



AFRICAN DEVELOPMENT BANK GROUP

Empowering Women in Africa through Access to Sustainable Energy

A desk review of gender-focused
approaches in the renewable
energy sector



Acknowledgements

This study was undertaken by Ms. Sohna Aminatta Ngum, Gender Specialist with the Office of the Special Envoy on Gender. Support was provided by Ms. Emanuela Gregorio, Economist with the Office of the Special Envoy on Gender, and Mr. Jeffrey Turner, Gender and Infrastructure Specialist with the Office of the Special Envoy on Gender.

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Background



As part of the implementation of the Bank's Ten-Year Strategy (2013-2022), its Gender Strategy (2014-2018), and the New Deal on Energy for Africa (a transformative partnership to light up and power Africa by 2025), the Office of the Special Envoy on Gender (SEOG) conducted a desk review of the gender dimensions of renewable energy initiatives. This work supports the Light Up and Power Africa dimension of the High-Fives, as well as two pillars of the Bank's Gender Strategy: 1. Women's Economic Empowerment; 2. Knowledge Management and Capacity Building Using Research and Advocacy.

Energy encompasses all productive, subsistence and leisure activities. The efficiency and effectiveness of activities and its users' quality of life are affected by both the quantity and quality of energy available. Women and men are equal stakeholders in benefitting from energy use. However, women and men do not have equal access to energy – the same energy service may impact women and men differently, driving distinct social and economic outcomes for each group.

The gendered division of labour creates different energy needs, as do different perceptions of the benefits of energy and the capacity to access those benefits depending on one's gender. Energy poverty hinders social and economic development. According to the International Energy Agency (IEA) (2014), 'Unreliable power supply has been identified by African enterprises as the most pressing obstacle to the growth of their businesses, ahead of access to finance, red tape or corruption.' This undermines competitiveness and access to regional and global markets.

Challenges in the energy sector

- Energy is a social challenge due to disproportionate access and consumption levels.
- Energy is an environmental challenge because excessive energy use could aggravate climate change.
- Energy is an economic challenge because energy supply challenges can hinder economic growth.

Modern energy access is defined as:



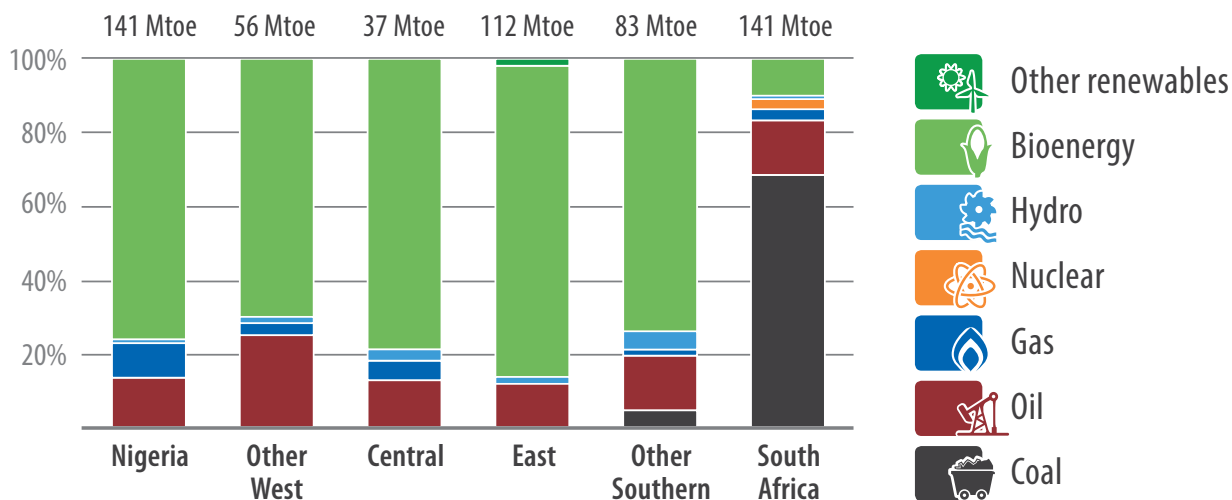
- Household access to a minimum level of electricity;
- Household access to safer and more sustainable cooking and heating fuels and stoves (i.e. minimum harmful effects on health and the environment);
- Access to modern energy that enables productive economic activity (for example, mechanical power for agriculture, textiles and other industries);
- Access to modern energy for public services (for example, electricity for health facilities, schools and street lighting).

Adapted from International Energy Agency (2014)

On average, electricity consumption per capita is less than that needed to continuously power a 50-watt light bulb. Since 2000, the sub-continent has seen rapid economic growth, leading to a 45% increase in energy use – 4% of the world total – according to the IEA (2014). Around half of on-grid power generation capacity (90 GW) in 2012 was in South Africa, with other countries lagging far behind. Coal constituted 45% of the capacity on average (mainly in South Africa), hydro 22%, oil 17%, and gas 14% (mainly in Nigeria), as Figure 1 highlights.

While the continent has vast solar, hydro, wind and geothermal potential, these renewable resources remain largely untapped. As Figure 1 highlights, less than 2% of sub-Saharan Africa's (SSA) energy mix is from modern renewables (excluding solid biomass, which has traditionally been used). Supportive policies and declining costs have helped nurture the modern renewables sector but it is still a minute amount compared to solid fuels. In 2014, renewable energy globally accounted for almost half of all new power plants. According to an article in *The Guardian*, the IEA views that figure as 'a clear sign that an energy transition is underway' (Carrington 2015). Green energy is the second-largest source of electricity in the world and is set to overtake coal in the early 2030s.

