



Solar Sister

Empowering women in Africa through clean energy solutions

2011 SEED Winner

SEED CASE STUDIES: INSIGHTS INTO ENTREPRENEURIAL SOLUTIONS FOR SUSTAINABLE DEVELOPMENT



SEED

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IMPRINT

Publisher: SEED

c/o adelphi research gGmbH
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Picture credits: Solar Sister

Supported by: the European Union, the Government of Flanders, Federal Ministry for Environment, Nature Protection, Building and Nuclear Safety, Germany and Ministry of Economic Affairs, Netherlands and UN Women

The findings, interpretations and conclusions expressed in this publication are those of the authors based on interviews and site visits to the enterprise and do not necessarily reflect the views of SEED or Adelphi Research.

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SEED Case Studies Series

Demonstrating Sustainable Development on the Ground Through Locally-driven Eco-entrepreneurship

Social and environmental entrepreneurship, also known as green and inclusive entrepreneurship or eco-entrepreneurship, could play a critical role in achieving a global Green Economy. By embracing the added values of social improvement and wise resource management eco-enterprises that have won a SEED Award are living proof that entrepreneurial partnerships between various stakeholders can create innovative and novel solutions for delivering sustainable development at the grassroots and be economically sustainable.

Over the last ten years, SEED has awarded nearly **180 SEED Awards** to eco-enterprises in 37 countries. While the value of eco-entrepreneurship in delivering sustainable development is increasingly recognised and harnessed in the development sphere, there is still very little data available on the triple bottom line impact of these enterprises and their contribution to sustainable development.

The SEED Case Studies are designed to help fill that gap by generating insights for policy and decision-makers on the role of green and inclusive enterprises in achieving sustainable development, and on enabling factors that can help them overcome barriers and reach scale and replicate.

AT A GLANCE

Solar Sister addresses energy poverty in rural Uganda, Nigeria And Tanzania by providing clean energy products to off-grid communities, while at the same time combatting climate change.

Solar Sister empowers thousands of rural women by training them to become micro-entrepreneurs and by providing them access to clean energy.

PRODUCTS & SERVICES



Portable
solar powered
appliances



Efficient cook
stoves

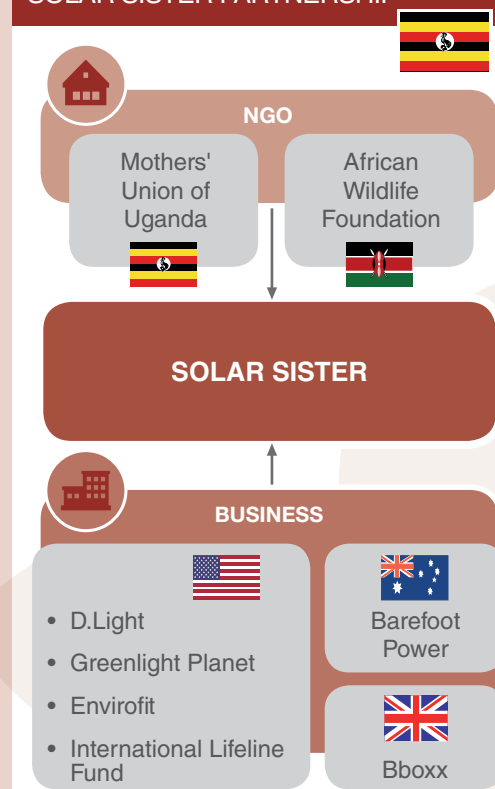


Training in
micro-entre-
preneurship

KEY FACTS

- Location: Kampala, Uganda
- Founded: 2009
- Active: Uganda, Tanzania, Nigeria
- Workers: 50
- Annual turnover: USD 1,195,700

SOLAR SISTER PARTNERSHIP



TRIPLE BOTTOM LINE

**Social impacts**

- By early 2015, generated direct employment for 50 people and income opportunities for almost 1,200 women
- By early 2015, provided clean energy and reduced human health hazards due to indoor air pollution for 180,000 beneficiaries
- » Reduces households energy costs by 30 %

**Environmental impacts**

- Reduced the amount of CO₂ emissions by replacing kerosene lanterns
- Reduced CO₂ emissions by replacing the use of diesel generators for phone charging
- » Reduces deforestation by selling cookstoves that are 60 % more efficient than traditional ones

