

Productive Use Potential and Sales of Off-Grid Solar to Women and Youth in Uganda

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ABBREVIATIONS

ACE TAF	Africa Clean Energy Technical Assistance Facility
FCDO	Foreign, Commonwealth and Development Office
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
GIZ	German Corporation for International Cooperation
GoU	Government of Uganda
GSADD	Gender, sex and age disaggregated (data) energy statistics
MEMD	Ministry of Energy and Mineral Development
MW	Mega Watts
NDP III	Third National Development Plan
NUCAFE	National Union of Coffee Agribusinesses and Farm Enterprises
NUWODU	National Union of Women with Disabilities in Uganda
OGS	Off-Grid Solar
PAYG	Pay-As-You-Go
PUE	Productive use of energy
PLWD	Persons with disabilities
REA	Rural Electrification Authority
RECSOs	Renewable Energy Civil Society Organisations
SACCOs	Savings and Credit Cooperative Societies
SAS	Stand Alone Solar
SHS	Solar Home System
SMEs	Small and Medium Enterprises
UNCDF	United Nations Capital Development Fund
UPHC	Uganda Population and Housing Census
USEA	Uganda Solar Energy Association
VSLAs	Village Savings and Loans Associations
WTP	Willingness To Pay

EXECUTIVE SUMMARY

Introduction

Women make up 51 per cent of Uganda's population and the country has one of the youngest populations in the world, with young people making up more than 50 per cent of the total population.¹ Forty-four per cent of households in the country have a family member with a disability, 12 per cent of who have someone with a severe disability. Persons living with disabilities (PLWD) also make up about 10 per cent of the working population.² Studies have shown that failure to address gender equality and disability in national programmes can have a detrimental effect on development, including energy programmes. For instance, losses in productivity due to ineffectively addressing disability range from 1 per cent to 7 per cent of GDP.² Therefore, exploring and addressing GESI in productive use of OGS will contribute to improving livelihoods, increasing incomes and overall poverty reduction, especially for women, youth and PLWD.

Study Objective

The main objective of this study was to establish the uptake of and identify opportunities for the use of stand-alone solar (SAS) products for productive use of energy (PUE), specifically by women, youth and PLWD in Uganda..

We also sought to establish whether SAS products are affordable and accessible to women, youth and PLWD and identify how gender disparities affect women's and men's control over PUE products. In addition, the study endeavoured to gauge the levels of awareness, barriers as well as existing opportunities for women, youth and PLWD towards uptake of SAS products for PUE. This study sought to establish whether there is sex-disaggregated data on access, affordability and uptake of SAS products for PUE in Uganda

Productive use of energy (PUE), is described as the use of energy for income generation in formal and informal enterprise, which can be home-based or in an enterprise location, including farm and non-farm income generation. Therefore, exploring and addressing GESI benefits in the context of OGS PUE will lead to recommendations on how to contribute to improving livelihoods, increasing incomes and overall poverty reduction, especially for women, youth and PLWD

Methodology

The study used a mixed methods approach to obtain and triangulate data. A comprehensive literature review was undertaken, with key documents obtained from ACE TAF, energy research institutions and relevant public domains. Additionally, key informant interviews were conducted with 23 respondents representing private sector solar companies, women, youth, PLWD and their associations, academia, farmer groups, development partners and government agencies. A survey was conducted online with over 200 respondents mainly through solar and farmer groups.

Findings and recommendations

Overall, the study reveals that the level of awareness of OGS is quite high in Uganda. Respondents indicated that they learnt about SAS products through marketing departments of solar companies that place adverts on radio and other media outlets. Awareness of SAS products is higher in urban areas than in rural areas. This is likely a result of the fact that urban residents have access to more information on OGS through a variety of channels including TV, newspapers and social media.

1. Uganda Household Survey, 2016/2017.

2. Government of Uganda (2019). State of Uganda Population Report – Promote social protection: Ensure equity and equality in harnessing the demographic dividend.

3. *ibid.*

The use of SAS products in Uganda can be categorised into micro- and meso-level use. At the **micro-level**, households are using solar home systems (SHS) mainly to substitute lighting from the grid. It is also apparent that most PLWD are using solar for lighting in their homes but less for businesses. At the **meso-level**, some agricultural processors such as the National Union of Coffee Agribusiness and Farm Enterprises (NUCAFE), who are promoting the production of eco-friendly coffee, have installed solar panels in their coffee production facilities. Such initiatives anticipate the generation of large amounts of OGS with the aim of selling any excess to the government. There is, however, limited awareness of PUE among PLWD, including by their associations.

The study also reveals a set of barriers and opportunities facing women, youth and PLWD in the uptake of PUE. The types of enterprises owned by women and youth are both an opportunity and barrier for OGS PUE. The study found that women dominate the service sectors, in particular food vending, which consumes low levels of energy. On the other hand, men dominate the agriculture, fisheries and manufacturing sectors which are heavy energy consumers.⁴

Electricity use was associated with better outcomes for businesses, which were mainly male businesses. Female enterprises were associated with lower profits and lower electricity consumption. Conversely, evidence shows that if energy companies target specific enterprises where women are employed, for example training women in food preparation or food vending sectors, and processing (e.g. dairy and fish processing), PUE in these enterprises can increase.⁵ Youth in Uganda are mainly found in micro and small-scale enterprises such as carpentry, barber shops, phone charging and small grocery shops with cold storage facilities.

The agricultural processing sector presents a big opportunity for PUE uptake by women, youth and PLWD. Currently, some aspects of the coffee and dairy value chain use SAS for agro-processing and value addition, including milling, husking and drying. The horticultural sector, where many women and youth are employed, has also started using SAS for irrigation and drying. There are opportunities for other agricultural value chains, such as tea, to make use of OGS PUE.

Differences in access to credit, finance and capital between women-owned enterprises and male-owned enterprises affects how their businesses can invest in SAS appliances and technologies, such as fridges, water pumps and power tools.

The study provides the following key recommendations to improve the uptake of PUE by women, youth and PLWD:

Government

- Improve multi-sectoral coordination: There needs to be more engagement between the Ministry of Energy and Mineral Development (MEMD) and other ministries to support the integration of GESI in the energy sector and OGS for productive use in particular.
- Prioritise resource allocation through institutionalised gender budgeting guidelines and promoting disability inclusion budgets to ensure that GESI is mainstreamed and functionally implemented.
- Build the capacities of individuals responsible for GESI mainstreaming in the OGS sector (e.g. gender focal persons) in the different ministries, including MEMD, to improve implementation of current policies and to ensure planned policies are developed and adopted.

4. UPHS, 2014

5. IDS and GIZ (2019). *Unlocking the benefits of productive use of energy for women in Ghana, Tanzania and Myanmar.*

- ⊗ Policy alignment and enforcement with a focus on PLWD, women and youth. Energy policies and regulations all need to be aligned and enforced across the sectors and among all the players in the solar energy sector. This process has started with the inclusion of GESI in the draft off-grid strategy.
- ⊗ Strengthen gender, sex and age disaggregated data (GSADD) collection: There is need to collect bottom-up data from community level to national level in partnership with local governments. We propose that the GESI focal persons at ministries, departments and agencies (MDAs) should receive training in guiding and managing GSADD collection exercises.

Private sector

- ⊗ Improve GSADD collection in OGS sector – OGS players and associations like Uganda Solar Energy Association (USEA) and Centre for Research in Energy and Energy Conservation (CREEC) should be supported to carry out data collection and in-depth research on participation of women, youth and PLWD in OGS PUE and the value chain. Players from other sectors like women's associations, PLWD and youth associations can also be supported to conduct OGS energy-focused studies of their members. USEA, for example, can identify the gaps and opportunities and then work with members to design programmes to address the gaps. Monitoring and evaluation, including collection of case studies and best practices, will go a long way in building the body of knowledge on women, youth and PLWD participation in productive use.
- ⊗ Advocacy for OGS productive use – Collective advocacy for specific OGS policy and regulatory framework that includes PUE and the value chain is important. USEA's and Renewable Energy Civil Society Organisations' (RESCO) capacity in this area can be built through tailored trainings.
- ⊗ Encourage development of gender-sensitive and disability inclusive company policies – Many solar companies do not have explicit gender, youth or PLWD policies, plans or strategies. Companies can be supported to develop these through peer-to-peer learning as seen from United Nations Capital Development Fund (UNCDF) or by partnering with organisations that work on these issues, such as disability organisations. The National Union of Women with Disabilities in Uganda (NUWODU), for example, supports organisations to conduct disability audits and develop action plans to address gaps and challenges.