Figure 1: Sub-Saharan Africa primary energy mix by sub-region, 2012



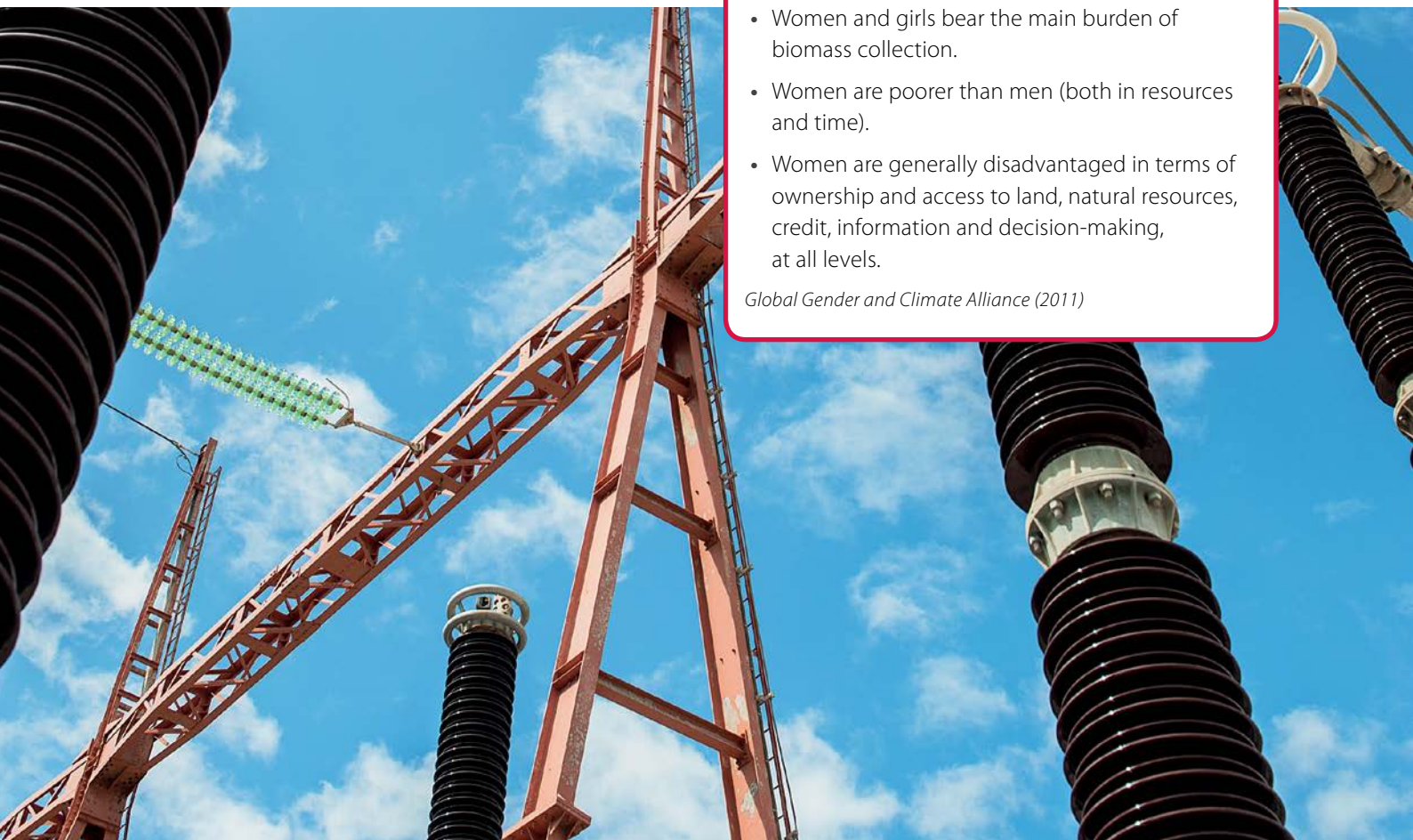
Based on International Energy Agency (2014)

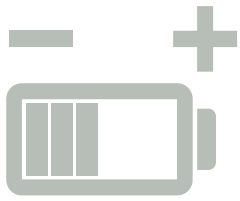
There are a number of efforts and initiatives across the region to build interest in and access to green energy. The Bank, with its catalytic role, could partner with such innovative initiatives to assist in scaling them up across countries.

Gender-specific problems in relation to roles in energy production and use

- Women and men have different energy needs linked to their gender roles.
- Women and girls bear the main burden of biomass collection.
- Women are poorer than men (both in resources and time).
- Women are generally disadvantaged in terms of ownership and access to land, natural resources, credit, information and decision-making, at all levels.

Global Gender and Climate Alliance (2011)





Challenges and opportunities

Energy poverty on the continent is gendered; there are different gender-defined roles in energy production, distribution and use in households, communities and the market. Therefore, women and men experience energy poverty differently. Women and girls are forced to travel long distances to collect fuelwood or water and to carry heavy loads. Additionally, the cooking takes place in poorly ventilated rooms. Köhlin et al. (2011) found that 'women spend 3-5 times as much time as men on domestic activities.' The same pattern was found in terms of energy collection. In rural and peri-urban areas, women and girls are mainly responsible for procuring and using cooking fuels; they are disproportionately affected by the negative effects of limited access to clean and modern forms of energy.

Some of the challenges faced by the majority of African women and girls include: (i) time poverty – time that could be used for educational or productive ventures; (ii) adverse health effects – exposure to respiratory diseases (as a result of indoor air pollution from cooking with traditional biomass); and (iii) safety issues encountered while gathering fuelwood. Rural women and girls are especially affected as the majority of energy is derived from traditional biomass fuels such as wood, charcoal and agricultural waste.

The African continent boasts abundant energy resources (including fossil fuels and renewables), enough to meet its energy needs. But it is lacking on the supply side – more than two-thirds of the population lacks access to modern energy. According to the International Energy Agency (2014), 'in sub-Saharan Africa as a whole, only 290 million out of 915 million people have access to electricity.' The organisation also notes that nearly 730 million Africans rely on the traditional use of solid biomass for cooking.

Lack of access to energy sources for lighting, heating, cooking, transport and economic production inhibits the productivity of men and women, and society at large. Yet women – as both consumers and suppliers – remain invisible in the energy sector. In designing projects to improve energy security, it is crucial to take into account the realities of the differences in needs, constraints and opportunities between women and men in relation to energy infrastructure and the development of services.

Renewable energy solutions such as solar, clean cooking and even biogas (energy from animal and household waste) have the great potential to aid in the development of women-owned small-scale enterprises. These enterprises could effectively be inclusive energy-producing companies using mobile phone-based micro-payment systems to generate revenue from local (rural or peri-urban) markets aimed at supplying this energy to the poor.

Effectively boosting Africa's energy access would help ensure that the continent attains the United Nations Sustainable Development Goals (SDGs). Globally, universal energy access is a focused target: SDG 7 aims to 'ensure access to affordable, reliable, sustainable and modern energy for all'. The effective development of Africa's energy resources and the energy sector would significantly boost the continent's economy. The IEA (2014) projects that 'every \$1 invested in power supply [would generate] more than \$15 in incremental GDP.'

The African Development Bank Group

The African Development Bank (AfDB) Group's 2011 Energy Sector Policy stresses the importance of increased investment to build the requisite infrastructure and in the establishment of effective governance systems in the energy sector for sustainable poverty reduction in Africa. As was previously mentioned, economic growth on the continent has resulted in increased energy demand, which also translates into increased energy-related carbon dioxide (CO₂) emissions.

Africa constitutes 13% of the global population and contributes the least to greenhouse gas (GHG) emissions but is bearing the brunt of climate change.

The AfDB Group's Ten-Year Strategy (TYS) has the twin objectives of inclusive growth and transition to green growth to ensure that environmental and climate change concerns are taken into consideration when transitioning the continent to a sustainable, low-carbon growth path and a greener economy. The Bank has long been involved in the infrastructure and energy sectors. Between 1967 and 2011, the AfDB devoted 30% of total infrastructure commitments to the energy sector and the majority of financing in the sector was used to support power supply schemes.

The Bank aims to support the gradual introduction of economically viable cleaner technologies. It will assist Regional Member Countries (RMCs) in gradually increasing the sustainable use of renewable energy sources where the potential exists, in fostering energy efficiency, and in adopting cleaner technologies.

AfDB Group 2011 Energy Sector Policy Objectives

1. Support Regional Member Countries (RMCs) in their efforts to provide their populations and productive sectors with access to modern, affordable and reliable energy infrastructure and services.
2. Assist RMCs in developing a socially, economically and environmentally sustainable energy sector.

Since women in many regions are typically the primary users of energy equipment, their input is valuable to the design and implementation of projects to meet their energy needs. They already have significant knowledge about local conditions and resources and the additional education of women and women's organisations about energy options and technologies can increase their ability to contribute to energy solutions, including the adoption of innovative and cleaner fuels and equipment. The women will thus be equipped with new skills, improved access to energy for households, and income-generating activities.

