



## CASE STUDY - Mali

### Solar Lantern for Rural Household Lighting and Cell Phone Charging

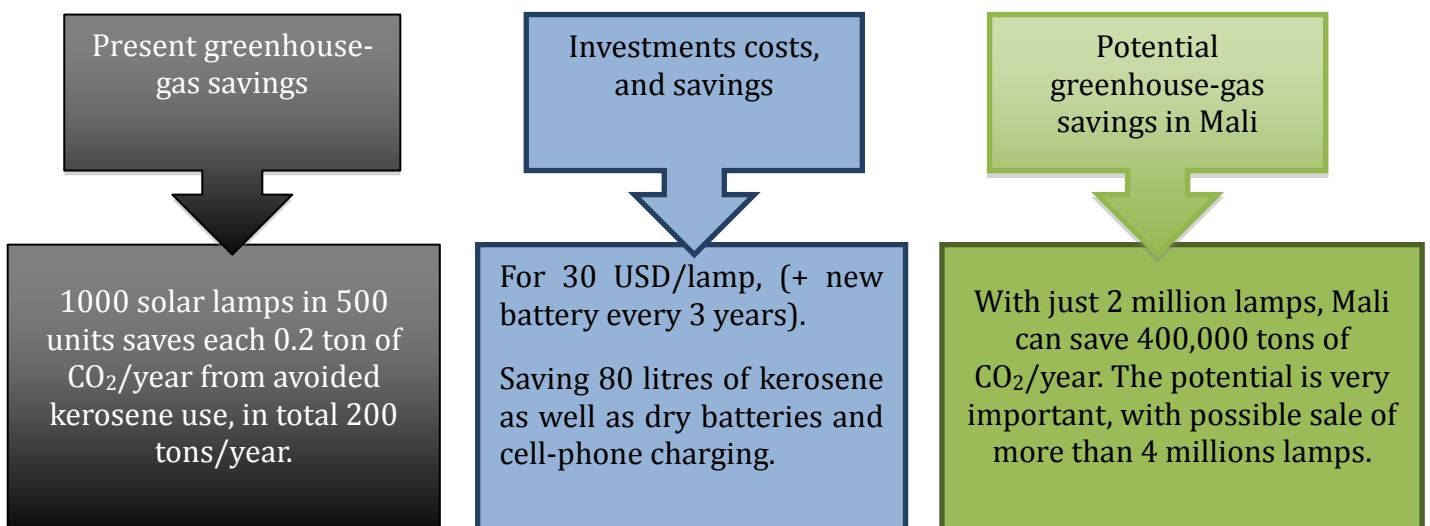
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#### Summary

Mali is a developing country; the electrification rate is below 12% in rural areas. Currently, large parts of population are dependent on poor-quality products to satisfy their energy needs. These products e.g., kerosene lamps and candles, have negative impacts for the population's health and environment. It should be noted that women and children are their main users. The rural people spend significant resources on their day-to-day domestic energy needs. This increases poverty in rural areas and thus increases vulnerability to the negative effects of climate change.

In fact, the recent development of lighting technologies, such as energy-saving light bulbs, light-emitting diodes (LEDs) with small solar panels of capacity between 5 to 10 watts, etc., has opened the way to cleaner and more economic lighting solutions, especially for rural households.

The "One Woman - One Solar Lamp" initiative was funded by Christian Aid's pro-poor energy innovation fund to develop sustainable, non-exclusive distribution and marketing networks for energy services for poor people. It focuses on rural women (300 people), improving impacts on global climate and generating income for 5 local entrepreneurs in rural and peri-urban areas of Mali. The initiative also facilitated the finance mechanisms by providing a 20,750 USD guarantee fund with a local microfinance institution to allow women sufficient access to credit.