Create/strengthen partnerships between OGS companies and women, youth, PLWD associations – For example, NUWODU is willing to create awareness on productive use of OGS to empower PLWD. Since NUWODU works with associations of women with disabilities in every district in Uganda, it is a valuable partner for OGS companies and players to promote productive use of OGS by PLWD, and is best coordinated through USEA. NUCAFE and farmer groups like Igara Tea Growers, who have over 6,000 members are also willing to partner with OGS companies to pilot and promote the participation of women, youth and PLWD in productive use of OGS. Currently, Igara Tea Growers farmers are only using solar for lighting at home but not for productive use.

1 CONTEXT AND RATIONALE FOR THE STUDY

While Sustainable Development Goal 5 recognises the importance of gender equality, and Sustainable Development Goal 7 has provided an ambitious target to ensure access to modern energy for all, to double the share of renewable energy in the global energy mix and to double the global rate of improvement in energy efficiency, in reality energy access and gender equality have not been inextricably linked, and addressing them together can offer social and economic development gains. The overwhelming reality is that it will not be possible to meet targets for affordable, reliable, sustainable, and modern energy access for all by 2030 unless the energy needs of women, youth and PLWD are met.

This study investigates the potential for energy to be a vital resource for all persons and crucial for a country's development across various sectors like health, education, transport, agriculture, water, trade and industrialisation. The country still has one of the lowest electricity access rates in Africa although access rates have improved considerably from 5 per cent in 2002 to 28 per cent in 2019.⁶ Promotion of renewable energy, such as solar, is one of the government's key strategies to improve electricity access and meet its target of 80 per cent access by 2040.⁷ Currently, 28 per cent of rural residences rely on solar lighting systems or solar lanterns, 3 per cent have solar home systems (SHS), while about 1 per cent are connected to mini-grids. This illustrates the vast potential for renewable energy, particularly OGS, in addressing the energy poverty in the country.

Gender equality and social inclusion (GESI) is a process and strategy for ensuring the concerns of women and men from all social groups (ethnicity, disability, caste, age, geographic locations) are an integral dimension in the design, implementation, monitoring and evaluation of policies and programmes in all spheres. With respect to the off-grid solar (OGS) energy sector, a GESI approach would aim to promote equality and strengthen legitimacy by addressing existing disparities and gaps highlighted in access and control over OGS resources, services, information, opportunities, distribution of power and decision making across the sector.⁸

Women make up 51 per cent of Uganda's population and the country has one of the youngest populations in the world, with young people making up more than 50 per cent of the total population.⁹ Forty-four per cent of households in the country have a family member with a disability, with 12 per cent having someone with a severe disability. Persons living with disabilities (PLWD) also make up about 10 per cent of the working population.¹⁰ Studies have shown that failure to address gender equality and disability in national programmes can have a detrimental effect on development, including energy programmes. For instance, losses in productivity due to ineffectively addressing disability range from 1 per cent to 7 per cent of GDP.¹¹ Therefore, exploring and addressing GESI in productive use of OGS will contribute to improving livelihoods, increasing incomes and overall poverty reduction, especially for women, youth and PLWD.

In Uganda, 31 per cent of households are female headed. Nonetheless, it is the women who are tasked with management of the household throughout Uganda. In the poor and vulnerable communities, a significant number of which are female headed, the bulk of household management usually involves sourcing fuel for cooking and lighting up the home. This reduces the productive time of the day for women. Kerosene has been the preferred fuel of choice for lighting since the 1980s, in no small part aided by government subsidies that have made it affordable, widely available and accessible in the rural areas.

6. Uganda Draft Energy Policy 2019.

7. Uganda Vision 2040.

8. Government of Nepal, Ministry of Science, Technology and Environment, Alternative Energy Promotion Centre (2014). *Gender Equality and social inclusion toolbox: Promotion for renewable energy technologies.*

9. Uganda Household Survey, 2016/2017.

10. Government of Uganda (2019). *State of Uganda Population Report – Promote social protection: Ensure equity and equality in harnessing the demographic dividend.*

11. *ibid.*



Female-headed households have the additional challenge of earning a livelihood while managing the home. This underscores the need for greater attention towards women's utilisation of energy resources for income generation and productive use of energy (PUE). In addition, for greater empowerment, there is the need to now promote women's role as energy agents and entrepreneurs and not just as consumers. A detailed analysis of the PUE potential of OGS by women will reveal the opportunities for time saving, income generation and improving the quality of life of women and their households.

SHS have been increasingly available and acceptable throughout Uganda from the 2000s, accelerated in part by the introduction of pay-as-you-go (PAYG) technology. While there is some data on general sales of stand-alone solar (SAS) systems to women, there is limited information available on sales of SAS systems for PUE purposes for youth and PLWD. The available data has only recently started being disaggregated, mainly due to donor and partner reporting requirements and aiming to capture the sales of solar to women, and then subsequently capturing the benefits of household solar for these groups.

In 2018, the Government of Uganda (GoU) expressed interest to promote PUE as a strategy to increase energy access and enhance rural livelihoods, particularly through solar irrigation. Notably, approximately 75 per cent of small-holder farmers in Uganda are women, and thus any enhanced uptake of solar irrigation is likely to positively impact rural farming households, and hence women's incomes.

While donor programmes and companies have highlighted sales of SAS to women as part of general sales, an assessment of OGS productive use potential geared towards women and girls has not been done in the Ugandan market. This study therefore assesses productive use potential of SAS through a gender lens.

1.1 Study Objectives and Methodology

The main objective of this study is to establish the uptake of, and identify opportunities for, the use of SAS products for PUE, specifically by women, youth and PLWD in Uganda. PUE is described as the use of energy for income generation in formal and informal enterprise, which can be home-based or in an enterprise location, including farm and non-farm income generation.¹² Therefore, exploring and addressing GESI in the context of productive use of OGS will contribute to improving livelihoods, increasing incomes and overall poverty reduction, especially for women, youth and PLWD.

This study also sought to establish whether SAS products are affordable and accessible to women, the youth and PLWD and identify how gender determines men's and women's control over PUE products. In addition, the study endeavoured to gauge the levels of awareness, barriers as well as existing opportunities for women, youth and PLWD towards uptake of SAS products for PUE. All in all, this study sought to establish whether there is sex-disaggregated data on access, affordability and uptake of SAS products for PUE in Uganda.

The study used a mixed methods approach to obtain and triangulate data. A comprehensive literature review was undertaken, with key documents obtained from ACE TAF, energy research institutions and relevant public domains. Additionally, key informant interviews were conducted with 23 respondents representing solar companies, women, youth, PLWD and their associations, academia, farmer groups, development partners and government agencies. A survey was also conducted online with over 200 respondents mainly through solar and farmer groups.

12. IDS & GIZ (2019). *Unlocking the benefits of productive use of energy for women in Ghana, Tanzania and Myanmar.*





Two key limitations were identified. One, the study was conducted between December 2020 and February 2021 amid the global COVID-19 pandemic. Measures to contain the spread of the virus prevented the organising of focus group discussions due to restricted physical interactions. Second, the study, which mainly adopted a qualitative approach relied on online surveys to collect quantitative data, which had a very low response rate due to, among others, the Internet shutdown during and after the elections in January 2021. There was persistent slow Internet connections a month after the elections which coincided with data collection and analysis for the study. High internet data costs also contributed to the low response rate for the online survey.

2 STUDY RESULTS

Evidence was gathered from most recent sources of secondary data on OGS. The sources provided global, regional and national insights into the OGS value chain. The data and the insights were synthesized to correspond to the key questions of this study.

2.1 Socio-economic Context for Women, Youth and PLWD in Uganda

According to the 2014 Uganda Population and Housing Census, females comprise 51 per cent of the population of Uganda compared to 49 per cent of males. Socially, Uganda achieved the global target of gender equality in primary school in the mid-2000s – the proportion of girls is higher than boys. However, due to barriers in retention of the girl-child, there are more boys than girls in higher levels of education from secondary school to tertiary institutions. Therefore, generally, more men have higher levels of education than women.