**Economic impacts**

- Generated over 1,100 micro-businesses
- Created a new green and inclusive value chain in marginalised areas of Uganda, Tanzania and Nigeria.
- » Improves economic productivity by providing affordable and highly efficient solar products

1. Partnering for local solutions

1.1 Local challenges

With its tropical but temperate climate, Uganda is a paradise for nature and wildlife. With its tropical forests, fertile equatorial glaciers found in the Rwenzori Mountains and numerous national parks Uganda is home to a remarkable diversity of wildlife ranging from mountain gorillas, leopards, elephants, more than 1000 bird species and many fauna. “In fact, Uganda has over 11% and 7% of the known world's total of species of birds and mammals respectively”¹; the reason why it is also known as ‘The Pearl of Africa’. However this landlocked country in East-Central Africa has also been victim to notorious dictatorships, human rights abuse and poverty. While Uganda has made enormous progress in reducing poverty from 56% of the population in 1992 to 24.5% in 2009, poverty is still deeply rooted in the country, especially in rural areas which are home to 84% of the people².



Rural access to electricity

The country faces one particular challenge, faced by many other countries in Sub-Saharan Africa, namely the serious lack of access to energy. According to the World Energy Outlook 2014, 1.3 billion people worldwide lack access to electricity³ of which 620 million people are based in Sub-Saharan Africa (two-thirds of the population)⁴. Despite the strong economic progress made in Sub-Saharan Africa over the past 10 years, the energy supply has not been able to keep up with the population growth and is particularly lacking in rural areas that do not have access to the national grid. In 2012, only 18.2% of the population in Uganda⁵ had access to electricity. Access to electricity is highly dependent on the level of urbanisation; for instance in 2010, only 5.3% of those in rural areas in Uganda had access to electricity, compared to 55.4% in urban areas.

Gender inequalities in Uganda

The Government of Uganda is committed to gender equality and the empowerment of women to promote socio-economic transformation and has incorporated gender policies in its recent National Development Plan. “As a result Uganda increased gender parity by 25% in primary schools and over 20% in secondary schools and is one of the eight countries that have reached the target of at least 30% women in national parliament”.⁶ Nevertheless, gender inequality remains entrenched in society and in 2013, the Gender Inequality Index (GII) ranked Uganda still in the bottom 25 countries⁷. For instance, 27% of the chronically poor households in rural areas

¹ Rank 164 out of 187 countries worldwide

Fast facts



In 2012, only 18.2% of the population in Uganda had access to electricity

In 2010, only 5.3% of the rural population in Uganda had access to electricity, compared to 55.4% in urban areas

In 2013, the Gender Inequality Index (GII) ranked Uganda still in the bottom 25 countries

Uganda has lost nearly a third of its forests in the last two decades

are headed by women with the percentage rising to 40% in the urban areas⁸. The energy gap between rural and urban areas combined with the poverty gap between genders puts rural women in a highly vulnerable position and makes them the most likely group to lack access to energy.

The hazards of conventional home energy use

As in many other developing countries, kerosene is an important household fuel for lighting and wood (or wood derivatives) for cooking in Uganda. “It is estimated that over 90% of Ugandans still rely on solid fuels for cooking, typically charcoal or wood for urban dwellers and wood for rural households”⁹, which contributes to the high rate of deforestation in the country. Indeed Uganda has lost nearly a third of its forests in the last two decades¹⁰ and the current overall national rate of deforestation is about 2%, with some areas reaching almost 100% loss¹¹. As for kerosene, evidence shows that its use is often coupled to hazards such as indoor air pollution which can impair lung function and increase infectious illness (including tuberculosis), asthma, and cancer risks; poisoning; fires; and explosions¹². In addition, both practices emit substantial amounts of CO₂ which contributes to climate change.

1.2 Creating innovative local solutions

The enterprise was created in 2009 in Uganda with the goal to empower women by giving them economic opportunities through last mile distribution of clean energy products (starting with solar-powered technologies and later adding clean cookstoves). It was replicated in Nigeria in 2012 and in Tanzania in 2013.

The enterprise does not itself manufacture any products, but its strength lies in the last mile distribution model of innovative clean technology. Solar Sister buys from international manufacturers of innovative clean technology, such as d.light, Greenlight planet, barefoot power and Bboxx through local distributors in Kampala. The wide range of products, consisting of simple solar lighting (USD 6.5–USD 35), lights plus mobile phone charging products and plug and play home kits² (USD 100–150), larger customised designed solar systems³

² Plug-and-play solar home system kits can provide power for multiple appliances, such as lights, mobile phones, TVs and fans. The systems are often sold as complete kits (solar module, charge controller/battery box, lights and appliances) that can be easily assembled.

