	🟡	🟡	🟢	🟢	🟢	🟢	🟢	High
	Shop-owner	🟡	🟡	🟡	🟡	🟡	🟡	🟡	Medium
	Waitress	🔴	🟡	🟡	🟡	🟡	🟡	🟡	Medium

*Note: The rankings are qualitative and based on consultations and our internal knowledge of the sector and its activities; *High favorability means high for the opportunities and low for the challenges and vice versa; Not prioritised for EV given higher cultural barriers and high technicality requiring higher level of education / training*

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Recommended priority activity

Legend*:
- Highly favourable for women's involvement
- Moderately favourable for women's involvement
- Low favourability for women's involvement

We selected 8 of the priority activities across the value chains for SF to focus on in creating employment for women (4/4)

Value chains	Prioritised activities	Prioritisation criteria							Priority
		Opportunities					Challenges		
		Potential earnings	Potential scale	Interest from women	Resilience of activity	Business case	Level of cultural hurdles	Level of training required	
Waste-to-energy	Waste collector	🔴	🟢	🟢	🟢	🟢	🟢	🟢	High
	Local waste handler	🔴	🟡	🟡	🟡	🟢	🟢	🟢	Medium
	Machine operator	🟢	🟡	🟡	🟡	🟡	🟡	🔴	Medium
	Floor worker	🔴	🟡	🟡	🟡	🟢	🟡	🟢	Medium
	Quality control specialist	🟡	🟡	🟡	🟡	🟢	🟡	🟡	Medium
	Technician	🟢	🟡	🟡	🟢	🟢	🟡	🔴	Medium
	Customer service rep.	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High
	Sales representative	🟡	🟢	🟢	🟢	🟢	🟢	🟡	High

*Note: The rankings are qualitative and based on consultations and our internal knowledge of the sector and its activities; *High favorability means high for the opportunities and low for the challenges and vice versa*

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Appendix 5: Scale of opportunity deep dives

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The market sizing considered various assumptions to estimate the total new jobs relevant for low-income women by 2030

To estimate the number of jobs for low-income women in SSA:

Total jobs in each sub-sector

- Using the methodology on the following pages, estimated the total number of number of new formal jobs available in each sector across SSA by 2030
  - Formal jobs is defined as: Jobs where a company formally employs someone full-time or part-time on a formal contract
- Applied a lower and upper bound multiplier to determine the total number of new informal jobs available in each sector across SSA by 2030
  - Leveraged consultations and analysis of the informal sector in other sectors across developing markets
  - Informal jobs is defined as: Jobs that do not have formal arrangements and can include contractors or microentrepreneurs engaging in a part of the value chain. These can include roles that support the value chain but where an individual is not directly employed, e.g. sales agents or logistics

Total low-income jobs in each sub-sector

- Estimated the % split between unskilled, semi-skilled, general & admin and advanced jobs in each sector
  - Leveraged relevant sector information including FSD Africa / Shortlist report[1]
- Assumed that low-income individuals can access an assumed % of each type of job, varying between the job types

Total low-income jobs for women in each sub-sector

- Applied 32% to the total new low-income jobs to represent the jobs available for women[2]
  - Leveraged Sustainable Energy For All data[2]
  - Assumed 5-10% (lower to upper bound) accessibility for women for EV drivers, given the lower penetration in this market and leveraging consultations[3]

Sources: 1) FSD shortlist Report, (2024), link; 2) SEforALL, (202), Improving energy data to enhance gender equality, link; 3) OCA Consultation

The OGS market sizing considers total new jobs within SHS and Pico solar sub sectors

To estimate the number of jobs for low-income women in SSA:

OGS

- Estimated the number of OGS products sold in 2023, leveraging GOGLA data[1]
- Applied growth rate to determine the annual sales of OGS products in 2030
    - Leveraged Market Trends Report 2022 optimistic growth rate to estimate a lower bound growth rate and Market Trends Report 2024 to estimate an upper bound growth rate[2]
- Estimated a localisation rate leveraging the FSD Shortlist report and an employment factor leveraging the Power for All report[3,4]
    - Applied these two factors to estimate the total number of new formal jobs in the OGS sector by 2030