Activity	Men	Women
Engagement in paid employment	51%	35%
Family work	11%	17%
Unpaid domestic and care work (collecting firewood, fetching water, childcare)	<15 hours	>30 hours
Self-employment	38%	48%

Table 1: Comparison of men's and women's engagement in different economic activities

There are more women (48 per cent) engaged in self-employment activities than men (38 per cent). Women are more engaged in the trade (55 per cent) and manufacturing (51 per cent) sectors, while the transportation, construction, agricultural and fisheries sectors is dominated by men. Women tend to be concentrated in service work (59 per cent) and elementary occupations (51 per cent) while men are concentrated in plant/machine operations (95 per cent).¹³

PLWD make up 12.5 per cent of the Ugandan population, with children with disabilities (17 years old and below) making up 2.9 per cent, youth with disabilities (18–30years) 2 per cent, adults living with disabilities (31–64) 5.5 per cent, and older persons with disabilities (65 years and above) constituting 2.1 per cent of the population. Disability is higher among women (6.9 per cent) compared to men (5.6 per cent). In addition, the disability prevalence rate is higher among those living in the rural areas (10.3 per cent) compared to those in the urban areas (2.2 per cent).¹⁴

Poverty rates are high among PLWD due to the immense barriers they face in accessing social services such as health, education and formal employment. PLWD are therefore majorly self-employed in the informal sector in businesses such as tailoring, carpentry, shoe-shining and retail trade. PLWD are often deprived of productive resources such as land by their families. Women and girls with disabilities face double discrimination and are more vulnerable to violence, abuse and exploitation.¹⁵

13. *ibid.*

14. *ibid.*

15. Uganda Equal Opportunities Commission (2017). *Annual report on the state of equal opportunities in Uganda, FY 2016/17: Enhancing national development through equity and inclusion.*



2.2 Legal and Policy Frameworks: Gender Equality and Social Inclusion in Uganda

The national legal and policy framework provides the mandate for government and other stakeholders to promote gender equality and social inclusion in all sectors including the OGS sector. This section examines the extent to which gender equality and social inclusion is taken into account.

Women

Chapter 4 of the 1995 Uganda Constitution calls for protection of human rights of all persons. The Constitution prohibits discrimination and promotes affirmative action of marginalised groups including women, PLWD and children.

The 2007 Gender Policy is meant to guide and direct all levels of planning, resource allocation and implementation of development programmes from a gender perspective. The priority areas for the policy are improved livelihoods, promotion and protection of rights, participation in decision-making and governance, recognition and promotion of gender in macro-economic management – all of which are relevant in promoting women's participation in OGS productive use.

Whereas the Ministry of Gender, Labour and Social Development (MGLSD) is the line ministry leading the monitoring of the Gender Policy, all government ministries, departments, agencies and other stakeholders have an equal responsibility in gender mainstreaming and implementation of the policy across their programmes. The policy further outlines the roles of different stakeholders in implementing the policy. In this regard, private sector players, such as solar companies, are required under the policy to, among other things: ensure that corporate policies and practices incorporate gender equality principles; ensure that essential products and services are accessible to both women and men, especially the poor; provide incentives and support to women entrepreneurs; and institute and implement affirmative action measures.

Affirmative action measures are a crucial internationally recognised strategy for promoting gender equality and social inclusion, particularly for historically marginalised groups such as women and PLWD. Affirmative action is legally enshrined in the Constitution and elaborated in numerous policies and legal frameworks. According to the Gender Policy, public sector bodies and institutions such as MEMD, the ministries of Agriculture, Lands, Water and Local Government, and the Rural Electrification Agency (REA), are mandated to develop and implement sector specific gender policies, strategies and activities; disaggregate data and information by sex and gender; commit adequate resources to gender related activities. Other policies that have integrated gender equality are summarized in Table 2.



Table 2: Policies integrating gender equality

Policy	Relevance to OGS and PUE
Employment Act 2006 and Employment Regulations 2011	Prohibits discrimination, promote women’s active participation in the labour force and protect their labour rights, including maternity leave and protection from sexual harassment at the workplace. Expectant mothers are protected from heavy or dangerous workload. The Act provides for equal pay for equal work for both women and men in the workforce.
National Agriculture Policy 2013	Recognises gender equality as a guiding principle. It notes that “agricultural development services will be provided to all farmer categories as individuals or in groups, ensuring gender equity”. Government also commits to achieve equity by ensuring agricultural interventions are balanced across regions and between genders. The policy promotes the use of appropriate, cost-effective technologies for processing agricultural commodities to enhance agricultural productivity.
Education Policy	Addresses barriers to access and retention of girls at primary, secondary and tertiary levels and provides for programmes to reach out-of-school youth, including young women and girls. In addition, the Ministry of Education has put in place a Ministerial Directive permitting pregnant girls to do examinations and further allocating them an additional 1.5 hours per examination paper. This directive was effected in the recent Uganda National Examinations Board’s (UNEB) Uganda Certificate of Education (UCE) and Primary Leaving Examinations (PLE).
National Gender-Based Violence Policy Domestic Violence Act	Prohibit and address violence against women including emotional, physical and sexual violence, which is a key barrier in the active participation of (young) women in domestic and productive sectors. More specifically, improved lighting in neighbourhoods as a result of SAS has been directly linked to enhanced security and reduction in gender-based and sexual assaults, particularly against women and girls.
Financial Institutions Amendment Act 2016	Sets out interventions to promote financial inclusion such as agent banking. Financial inclusion is important to promote access to finance and credit by out of reach and marginalised populations, majority of whom are women.
Microfinance Institutions and Money Lenders Act 2016	Provides for the management and control of money lending services and regulates microfinance institutions comprising among others, self-help groups and savings and credit cooperative societies (SACCOs). Self-help groups and SACCOs have historically been organising and mobilising vehicles for women’s economic empowerment, leadership growth, as well as enabling group asset ownership. The Act notes that self-help groups “shall be registered for the purposes of developing the economic interests of group members by providing services including credit and group farming”. Women’s membership in community groups such as self-help groups and SACCOs has been positively co-related to women’s ability to influence decisions from the household level to higher levels. ¹⁶ These groups are therefore important because of their potential to encourage productive use of SAS among women.
Land Policy 2013 Land Act 1998	Protect the land rights of women and other marginalised groups. Land rights are important for PUE such as in agriculture and access to credit.

16. IDS & GIZ (2019). *Unlocking the benefits of productive use of energy for women in Ghana, Tanzania and Myanmar*



Youth

Policies that mandate government and other stakeholders to protect the youth or involve them in nation building are highlighted in Table 3.

Table 3: Policies that promote youth involvement

Policy	Relevance to OGS and PUE
National Youth Policy 2001	<p>provides an operational framework through which to ensure meaningful involvement of youth (including youth with disabilities) in national development. Gender inclusiveness, equity and accessibility are principles that should guide all actors as they implement the policy.</p> <p>The policy promotes youth participation and decision-making by establishing youth structures like the National Youth Council and youth representatives at local government and national level. It acknowledges barriers to youth participation in decision-making as lack of leadership and management skills and low resource allocation to youth programmes. One of the objectives of the policy is to promote social and economic empowerment of youth, as well as increase youth involvement in decision-making, leadership and community-based development programmes, which provide the avenue for increasing youth participation in productive use OGS.</p>
Employment Act 2006 and National Employment Regulations 2011	Prohibits forced and child labour and discrimination based on gender, age, disability, region, HIV status, etc. They provide for apprenticeship at any workplace or designated trade from the minimum age of 17 years.
Skilling Uganda BTVET Strategic Plan 2011–2020	Seeks to make Business, Technical, Vocational Education and Training (BTVET) relevant to productivity and economic growth and increase access to and quality of skills development for youth in response to market demands.
Third National Development Plan (NDP III) 2020–2025	Seeks to harness the demographic dividend of the youth population to increase the working population and stimulate savings, consumption and economic growth. ¹⁷

17. Youth Coalition on Electoral Democracy in Uganda (2015). *National Youth Manifesto 2016-2021: A social contract with young Ugandans.*



Disability

The policies that address disability are presented in Table 4:

Table 4: Policies that address disability

Policy	Relevance to OGS and PUE
1995 Constitution of Uganda	Prohibits discrimination against PLWD.
Persons with Disabilities Act 2006	<p>Also prohibits discrimination of PLWD and calls for them to have equal opportunities in all sectors of society. The Act provides a 15 per cent tax reduction to private sector companies that employ 10 or more PLWD. Very few companies in Uganda have reached this threshold.</p> <p>Provides for the rights of PLWD in the labour market. For equitable recruitment, companies are encouraged to advertise for vacancies encouraging PLWD to apply. The Minister and National Council for Disabilities provide information to employers on necessary assistive devices for PLWD. Employers are expected to ensure that their physical premises are accessible to PLWD and that assistive devices to enable PLWD employees to execute their duties are provided. Employers are also to ensure equal treatment and opportunities for PLWD at places of work.</p>
Employment Regulations 2011	Provides for compensation to workers disabled due to industrial accidents.
Workers Compensation Act 2000	Monitors the rights of persons with disabilities as set out in various national and international laws.
National Policy on Disabilities 2006	Provides a rights-based framework for meeting the needs of PLWD.
Equal Opportunities Act 2006	Provides for monitoring and ensuring non-discrimination and equal opportunities for marginalised groups including PLWD.
Employment Act (No.6) 2006	Prohibits employment-based discrimination of PLWD
BTVET Act (No.12) 2008	Calls for equitable access to education and training for PLWD. ¹⁸
ICT for Disability Policy 2017	Provides a proactive approach to enhancing the quality of life and improving livelihoods of PLWD using accessible information and communication technologies (ICTs) in order to enable them to live independent lives.

