

GEOG4065 Energy Policy and Analysis  
Service-learning Project - Desktop Research Report

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**1. Sub-Saharan Africa**



Sub-Saharan Africa has 590 million off-grid population. This region is one of the world's biggest markets for portable solar power solutions. Most of the households here spend 40% of their family income for buying inefficient and dangerous kerosene and candles for lighting. And they need to walk long distances to collect firewood for cooking. These materials are not only environmentally unfriendly but also putting health at risk.

Solar Sister, established in 2009, is a not-for-profit social enterprise addressing energy poverty, women's empowerment, and climate change issues in sub-Saharan Africa (specifically, Nigeria, Tanzania, and, earlier, in Uganda). Solar Sister started by training ten women entrepreneurs in Uganda in 2009. To date, the activity has created micro-businesses for 5,019 Solar Sister entrepreneurs in the sub-Saharan Africa region, distributed over 400,000 clean energy products, and reached nearly 2 million Africans.

The portable solar power can help both in improving the environment and saving their household money. Each solar lantern in its 10-year lifetime will replace the use of about 600 litres of kerosene, thereby mitigating about 1.5 tonnes of carbon dioxide (CO<sub>2</sub>). The sale of solar products by Solar Sister entrepreneurs so far will help mitigate 9,564 tonnes of CO<sub>2</sub> emissions. Further, a solar lantern costing USD 18 brings USD 163 cumulative savings over a five-year period by displacing kerosene usage.



*A Solar Sister entrepreneur is introducing solar lanterns to her community*

Besides women's empowerment since women here have less rights compared to men, women are a more efficient way for introducing solar power in a community or household scale. It is because women usually stay at home more and in charge of house work including managing energy or resources at home. Also, they care about their children's learning that solar lanterns allow children to study at night. A number of quantitative and qualitative studies have shown that clean energy access is linked with better chances for girls to complete primary education.



*Children are using solar lantern to study*

In Solar Sister, 86% of their entrepreneurs are female from different sectors including teachers, health workers, and small businesswomen. They can give reliable instructions from female positions and to build relationships by sharing experiences so that the users are more willing to change their traditional energy materials and help promote it to neighbors through their natural network in their community. However, low awareness of clean energy in the communities is their difficulty. Thus, they are continuing to emphasize and promote the importance of women in clean energy development in rural communities.

Nonetheless, women are their focus but not the only factor of being successful. Building a local distribution network is another factor so that locals can receive the products easily, where transportation is not developed and most locals rely on foot. The company first gathers different related products and components internationally from different places, then brings it to sell in the local community. There is a term called “business in a bag”, a start-up kit of inventory, training and marketing support to bring clean energy directly to their customer's doorsteps.

Also, Solar Sister has tried to build partnerships with different local and worldwide organizations. It is a significant success factor. Local partnerships with such as the Mothers' Union of Uganda and conservation organizations such as the African Wildlife Foundation enable Solar Sister to set up networks for providing clean energy products in Africa. In the beginning of their start-up, United States Agency for International Development's (USAID) Development Innovation Ventures (DIV) initiative and the US State Department's Partnership on Women's Entrepreneurship in Renewables (wPOWER) provided grants after hearing their business concept so that they can engage their work efficiently and quickly. On the technology front, Solar Sister partners with the world's leading clean technology manufacturers. Solar Sister is the World Bank's Lighting Global Associate, which means that Solar Sister's product portfolio is made up of products that meet the highest quality standards to best fit the needs of customers across rural Africa. Solar Sister is working closely with the International Network on Gender and Sustainable Energy (ENERGIA) to scale up its impact and share best practices on building a gender-inclusive sustainable energy sector. In the clean cooking sector, Solar Sister is partnering with the Global Alliance for Clean Cookstoves to apply the innovative human-centred design principles to empower women entrepreneurs.

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## 2. Odisha, India

According to Behara et al (2015), there is an existing gender gap of employment in India, primarily due to challenges from gender roles (as cited in Ianole & Mukhopadhyay, 2018).

However, dedicated organisations such as AIWC (All India Women's Conference), SEWA (Self Employed Women's Association) and The Energy and Resources Institute (TERI) have been providing training and learning, financial support, business acumen support to set up business in different parts of the country (Ianole & Mukhopadhyay, 2018), for discovering the potential of women entrepreneurs in sustainable energy, and achieving sustainable development.

To illustrate, with their support, there are three target villages in Odisha, India representing a large number of women solar entrepreneurs. Under the women-led solar program, rural women are assembling solar accessories in village-based technology centres, solar engineers are increasingly employed in designing Solar Home Systems (SHS), working in battery factories, and other accessory related businesses (Ianole & Mukhopadhyay, 2018).

According to Ianole & Mukhopadhyay (2018), the woman-led, community-based solar businesses in Odisha generated ripple effects on the society and not just at the household level:

To start off, it is an important step for promoting gender equality. Firstly, these businesses develop entrepreneurial spirit in a community which could benefit rural regions in the long-run. Secondly, it boosts the confidence level and business sense of women in the community.