³ Pricing vary depending on system sizing

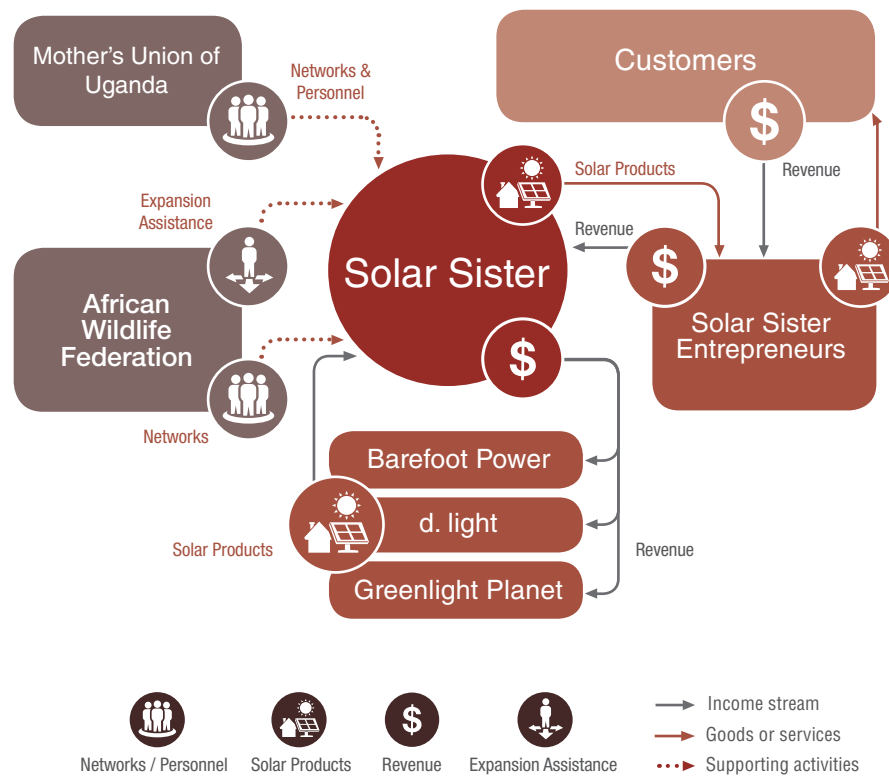
and efficient cookstoves (USD 25–USD 45), are delivered directly to Solar Sister's country headquarter in Kampala, from where products are supplied to field staff who collect orders from Solar Sister Entrepreneurs across the country.

Solar Sister Entrepreneurs are local women recruited, trained and mentored by Solar Sister to set up their independent clean energy enterprises. They are provided with a full “business –in- a-bag”, the start-up kit of clean energy products, marketing support and ongoing coaching to run their energy enterprises. The entrepreneurs invest in the business start-up inventory, and get the marketing and coaching support as a value added benefit from Solar Sister. This business model uses the women's most valuable asset, their social network of family, friends and neighbours, and addresses the women's lack of access to capital and low threshold for risk.



Solar Sister caters for different market segments ranging from small households, businesses as well as institutions such as school and health clinics, which buy larger kits to meet their energy needs. The products that Solar Sister sells are selected based on the criteria of design, durability and post point of sales service supply chain /manufacture warranties. A key strength of Solar Sister is that the entrepreneurs are rooted in their communities and become trusted energy advisors and go to points for quality customer care.

This focus on woman-to-woman sales is the best way of introducing new technology in rural households where women are the primary users and managers of household energy. It addresses the huge gap in the last mile distribution to connect life-changing solar technologies to end customers, the grassroots marginalised communities. The enterprise creates value for both their customers, who have access to clean and reliable energy, as well as the women who are the champions of the organisation.



Local NGO

One important NGO partner is the **Mothers' Union of Uganda**, a community-based organisation which has been a grassroots partner of Solar Sister since 2010. The NGO offers access to networks of women's groups and the Mother's Union uses the partnership to give its members income generation opportunities.