18 . International Labour Organization (2009). Fact sheet – Inclusion of people with disabilities in Uganda.



2.3 Legal and Policy Frameworks for Renewable Energy and OGS Sector

Uganda has a robust energy policy and legal framework which in recent years has recognised the need to create an enabling policy environment that promotes renewable energy as an integral part of the country's energy mix. However, there still remain gaps in social inclusion especially for PLWD and youth.

GoU has recognised gender and inclusion as key principles in its energy policies. Some of the strategies the government has committed to mainstream gender and inclusion in the energy sector include: developing capacity on gender equality, women's empowerment, gender analysis and gender audits; ensuring gender, sex and age disaggregated data (GSADD); supporting affirmative action to increase female participation in the energy sector in employment, entrepreneurship and senior management; promoting career guidance and role mentoring programmes in schools and tertiary institutions to increase uptake of science subjects by girls; instituting requirements for contractors to incorporate local content in their employment schemes targeting both male and female young people; developing the local energy sector workforce and skills through internships and apprenticeships for young people; developing credit and financing mechanism for young energy entrepreneurs.

Government strategies to increase uptake of energy services among PLWD include conducting a baseline study on PLWD and energy; establishing institutions or measures to provide energy related training and skills development for PLWD; instituting measures that require large energy sector companies to include PLWD in their recruitment strategies; setting up energy related fiscal incentives and waivers for households as well as educational and health institutions for PLWD.

The Draft Energy Policy 2019 covers renewable energy, clean cooking and electrical power, rural electrification and access, energy efficiency and conservation, nuclear energy and cross cutting issues. The policy notes that renewable energy has steadily gained dominance in the national energy sources, and there is an enabling environment that has enhanced private sector investment in the sector including OGS. The policy further points to the urgent need for the country to shift towards cleaner energy sources to fulfil its commitment to lower greenhouse gas emissions as a prerequisite for sustainable development. The draft policy has recently undergone a gender review with the participation of several stakeholders, including development partners and private sector. As a result, gender and equity responsiveness is one of the main guiding principles of the draft. Unfortunately, there was limited engagement with PLWD and their constituencies in the review of the draft.¹⁹

The Renewable Energy Policy 2007 aims to increase the share of renewable energy in the national energy mix. SE4ALL Action Agenda 2014 has a more specific target of "doubling the share of renewable energy in the global energy mix by 2030" and "providing universal access to modern energy". The Rural Electrification Strategy and Plan 2013–2022 targets increasing rural electrification to 26 per cent by 2022. The Electricity Connections Policy 2018 aims to increase access to cleaner energy for Ugandans.

These policies illustrate the high potential for access and use of OGS, particularly in meeting the rural electrification targets of the country. However, they were not explicitly gender sensitive or socially inclusive, with limited interrogation of the differences in opportunities and impact of the policies on different groups such as women, men, young people or PLWD.

19 . Key informant interview, 2021.



The Scaling up Renewable Energy Programme (SREP) Investment Plan prioritises scale up of innovative small-scale solar photovoltaic (PV) projects, including developing regulations, legislation, standards and strategy and investment guidelines. SREP has specific gender and social inclusion (GESI) targets: “the number of jobs created for men and women, businesses and community services benefiting from increased grid penetration; and “energy access in remote rural locations such as isolated islands”.

Other regional and international policies like the East African Community (EAC) Climate Change Policy 2011; EAC Industrialisation Policy 2012; EAC Cross-Border Electrification Policy 2014; EAC Energy Security Policy Framework 2018; African Union Agenda 2063; Convention of the African Energy Commission 2001; and African Union Gender Policy 2009 strengthen the national mandate on renewable energy.

The Declaration on Gender Equality and Sustainable Development Goals and Agenda also constitute part of the existing legislations.

However, there are persistent GESI challenges including: low representation of women in the energy sector, particularly in management positions and as entrepreneurs and contractors; vulnerability of women to sexual and gender-based violence (SGBV) around energy project sites; inconsistency in generation of GSADD in energy; and limited financing and credit for youth to engage in innovation and entrepreneurship in energy products and services.²⁰

More specific challenges with respect to GESI in the energy sector are highlighted in the Draft Energy Policy 2019 as follows:

- ❁ Lack of a gender strategy for the energy sector and limited capacity to undertake regular gender analyses for energy projects.
- ❁ Limited awareness of the value of gender mainstreaming in the energy sector.
- ❁ Low representation and participation of women in the energy sector, particularly in management positions and as entrepreneurs, contractors, among others.
- ❁ Vulnerability of women and girls to SGBV around energy project sites, at workplaces and during biomass collection.
- ❁ Inconsistency in the generation of GSADD in energy.
- ❁ Limited financing and credit for youth to engage in innovation and entrepreneurship in energy products and services.
- ❁ Limited access to electricity necessary for powering the assistive technologies needed by PLWD, especially in their educational environments.
- ❁ Limited opportunities for active participation, employment and engagement in the energy sector in part due to limited training and capacity building opportunities.
- ❁ Unaffordability of clean, safe and modern forms of energy due to lower income levels and additional expenses incurred due to disabilities.
- ❁ Inadequate gender and sex disaggregated energy-related data on PLWD.

In conclusion, with regard to policy challenges, GoU does not have specific, clear and consistent targets for OGS. However, it is now developing the Electrification Expansion and Improvement Programme that will hopefully enable and guide a significant scale up and alignment of investments in the OGS sector.²¹

20. Draft Energy Policy 2019.

21. Uganda Off-grid Energy Market Accelerator (UOMA), 2018.

3 EVIDENCE FROM PRIMARY AND SECONDARY DATA

3.1 Productive Use of Off-Grid Solar in Uganda

PUE is not only important for consumers in terms of improving their livelihoods through income generation, it is also important for energy suppliers as it increases demand for energy. Instead of energy like electricity or solar only being used for domestic lighting for a few hours in a day, PUE means that energy is used for longer hours thereby driving down energy costs (like tariffs), making energy more affordable, and increasing energy demand.

PUE, including from OGS, is envisaged as a driver of industrialisation, rural development, employment and income generation. Uganda Vision 2040 targets a shift from agricultural dependence (particularly subsistence agriculture) towards industrialisation (including agricultural value addition and processing) and the service sector. Industry and service sectors are therefore seen as cornerstones of the country's strategy to transform from a peasant to modern, middle income country by 2040 – both at the level of sectoral contribution as well as labour force distribution. Uganda is ranked 121 out of 142 countries in terms of overall competitiveness of its goods and services. By 2010, the country's Gross Domestic product (GDP) was USD506 and the target is to increase it to USD9,500 by 2040.²²

Agriculture and infrastructure such as energy, water and mechanised irrigation schemes are some flagship areas that the NDP III highlights for productive use. Specifically, the NDP III calls for investments in: “increased agricultural production/productivity and agro-processing...and labour-intensive light manufacturing (including cottage industries”); and “sequential and coordinated infrastructure investments in energy, roads, water, air, rail, industrial parks and mechanised irrigation schemes to support increased production/productivity”.

While the government's policy commitment to investing in infrastructure such as energy is commendable, research has shown that for the productive uses of energy to be harnessed, other enablers would have to be put in place. These enablers include: awareness of and access to energy products; access to finance for the energy appliances or products, which points to affordability; access to other support infrastructure like roads and water; access to markets; skills for end-users including entrepreneurs to identify new business opportunities created by energy; and quality of the energy products and services.²³

The use of OGS for productive uses varies for women, men, youth and PLWD due to differences in opportunities, access and control over resources and decision-making power at individual, household and enterprise levels. Findings from this study agree with other studies on PUE such as those conducted by ENERGIA (2014-2019) that confirmed this with evidence emerging from several countries.²⁴

3.2 Level of Awareness on Available PUE Opportunities for Women, Youth and PLWD

The level of awareness of OGS is high in Uganda. Respondents indicated that they learnt about OGS products through marketing departments of solar companies who place adverts through radio. The 2019 Economic Survey shows that a large percentage of households own a radio – in the absence of grid or off-grid energy, dry cell batteries, which are more affordable, can be used to power a radio. While this is important, it is evident that most of the radio adverts are usually gender neutral in the sense that they do not have specifically targeted messages to reach women, youth and PLWD to encourage them to tap OGS for productive uses.