## ***Description, Development and Background Situation***

In several areas in Mali, women are responsible for buying kerosene, as well as for carrying wood for the family, sometimes accompanied by their children. They spend a lot of money, time and energy to carry out these activities. "The One Woman - One Solar Lamp" concept is an innovative initiative developed by MFC Nyetaa in partnership with Christian AID, to promote a suitable business for clean-energy, low-cost technological solutions for rural areas in Mali. The goal is to support the women faced with the challenge of climate change, by substituting their kerosene lamps with solar lanterns. This is made possible by building a solar lantern supply chain, and providing micro credits in collaboration with a non-profit microfinance institution. This is, of course, based on delivery of a high-quality product to the end users.

The lighting product was selected, in collaboration with the social enterprise ACCESS SARL (the distributor), according to the criteria of quality and reliability. The product is composed of two lamps and a cell phone charger. The distribution was organised to the sales points and to women's cooperatives by ACCESS SARL. Nyetaa Finances SA, a micro-finance institution, was in charge of the credit facility for the women's groups.

The women have been organised into mutually supportive groups of 15 to 20 people by the micro-finance institution. They have a weekly meeting to exchange information, and also collect money (0.21 USD per person). These activities involve more than one hundred villages and 150 groups of women around the Districts of Bougouni and Kati. They take a loan through Nyetaa Finances, and ACCESS SARL provides the product. More than five hundred women have been able to purchase the solar lamp in this way. The lamp costs 15,000 FCFA (30\$USD), and the lifetime is approximate 10 years for the lamps, 20 years for the solar panel, and 3 years for the batteries. The maintenance cost is very low, just battery replacement every 3 years.

### **Socio-Economic impact:**

The solar lamps is cost 30 USD and the savings is 144 USD (only kerosene) up to 242 USD (incl. dry batteries and cell-phone charging), the pay-back time is around 3 months (as torches and some kerosene will be still needed during rainy seasons). This business is sustainable and needs no subsidy. But it is good to make it with social non-profit enterprise.

### **Environment impacts:**

For the savings, each lamp (two light points) saves 80 litres of kerosene that produces 0.2 tons savings of CO<sub>2</sub>. The theoretical potential of 2 million lamps is 400,000 tons of CO<sub>2</sub>, just in Mali, and just based on current consumption.



## ***Effect on Poverty Reduction, Obstacles, and Dissemination***

More than 500 women benefitted from the product. Improvements included better living conditions, environmental aspects from reduced use of kerosene, economic aspects (increased income reduced cost of energy for lighting), as well as significant social and education benefits. At night, 30% use it for commercial purposes for charging cell-phones. In the daily market, the cell-phone is charged around 0.21 USD, and with different connection ports, some women might recharge around 5 cell-phones per market day, as well as one or two during an ordinary day. The initiative improves the women's income and living conditions. Several additional activities and products also result, such as reparation of the lamps, and selling food and other items at night.

In the villages, people use kerosene lamps (cost 11 USD, duration 1 year) and Chinese torches (4 USD, duration one month) for lighting. This equipment will be removed frequently by the users. The yearly consumption of kerosene is 144 USD (around 80 litres), and 9.80 USD for the dry batteries for the Chinese torches.

The initiative has stock limits considered by many women as obstacles, because the project partners fixed the quantity at 550 units. The product also has registered some weakness as recharge problem during the rainy season because of the lack of sun. Besides, the lamps have a battery charge of 12 to 500 hours, depending on the setting level. Consumers have a choice of four positions: bright (40h), brighter (20h), brightest (12h) and bed (500h). During the rainy season, it will be better to use the less-bright level to save energy.

The dissemination included sharing of information with several stakeholders involved in energy and in women's and children's welfare. Leaflets and other communication tools were used.

## ***Effects on Greenhouse-Gas Emissions (Fossil Fuel)***

According to the Indian solar equipment provider D-Light, one kerosene lamp consumes around 80 litres each year, which represents 0,2 tons of CO<sub>2</sub>/year. With 1000 solar lamp-units sold in the village (each box has 2 lamps, with total of 2x500=1000 units), that avoids 200 tons of CO<sub>2</sub> emissions (1000 units x 0.2 ton = 200 tons/year). The CO<sub>2</sub>-reduction of 0.2 ton is per lamp, not per litre of kerosene. Between the project's start and 2013 the initiative, consumers have avoided more than 32,000 tons of CO<sub>2</sub>.