International NGO

The African Wildlife Foundation (AWF) is an environmental conservation organisation which partnered with Solar Sister recently. The organisation has assisted Solar Sister's expansion on the ground in Tanzania. Not only do they provide networks in Tanzania, but also rented office space in their Tanzanian headquarters. The AWF is a highly credited organisation and the association gives Solar Sister access to their networks, in turn enabling some members of the AWF network to generate income as Solar Sister Entrepreneurs.

1.3 The Power of Partnerships

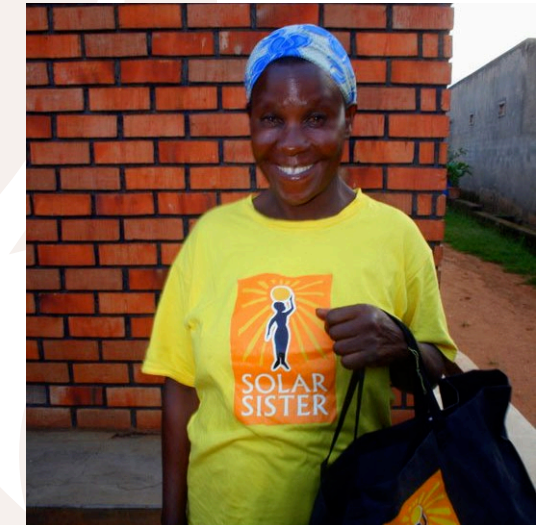
Solar Sisters has built a strong network with over 100 partners by creating grassroots linkages and institutional relationships with NGOs and businesses. A few are particularly active and close (see below). The enterprise has set up different partnership arrangements, depending on the partner; some are formal, specifically with the international suppliers, while those with the grassroots organisations, such as the Mothers' Union of Uganda, are rather informal and based on trust. Solar Sister has an international Board of Directors (BOD), while at the country-level they hold leadership summits to bring teams together, strategise, and ensure that partnerships are running smoothly and business strategies are implemented.

Partnership management: nurturing relationships

The enterprise has not encountered any major challenges in their partnership arrangements. One initial supplier has left the partnership due to changing demands but still promotes Solar Sister on social media. The variety of partners from different countries and cultures means that Solar Sister has to constantly work to nurture

these relationships. Solar Sister uses its in-country teams to find amicable solutions to any potential partnership challenges.

Looking ahead, the enterprise is actively seeking additional enterprise-oriented partnerships for its in-country distribution networks. Once new partners are identified, those will be linked to the in-country managers and field staff who work closely with them.



International Business

Solar Sister has a diversified mix of product partners including **d.light**, **Greenlight Planet**, **Barefoot Power**, **Bboxx** in the solar range, and **Envirofit** and **International Lifeline Fund** in the clean cooking space. Solar Sister's tech partners benefit from Solar Sister's last mile reach and real time feedback on what products customers particularly respond to meet their unique energy needs.

2. Building an inclusive eco-enterprise

The business was founded in October 2009 and began operation in 2010 in partnership with the Mother's Union of Uganda. They began with only 10 Solar Sister Entrepreneurs, who performed so well beyond their original sales target that the enterprise was able to grow rapidly. In 2011 Solar Sister won a SEED Award and was an Early Prize Winner in Ashoka Changemaker's Women Tools Technology and Powering Economic Opportunity competitions. Their strong financial performance and good partnership networks enabled them to expand beyond Uganda and by early 2015 they were working with over 1,100 entrepreneurs: 728 in Uganda, 309 in Tanzania and 159 in Nigeria.

2.1 Financial development

In its first years, the enterprise grew out of a grant of USD1,000,000 from USAID's Development Innovation Ventures initiative which was used to scale up the enterprise's network in Uganda and begin operations in Tanzania. The next year, Solar Sister received another grant from the Partnership on Women's Entrepreneurship in Renewables (wPOWER) consisting of an additional USD1,000,000. This money was used for similar purposes of training and enlarging Solar Sister's network. In 2013, a turnover of USD 1,195,742 resulted in a profit of USD 259,420. While 80% of the income originates from sales, grants are still needed for scale up, investment in building the last mile distribution network and training the human resources for the growing clean tech sector.