Respondents reported that awareness of SAS products is higher in urban areas than in rural areas. This is a result of the fact that urban residents have access to more information on OGS through a variety of other channels including TV, newspapers and social media.

22. Uganda Vision 2040.

23. IDS & GIZ (2019). *Unlocking the benefits of productive use of energy for women in Ghana, Tanzania and Myanmar.*

24. ENERGIA (2019). *Gender in the transition to sustainable energy for all: From evidence to inclusive policies.*



The use of OGS in Uganda can be categorised into micro- and meso-level use. At the micro-level, households are using SHS mainly to substitute lighting from the grid. It is also apparent that most PLWD are mainly using solar for lighting in their homes but less for business. At the meso-level, some agricultural processors, such as the National Union of Coffee Agribusiness and Farm Enterprises (NUCAFE), who are promoting production of eco-friendly coffee, have installed solar panels in their coffee production facilities. Such initiatives anticipate generation of large amounts of OGS with the aim of selling any excess to GoU. A respondent in the study noted: “Production of large amounts of OGS by facilities is mainly externally funded. For example, for NUCAFE the (installation of solar panels) initiative was funded late 2020 under the Climate Change Fund. It was anticipated that the excess energy would be sold to UMEME (grid)”.

It is also evident that some key stakeholders like the disability organisation National Union of Women with Disabilities in Uganda (NUWODU) have not had any specific programme promoting solar energy. More so, they are not aware of productive use of OGS by women, youth or PLWD. This is a significant indicator of the need to create awareness and budget allocation for all related efforts to bring the benefits of OGS PUE to the forefront. Besides using OGS for lighting, communities are mobilising into community groups like village savings and loans associations (VSLAs), cooperatives and SACCOs with the aim of harnessing larger OGS for productive uses. A notable example is in horticulture, where many farmers are using solar dryers to dry their fruits.

Some respondents observed that there is a high demand for OGS among fruits, vegetable and possibly coffee farmers. Notably, in a few instances, OGS has been used to power water pumps and fridges at the household level. The study did not conclusively establish large-scale use of OGS for productive use even though there is a visible need for OGS for maize and coffee milling. A respondent noted: “You need to have a big system to mill with solar. Essentially, mini-grids are not affordable for majority of women, youth and people living with disabilities.”

For families that have SAS products their satisfaction levels are moderately high. However, several barriers and challenges have been reported.

Finally, evidence from the study reveals high awareness of SHS although there is low awareness of OGS for PUE, particularly in the rural areas, and among PLWD.

3.3 Access, Affordability and Uptake of OGS for Productive Use

The OGS ecosystem is divided into pico solar lanterns, SHS (small and large systems) and mini-grids. Annex 1 highlights some of the uses of these systems. Other research and interviews from this study show that women and youth have used these systems for varying productive uses.

In the last three years, positive changes have been witnessed in the energy sector in Uganda. These changes have created an enabling policy environment for renewable energy in the country, including tax waivers. There has also been a rise in private sector companies and development partners supporting access to OGS systems and SAS products to end-users for both lighting and productive use. Some private sector companies like Solar Now, Village Energy and Village Power are offering PUE solar products for household and agricultural use.





3.4 Affordability: The Ability to Pay

The cost of SHS ranges from about USD70 for less than 10W to over USD800 for more than 100W. Sales of SHS, particularly larger ones, have been mainly driven by credit sales through PAYG operators with links to private solar sector companies. About 270,000 units were sold in 2018²⁵ although gender, age or PLWD disaggregated data for these sales was not available.

Affordability of OGS, particularly for poor households is linked to awareness, willingness to pay (WTP) and ability to pay (ATP). Awareness encompasses consumers' understanding of solar, its benefits and purchase of energy. Research in Uganda shows that a number of consumers can afford basic solar products but do not trust the products and have different perceptions of the value and benefits they can accrue from solar vis-à-vis their current energy solutions or lack thereof.

WTP is influenced by consumer perceptions about the percentage of income they are willing to spend on OGS. Some factors that may affect WTP include highest level of education in households, socio-economic indicators like asset ownership (such as house or land), quality and continuity of the products, including after-sales services, and ease or cost of payment.²⁶ Given the population socio-economic indicators earlier highlighted in this study, men would have a higher WTP than women or PLWD who have lower indicators in these areas.

ATP, on the other hand, is influenced by economic activities that dictate income levels of individuals and households.²⁷ About 19.7 per cent of the Ugandan population is below the poverty line. There are also more unemployed women (11 per cent) than men (8 per cent). Youth unemployment was higher for young women (14 per cent) than young men (9 per cent), while PLWD make up only about 10 per cent of the working population. Low-income levels across these marginalised groups affect affordability of OGS, which remains a major hindrance to their energy access. Differences in access to credit, finance and capital between women-owned enterprises and male-owned enterprises affect how their businesses can invest in appliances and technologies, such as OGS or products that are powered by OGS such as fridges, water pumps and power tools.

Access to capital by enterprises also affects the owners' growth mindset. Female-owned businesses tend to be in the informal small and medium enterprises (SMEs) sectors, employing few workers outside of the family circle, and focused more on meeting daily subsistence needs rather than growth. Research shows that higher energy needs are part of growth ideas for businesses, mainly male-owned businesses.²⁸ However, there is more balance between male and female businesses in the growth idea of "investing in new equipment", which may point to an opportunity for both energy companies and financial institutions to offer trainings on OGS for productive use as well as access to affordable financing for OGS products.

The study, on the whole, revealed that there are gender disparities in affordability of OGS for PUE between male and female owned businesses. Youth and PLWD also found OGS for PUE less affordable due to the barriers presented in this report.

25. Uganda Off-grid Energy Market Accelerator (UOMA), 2018.

26. *ibid.*

27. *ibid.*

28. IDS & GIZ (2019). *Unlocking the benefits of productive use of energy for women in Ghana, Tanzania and Myanmar.*



3.5 Uptake of OGS for Productive Use by Women, Youth and PLWD

Several players in the OGS ecosystem have promoted the uptake of solar for productive use. Some private sector solar companies are explicitly targeting women²⁹ as part of their product distribution models for both business and social impact. As a business case, a few companies have found that women have the potential to boost their revenues from sales of SHS in particular since as women are considered to play a big role in decision-making on the purchase of home systems, and that due to their large social networks, women sell more SHS than men at community level. At the social impact level, SHS have been found to increase the amount of time available for women to manage their own business and therefore contribute to improving their own and their families' livelihoods.³⁰

Respondents interviewed for this study highlighted several ways that different consumers like agro-processors, businesses and farmer groups use OGS for PUE.

Use of OGS in the coffee value chain (processing and hulling)

The coffee value chain in the country has been an early adopter of OGS for productive use. NUCAFE, with the support of partners like the Agricultural Business Initiative (aBi Development) and others promoting production of eco-friendly carbon-neutral coffee, commissioned an industrial solar power plant at its coffee processing factory in Namanve in August 2020. With this move, it made history as the first coffee organisation to do so in East and Central Africa. The OGS power plant has a total of 442 panels each rated at 390W, with a total expected maximum output of 172KW. The plant is projected to save 241.3 tonnes of CO2 emissions per annum, while savings of over 70 per cent in power bills have already been registered at the plant.³¹ It is anticipated that the excess energy will be sold to UMEME.

The NUCAFE solar plant is used for primary coffee processing by powering its hulling system, which eliminates the need for a secondary processing company. NUCAFE also uses various OGS along its value chain, including micro solar panels and inverters. NUCAFE serves over 215,120 coffee farming households³² by using a farm-ownership model to provide all the services they deliver like trainings and business support. So far, however, NUCAFE has not conducted a study to establish the gender, age and disability distribution of their farmers or how PUE is used among these different marginalised groups in their membership.³³

There is still a lot of potential for productive use of OGS in the coffee value chain such as wet processing, which is largely women and labour intensive as pointed out by a respondent: "There are areas that have not been explored that have potential, like use of solar for wet processing, which would reduce labour and improve time for women and youth who have the roles of drying coffee".