Source: 1) GOGLA, (2023), Global Off-Grid Solar Market Data July-December 2023, link; 2) GOGLA, (2024), OGS Market Trends Report, link; 3) FSD shortlist Report, (2024), link; 4) Power for All, (2022), Powering Jobs Census, link; Off-grid Solar Market Trends Report 2022, link

The PUE market sizing considers total new jobs within the solar water pump (SWP) and cold storage sub-sectors

To estimate the number of jobs for low-income women in SSA:

SWPs

- Estimated the number of SWPs sold in 2023, leveraging GOGLA data[1]
  - Assumed that the GOGLA reported sales is a % of total sales in SSA, leveraging Efficiency for Access report[2]
- Applied growth rate to determine the annual sales of SWPs in 2030
  - Leveraged Market Trends Report 2024 to estimate a lower and upper bound growth rate[3]
- Estimated a localisation rate leveraging the FSD Shortlist report and the employment factor using company data of SWP providers[4]
  - Applied these two factors to estimate the total number of new formal jobs in the SWP sector by 2030

Cold storage

- Estimated the annual additional total serviceable market of farmers for cold storage in 2030, leveraging PULSE report estimates of growth between 2018 and 2030[5]
- Assumed one solar cold storage unit per farmer and applied an assumed lower and upper bound adoption rate by 2030 to estimate the additional cold chain unit sales in 2030[4]
- Estimated a localisation rate leveraging the FSD Shortlist report and the employment factor using company data of cold storage providers[4]
  - Applied these two factors to estimate the total number of new formal jobs in the cold storage sector by 2030

Source: GOGLA, (2023), Global OGS Market Data, link; 2) Efficiency for Access, (2024), Leave No One Behind, link;3) GOGLA, (2024), MTR, link; 4) FSD shortlist Report, (2024), link; 5) ESMAP, (2019), PULSE Report, link;

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The clean cooking market sizing considers total new jobs within LPG, biogas, bioethanol, eCooking and briquette sub sectors

To estimate the number of jobs for low-income women in SSA:

Clean cooking fuels – LPG, biogas, bioethanol and eCooking

- Estimated the increase in population with access to clean cooking in Kenya and SSA between 2024 and 2030, leveraging World Bank data, Energy Progress Report data and International Energy Agency data[1,2,4]
- Esitmn
- Calculated job per population with access to clean cooking for LPG, Biogas, Bioethanol and eCooking in Kenya, using the Powering jobs employment footprint report[3]
- Applied the estimated job per population with access to clean cooking to the increased population with access to clean cooking in SSA between 2024 and 2030 to estimate the additional formal LPG, Biogas, Bioethanol and eCooking jobs in SSA by 2030

Briquette/Pellets

- Estimated the briquette production capacity in Kenya, leveraging Alkebulan data[7]
- Applied lower and upper bound growth rate in line with increase to agricultural waste to estimate the additional briquette production in SSA by 2030, leveraging World Bank data[8]
- Estimated an employment factor using company data of briquette companies
    - Applied this to estimate the total number of new formal jobs in the briquette sector by 2030

Source: 1) World Bank, (2024), Population data, link; 2) Energy Progress Report, (2024), link; 3) Chih-Jung Lee et al., (2021)) Powering jobs employment footprint of clean cooking solutions in Kenya, link; 4) IEA, (2024), A Vision for Clean Cooking Access For All, link; 5) OCA analysis;

The E-mobility market sizing considers total new jobs within the electric 2-, 3-, and 4-wheelers, LCVs, and charging infrastructure

To estimate the number of jobs for low-income women in SSA:

Electric 2-,3-, and 4-wheelers, buses and LCV excluding drivers

- Estimated the annual sales of the relevant e-vehicle in 2030, leveraging McKinsey and SF report[1]
- Applied a localisation rate and employment factor, including roles within the value chain, e.g. manufacturing and sales, leveraging the FSD Shortlist report[2]
    - Applied these three factors to estimate the total number of new formal jobs in the E-mobility sector by 2030