2.2 Employment situation

Starting 2015, the enterprise reports a total of 50 employees: 4 employees in the USA, 17 in Tanzania, 17 in Nigeria and 12 in Uganda. The enterprise is a female-driven business with 75% of the employees in the USA being female, 77% in Tanzania, 94% in Nigeria, and 92% in Uganda. All staff members are trained in various business and HR policies, and the enterprise aligns financial and social insurance policies between

the different countries of operation. Aside from job creation for the country teams, the business model creates job opportunities for the women entrepreneurs through the development of the micro-enterprises and enterprise opportunities for Solar Sister's growing network. So far 1,196 women have become Solar Sister Entrepreneurs in the three countries

Fast Employment Facts



2.3 Business Development

Solar Sister has two primary business targets. The first is to expand their female entrepreneurship network, and the second is to improve clean energy access through grassroots connections. The expansion of Solar Sister's women's entrepreneur network is quantified by the number of women participating as entrepreneurs: from its target of 200 entrepreneurs in 2011, Solar Sister has now trained and mentored over 1,100 female entrepreneurs. Solar In geographic terms, although the enterprise is centred in Uganda, it now has entrepreneurs in Nigeria, Tanzania, as well. They had pilots in Rwanda and South Sudan in the past but are not working there presently. The enterprise continues to grow at a fast pace yet they aim to improve their achievements in terms of direct staff infrastructure, skills development and mentorship.

By expanding the number of female entrepreneurs, the enterprise is also helping to meet their second business target: improving clean energy access. Solar Sister measures the number of people reached through the number of sales - 57,274 units since the outset - which

translates as more than 180,000 beneficiaries now having access to clean technologies. The enterprise is aiming to continue its scale up by developing new partnerships and to grow its grassroots networks even further. The scale up of the business is tied to having more end users. The end users are linked to entrepreneurs

who, if they could get financial support, could scale up their businesses. Therefore identifying institutions that could provide direct financial support to the entrepreneurs to help them scale up is crucial for Solar Sister to scale up.



3. Reaching impact

As an inclusive eco-enterprise, Solar Sister not only aims to be financially sustainable, but equally strives to generate environmental, economic and social benefits for the local communities. While most of the impacts from Solar Sister can be seen at the social level by distributing energy devices to marginalised communities and through women's empowerment, the business model is also directed to environmental benefits through emission reductions, and to economic benefits through business linkages, secondary enterprise creation, and increased productivity.

3.1 Beneficiaries

- **Sourcing and production:** the technical business partners are the first beneficiaries in the value chain as they gain extensive networks to sell their clean energy products in Sub-Saharan Africa.
- **Distributors:** the Solar Sister Entrepreneurs constitute the second group of beneficiaries. These women are able to set up micro-enterprises in clean energy products from which they derive a sustainable income.
- **Communities:** customers of the Solar Sister Entrepreneurs, ranging from poor household, businesses to larger institutions like school and health clinics, now have access to electricity, which most of them did not have before, and to cleaner cooking stoves. This not only allows them to save money, but enhances their access to information and income and they benefit from healthier indoor air quality as fumes from diesel, kerosene and paraffin are reduced.

3.2 Social impacts

The social impacts of Solar Sister not only apply to households in Uganda, Tanzania and Nigeria but its effects multiply throughout entire communities in various ways.

Income generation and cost savings

Firstly, the enterprise generates stable income⁴ for its 50 employees. Secondly, 1,196 women (728 in Uganda, 309 in Tanzania and 159 in Nigeria) have increased their household's income by becoming Solar Sister Entrepreneurs. With an average household size of 5.2 in rural Uganda^{xiii}, a national average of 4.9 in Tanzania^{xiv} and 5.9 in Nigeria^{xv}, this new income generation opportunity directly impacts approximately 6,200 people in the three countries.

In addition customers also receive financial benefits since the clean technology products reduce the costs of electricity from the grid (if available at all), paraffin wax and kerosene. Typically beneficiaries save 30% on kerosene and paraffin alone when they use solar appliances from Solar Sister and so far, Solar Sister has reached over 180,000 beneficiaries in the three countries.

"Income has increased both ways, for myself and my customers. I see solar lamps benefiting us in many ways now and in future with the rationing of power/electricity. Solar as alternate source of power (sun is free), saves on electricity and paraffin and also on phone charging." Solar Sister Entrepreneur

Women's empowerment

Women benefit as entrepreneurs as well as customers. Solar Sister focuses specifically on woman-to-woman sales in rural households as women are the primary users and managers of household energy. As customers, women reduce their household costs and as entrepreneurs, they bring additional income to the household. In both cases the extra money in the household budget can be used for the children's education, for health care, clothing or food; this means that women depend less on their husbands. Beneficiaries have reported that in turn this has led to greater respect within the household and greater influence in the household decision-making process. In addition,

⁴ Salary rates depend per country

the entrepreneurs acquire transferrable skills in sales, pricing, record-keeping, and technical knowledge about how to repair the products. Finally they develop confidence and knowledge as they travel to new areas and extend their networks.