The AfDB traditionally concentrates on large-scale, capital-intensive technology projects designed to provide energy for growth in the formal sectors of the economy – cash crops and mechanised production – which are primarily the domain of men. Household energy-consuming activities, which are primarily the domain of women, such as food processing, water procurement, and the transporting of water and fuel, are generally not included in energy planning. The energy component in development policy and planning is traditionally gender blind – there is a blanket assumption that a good energy policy, programme or project will meet the practical needs of women and men equally. It fails to recognise that women and men have different needs, which thus yields limited effects on the gender relations of beneficiary communities.

Figure 2: Investing in a woman means investing in the future

1,000 **ENTREPRENEURSHIP**
Over 1,000 Solar Sister entrepreneurs are spreading light, hope, and opportunity.



WOMEN'S EMPOWERMENT
Solar Sisters are role models – women in business and the technology industry.

4+ **EDUCATION**
4+ hours of solar light means more time to study.



HEALTH
Solar lamps replace kerosene, which produces toxic fumes and black carbon, and increases risk of burns.



LIVELIHOODS
Creates opportunities for solar-powered businesses, like phone charging.



HOUSEHOLD PROSPERITY
Energy savings mean money can be reinvested in lifting a family out of poverty.

90% **FAMILIES**
Women invest 90% of their income into their family's well-being.

Based on a figure found at www.solarsister.org



**INVEST IN A WOMAN.
INVEST IN THE FUTURE.**

How women and clean energy technology create social, economic and environmental benefits for the entrepreneur, her community and the world.



CONNECTIVITY
85% of rural populations own phones for business and to connect to the world. Only 5% have a place to charge them.

2/3 **CLEAN COOKSTOVES**
2/3 more efficient with impacts on health, time savings, and household expenses.



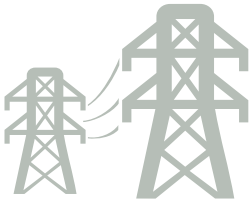
ENVIRONMENT
More efficient cook stoves reduce fuel use by 30-60%, resulting in fewer greenhouse gas and black carbon emissions and reducing impacts on forests, habitats and biodiversity.



SAFETY
Brighter lights at night are safer for traveling and performing necessary chores.

600M **RURAL ENERGY ACCESS**
Solar has the potential to reach the 600 million people in Africa who live without reliable electricity.





Electrification



Sub-Saharan Africa has more people living without access to electricity than any other region – nearly half the global total and more than 620 million people. It is the only region in the world where the number of people without electricity access is increasing – rapid population growth is outpacing efforts to provide access.

According to the IEA (2014):

- Electricity access rates for SSA were 32% in 2012, up from 23% in 2000;
- Electricity constitutes 7% of final energy consumption, some 10% less than the global average;
- In 2012, total electricity consumption in the residential sector represented 27% whilst industry represented 50%.

The IEA (2014) also notes that across SSA in 2012, the average cost of generating electricity was around US\$ 115 per megawatt-hour (MWh). The IEA attributes such high costs to transmission and distribution (T&D) losses (18% on average across the region when South Africa is excluded). Poor maintenance and inefficient system design and operation reduce power supply reliability. All these factors increase the cost of power delivery and can add US\$ 50 to US\$ 80 per MWh to the average cost to the consumer. Consumers are thus faced with high costs for unreliable services.

Why is lighting important for women?

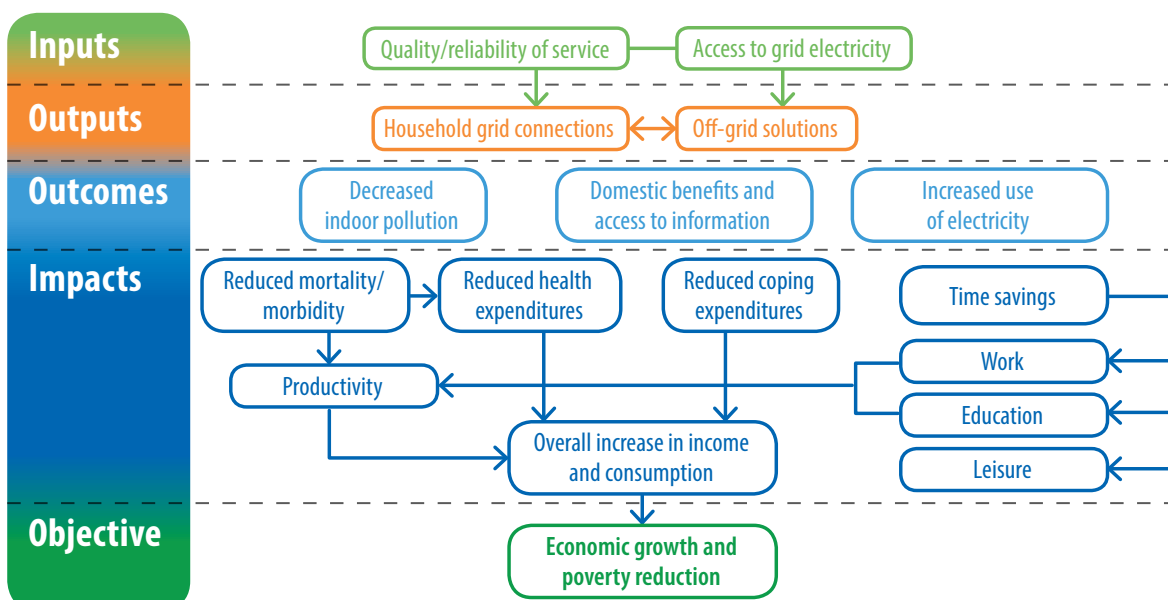
- It increases women's literacy and educational levels.
- It extends the working day of women for income-generating activities.
- It provides greater access to public spaces.
- It enhances safety.
- It opens opportunities for extended trading hours by street vendors (who tend to be women) when it includes street lighting.

The population changes occurring in SSA have major implications for the development of the energy sector:

- Only 37% of the population lives in urban areas – one of the lowest shares of any region worldwide.
- Grid-based electrical power is primarily found in urban areas – many rural and poor urban communities also do not receive adequate distribution of gas or other cooking or heating fuels.

The figure below illustrates these issues and possible routes to address them.

Figure 3: *Impact pathways of rural electrification programmes*



Based on International Food Policy Research Institute (2014)



Households can typically spend 20-25% of their income on kerosene even though the cost of using it for lighting (measured as \$/lumen hour of light) can be 150-times higher than that provided by incandescent bulbs and 600-times higher than that from compact fluorescent lights.

Unreliable electricity has a detrimental effect on the health of many Africans, especially women and children. The powering of emergency medical equipment, storage of blood and vaccines, and performing of basic health procedures, especially after dark, are all contingent on reliable electricity supplies. Van Leeuwen (2014) notes that: 'Without reliable electricity, pregnant women deliver in the dark or are unable to undergo emergency caesarean section at night.' Children face limited access to life-saving vaccines or critical emergency care. These factors contribute to Africa's high maternal mortality rates. The World Health Organization (2015) found that '99% of maternal deaths occur in developing countries, and more than half of these deaths occur in sub-Saharan Africa.' Stakeholders need to take such factors and figures into account when conceiving and implementing electrification projects.