Plus, the woman-led project can engage the community and be developed into a sustainable project: Firstly, women led solar businesses generally tend to involve other members (mostly women), and reinvesting the money into the business and generating other income-generating vocational activities that continue the cycle and involve other women from the community. Secondly, since the chances of women leaving the village are smaller compared to those of men who tend to leave the village for highly paid seasonal jobs in town centres, they ensure that both income and the work involvement stays and sustains itself over time.

Not only the participation of women itself is important for these solar programs, its subsequent impacts on the community also matters: Firstly, it is leading women to developing a significant voice in the panchayat and local bureaucracy, to add value to the community (for example proposing to build toilets and better hygienic environment). Secondly, with solar lanterns or lamps promoted by these women-led community based solar projects, additional available lighting at home after dark. It is significant for rural communities in India where electricity is not available. To illustrate, solar lanterns lead to better education for kids in the community, as they can use the light to read and write at night.

It is also remarkable that women can exercise a special role when participating in a self-help group. In fact, there is also a strategy by the company Enzen Global Solutions Pvt. Ltd., an energy and environment firm to innovate the regional Power Distribution and Management business in Odisha to include women self-help groups in meter reading and bill collection in the power distribution sector (Saur News Bureau, 2019).

To illustrate: Despite the fact that it is rather stressed more on women’s participation by self-help groups rather than being a women-led program, there have also been some interesting findings. “Before the programme was launched, there was a lot of power theft and tampering of meters in Odisha. People were reluctant to pay their dues on time. The men who went to read the meters were treated by the consumers as hostile entities,” as suggested by Debabrata Rout, the Head of Power Distribution, India Operations at Enzen (as cited in Saur News Bureau, 2019). It showed that women promoted a ‘softening effect’ on customer relationships by bringing more empathy in the relationship between consumers and bill collectors (Saur News Bureau, 2019).



*Women working in meter reading and bill collection (Saur News Bureau, 2019)*

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### 3. Thailand

It is important to promote renewable energy development especially in developing countries. This is because energy not only being used for daily household needs (such as lighting, cooking, heating), energy also can help to promote national development and promotes social progress through improved health, education, and access to clean water resources. Developing renewable energy can empower the women right in these countries. For instance, health protection. Pollution caused by burning solid fuels is a serious health problem for women and girls. Every year, 4.3 million people die from indoor air pollution, most of them women and children. For example, in 2012, exposure to air pollution caused about 7 million deaths, accounting for 1/8 of the total deaths in the world, confirming that air pollution is one of the largest environmental health risks in the world. Moreover, women spend most of their time collecting firewood.in South Asia spend up to 20 hours or more a week on collecting firewood.<sup>1</sup> This makes women do not have time for rest and relax both in the labor market and home and women facing time poverty. The shortage of natural resources will exacerbate the problem of women's time poverty. Women must spend more time collecting firewood, causing them to lose the opportunity to participate in education and training. Therefore, with the development of renewable energy, womens can reduce the chance of burning solid fuel to generate electricity. This can protect women's health.

Solar Power Company Group(SPCG) is a Thailand solar power company and this company is one of the largest solar power developers and operators in Asia. The chief executive and president of SPCG is a woman who is named Wandee Khunchornyakon and she was praised for starting the implementation of Thailand's clean energy plan. In 2008, Thailand government announced a 20% reduction in carbon emissions in the next 15 years and doubled the production of renewable energy by 2040.After the announcement, Wandee Khunchornyakon started to implement the solar power revolution plan. In 2010,Wandee Khunchornyakon, with the support of Asikorn Bank, began to operate a small-scale solar power plant (installation capacity of 7.5MW). Currently, under the leadership of Wandee Khunchornyakon, the Solar Energy Group has operated 36 solar power plants with a total installed capacity of 260MW, which can provide household electricity to 24,000 households. The Solar Energy Group plans to increase the installation capacity of solar energy in the next three years to reach a scale of 500MW, and expand the scope of rooftop solar panels to Japan, the Philippines and Myanmar. Khunchornyakon get the Lighthouse Activity Award by the United Nations Framework Convention on Climate Change (UNFCCC).This solar energy revolution which promoted by Wandee Khunchornyakon illustrates that Thailand women start participate in the promotion of clean energy projects and participate in the success of energy decision-making in Thailand.

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<sup>1</sup> Practical Action, 'Gender and Livelihoods Impacts of Clean Cookstoves in South Asia', Research Report, Global Alliance for Clean Cookstoves, 5 May 2015.