Health, education and family ties

Solar Sister's products benefit the health and safety of its customers. It is estimated that smoke from cooking constitutes the fifth worst risk of disease in developing countries and causes almost 2 million premature deaths per year. By replacing kerosene and paraffin products and by providing 60% more efficient cook stoves, Solar Sister significantly contributes towards reducing indoor air pollution as well as reducing the risk of house fires which are still reported to cause death and serious injuries on weekly basis.

Children benefit from far better quality and longer lighting, allowing them to study indoors and in the evenings and so to attain better grades at school.

Finally, households also report that solar lighting has beneficial effects on family relationships, as families are better able to sit down and talk in the evening.

3.3 Economic impacts

The economic aspects of the Triple Bottom Line include the internal economic performance (Section 2) as well as external economic development. Solar Sister improves economic productivity, enhances business networks and expands market opportunities through competition and the generation of secondary businesses. Productivity gains are derived from the nature of the product since solar appliances save time and resources for its users; for instance while people often walk 2-3 km to charge their phones, solar chargers allow people charge their phones at home.

The business model is based on women entrepreneurs travelling to the customer; this means that business relationships are developed between different regions of the countries and between different, previously unconnected, segments of society. As the economic network expands, so does the knowledge of solar energy. This in turn encourages market competition for solar products.

Finally by encouraging entrepreneurship and providing the required skills, Solar Sister has enabled numerous Solar Sister Entrepreneurs to successfully start secondary businesses in the community, such as pig farming or making children's iced treats.

3.4 Environmental impacts

The clean energy products contribute to climate change mitigation by directly reducing the amount of black carbon and greenhouse gas emissions that would otherwise have been emitted from kerosene, paraffin or diesel devices^{xvi}. According to Solar Sister, every solar lantern saves over 550 litres kerosene and displaces about 1.5 tons of CO₂ emission over its lifetime on average. In addition, CO₂ emissions are reduced by avoiding the use of diesel generators for charging phones and the efficient cookstoves reduce the amount of wood or charcoal used for cooking by 60%. The latter not only reduces CO₂ emissions that would have been emitted from burning solid fuel, but also by reducing the number of trees that are being cut to provide this solid fuel. So far 53,917 solar products and 3,357 cookstoves have been sold, and the use of these clean energy technologies mitigates CO₂ in that way.

The longevity of the product means that it has a very long life cycle, reducing waste. At the same time the entrepreneurs are also trained to handle repairs, which extends the longevity.

3.5 Policy impact

Solar Sister does not directly influence policy but instead tries to inform and educate. The enterprise is mostly concerned with showing policymakers the interconnection between gender and access to energy. By participating in a number of international forums including the 'UN Global Alliance on Energy', 'Energia Africa', 'Sustainable Energy for All' and the 'Alliance for Clean Energy Cook Stoves', Solar Sister advocates the use of favourable policies that enhance inclusive energy access. The enterprise also takes part in stakeholder fora, focusing especially on education and best practice. They use these fora to share their experiences and provide case studies for the participants.

4. Charting green and inclusive growth

IMPACT

Access to clean energy for all and women empowerment

By combining a solar and clean energy technology with an Avon-style direct sales network, Solar Sister contributes to reducing energy poverty to even the most remote communities in Africa; they have so far reached over 180,000 beneficiaries. With the distribution model for women, by-women sales network, Solar Sister solves the problem of 'last mile' access to clean energy and brings high-quality, affordable solar technology right to women's doorsteps. At the same time they offer over 1,100 women a chance to make a sustained living through a micro-consignment model that minimises start-up risks and enables the Solar Sister Entrepreneurs to become successful businesswomen without incurring high-interest loans. This unique deployment of micro-consignment embraces empowerment while reducing CO₂ emissions and therefore mitigating climate change.