Enterprises headed by women tend to face more barriers in accessing electricity from the grid compared to their male counterparts. Studies done in Kenya, Ghana and Zambia found that 'women entrepreneurs face greater discrimination in the form of delays in obtaining electrical connections and the expectation that they will pay bribes to get them' (UNDP 2011). Candles and kerosene lamps are replaced by electricity, thus reducing air pollution and the risk of fire and burns. But with no decision-making power, electrification could yield limited positive results for women. The impact of home electrification on women depends on:

- a) The amount, length and reliability of the electricity supply;
- b) The location of installed lighting; and
- c) The type of appliances purchased.

A study in Côte d'Ivoire found that in rural areas, those with electricity have 0.1333 ($p=0.066$) fewer children than rural residents without electricity.

Peters et al. 2011

Köhlin et al. (2011) found that when electricity is limited, either by supply or affordability, household decision-makers (predominantly male) may opt to light social areas and buy televisions before installing lighting and appliances used for household chores such as cooking. Köhlin et al. (2011) quote the World Health Organization and United Nations Development Programme as estimating that '6% of the urban population in developing countries relies on electricity for cooking, and only 2% of the rural population.' This shows that when designing interventions, the participation of both men and women and a context-specific understanding of how household decisions are made would ensure equal reaping of possible benefits.

Electrification has many uses other than lighting: it also provides power. It could be used for pumps (irrigation and drinking water), which would decrease the water collection time burden for women and girls. They could then use that time for educational or income-generating activities. Greater access to media can also influence knowledge about health, beliefs and attitudes about gender roles, and awareness about women's rights.

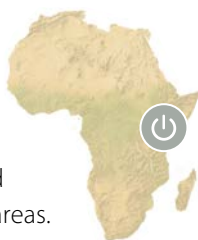
Barriers such as a lack of access to credit and training limit the possibilities for women to develop and use energy-based technologies. Women can play a crucial role in energy production, distribution and use if they are given the requisite technical assistance and training. Analysis by the World Bank's Independent Evaluation Group (2008) found that rural electrification has a positive impact on home businesses: 'the number of home businesses grew significantly more in communities that became electrified than in [...] those communities that did not.' For example, the group notes that in Ghana women prepare snacks to be sold to people who come to the house to watch television in the evenings; similar patterns were found in South Africa.

AfDB projects

Kenya

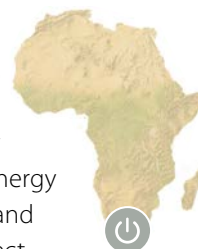
The **Last Mile Connectivity Project (ONEC)** is a typical electricity access project involving the construction of a distribution network and increased customer connections in low-income areas.

An analysis of relevant gender aspects was carried out during the project's conception and assessed the burdens facing women and girls in low-income households. These included increased exposure to smoke inhalation and indoor air pollution, and the risk of burns due to candle and kerosene lamp use. Linkages between energy access and health were also considered. Some US\$ 350,000 was allocated to a capacity building programme for power utility staff, including gender mainstreaming workshops in all regions. It will improve targeting of differentiated gender needs in rural energy and related development projects in order to change 'gender neutral' assumptions in energy planning and development.



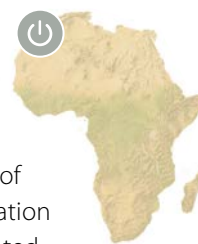
South Africa

The **XiNa Solar One Project (OPSD)** is a public-private partnership building a 100-MW concentrated solar power (CSP) plant designed to store energy and dispatch it during peak load demand periods and base load hours. The project has allocated management positions to women and set procurement targets for women-owned vendors. The project also incorporated a socio-economic development component with a percentage of revenues directed to infrastructure and feeding programmes to benefit communities through improvements in education, living standards and future prospects for youth.



Morocco

The **Ouarzazate CSP Power Plant Project (Phase II) (ONEC)** has resolved to address diminishing gender inequalities in the area as part of the conception of Phase II upon evaluation of Phase I. Women and youth are targeted for indirect employment opportunities linked to the NOORo II and NOORo III stations. The planned training programmes will enable the significant participation of women, with the aim of strengthening their professional skills to make them more employable and empowering them socially and economically. The training programmes will be implemented through a partnership with the Polytechnical Institute of Ouarzazate and will include programmes on renewable energies, the training of women entrepreneurs in the region, the training of women in the project zone on agricultural activities, and other activities. Women will be included in different stages of the project by placing them in decision-making bodies. The project will work with Ouarzazate-based women's organisations and other gender-focused organisations.





Initiatives on the continent

Continent-wide

Pay-As-You-Go (PAYG) Off-Grid Energy

Pay-As-You-Go (PAYG) is a microfinance platform for household energy systems that have relatively high up-front capital costs for off-grid consumers. An information technology system underlies the platform, allowing automated payments and system monitoring/activation. GSM-enabled mobile money payments, scratch cards and tactile keypads or premium SMS are all part of the payment and verification systems. The platform allows manufacturers and distributors to act on behalf of their customers to access financing through working capital and other funds. https://www.lightingglobal.org/wp-content/uploads/2015/05/Off_Grid_Power_and_Connectivity_PAYG_May_2015.pdf

Continent-wide

Barefoot College (SE4All, UN Women and Clinton Global Initiative)

For over 40 years, the Barefoot College has used innovative means to bypass barriers restricting women's active participation in the energy sector. This is done through technical training and capacity building to enable women to become solar engineers and scale technology in their communities. The women are thus able to train even more women in their communities and beyond. Financial, leadership and governance training enable them to plan and lead effectively. The women are equipped to bring electricity to their communities (most for the first time). They also introduce a renewable and sustainable source of energy that can be maintained and replicated in other communities. Villagers pay toward the costs of equipment and its maintenance in five-year instalments, with the funds also ensuring that the women engineers receive a monthly stipend for their work. A 20-watt solar panel, one 12-volt battery, one cell phone charger and three 9-watt lamps are supplied to every participating household. Barefoot College now has more than 70 trained, rural, semi-literate and illiterate women working as solar engineers in Sierra Leone and Liberia. An initiative with UN Women also provides distribution, installation and maintenance of household solar electrification and mini solar plants for diagnostic clinics and maternal health centres. The Barefoot College has also committed to launching six regional training centres in Africa to train 560 illiterate rural women on how to electrify their villages with solar energy within 6 months of training. Initiatives currently exist in Burkina Faso, Liberia, Senegal, South Sudan, Zanzibar and Tanzania. Benefits of the programme include savings on the cost of kerosene (monthly savings of about 1,000 shillings) and charging cell phones at the local market. Another benefit is a decrease in health and safety hazards due lower use of highly flammable kerosene.

www.barefootcollege.org

Continent-wide

Off-grid lighting (Solar Sister)

Solar Sister uses another innovative approach to promote off-grid lighting: a micro-consignment model applied by partnering with formal and informal women's organisations. Solar Sister extends a loan providing women with the device inventory to sell to others, including mobile technology. Participating women offer to charge others' phones for a fee using their off-grid energy device, supplementing their income. Efficiency is ensured in the programme through the use of mobile banking and text messaging to communicate with the entrepreneurs and streamline funds.

www.solarsister.org

Continent-wide

Lighting Africa (World Bank and IFC)

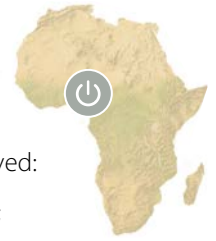
Lighting Africa seeks to accelerate the development of the commercial off-grid lighting market in SSA. It mobilises the private sector to build sustainable markets to provide the rural and urban poor with safe, affordable and modern off-grid lighting.

