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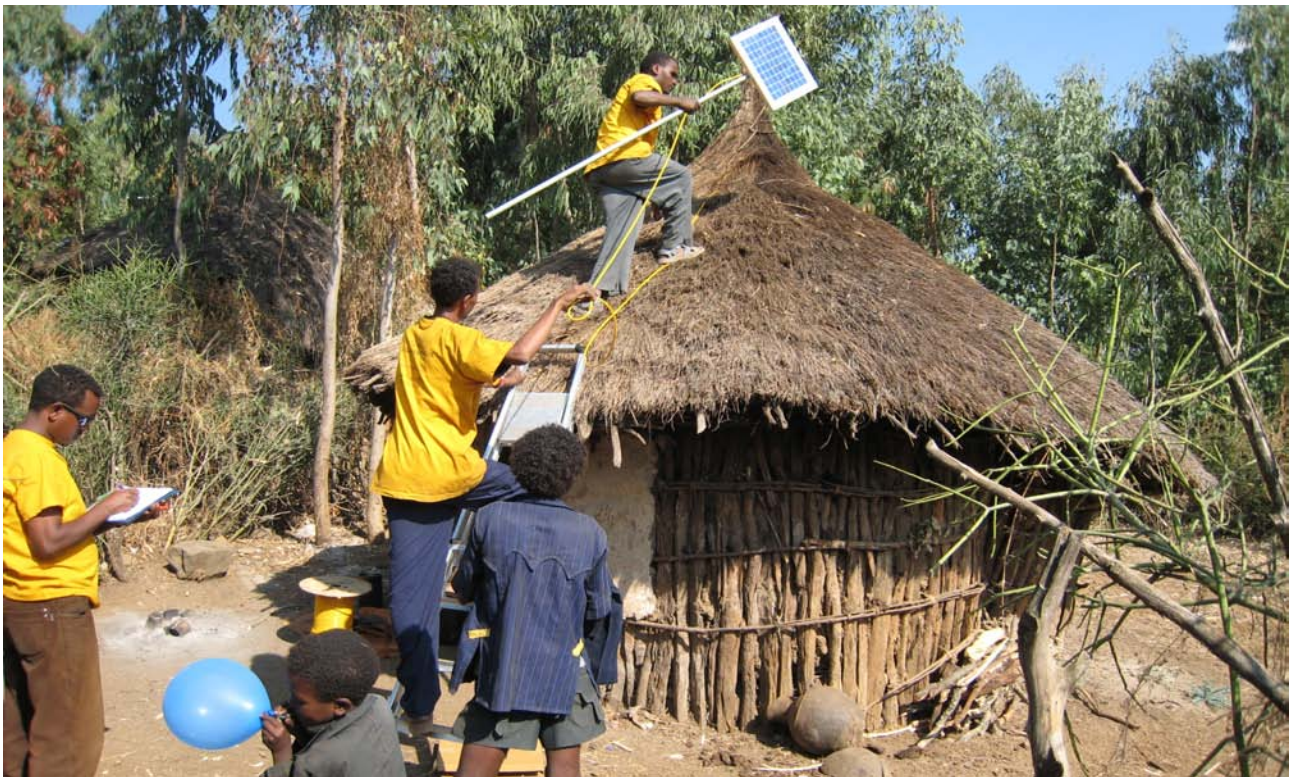
Solar Light for Rural Households in Ethiopia



Solar Home Systems offer Ethiopian people reliable and clean electricity – since the start of August 2010 more than 8,000 systems have been installed succesfully.

Project summary

myclimate helps to improve the livelihoods of thousands of people living in rural regions in Ethiopia by supporting the voluntary carbon offset programme "Solar Lighting in Rural Ethiopia". The programme distributes solar home systems to villages that are not connected to the electricity grid but instead depend on kerosene lamps for lighting. Thanks to the programme, households now have reliable access to clean electricity and are able to go about their activities even during night time. The use of solar lighting, instead of kerosene, not only leads to reductions of greenhouse gas emissions but also has a positive effect on people's health. Last but not least, people can charge their mobile phones at home instead of walking a long way to the next city.