Use of OGS for irrigation

Organisations like NUCAFE and Balton use OGS solar water pumps for irrigation. NUCAFE has worked with Sum Solar to establish micro-irrigation at household level among coffee producing households. Balton provides solar water pumps to its clients after supporting them to conduct energy audits based on their household and business needs, and has implemented a pilot solar irrigation project with the Ministry of Agriculture. Since women and youth in Uganda are mostly involved in water use for household and agriculture, it can be inferred that they will benefit the most from OGS PUE with solar powered irrigation. This would save their time and reduce labour.

29. See Annex 1.

30. Uganda Off-grid Energy Market Accelerator (UOMA), 2018.

31. NUCAFE (2020). NUCAFE commissions first industrial solar power plant in Uganda.

32. <https://nucafe.org/about-nucafe/>

33. Key informant interview





Solar drying

Respondents highlighted the increasing productive use of OGS by horticultural and coffee farmers for solar drying of fruits and coffee. A respondent noted: “Solar dryers are faster at drying and are time-saving, which produces better quality coffee.”

Water heating in urban areas

Study respondents noted that OGS is increasingly used for water heating in urban areas both in homes and businesses like hotels, lodges and salons. Solar heaters are popular due to the significant cost savings provided to the client. As a respondent pointed out: “The average saving a client makes from our solar heaters is 100,000 Uganda shillings per month compared to UMEME. The average household spends 200,000 shillings on UMEME, which means solar would save them 50 per cent of their energy bills”.

OGS in refugee settlements

Respondents noted that OGS is also being used in many refugee settlements in Uganda thanks to partnerships between development partners, government and solar companies. Uganda has one of the largest refugee population in the world, with over 1.4 million refugees mainly from Central, East and Horn of Africa. Women make up over 50 per cent of refugees.³⁴ Refugees start by using solar for home lighting and then graduate to PUE like fridges for cold storage or phone charging in small-scale businesses in the camps. Development partners like German Corporation for International Cooperation (GIZ)/Energising Development (ENDEV) partner with solar companies to provide solar services and products in refugee contexts. However, there is need for further research on OGS PUE by women, youth and PWDs in the refugee settings. ENDEV, World Bank and REA are supporting MEMD to develop a Sustainable Energy Response Plan for Refugee and Host communities (SERP).³⁵ The proposed SERP will explore PUE at household and community level among refugee and host communities.

OGS mini-grid companies promoting PUE

Some mini-grid companies are promoting the productive use of solar among the communities and businesses that they serve. The companies support businesses such as bars and mills with training to build their business skills so that they can be more profitable and buy solar for their productive use.

Supporting women and youth businesses in OGS PUE

Respondents from solar companies interviewed for this study highlighted some achievements in women’s participation in OGS PUE. For example, one local solar company designed business hubs powered by solar in a project supported by the United Nations Capital Development Fund (UNCDF). The business hubs enabled the establishment of women-owned businesses like hair salons and kiosks. Other companies have noted that women-owned businesses have used OGS for phone charging, powering fridges for cold storage, lighting for bars, restaurants, tailoring businesses and salons.

Women business owners have reported increased decision-making power due to their income generating activities. OGS has also been used for security lights in communities, which has improved security and more hours for trading for women and youth. Lighting in health centres has led to better health outcomes for communities, especially improving women’s sexual and reproductive health rights, such as by reducing maternal mortality. Youth-run businesses that are reported to be active in OGS PUE include barber shops, phone charging, small printer and computing shops, discos and cinemas.

³⁴ Uganda Comprehensive Refugee Response Portal.

³⁵ Interview with study respondent.

4 OPPORTUNITIES FOR PARTICIPATION OF WOMEN, YOUTH AND PLWD IN OGS PUE

Level	Strategic Opportunities
Policy level (Integrating GESI into OGS PUE)	<p>REA is in the process of developing an Off-Grid Strategy that will focus on PUE, in particular from mini-grids. However, respondents noted that the strategy has not highlighted the promotion of women, youth and PLWD in PUE. This creates an opportunity to mainstream GESI at the policy level.</p> <p>Another opportunity is the development of the Sustainable Energy Response Plan (SERP). GIZ/ENDEV, World Bank and UNHCR are among the development partners supporting MEMD to develop the SERP, which will promote PUE at household and community level among refugees and host communities. This policy presents an opportunity to mainstream gender equality and inclusion of youth and PLWD.</p>
Programme level (Ministry level)	<p>The Ministry of Agriculture and World Bank have an initiative to promote solar water pumping. According to respondents, the World Bank is also in the process of developing a productive use strategy for OGS. Some solar companies, such as Power Trust Africa, have received grants from UNCDF to support women's businesses to use OGS in refugee camps. These initiatives are opportunities to document lessons and scale up efforts that have worked in PUE for women, youth and PLWD.</p>
Programme level (Community)	<p>Respondents noted that there is opportunity to target VSLAs of women and youth as a way of promoting financial inclusion and PUE. Many solar companies and financial institutions have not tapped into the potential of the thousands of VSLAs, SACCOs and investment groups that exist in the country. Many women-led SACCOs are farmer groups that can be supported to use solar for PUE through credit packages for purchase of solar products like water pumps or driers or mills.</p>

4.1 Barriers to PUE Uptake Among Women, Youth and PLWD

Limited data on OGS PUE

Respondents noted that there is little data on women, youth and PLWD uptake of PUE. A respondent noted: "For solar water pumps, what is the effect of these technologies on users?" Following the COVID-19 pandemic, which has wreaked havoc on the Ugandan economy, PUE has the potential to move businesses from low productivity to consistent productivity. However, few studies have been done on PUE in the COVID-19 era. Further, there is limited data on financing for OGS and its effect on women, youth and PLWD, who usually have less access to credit. This would affect their PUE participation.

Finally, there is limited GSDD in Uganda on participation of women, youth and PLWD across the various agricultural processing value chains where there is most potential for PUE, such as coffee, fish, dairy and tea.



High OGS cost

For many clients, the that the cost of OGS is high affects their WTP. As one respondent shared: “Initial investment in solar is quite high. One time, I wanted to have my security lights on solar. I called a certain company but they were requesting for many millions of shillings that I got discouraged”. Large-scale businesses like some agro-processors in the tea industry feel that the OGS costs are much higher than grid electricity, which makes OGS less cost effective.

Limited awareness of OGS and lack of business skills among women farmers

A respondent noted: “If you want women farmers to use OGS, they need to understand and change their attitudes from doing agriculture for survival to doing it as a business.” There needs to be more awareness creation among women, youth and PLWD about solar as an alternative source of energy for both households and PUE.

Limited OGS accessibility by PLWD

Many rural areas are still out of reach for OGS companies. Some solar agents do not reach last mile areas, where PLWD are located, and they do not have service centres or outlets at the local level. There is limited specific targeting of PLWD in marketing and awareness raising for solar.

Lack of OGS specific PUE in energy policies

The Draft Energy Policy 2019 mentions productive use of electricity generally but is not specific on OGS PUE. The development of an OGS strategy by REA is a step in the right direction. PUE should be integrated into this strategy.

Other identified barriers to PUE by women, youth and PWD include:

- ☉ High cost of OGS installation and maintenance.
- ☉ Low and poor knowledge of other ways OGS can be used beyond lighting among the populace.
- ☉ Information on OGS is not accessible since some agents do not reach rural areas where PLWD are located.
- ☉ Limited specific targeting of PLWDs in marketing and awareness raising of OGS.

4.2 Lack of Decision-Making Power Over OGS Resources by Women, Youth and PLWD

The women may not have a voice to decide on the OGS technology used even at the household level, let alone businesses that they do not own. Most women, youth and PLWD are employees or family workers, with few owning their own businesses.



Challenging social norms

Breaking social norms to allow more women to enter traditionally male-dominated enterprises like manufacturing, which are energy intensive, is another factor that research has shown affects women's PUE. In Ghana, providing appropriate equipment and technology such as small power tools to women enabled them to break into some male-dominated sectors that required physical strength such carpentry.³⁶

Other barriers to OGS PUE

It is apparent that although there is a significant level of enthusiasm towards OGS for productive use, some notable barriers exist. For example, for the groups that have attempted to utilise OGS in processing, they find the energy fluctuations demotivating since a slight reduction in energy affects the processing of fruits and vegetables, thus incurring financial losses. NUCAFE, for example, is experiencing these technical problems, yet the lifespan of the solar panels, according to the information they were given, is 20 years. NUCAFE has conducted pilot studies in supporting solar among their SME processing partners (at the time of this study, NUCAFE had not completed the pilot). However, they noted that most of the SMEs they support are not using OGS although it was not clear why there was low uptake.