Nigeria

Lighting Africa

(World Bank and IFC)

A pilot project where 36 primary healthcare centres (PHCs) across three states received solar lanterns was implemented under the Nigerian State Health Investment Project. It was held under the premise that the deployment of off-grid lighting products could improve the lighting situation in health centres and enhance 24-hour service. The project involved:



- The procurement and distribution of solar lanterns to 36 health centres;
- The training of Ministry of Health staff, including midwives and primary health care staff, and Transmission Company of Nigeria staff on the selected off-grid lighting products;
- Monitoring the deployment and use of solar lanterns in the selected states.

The number of working hours for midwives increased by up to 30% following the introduction of the solar lanterns. They replaced inefficient and unreliable options such as wax candles, flashlights and kerosene lanterns. Those options were not bright enough and emitted noxious fumes.

Continent-wide

ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREE) (Economic Community of West African States)

The ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREE) is a standalone programme focused on complementing the regional effort to improve access to sustainable energy for all. It ensures the success of ECOWAS renewable energy and energy efficiency policies by including both women and men in solving the region's energy crises.

Other initiatives involving ECOWAS include:

- 2015 ECOWAS Policy for Gender Mainstreaming in Energy Access;
- The Mano River Union (MRU) Framework Action Plan concerning energy and women's economic empowerment;
- The West African Clean Cooking Alliance (WACCA);
- The ECOWAS Federation of Business Women and Entrepreneurs (FEBWE);
- The World Bank's Gender and Energy Program of the Africa Renewable Energy Access Program (AFREA);
- The UNDP Multifunctional Platform Programme.



Menengai Geothermal Project, Kenya

The Menengai Geothermal Project harnesses geothermal development, a "new" renewable energy. When communities gain access to modern forms of energy, this has a positive impact on gender, including improvements in health and education for women and girls. As the new Kenyan constitution calls for a 30% government procurement preference for youth, women and persons with disabilities, the geothermal project will employ a minimum of 30% women, a high number for a small town in Kenya. The 30% requirement aims to enhance women's participation in fields traditionally dominated by men, enabling them to acquire the required skill sets.

The emergence of employment opportunities for women such as those presented by the Menengai Geothermal Project translate into an increase in revenues available to their households and the micro and small enterprises that will employ these women or be created by them. Additionally, the provision of water to local communities will directly affect the empowerment of women and girls who normally collect water for domestic purposes. The project has a strong potential for replication and is currently targeted for expansion in Tanzania, the Comoros and Djibouti, along the Rift Valley.





Bioenergy

The main form of energy used on the African continent is bioenergy, mostly due to its low cost and relatively easy availability. Tree management by farmers is on the rise, especially in East Africa, due to increasing reliance on private fuelwood supplies. A survey conducted in the Ethiopian highlands found that 72% of trees were planted primarily (37%) and partly (35%) to produce fuelwood. In a more recent survey from Ethiopia on the use of trees and forest, 50% of a sample of 600 households said that they got their fuelwood from their own property. It was the most important (19%) or second-most important (24%) purpose of planting the most dominant tree (Köhlin et al. 2011).

Various technologies could be used to convert biomass to provide more convenient forms of bioenergy. Technologies such as co-generation, organic waste turned into biogas and the production of liquid biofuels and others hold great potential because they could provide low-cost and locally available, modern sources of energy for the production of electricity and heat. The development and use of such technologies would also lead to job creation through the expansion of local industries. Additionally, the conversion of existing plants to burn biofuels through co-firing would lead to reductions in CO₂ emissions due to the sustainable production and use of biomass.

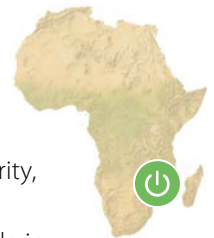
AfDB projects

Mozambique

The **AfDB-CIF Sustainable Land and Water Resources Management Project** aims to increase communities'

capacity to address poverty, food insecurity, land degradation and climate resilience.

The project's goal is to help 40,000 people in drought-prone regions get increased access to water infrastructure for agriculture, livelihood diversification and sustainable land management, including reforestation, fire control, more efficient cook stoves, and charcoal production units. Sustainable livelihood enhancements, particularly for women, include the promotion of agro-forestry (cashew farming, community forestry nurseries), and the promotion and improved management of facilities for non-ruminant livestock (poultry, apiculture and aquaculture). Over 70% of targeted beneficiaries are women; the project will also encourage the participation of women in capacity building.



Initiatives on the continent

Continent-wide

Africa Biogas Partnership Programme (ABPP)
(Hivos, Netherlands
Ministry of Foreign
Affairs and SNV)

Funded by the Netherlands, the Africa Biogas Partnership Programme (ABPP) supports national domestic biogas programmes. It aims to construct 70,000 biogas plants in Ethiopia, Kenya, Tanzania, Uganda, Senegal and Burkina Faso. More than 50,000 plants have so far been constructed.

<http://africabiogas.org>

Continent-wide

(B)Energy

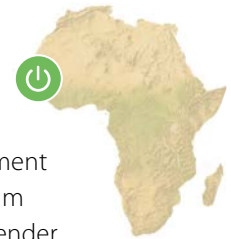
A second energy programme aims to provide affordable, mobile and durable biogas products that help turn users into entrepreneurs. By producing more biogas than their own households consume, entrepreneurs can sell the biogas and generate income. To make biogas, food waste and animal droppings are added to a biogas 'digester', which then produces methane gas that can be piped out. When enough gas is produced, it is transferred into two pillow-shaped, metre-long inflatable balloons that can be transported on the back like a rucksack. Each balloon holds 1.2 cubic metres of gas – enough for about five hours of cooking. The surplus can then be sold to customers. The one issue is the initial cost of the devices: empty gas bags cost over 40 euros, a substantial sum in Ethiopia. A partnership with financial institutions could provide financial services or microloans.

www.be-nrg.com

Senegal

Second phase of the Sustainable and Participatory Energy Management Project (PROGEDE II) (World Bank Group and Nordic Development Fund)

The second phase of Senegal's Sustainable and Participatory Energy Management Project aims to empower communities while preserving forest ecosystems. It helps families diversify their household fuel needs through the use of biogas and support to beekeepers, and has brought improved seeds and larger yields to farmers. The Energy Sector Management Assistance Program (ESMAP) and Africa Renewable Energy Access Program (AFREA) provided support to ensure the successful implementation of gender components:



- The limitations of PROGEDE I were highlighted during its **evaluation**, which helped to shape the conception of PROGEDE II;
- Gender was considered and incorporated in the **planning** stage of PROGEDE II – women were included in the decision-making bodies of target communities, particularly forest management systems, to ensure the equitable gender allocation of income-generating activities;
- **Commitment** from the Senegalese government was encouraged to identify gender in the Project Development Objective, which then informed the overall approach; commitment from various stakeholders, including community and opinion leaders, from target communities was also fostered;
- **Gender budgeting** ensured that adequate funding was allocated to women-specific activities;
- **Context specificity** ensured that the target communities were not treated like homogenous entities;
- **Gender disaggregated indicators** helped capture quantitative differences and qualitative changes to ensure women were targeted;
- **Training** given to women, especially in commercial activities, helped challenge gender stereotypes; women became involved in traditionally male-dominated and profitable activities such as forest cutting and carbonisation.