*Wandee Khunchornyakong in a PV plant © Solar Power Company Group*

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#### 4. China

Another case is from China. A solar energy development project led by a young Shanghai female entrepreneur is driving China's energy transformation in the community. The NGO "Green-light Year" was established by Ni Huan in 2016. Her home is the first home user of copper indium gallium selenide (CIGS) solar thin-film<sup>2</sup> distributed power station in mainland China. In the beginning, Ni Huan sprouted to install solar panels in his backyard at home because of the hot summer. The electricity generated by solar energy can meet 90% of the demand of the Ni Huan family. After the successful installation of solar panels at home, many schools and groups are interested in visiting Ni Huan's backyard. From 30 people a day to 100 people rapidly, this also means that Ni Huan's solar panel project is attracting people from all walks of life in the community. Therefore, she established the "Green-light Year", and her team is composed of a group of small but dedicated local community mothers.



*Solar panels in Ni Huan's yard.*

In terms of communities, "Green-light Year" organizes different activities, such as the ecological balcony, solar power system, and so on. Ni Huan also began to cooperate with local schools to install solar roof projects. Also, this Solar energy concept has attracted the attention of local and neighbouring governments, and the government has also invited her to other communities to promote community activities. For example, her team was invited to assist with Shanghai's Chongming Island eco-city project. This project will increase the use of renewable energy for another community. For example, local solar roads, solar plazas and other new energy application technologies. Solar photovoltaic power generation can be used for bus shelters, parking sheds, and traffic lights as well.

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<sup>2</sup> A copper indium gallium selenide solar cell is a thin-film solar cell used to convert sunlight into electric power.



School tour group packs in Ni Huan's courtyard

### 低碳参观（上海市闵行区）

**第1站**  
环保达人的家和社区

参观要点:

- 阴天也正常发电的家用光伏电站
- 新能源汽车
- 厨余垃圾堆肥
- 养鱼不换水、种菜不施肥的鱼菜共生系统
- 海第一个社区级的新能源汽车充电停车场

**第2站**  
交大中意能源楼

参观要点:

- 人脸识别门禁系统
- 节能外墙
- 智能家居现场展示
- 小小气象站
- 屋顶太阳能系统与室内温控系统的结合
- 太阳能烧烤机和品尝烧烤机现烤的红薯和玉米（晴天时）

**第3站**  
交大生态房“日上江村”

参观要点:

- 光热和光伏系统
- 不用瓦的太阳能屋顶
- 水循环和水净化系统
- 室内能源管理系统

### 科普参观（苏州工业园区）

参观地点：协鑫未来能源馆、上海交通大学苏州人工智能研究院、中国科学院苏州纳米技术与纳米仿生研究所、国门生物安全教育基地

上海路线	累计接待13,539人	累计接待161场
苏州路线	累计接待140人	累计接待4场

注：数据统计起止时间为2014年8月至2019年12月31日

社区

Community project organized by "Green-light Year"

As Ni Huan said: "Using the unique influence of women to promote community movements can be more deeply rooted in the community. Therefore, in China, the successful case of Shanghai proves the influence of women in the community and that they are important stakeholders in promoting energy transformation."

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## 5. Japan

In Japan, male have always played a dominant role in the policy-making processes of energy issues. While the government has put huge efforts in developing a sustainable society, it has been criticized for being male-centred by emphasizing too much on economic, scientific and technical aspects with the absence of ideas or initiatives from a female perspective (Ambarwati, 2017). Recently, there are rising numbers of non-governmental organizations (NGO) evolved from both rural and urban communities among the country which actively engage citizens' participation, especially female, in promoting energy saving and advocating the use of renewable energy. The case example of Renewable Energy Promoting People's Forum (REPP) may give us a different vision to think about how female, as critical stakeholders in the society, can contribute to the energy futures.

Like many environmental groups in the world, REPP has conducted various community-based talks or workshops to raise people's awareness and arouse public's interests towards energy issues since its establishment in 1997. While the group gained positive feedback from the locals, it has started to focus on holding activities that are targeted for female in the past few years. Led by a young mother, Ms. Yuko Oka, REPP recognized that female have always been neglected by the current decision makers of energy policies. In fact, they do act as significant actors in promoting environmental conservation and green habits in their daily lives. In the Japanese society, most women become housewives when they are married. They are always responsible for decision-making on the consumption and management of household needs as well as act as models for children to reinforce positive values and habits. Under such circumstances, Ms. Oka decided to hold more female-centred activities. For example, it organizes study and discussion sessions specialized for mothers to enhance their knowledge on renewable energy issues with simple explanations, which make them easier to understand. It launches a family-based eco-camps in collaboration with Tokyo Electric Power Company to promote community-owned solar panels. As the major energy users at home, REPPs encourages its female participants to engage in the data collection and analysis process by measuring and analyzing the energy use data or statistics at home. With the combination of opinions based on daily life experiences with professional knowledge, REPP can understand the living habits of female and make suitable recommendations to them as well as designing relevant educational programmes. It is observable that more female participants are willing to take part in female-based activities because it makes them more comfortable to express their thoughts.

Based on the following case example, it is believed that society should recognize more on female by allowing them to participate in the decision-making process of energy issues. Under a gender-equality framework, energy development can become more efficient and receive higher public acceptance.



*Solar panel workshop for housewives*

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