There is also the high upfront cost.

In spite of the listed barriers this study identified great opportunities for OGS for productive use in Uganda. However, these opportunities can only be realised if technical and monitoring support is provided to the end-users.

36. IDS & GIZ (2019). *Unlocking the benefits of productive use of energy for women in Ghana, Tanzania and Myanmar.*



5 RECOMMENDATIONS TO ADDRESS GESI GAPS IN THE OGS FOR PUE

Strengthen awareness creation on OGS for PUE among women, youth and PLWD

There is a need to create awareness on the role PLWD, youth and women can specifically play in OGS for PUE.

Conduct further in-depth research and data collection on OGS PUE

Government and private sector players across multiple sectors (energy, agriculture, gender, finance, business, water) should be supported to collect GSADD on participation of women, youth and PLWD in PUE, especially of solar. This data can be integrated into existing studies like the Uganda National Housing Survey (UNHS) and the Uganda Population and Housing Census (UPHC). To support GoU's goal of promoting agro-processing,³⁷ further research is also needed on PUE by women, youth and PLWD across the various agricultural processing value chains where there is most potential for PUE such as coffee, fish, dairy, tea and rice.

OGS private sector players, through their associations, can also be supported to conduct in-depth research on gender equality and social inclusion in OGS. For example, USEA can pilot research studies on OGS PUE with their members, examine the opportunities and gaps, and then design programmes to address these. Lessons learnt from these programmes can guide future programming on participation of women, youth and PLWD in OGS PUE. CREEC and other research and capacity development institutions can be supported in integrating testing of solar products that are better suited for PLWD to increase their PUE participation. This can be done in collaboration with PLWD associations.

Finally, agro-processors and other potential uptakers of OGS PUE should be supported to collect GSADD about their membership in relation to PUE and GESI.

Support policy integration of GESI in OGS PUE

Support GoU to mainstream GESI in OGS PUE policy frameworks that are currently being developed like the Off-Grid Strategy under REA, SERP and the Draft Energy Policy 2019 under MEMD. These policies present an opportunity to mainstream gender equality and inclusion of youth and PLWD in OGS PUE and value chain. Local governments should also be supported to integrate GESI and OGS PUE into their energy action plans. This will strengthen work being done by partners like GIZ/Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP) who are working at the local level. There is need for stakeholders to drum up support for the Draft Energy Policy, ultimately ensuring the GESI components are not left out.

Additionally, Treasury should prioritise resource allocation through institutionalised gender budgeting guidelines and promoting PLWD inclusion budgets for OGS PUE.

Finally, GoU, development partners and other stakeholders like USEA should support the implementation of these policies through building the capacities of individuals responsible for GESI mainstreaming in the OGS sector (e.g. gender focal persons) in the different ministries, including MEMD.

37. NDP III 2020/21–2024/25.



Ministry of Agriculture should develop specific PUE strategy

GoU must have a strategy to help women in both urban and rural areas to access and use solar power in the agricultural sector. Ministry of Agriculture should have a specific strategy on how to promote OGS in productive uses in agriculture, especially in value addition. This will greatly improve the livelihoods of women and youth who have lower access to productive resources and services than male farmers and yet they form 77 per cent and 63 per cent of agricultural labour respectively in the country.³⁸

The PUE strategy can recommend which agricultural sectors can take advantage of OGS and which districts would have a comparative advantage in PUE. The strategy should have clear policy objectives, clear targets, outputs, strategies and costing.

Finally, the Draft Energy Policy 2019, when implemented, can provide incentives to large agro-processors to ensure that small solar installations can add power to the grid where there is no grid. Currently, private players outside of the energy sector are penalised if they are below the grid feed of 2MW. The Electricity Regulatory Authority (ERA) should therefore recognise and partner with non-energy partners in agriculture to promote OGS PUE.

Strengthen government multi-sectoral coordination on PUE

OGS PUE should be promoted using a multi-sectoral approach. Currently, MEMD, Ministry of Water and Ministry of Agriculture have PUE initiatives but are working in silos with limited coordination. As one respondent noted: “We have tried to engage the Dairy Authority to see how the milk cooling can be put on solar. We have had limited engagements with Agriculture on irrigation but not a lot of traction”.

Multi-sectoral coordination among ministries, departments and agencies (MDAs) like the Dairy Authority, REA, Coffee Authority, Ministry of Water, Ministry of Agriculture, MEMD, Ministry of Gender, Labour and Social Development, Ministry of Roads and Works and so on, is vital to overcome barriers for OGS PUE, particularly for women, youth and PLWD. This coordination should not only be at the national level, but also at local government level, which is the point of contact for communities like farmer groups.

Furthermore, it is recommended that GoU improves its coordination with development partners and private sector on OGS PUE for GESI.

Provide incentives and make a business case for inclusion of women, youth and PLWD

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Furthermore, it is recommended that GoU improves its coordination with development partners and private sector on OGS PUE for GESI.

38. FAO (2017). *Gender and adaptation planning in the agricultural sectors: The case of Uganda*.



Government should reduce cost and make solar products more affordable

Government and private sector should improve affordability, especially for bigger solar products for productive use such as solar irrigation pumps. Some solar companies still have a monopoly on specific solar products like water pumps, which drives up the prices. Creating conditions to improve competition will also lower the costs and benefit clients in the long-term.

GoU and financial institutions can explore offering different loans to different clients e.g. individuals and companies. Businesses, agro-processors and others can be supported to conduct cost-benefit studies on different energy options including OGS to encourage PUE. GoU should also consider improving tax rebates for solar products. Currently, respondents noted that solar panels are tax free³⁹ but solar batteries are not, which means the costs are passed on to the clients.

Support partnerships between OGS companies, agro-processors and women, youth and PLWD associations

Just as within government, there is need for coordination among various private sector and civil society players across sectors. Partnerships between associations representing women, youth and PLWD on the one hand and agro-processors and OGS companies on the other should be strengthened. These linkages will facilitate information exchange, learning and capacity development based on their different expertise. For example, a coffee agro-processor can partner with a PLWD association to reach PLWD farmers. PLWD organisations like NUWODU have skills in supporting institutions to conduct disability audits and disability mainstreaming.

Furthermore, OGS companies and associations like USEA can partner with women, youth and PLWD associations to create awareness, provide products and train on OGS PUE. For example, NUWODU is willing to create awareness on productive use of OGS to empower PLWD. Since NUWODU works with associations of women with disabilities in every district in Uganda, it is a valuable partner for OGS companies and players to promote productive use of OGS among PLWD.

NUCAFE and farmer groups like Igara Tea Growers, who have over 6,000 members, are also willing to partner with OGS companies to pilot and promote the participation of women, youth and PLWD in productive use of OGS. Currently, Igara Tea Growers farmers are only using solar for lighting at home but not for productive use. USEA would be an ideal coordination partner bringing together OGS companies, farmer groups and PLWD associations.

Create a multi-stakeholder platform for dialogue on GESI issues in OGS sector

There is need for dialogue involving PLWD, women, youth, private sector and government to understand the GESI issues in OGS PUE and create a plan on what can be done. There is currently no platform to discuss gender equality and social inclusion in the energy sector in order to understand the barriers and opportunities. Information from this dialogue can be used for monitoring and advocacy.

Promoting OGS PUE through SACCOs and VSLAs

It is recommended that GoU build the capacity of SACCOs and VSLAs so that they can become vehicles for OGS PUE financing for women, youth and PLWD.

39. <https://www.monitor.co.ug/uganda/oped/commentary/tax-incentives-promoting-uganda-s-solar-energy-sector--1819818>



Development of gender sensitive and disability inclusive organisational policies

Many solar companies and government departments do not have explicit gender, youth or PLWD policies, plans or strategies. Stakeholders can be supported to develop these through peer-to-peer learning by partnering with organisations that work on such issues. NUWODU, for example, can support organisations to conduct disability audits and develop action plans to address gaps and challenges through sharing their tools and expertise.



6 OPPORTUNITIES FOR LEARNING FROM EXISTING INITIATIVES ON PROMOTING PUE UPTAKE BY WOMEN, YOUTH AND PLWD IN UGANDA

Budding research on OGS PUE

The Technology, Markets and Investments (TEMARIN) project by the United Nations Environment Programme (UNEP) is a research project to strengthen support for solar domestic companies looking at productive use and household use of solar. It was awarded in February 2021. At the same time, GIZ/ENDEV will soon undertake a study of PUE in refugee settlements and other areas while NUCAFE is planning to explore solar units that can serve PUE both at household and production level.