Water



Women and girls are primarily responsible for the collection of water for domestic use in rural areas; they are thus tasked with walking (most times) very long distances. This increases time poverty and has health and educational impacts. It also limits women's agricultural productivity and negatively impacts sanitation levels. According to the United Nations Special Rapporteur on Extreme Poverty and Human Rights (2013), in SSA, 71% of the burden of collecting water for households falls on women and girls. They spend a total of 40 billion hours a year collecting water – the equivalent of France's entire workforce. Limited water supplies mean less water is boiled for drinking and other hygiene purposes, which increases the likelihood of waterborne diseases.

Poor sanitation facilities in the home force women and girls to use unsecured locations outside the home, which (as in the case of electricity) puts their safety at risk. Limited access to sanitation facilities in schools negatively impacts the school retention rates of girls, including their climbing of the educational ladder following puberty. According to a 2015 report by the United Nations Children's Fund (UNICEF), a study in Tanzania found a 12% increase in school attendance when water was available less than 15 minutes away compared to more than half an hour away. These factors reduce the ability of poor people to improve their livelihoods: adults are prevented from working effectively and there is a detrimental effect on children's learning. Adequate sanitation facilities would positively impact the economic and educational productivity of women and girls and their personal safety and dignity.

Electrified or mechanical water pumping thus relieves the burdens that women and girls bear and improves the health, sanitation, nutritional and educational levels of their families. According to the Global Gender and Climate Alliance (2011), 'a family of five needs about 100 liters of water weighing 100 kg each day to meet its minimum needs.' Women and girls are thus forced to walk to the water source at least two or three times a day. The World Health Organization (2011) warns about the physical burden carrying heavy loads has on the

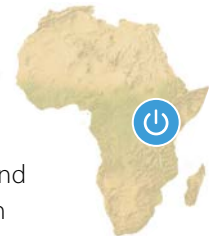
health of women and girls over long periods of time, such as cumulative damage to the spine, the neck muscles and the lower back, which leads to early ageing of the vertebral column.

Therefore, the active participation of women and girls in project conception and implementation is crucial to ensure that their needs are effectively addressed. UNICEF (2015) also mentions evidence showing that water and sanitation services are generally more effective if women take an active role in various project stages, from design to planning and through to ongoing operations and maintenance procedures. UNICEF (2015) also notes a World Bank evaluation of 122 water projects which found that 'the effectiveness of a project was six or seven times higher where women were involved than when they were not.'

AfDB projects

Uganda

The **Full Water Supply and Sanitation Programme (OWAS)** aims to support the government's efforts to achieve the sustainable provision of safe water and hygienic sanitation. This will be based on management responsibility and ownership by users. The project recognises the crucial role that women play in the management and use of water and sanitation and therefore stresses the need to involve women in decision-making processes and to promote their participation through capacity building. Women were allocated positions in water users associations (WUAs) and water and sanitation service boards (WSSBs), increasing the numbers where at least one woman holds a key managerial position from 85% to 95%. Staff will also undertake training in gender mainstreaming and gender disaggregated data collection. The project will decrease time poverty for women and girls, which will enable their participation in productive and educational activities.



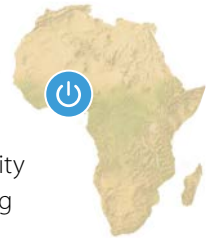
Initiatives on the continent

Benin

Solar Market Gardens
(Solar Electric Light Fund
(SELF))

Solar Market Gardens use solar-powered drip irrigation systems to help women farmers in remote, arid regions grow crops during the dry season. Farmers are thus able to achieve higher yields over larger areas with less water and labour. The initiative reduces greenhouse gas emissions while allowing women farmers to increase their income and improve food security for their families. Higher income levels have paid for expenditures including school fees and medical treatment.

www.self.org

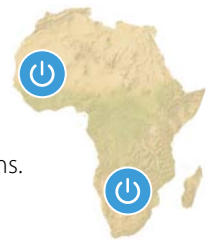


East and Southern Africa

Child Friendly Schooling (UNICEF)

Child Friendly Schooling focuses on building separate toilets for girls and boys and the provision of hygiene education throughout eastern and southern Africa. The programme is significantly increasing girls' school attendance: in Uganda, improved attendance and lower drop-out rates for girls have been noted following the introduction of female-only washrooms.

www.unicef.org



30 March 2015

During an AfDB project preparation mission to West Kordofan State, Sudan, this young girl reports to a water and sanitation engineer that she cannot go to school because she is in charge of collecting water for her family. She spends up to 6 hours walking 10 km or more to fetch water without being relieved of other household chores. Some 30% of girls discontinue their education, mainly to help their families fetch water. The literacy rate is 24%.



Clean cooking

At least 730 million sub-Saharan Africans rely on the traditional use of solid biomass for cooking, the majority using inefficient stoves in poorly ventilated areas. The World Health Organization (2012) notes that 4.3 million premature deaths, of which 600,000 are in Africa, can be attributed annually to household air pollution resulting from the use of traditional solid fuels, such as fuelwood and charcoal.

The benefits of improved stoves

An improved stove is designed to increase energy efficiency, remove smoke from indoor living spaces, and lessen the drudgery of cooking duties.

Cooking technologies have positive secondary benefits (Köhlin et al. 2015):

- **For the local environment**, including by reducing watershed degradation and biodiversity habitat loss;
- **For the regional climate**, including by reducing black carbon emissions.

Within the household, cooking and the kitchen constitute 'household public goods' that improve household health.

In SSA, more than half the population in 42 countries relies on solid biomass for their cooking needs, and in 23 of these the share is above 90% (IEA 2014). Nearly three-quarters of those dependent on solid biomass for cooking live in rural areas and often devote hours each day to fuelwood collection. The brunt of fuelwood collection and cooking falls on girls and women; they therefore face all the associated health and social implications.

Considering that women and girls bear the brunt of household chores, including cooking, there is a need to focus on energy solutions for cooking instead of solely focusing on the availability of fuels. This would ensure that how women use their time is taken into account and lightened where the search for fuelwood is concerned. Improved stoves can also positively impact public health, women's empowerment, education and environmental management.

The transition to cleaner cooking fuels and appliances is not straightforward due to fuel stacking: those with access to modern fuels, such as liquefied petroleum gas (LPG), natural gas, biogas or electricity, may continue to use solid biomass for cultural or financial reasons. The IEA estimates that around 80% of residential energy demand in sub-Saharan Africa is for cooking, compared to 5% in OECD countries. This is attributed to households prioritising energy for cooking (and lighting) within very restrictive budgets (when paid for). The low efficiency of cook stoves used is another factor: three-stone fires are typically 10-15% efficient, compared to 55% for an LPG cook stove.

Yet incentives lack for improved stoves

Cook stove prices range from US\$ 60 to US\$ 160, an amount that many African households would rather use for other expenses. The potential fuel savings improved stoves offer is not always a large enough incentive for families that have easy access to free firewood. Donor support for stove programmes is declining due to the failure of many interventions to live up to expectations.