Electric 2-,3-, and 4-wheelers, buses and LCV drivers

- Estimated the additional cumulative relevant e-vehicle in SSA between 2025 and 2030, leveraging McKinsey and SF report[1]
- Estimated the % of the relevant e-vehicle that is used for commercial use, leveraging Cleantech Group data and applied this to estimate the total additional cumulative sales between 2025 and 2030
- Assumed one driver job per commercial use e-vehicle
    - Assumed only informal jobs in this sub-sector and therefore did not apply the formal to informal multiplier and assumed 100% of these jobs relevant for low-income individuals[4]

Charging Infrastructure

- Estimated a lower and upper bound for the number of new charging stations by 2030, leveraging the FSD Shortlist report[1]
- Estimated a localisation rate and an employment factor leveraging the FSD Shortlist report [2]
    - Applied these three factors to estimate the total number of new formal jobs in the charging infrastructure sector by 2030

Source:1) Mckinsey and SF, (2024) Financing the transition to electric vehicles in sub-Saharan Africa, link; 2) FSD shortlist Report, (2024), link; 3) Cleantech Group, (2024), E-mobility in Sub-Saharan Africa: Electric Two Wheelers Gaining Momentum, link; (4) OCA analysis

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The food & ag processing market sizing considers total new jobs within the agro-processing and street vendor sub-sectors

To estimate the number of jobs for low-income women in SSA:

Agro-processing

- Estimated the additional serviceable addressable market of solar agro-processing by 2030, leveraging the PULSE report[1]
- Applied an assumed lower and upper bound adoption rate by 2030[2]
- Assumed one formal job per new agro-processing plant to estimate the total number of new formal jobs in agro-processing by 2030

Street vendors

- Estimated the additional urban population of SSA between 2024 and 2030, leveraging World Bank data[3]
- Applied estimated street vendor per population in Nairobi to additional urban population in SSA to estimate the additional street vendors in SSA by 2030[3,4]
- Estimated an upper and lower bound for the number of street vendors utilising electric or clean cooking, leveraging an FAO report
- Assumed one green job per new street vendor using electric or clean cooking
    - Assumed only informal jobs in this sub-sector and therefore did not apply the formal to informal multiplier and assumed 100% of these jobs relevant for low-income individuals[2]

Source: 1) ESMAP, (2019), PULSE Report, link; 2) OCA analysis 3) World Bank, (2024), World Bank Data from database: Population estimates and projections, link; 4) Macrotrends, (2024), Nairobi Metro Area Population 1950 – 2024, link; 5) FAO, Street Foods in Nairobi, link;

The waste-to-energy market sizing considers total new jobs within agricultural waste, municipal solid waste and briquettes

To estimate the number of jobs for low-income women in SSA:

Agricultural waste

- Estimated the agricultural produce per annum in 2022, leveraging FAO data[1]
- Applied lower and upper bound growth rate to determine the additional annual forecasted agricultural produce in 2030, leveraging UNDP data[2]
- Estimated the % of produce wasted and of that, % used for biomass, leveraging World Resources Institute and AGU data respectively[3,4]
- Estimated an employment factor using company data of waste-to-energy providers
    - Applied this to estimate the total number of new formal jobs in the agricultural waste sector by 2030

Municipal solid waste (MSW)

- Estimated the municipal solid waste per annum in 2022, leveraging UNDP data[5]
- Applied lower and upper bound growth rate to determine the additional forecasted municipal solid waste by 2030, leveraging UNDP data[2]
- Estimated the % of MSW collected and of that, the % that is organic and % used for biomass, using % of ag waste used for biomass as a proxy[3,4,6]
- Estimated an employment factor using company data of waste-to-energy providers
    - Applied this to estimate the total number of new formal jobs in the agricultural waste sector by 2030