OGS expertise

NUCAFE has an internal engineering team for the solar system they have installed at the coffee processing plant in Namanve. Other organisations can learn from this initiative.

Support and partnership with finance institutions to encourage OGS use

GIZ/ENDEV is planning to partner with other stakeholders who work with VSLAs such as BRAC, a finance institution that has started looking into solar energy product loans. BRAC links with VSLAs to build capacities in financial literacy, life skills and business skills among others. ENDEV will link BRAC with its partner solar companies in refugee contexts who work with groups of over 1,000 individuals.

Supporting gender transformative mainstreaming in government energy policies

GIZ/PREEP has supported MEMD in developing a gender strategy for the Ministry. PREEP also supported gender mainstreaming during the revision of the Draft Energy Policy 2019.

Promoting OGS PUE through existing rural electric cooperatives

NRECA International has experience in strengthening the institutional capacity of rural electric cooperatives (RECs) since 2011. These RECs can be an entry-point to promote uptake of OGS and PUE.

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Annex 1: Explicit Gender and Social Inclusive Projects in OGS Uptake for Productive Use (Source: UOMA, 2018)

Solar player	Target action	Approach	Results to date	Affiliate organisations
USAID: Power Africa Off Grid Energy Challenge	Promote innovative solutions that develop, scale up proven technologies for off-grid energy, reaching communities not served by the grid.	Awards grants of up to USD100,000 each to African companies providing off-grid solutions that deploy renewable resources and power local economic activities.	Five Ugandan enterprises, including Green Heat, One Lamp, GRS Commodities and two women-owned business, have been awarded grants.	Implementers: USADF Funders: Power Africa GE Africa
UNCDF: Clean Start Program	Supports low- income households to transition to renewable energy. Co-invests in early-stage business ideas of private companies that can bring affordable clean energy to under- served markets. Emphasis is on the inclusion of women and youth in value chain	Risk capital (performance-based grant) to bring early-stage business ideas to market. Advisory services to address implementation bottlenecks, facilitate linkages to partnership & funding opportunities. Knowledge and learning in the form of research initiatives, M&E & networking events. Nationwide campaigns to improve consumer awareness & protection. Partnerships with government, development partners, & other stakeholders to leverage resources & strengthen sustainability & impact.	2015 Energy Access Challenge funding five businesses in PAYG solar and clean cook stoves through two-year partnerships (2016–2017), cost share 30% (cash & in- kind). New round to fund 15 more SMEs in clean cooking and solar (pico, larger SHS and micro-grids) through 2- to 3-year partnerships, cost share TBC; Clean Cooking Challenge Window Call for EOI launched in March (cost-share 40%).	Implementers: UNCDF Funders: Renewable Energy Challenge Fund (RECF) Uganda (Embassy of Sweden in Uganda, UNCDF, FCDO Uganda) Clean Start Global (Austrian Development Agency, Liechtenstein Norad, Sida, UNCDF)
BMZ: Promotion of Renewable Energy and Energy Efficiency Programme (PREEEP)	Promote sustainable use of energy for socio-economic empowerment, increased access to renewable energy and efficient utilisation of existing energy resources. Focuses on three areas: •Supporting clean energy strategies. •Mitigating climate change. •Promoting access to energy.	Support MEMD in areas of energy policy, improvement of market structures and energy efficiency. Support activities in implementation of energy programmes at district level, monitoring and evaluation and mainstreaming of cross-cutting issues such as gender and HIV/ AIDS Work through ENDEV to achieve advance access.	Policy support: •Energy programmes structured in West Nile & Lango. •Quality management system for the planning, steering and evaluation processes of MEMD. •Fully operational GIS lab. •Market development: -Capacity building through associations. -Awareness campaigns. •Licensing. •Standardised licensing procedures for small-scale off-grid energy projects with REA & ERA.	Implementers: MEMD, REA, ERA Funders: BMZ, KfW



Solar player	Target action	Approach	Results to date	Affiliate organisations
UNDP NAMA: Green Schools Project	Provide sustainable energy solutions to boarding schools in the mainly off-grid rural areas through solar energy, efficient cook stoves and biogas technologies	<p>Creating an appropriate financing vehicle (revolving loan fund) for the planned large-scale roll out of green technologies in the schools & designing new business models for schools to pay back installation costs.</p> <p>Complementing the technologies with capacity-building & awareness trainings for companies and a life skills programme for youth and local communities</p>	Project has been pre-selected to receive funding by Germany and the UK of up to €60 million to support the development phase.	<p>Implementers: UNDP, MEMD</p> <p>Funders: UK, Germany</p>
UNDP NAMA: Green Schools Project Shell Foundation: Market development	Leverage foundations, government, private sector, DFIs and other financiers to amplify impact and accelerate market growth.	Market institutions used to tackle barriers and facilitate effective deployment of blended capital to accelerate market growth.	<p>Help build demand through communications and market advisory.</p> <p>Providing learning and analysis for key themes such as last mile distribution, rural utilities & gender impact.</p> <p>Funding for industry associations such as GOGLA, GACCC.</p> <p>Supporting local accelerators to act as neutral market influencers such as EPD in Rwanda and UOMA in Uganda.</p> <p>Supporting innovation for market infrastructure such as impact valuation.</p>	<p>Implementers: Various</p> <p>Funders: Shell Foundation</p>
Philips Lighting Foundation: Village Academy	<p>48 young men & women trained to be PV solar electricians by 2018.</p> <p>60 out-of-school Ugandan & urban refugee youth trained by 2018.</p> <p>20 of small/ medium size business owners trained in productive use of energy by 2019.</p> <p>At least 60% of graduates placed in employment and/or have increased income by 3Q2018.</p> <p>At least 50% of trainees targeted being female graduates.</p>	<p>In-village trainings for youth on technical skills, sales & soft skills necessary to enter the solar industry.</p> <p>Tailor made courses for energy companies on capacity building and soft skills.</p> <p>Facilitating access to start-up financing, high quality solar products & mentorship on scaling for SMEs.</p>	<p>Held MCE Sales Agent Training in September 2017 where 20 youth were trained as solar sales agents and equipped with stock in partnership with MCE Uganda and d.light.</p> <p>Conducted Soroti solar PV training on May 2016 where 10 young men and women were trained and certified, 8 of whom found work in the solar industry in Soroti.</p>	<p>Implementers: Village Academy</p> <p>Funders: Philips Lighting Foundation</p>

Annex 2: List of Key Informants and Contacts

No.	Name	Position	Organisation
1	Lameck Kiirya	General Manager	Igara Growers Tea Factory
2	Jackson Byaruhanga	Deputy General Manager	Igara and Buhweju Tea Factory
3	Waringa Matindi	Chief Executive Officer	Village Energy
4	Julius Magala	Digital and Energy Finance – Coordinator	United Nations Capital Development Fund (UNCDF)
5	Alex Wanume	Country Manager	Winch Energy
6	Seye Ogunrotini	General Manager – Technology and Innovation	Balton Uganda
7	Benon Bena	Manager, Off-Grid Renewable Energy Development	Rural Electrification Agency (REA)
8	Eileen Lara	Energy Officer	Centre for Research in Energy and Energy Conservation (CREEC)
9	Moses Okwonga	Executive Director	Africa Youth Forum Against Poverty
10	David Muwonge	Deputy Executive Director (Finance, Administration and Compliance)	National Union of Coffee Agribusiness and Farm Enterprises Limited (NUCAFE)
11	Pia Hopfenwieser	Head of Component, Electricity	Energising Development (ENDEV) Uganda, GIZ
12	Bettina Ssemwaka Baesch		GIZ
13	Helen Kyomugisha		GIZ
14	Anja Rohde		GIZ
15	Fred Muwanga	Principal	Nakawa Vocational Training Institute
16	Eunice Among	Programme Manager	National Union of Women with Disabilities in Uganda (NUWODU)
17	Peninah Kyarimpa	Project Manager, Social and Environmental Responsibility (SER)	aBi Development Limited
18	Charles Barazah	Country Manager	Azuri Technologies
19	Doreen Nambooze	Membership Officer	Uganda Solar Energy Association (USEA)
20	Esther Kagezi	Human Resource Manager	Power Trust Uganda Limited
21	Florence Kuteesa	Executive Director	Council for Economic Empowerment of Women in Africa (CEEWA)
22	Mr Odia	Senior Technician	Solar Energy for Africa
23	Arafa Kamoga	Coordinator	National Renewable Energy Civil Society Organisations Network (RESCO)



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