A study by Duflo et al. (2012) on the distribution of inexpensive (about US\$ 12.50 after subsidies), improved stoves in India highlights that:

- **Initial household take-up and usage of the new stoves was far from universal and declined** markedly over time as users failed to make the maintenance investments necessary to ensure full operation (for example, cleaning the chimney).
- **Households that received the improved stoves still continued to use their traditional stoves** in combination with the new ones, even when the majority of the improved stoves were functional.
- **The stoves failed to achieve their primary goal** of reducing exposure to hazardous air pollutants.
- **There was no difference in lung function** between women who regularly cooked with the new stoves and control groups. The study also failed to find a positive impact on self-reported health outcomes, including birth weight, infant mortality rates, and the probability of a cough, higher blood pressure, or of any illness in the last 30 days.
- **There was no evidence of potential climate benefits** from reductions in deforestation due to no decline in total wood used for cooking.

AfDB projects

Continent-wide

SE4All Africa Hub (hosted by the AfDB): SE4All is a multi-stakeholder partnership between governments, the private sector and civil society dedicated to supporting the continent's progress towards:

- Ensuring universal access to modern energy services;
- Doubling the global rate of improvement in energy efficiency;
- Doubling the share of renewable energy in the global energy mix.

Action agendas and investment brochures are under development. The Hub also provided direct technical assistance to more than 10 African countries upon the request of their governments.

Tanzania

SE4All Action Agenda 2015: Tanzania is a member of the Global Alliance for Clean Cookstoves (GACC). Under the umbrella programme, an assessment of the market for improved cook stoves was carried out. It revealed an estimated penetration of cook stoves in approximately 1,000,000 households, the majority of which were charcoal burning stoves. The study noted that the market for cook stoves is very fragmented and dominated by the informal sector – no one appears to have commercialised the technologies on a large scale. A taskforce has been initiated to increase coordination between relevant stakeholders to come up with a joint way forward. A strategy is in the works that recommends the development of an improved cook stoves project with quantitative country targets aimed at reducing fuelwood and charcoal consumption.



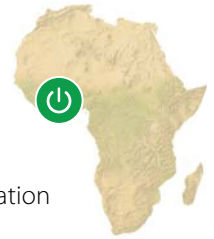
Initiatives on the continent

Ghana

Support projects (UN Women)

UN Women is providing support to ABANTU for Development and the Coalition for Gender Action on Climate Change for Equality and Sustainability projects. The aim is to improve women's health and cooking conditions and limit the use of trees for fuels. Women have been provided with modern cook stoves fuelled by sustainable LPG and trained in cleaner cooking. The involvement of women in all stages of design and implementation has facilitated ownership and the widespread use of gas stoves as well as supplemented incomes.

www.unwomen.org



Uganda

Post-Harvest Programme

(Food and Agricultural Organization of the United Nations/United Nations Development Programme)

The Post-Harvest Programme in Uganda recommended small-scale solar dryers for long-term storage and household consumption of fruit and vegetables after rural women came to the conclusion that solar dryers were better for income generation than food security. In 1992, the Fruits of the Nile Company was formed to link rural producers with the European market for dried fruit. Three years later, more than 50 women's groups had incorporated the solar drier technology. More than 50 tonnes of dried fruit had been exported by that time. A side benefit of the company's creation was that the original food security concerns were also addressed: when not drying for profit, the solar dryers are used to preserve vegetables and fruits for home storage and consumption.

www.energia.org/resources/newsletter/enarchive.html



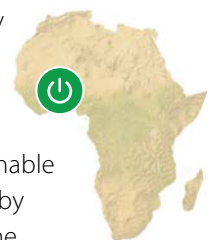
Burkina Faso

Empowering Women Beer Brewers

(United Nations Industrial Development Organization)

The Empowering Women Beer Brewers project partnership with the Ministry of Environment and Sustainable Development, and funded by the Global Environment Fund, promotes women's economic empowerment and clean technologies by distributing fuel-efficient cook stoves in the beer-brewing sector. A credit line will be established for women to access financing to enable them to purchase the cook stoves. The aim is for financing to be provided by a regional African bank and implemented by a local financial institution. The project also focuses on developing four clusters of women beer brewers to generate collective gains and facilitate their integration into the local value chain. The project is expected to improve the health and environmental conditions of more than 1,600 women and to increase women's profits and incomes through a 40-50% reduction in fuelwood consumption.

www.unido.org/fileadmin/user_media_upgrade/What_we_do/Topics/Women_and_Youth/Factsheet_BKF_women_2013.pdf



Mali

Household Energy and Universal Access Project (HEURA)

(International Development Association and Global Environment Facility)

The Household Energy and Universal Access Project for clean energy in homes concentrated on master plans for the supply of wood for fuel and supported the design and implementation of efficient coal production. Some 874,000 hectares of woodlands were placed under community management. The project seeks to promote community-based forest management, with a view to reducing consumption pressure on forest resources while encouraging fuel substitution and energy-saving initiatives. A second project promoted the substitution of firewood with kerosene and LPG and the manufacture of efficient cook stoves. Another element of the project established a solar power network with a capacity of 120 watts, using 192 batteries and bringing together 232 consumers, including residential homes and health and maternity centres, and providing ten hours of electricity supply.

www.thegef.org





Kenya

The Upesi Rural Stoves Project (GTZ and KENGO)

The Upesi Rural Stoves Project trained women in stove production, distribution and installation, which led to widespread adoption of the fuel-efficient stoves. The project built on women's pottery skills, which were applied in stove production. The women also received training in costing and pricing, record keeping and marketing. Some women stove producers went on to train other women for a fee. The final project evaluation stated that 16,000 stoves had been manufactured, purchased and installed. Monthly fuel savings of 90 kilogrammes were noted, representing 40% fuel use savings.

www.undp.org

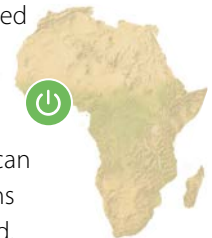


Côte d'Ivoire

Small Grants Programme (Global Environment Facility (GEF))

The Literacy Center for the Promotion of Women in Côte d'Ivoire implemented the Small Grants Programme to reduce emissions from burning firewood and to encourage the use of improved stoves. Ten women community leaders were taught how to manufacture the improved cook stoves. As a result, 147 improved stoves were manufactured through knowledge that can be shared beyond the community. Firewood production and CO₂ emissions have been halved and dozens of trees in the Banco Forest have been saved.

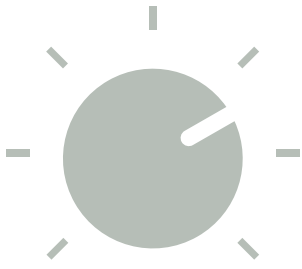
www.thegef.org



Continent-wide

Liquefied petroleum gas (LPG)

In Senegal, strong policies and incentives have supported LPG use and led to a significant decrease in the percentage of the urban population using solid biomass: just 25%. Ghana has set the ambitious goal of providing 50% of households with LPG by 2016, compared to less than 20% today. Kenya plans to eliminate kerosene use in households by 2022 and has a relatively developed market for improved biomass cook stoves in urban and peri-urban areas. High costs present the greatest barrier to the adoption of LPG; therefore, it is crucial that the market be as efficient as possible. Passing efficiency gains on to consumers to lower prices will lead to expanded household LPG use. ENERGIA (2014) stresses that for further expansion, government actions such as 'establishing a regulatory environment and supporting subsidy and microfinance schemes' are necessary. Where kerosene is subsidised, switching household fuel to LPG can save governments money. Financial inclusion and access to bank accounts and putting the LPG account in women's names would empower women's access to LPG services. LPG is not considered a renewable energy but it is included in this study because of its huge potential to solve some of the African continent's energy problems.