CHALLENGES

Scaling micro-business, customer awareness and national policies

The main challenge for Solar Sister lies in scaling up the business which is tied to having more end users. The end users are linked to entrepreneurs who often lack the financial support needed to scale up their businesses. In addition, introducing a new technology always requires much customer education and awareness creation. The lack of awareness of clean energy technologies still poses a threat but Solar Sister is trying to find ways of filling that gap at community level. Similarly, the lack of understanding in government of the importance of clean technologies in development has raised problems. For instance tax duty imposed on some clean energy products in 2014 tended to increase the sales price of products, so distorting the entire value chain.

SUCCESS FACTORS

Innovative global network of female micro-entrepreneurs

Strong partnerships and extensive networks are the strength of the enterprise. Solar Sister is one of the few – if not the only – organisation in the world to have built a global network of female micro-solar entrepreneurs to address energy poverty, combat climate change and advance human development. By engaging women at the grassroots, local and cultural challenges are also addressed. With the high demand for energy in deprived areas, in offering a range of products of high quality and with a long life-cycle, Solar Sister has created an innovative value chain in Uganda, Tanzania and Nigeria that works for those at the base of the pyramid.

FUTURE NEEDS

Scale up locally and internationally

To scale up, Solar Sister is looking to develop more partnerships at the grassroots level as well as at the policy level, to create more awareness and incentives for people to use clean products. In order to do so, Solar Sister is looking for financial links to local institutions that can provide financial support to the entrepreneurs and also for partners to enable diversification of the business, new ways of communicating the product benefits to rural women, and examining ways to reduce product cost so as to reach larger markets. Since Government could play an important role by providing incentives for people to take up clean energy technologies, Solar Sister is also exploring ways of further advocating clean energy technology at the national level.



Acknowledgements

We would like to express our sincere appreciation to Neha Misra (Chief Collaboration Officer of Solar Sister), Thomas Kyonze (Solar Sister Supplier) and the beneficiaries Abhay Shah, Catherine Ssebaduka, Eva Walusimbi, Catherine Wasimbi, Veronica Muwanguzi, Hannah Namuyomba Owot, and Ruth Nabitalo for participating in numerous hours of interviews and kindly giving us a glimpse into their daily activities. We are also grateful for all the technical assistance and advice received from the Koninklijk Instituut voor de Tropen (KIT), the African Centre for Technology Studies (ACTS) and from our colleagues at SEED: Timothy Chipperfield and Marianne Henkel.

About SEED

SEED strengthens the capacity of small grassroots enterprises in developing countries to enhance their social, environmental, and economic benefits, builds bridges between entrepreneurs and policy makers and stimulates exchange and partnership building.

SEED was founded by the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and IUCN (International Union for Conservation of Nature) at the 2002 World Summit on Sustainable Development in Johannesburg and is hosted by Adelphi Research gGmbH, based in Berlin, Germany.

Adelphi Research (AR) is a leading think-and-do tank for policy analysis and strategy consulting. The institution offers creative solutions and services regarding global environment and development challenges for policy, business, and civil society communities.

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Helen Marquard – Helen Marquard has been Executive Director of SEED since 2007. Prior to that she was a senior official in the UK government, responsible for various aspects of environment and sustainable development policy at the EU and international level. Helen holds a PhD from Manchester University.

Notes

This case study is mainly based on interviews and site visits to the enterprise in late 2014 / early 2015, as well as internal documents such as the enterprise's business plan. Additional resources are listed below.

- I FAO Corporate Document Repository. <http://www.fao.org/docrep/004/AC427E/AC427E05.htm>
- II Rural Poverty Portal. Rural Poverty in Uganda. <http://www.ruralpovertyportal.org/country/home/tags/uganda>
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- VI UNDP, <http://www.undp.org/content/uganda/en/home/mdgoverview/overview/mdg3.html>
- VII United Nations Development Programme 2013, Table 4: Gender Inequality Index <http://hdr.undp.org/en/content/table-4-gender-inequality-index>
- VIII New Vision. Women the poorest in Uganda By Elvis Basudde (08 March 2013) <http://www.newvision.co.ug/news/640475-women-the-poorest-in-uganda.html>
- IX Carbon Footprint Ltd. Carbon Offset and CSR Solutions: http://www.carbonfootprint.com/docs/cfp_gs-447_uganda_cookstoves_issue_11.pdf
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- XVI Scientific Advisory Panel of the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC). Scientific Advisory Panel Briefing: Kerosene Lamps & Slcps [12 November 2014] <http://www.unep.org/ccac/Portals/50162/docs/ccac/NOV2014-SAP%20Kerosene%20briefing.pdf>

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