Source: 1) FAOSTAT, (2024), link; 2) UNDP, Food Production and Consumption Trends, link; 3) WRI, (2022) 3 ways to tackle food loss and waste in Africa, link; 4) AGU, An assessment of biofuel and burning of agricultural waste, link; 5) UNDP, (2012), Smart urban Resilience in SSA, link; 6) Muyiwa et al., (2023), Municipal Solid Waste Collection and Coverage Rates in Sub-Saharan African Countries: A Comprehensive Systematic Review and Meta-Analysis, link; 7) Alkebulan, (2023), Use of briquettes in Kenya, link; 8) World Bank, (2024), Population data, link;

The Minigrids market sizing considers MW installed in SSA

To estimate the number of jobs for low-income women in SSA:

Minigrids

- Estimated the number of minigrids and MW installed in SSA in 2022, leveraging Mini Grids for Half a Billion People Report[1]
- Applied lower and upper bound growth rate to determine the additional MW installed in 2030[1,5]
    - Leveraged Mini Grids for Half a Billion People Report and iea estimates to determine a lower and upper bound[1,5]
- Estimated a localisation rate leveraging the FSD Shortlist report and an employment factor leveraging the Power for All report[3,4]
    - Applied these two factors to estimate the total number of new formal jobs in the Minigrids sector by 2030

Source: World Bank, (2022), Mini Grids for Half a Billion People Report, link; 2) OCA analysis; 3) FSD shortlist Report, (2024), link; 4) Power for All, (2022), Powering Jobs Census, link; 5) iea SSA solar PV capacity additions 2017-2022 and average annual additions 2023-25, link

Photo credit: istock

Appendix 6: Stakeholder consultations

Below is a list of stakeholders we consulted to gain key insights on the climate-smart sector across SSA (1/2)

Stakeholder type	Organization	Description	Value chain	Target countries of operation
Private companies	Ampersand	Provides affordable electric motorcycles and charging infrastructure for sustainable transportation	E-mobility	Rwanda and Kenya
	BSUL	Provides affordable biogas systems for rural communities, offering sustainable cooking and lighting solutions	Waste-to-energy	Uganda
	Cambridge Industries	Develops waste-to-energy plants, transforming urban waste into renewable energy to support sustainable city infrastructure	Waste-to-energy	SSA
	Davis and Shirtlif	Offers products such as pumps, solar systems, and water treatment technologies	PUE	SSA
	eBee	Provides electric bicycles and fleet solutions in East Africa, creating climate-smart jobs for women and youth while promoting sustainable transport and reducing carbon emissions	E-mobility	Kenya, Uganda and Rwanda
	Jacobs Ladder Africa	Empowers youth through green workforce training and supports sustainable startups in sectors like agriculture, energy, and waste management	Cross-cutting	SSA
	Mwingi	Empowers rural women entrepreneurs by providing access to essential goods and services	Food and Ag processing	Kenya
	Sistema.bio	Delivers biodigester technology to smallholder farmers, converting waste into energy and fertilizer for improved agricultural productivity	Waste-to-energy	Global
	Solar Sister	Empowers women entrepreneurs to distribute affordable solar-powered lights and clean energy solutions in underserved regions	OGS	SSA

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Below is a list of stakeholders we consulted to gain key insights on the climate-smart sector across SSA (2/2)

Stakeholder type	Organization	Description	Target countries of operation
Development partners	ESMAP	Assists low- and middle-income countries achieve sustainable energy solutions	Global
	GEAPP	Accelerates clean energy transitions and supports inclusive economic growth in emerging economies	SSA
	GIZ	Provides technical expertise and solutions for sustainable development and international cooperation	Global
	IFC	Finances private sector development in emerging markets to boost economic growth and reduce poverty.	Global
	Practical Action	Uses technology to address poverty and improve energy, agriculture, and water access	SSA
Industry experts	60 decibels	Specializes in impact measurement, providing data to assess and improve social, environmental, and financial outcomes	Global
	SHINE	Partners with grassroots organizations and women-led groups to scale sustainable energy systems and achieve universal clean energy access by 2030	Global
	Shortlist	Connects skilled professionals with companies, emphasizing technology and data-driven recruitment	Global
	Value for Women	Supports businesses and organizations to incorporate gender inclusion strategies for social and economic impact	SSA
Investors	KawiSafi	Invests in renewable energy ventures in East Africa, focusing on scaling clean energy access and reducing carbon emissions	SSA
	Sahara Impact Ventures	Supports and invests in social enterprises addressing critical challenges in energy, water, and economic empowerment across Africa	SSA