Conclusion

There are different factors at play leading to women and girls being disproportionately affected by energy poverty. Any intervention regarding universal energy access needs to take those factors into account. As was noted in the opening pages, the AfDB's initiatives have traditionally concentrated on large-scale, capital-intensive technology projects designed to provide energy for growth in the formal sectors of the economy, including cash crops and mechanised production, which tend to be the domain of men. AfDB energy projects with gender dimensions show that some progress has been made and that it is possible to scale up and ensure that all future energy projects incorporate gender.

Energy poverty encompasses more than electricity access. Biomass, access to water and sanitation, and clean cooking are all components that require consideration. The focus of the AfDB New Deal on Energy is power and electrification. While these are dire needs for the continent as a whole, electrification alone risks yielding limited results if it ignores the other factors in energy access. Gender-equitable energy provision relies on a holistic discussion about the gender-defined roles in energy production, distribution and use in households, communities and the market. This means that AfDB projects must take household energy-consuming activities into account, including food processing, water procurement, and the transportation of water and fuel, in order to incorporate women's activities and ensure equitable participation.

The active participation of women and men from beneficiary communities in all stages of the project cycle is important in ensuring that their needs are met. However, considering that women are the primary users of energy equipment in many areas, it is especially important to involve them in all stages of the project cycle in order to meet their energy needs. For example, the initial World Bank PROGEDE project completion report states that the project 'recognized and promoted the role of women within the village structures, and provided substantive capacity development and revitalised all women's groups and associations'

Gender mainstreaming at the Botswana Power Corporation

An audit of Botswana's energy policies and programmes revealed that the energy sector was not gender-sensitive and energy policies and programmes were not gender-responsive. With the support of ENERGIA, the Botswana Power Corporation (BPC) started mainstreaming gender in its operations (grid and off-grid) in 2011 and now has a concrete strategy to design and market electrification services and products to its customer base and reach those being marginalised in terms of electricity access. The institutionalisation of gender sensitivity within the Botswana Power Corporation was also promoted.

Botswana Power Corporation 2011

(World Bank 2005). But the contrary was found by Bandiaky (2008): women in the village communities held secondary or marginal positions of importance, the women tended to be leaders of women's associations confined to working in the sub-committees; they were not members of the powerful decision-making board and their positions on the committees were frequently only on paper. One of the contributing factors to PROGEDE II's success was in addressing the aforementioned constraints and ensuring women's active participation in decision-making positions. This highlights the importance of evaluation and learning from past mistakes.

At the Regional Member Country (RMC) level, the AfDB could encourage gender-equitable energy interventions by making a business case for equity in access to opportunities (production, distribution and use) in the energy sector. For the past few years, numerous countries on the continent have made attempts to address gender equality in the energy sector, including Mali, Botswana, Senegal, Uganda and Kenya. There is commitment from some governments and the Bank has an entry point to ensure that other governments follow suit.



Adopt a Light, Kenya

Founded by Esther Passaris, Adopt a Light installs, upgrades and maintains street light poles and enables companies to advertise for a fee. The project aims to partner with various city councils around Nairobi and municipalities in Kenya to improve the country's street lighting facilities. As a public-private partnership, the company has entered into an agreement with the Nairobi City Council, with the City Council providing labour and electricity while Adopt a Light provides marketing and raw materials.



RMCs could be encouraged to promote women as not solely consumers but also producers of energy. The AfDB XiNa Solar One project is the perfect illustration of a public-private partnership that took gender into account during the project conception phase and allocated procurement and decision-making positions to women. RMCs other than South Africa, such as Kenya and Ethiopia (in talks), among others, have public procurement allocations for women. The AfDB could work to promote this as a continent-wide initiative. This would also promote female-owned/run independent power producers, such as Adopt A Light (see box) on the continent to give them opportunities in reaching more clients.

There are negative effects of launching initiatives without taking context specificity into account, especially when dealing with clean cooking. For the AfDB, a partnership with an organisation with a proven track record and local operations would be the most advisable route. The Bank has to ensure that the improved cook stoves used are context specific and have been tested in field settings to understand whether they will provide the benefits measured in laboratory tests before devoting valuable resources. The gap between those who design and produce technologies and the needs of consumers must be narrowed. The full participation of intended beneficiaries (women and men) in all aspects of the project cycle is contingent on the success of a clean cooking initiative.

The AfDB needs to understand the gender dimensions of energy use (women and men), the context-specific nature of energy use and ways to promote gender equity and women's empowerment, whilst simultaneously enhancing the effectiveness of energy projects, poverty programmes and overall sustainable development activities. As ENERGIA (2011) notes: 'Although access to more modern energy alternatives will not necessarily lead to greater equality in gender roles, it can at least relieve some of the most burdensome and unhealthy aspects of their daily lives and expand the development options of women, their families and their communities.' Therefore, the Bank's New Deal on Energy and Power Africa initiatives must take these messages into account when designing interventions in order to attain universal access to energy by 2030.



Recommendations

- **Strengthen collaboration** between SEOG, ONEC and ORQR.4 to ensure that intended beneficiaries (women and men) are included in all stages of the project cycle, from concept to design, financing, mobilisation, implementation and measuring and evaluation.
- **Shift** from the traditional **supply-side** approach (primarily focusing on technology solutions) towards a **demand-side** approach (energy as an aspect of the social and cultural setting).
- **Build capacity of and further train staff** working in the energy sector at the Bank, especially operations staff.
- **Evaluate previous Bank energy projects** to determine their possible shortcomings in incorporating gender and learn from those which did for future projects.
- **Include gender budgeting** in energy projects (promote such activities with RMCs), not by focussing all projects primarily on gender but by allocating resources to ancillary gender components.
- **Work with RMCs** to increase women's participation in the energy sector through procurement allocation. Promote the employment of women in the energy sector as operation and maintenance technicians at the local level. Create an enabling environment for both women and men to participate in the energy sector. A study analysing the effects of public procurement allocation for women on RMCs that have adopted the initiative to use as an advocacy tool with other RMCs would be a good step.
- **Ensure that projects that address women's energy needs take into account the types of value-added productive activities** typically done by women. Women should be encouraged to become involved in producing and distributing new energy technologies and services. This would lead to promoting and creating business opportunities for women in the energy sector.
- **Collect and disaggregate data** at each step of the policy and implementation process in order for stakeholders to specifically address how their decisions and interventions will affect various population subgroups in different ways.
- **Strengthen the public-private partnerships** of relevant stakeholders in the sector. Funding could come from ring-fencing of existing AfDB facilities, for example the Transition Support Facility (TSF).
- **Conduct a qualitative methodological study** for any clean cooking initiatives to understand the adoption of improved cook stoves.





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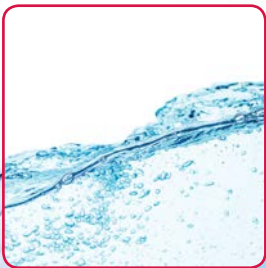
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Contact

Rosine Cathy Ijimbere

Office of the Special Envoy on Gender (SEOG)

r.ijimbere@afdb.org