The product produces a good quality of light, and no smoke, which is better for user's health. It will allow children to study in the evening in better conditions and with better impact on the global climate due to the saved CO<sub>2</sub> emissions from kerosene.

## ***Analysis of the Costs as Climate Mitigation Measure***

A household in a rural area invests yearly 11 USD kerosene lamps and 40 USD (approx. 4 USD x 10 month) in Chinese torches for their daily lighting solution, for a total cost of investment around 51 USD. For yearly operation, they expend 144 USD for kerosene, 49.60 USD for dry batteries, and 37.8 USD for cell-phone recharge. Total cost is 242.4 USD. So the initiative can allow avoiding the latter expense by purchasing one solar lantern, which costs 30 USD with two lighting point, and telephone charging.

## ***Analysis of the Potential for Scaling Up for instance to National Level, and to Replicate in other Countries***

Lack of access to electricity is more severe in sub-Saharan Africa where 500 million peoples do not have access to any modern form of energy, particularly in rural areas where national electricity access rate is around 2%. Mali is no exception, with electricity coverage standing in 2009 at around 60% in urban areas and falling to about 12% in rural areas, where the majority of the population live. At current electrification rates, the majority of

people living in rural areas, especially the poor, will continue to have no access to modern energy services for the next decade at least. From the 12,000 Malian villages, less than 300 have received electricity so far, with support from AMADER<sup>1</sup> and other organisations. The Malian market can absorb more than 2 million solar lanterns in the rest of the villages, which live without energy. That will reduce emissions of 400,000 tons of CO<sub>2</sub> and will contribute to climate-change mitigation.

The lessons and experience from this initiative are documented and have been shared with energy stakeholders. The social enterprise ACCESS SARL has planned to import one container of 2,400 lamps. At the local level, the AMADER also encourages the public private partnerships to increase access to lighting products in rural areas. At the international level, this business model (cash and credit option through microfinance and women’s cooperative) will allow the Lighting Africa project managed by the World Bank to increase energy access for women.

***Estimate of Support Needed for Scaling Up; Grants, Loans, Capacity***

The financial mechanism is a key requirement for the initiative to be scaled up. The pilot phase showed that the business model is sustainable as long as the social enterprise and the financial institution have a guarantee fund to import more products and to allow women to generate collateral. Based on this analysis, the government must encourage this type of initiative with incentives or grants and with a large-scale communication and marketing.

***How this Case Can Contribute to Climate Mitigation***

This case is important to improve livelihoods, but it also contributes to climate mitigation. It does so in its present form, but it could do it much more if brought to national or regional levels, together with other, similar initiatives.

<b>Present greenhouse-gas savings</b>	1000 solar lamps in 500 units save 0.2 ton of CO <sub>2</sub> /year each from avoided kerosene use, in total 200 tons/year
<b>Potential greenhouse-gas savings in Mali</b>	If all people without electricity in Mali replace kerosene with solar lamps, a total of 2 million lamps will save 400,000 tons of CO <sub>2</sub> /year. Since not all in Mali can afford light all days, the actual savings will be lower, but in an expected future when all can afford light, this will be the savings.
<b>Investments costs</b>	80 USD/lamp (+ new battery every 3 years)
<b>Savings</b>	80 ltr of kerosene as well as dry batteries and cell-phone charging, 144 USD (only kerosene) to 242 USD (also batteries and phone-charging).
<b>Resources needed for large-scale dissemination</b>	Expanded supply network of quality lamps. Expanded micro-loan facility. Nation-wide repair facilities. - Government certification to control import of good quality of product, and laboratory to control the quality. - Government can support private sector with innovative business model for more expansion.

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