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Photo credit: Solar Sister

Appendix 7: FGD details

We conducted 5 FGDs in Kenya targeting women across multiple climate-smart value chains to understand their unique challenges

Location	Description	Value chain	No. of participants	Participant roles
Urban/peri-urban areas	In urban and peri-urban areas, four focus groups were conducted with a total of 28 participants—26 in person and 2 virtually—using a combination of group discussions, one-on-one interviews, and written questionnaires	**Waste-to-energy**, **Clean cooking**, **Off-grid solar**, **E-mobility**, **PUE**	**28** *24 of whom were women; participants either had jobs, were self-employed or in training*	• Sales agent • Driver • Technical coordinator • Solar technician in training
Rural areas	In rural areas, one focus group consisting of 8 participants was conducted in person, utilizing group discussions and written questionnaires	**Waste-to-energy**, **Clean cooking**, **Off-grid solar**, **PUE**	**8** *7 of whom were women; all were self-employed*	• Sales agent

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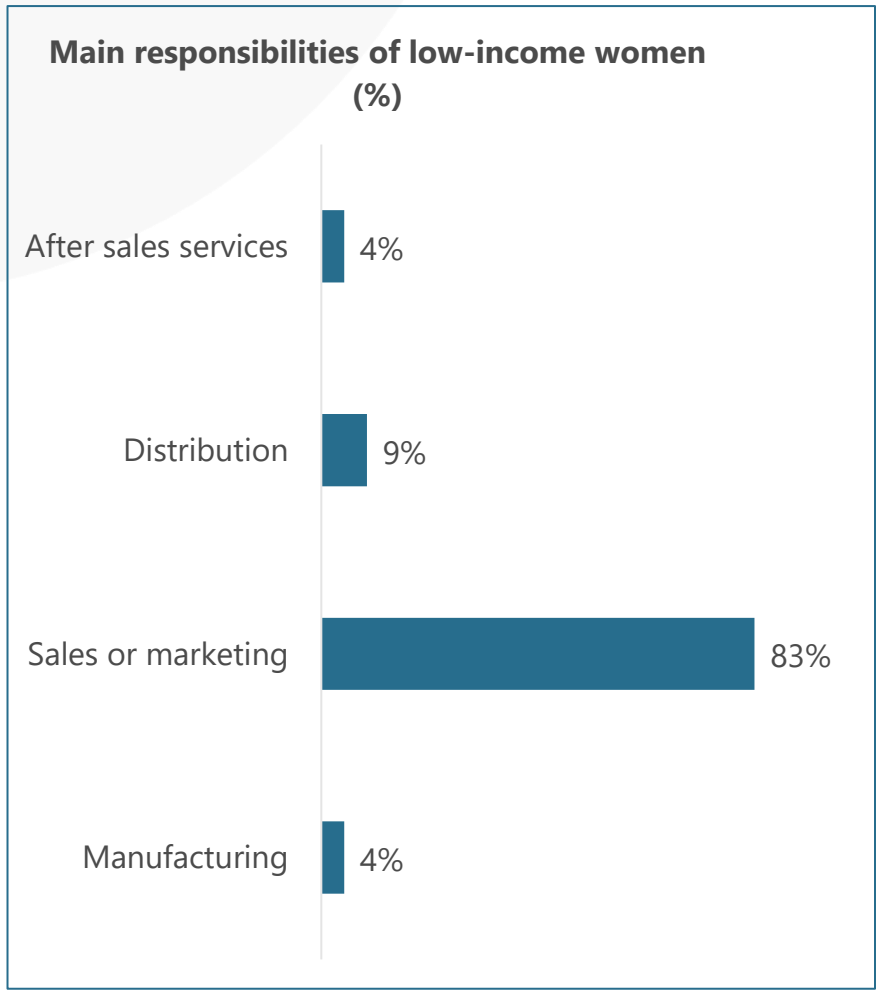
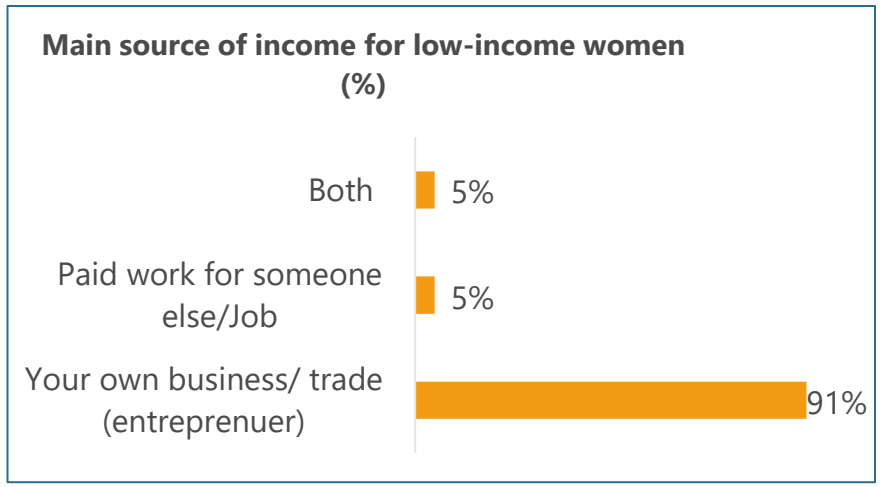
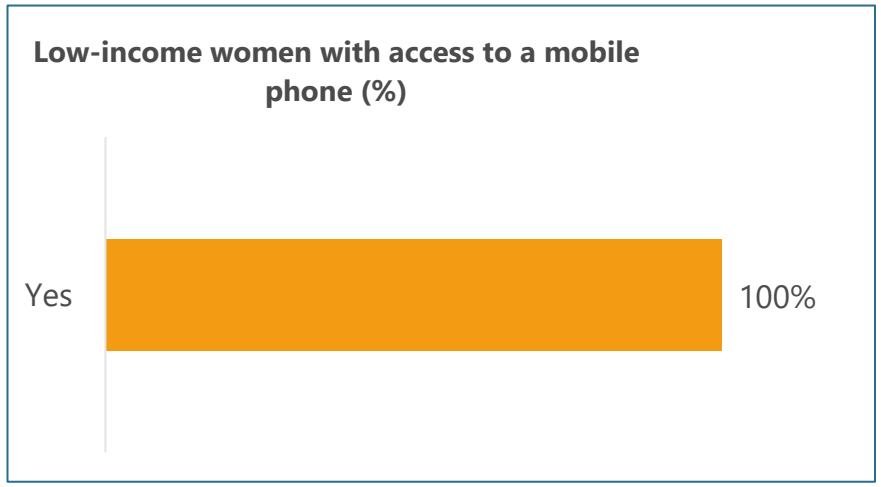
Of the sales agents we spoke to, entrepreneurship was their main source of income







- **Main responsibilities of low-income women*:** Most low-income women participate in sales or marketing roles due to the availability of training from programmes like Solar Sister that guide them in their day-to-day business
- **Main source of income for low-income women*:** Entrepreneurship is the primary source of income, as sales agent roles typically offer higher earnings than traditional jobs.
- **Low-income women with access to a mobile phone*:** Most low-income women have access to mobile phones and use them to contact customers, receive payments, and promote their products

Note: *Please note that this data is solely from the Focus Group Discussion (FGD) conducted with Solar Sisters

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