Project benefits

The programme reduces CO_2 and at the same time makes a significant contribution to sustainable development in the region:

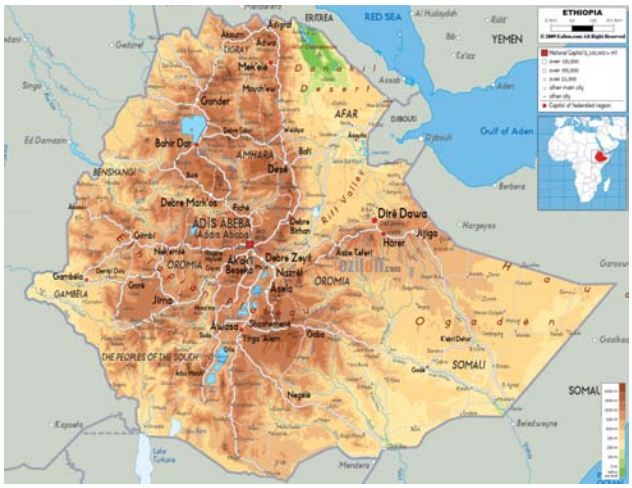
- **It reduces the numerous restrictions on the population at night-time.**
- **It prevents inhabitants suffering from health-hazardous smoke.**
- **It offers educational opportunities and creates new job vacancies through the professional sale, installation and maintenance of solar home systems.**
- **It enables cost savings since the solar home systems are less expensive than kerosene in the long run.**

Facts and figures on the carbon offset programme

Programme location	Ethiopia, several regions
Programme standard	Gold Standard VER
Programme type	Sun
Emission reductions	170,000 t CO_2e (over 10 years)
Situation without programme	Use of kerosene lamps for lighting
Programme start	August 2010

The programme country and region

Ethiopia, a country with very diverse flora and fauna, faces many environmental challenges. Since agriculture accounts for a large share of the national GDP, deforestation and bad water management are of major concern for the country. Another issue is the electricity grid. The consumption of electricity in Ethiopia is increasing at a fast pace. The country is becoming one of Africa's major electricity producers with over 80 per cent of its energy being produced by hydropower plants. However, only 20 per cent of the population has access to the electricity grid. The households without access either use kerosene lamps or diesel generators to generate light.



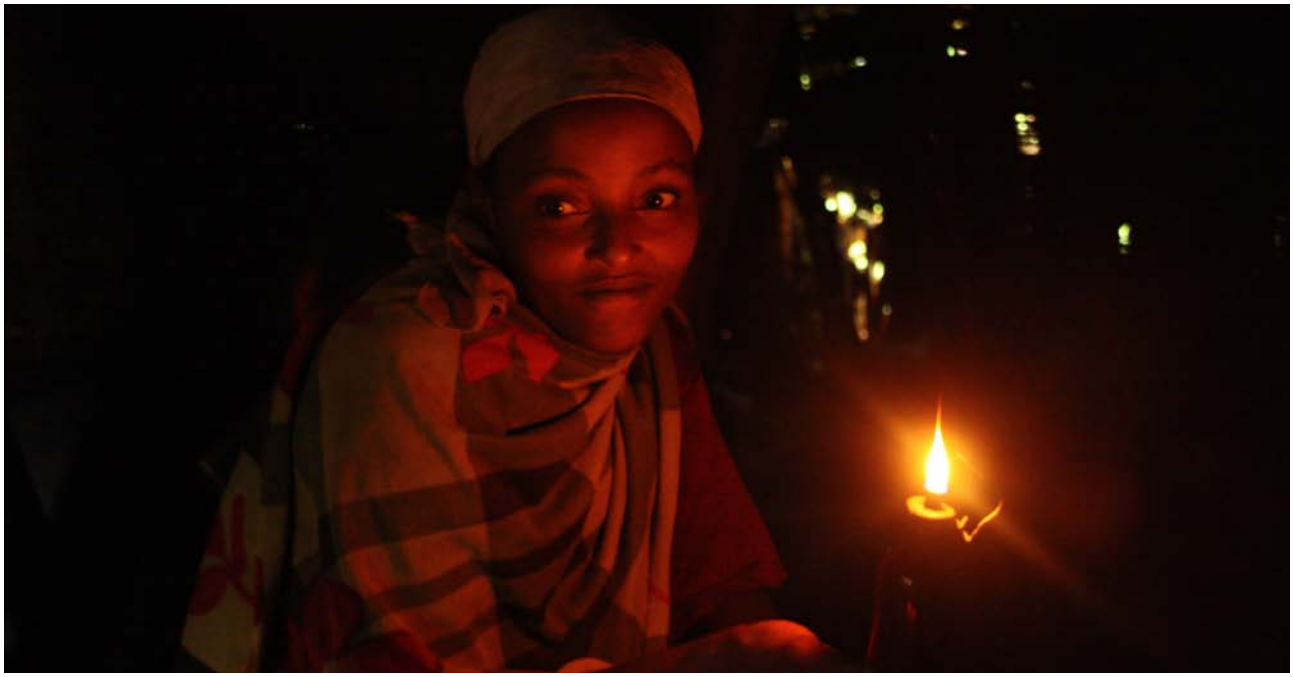
Map of Ethiopia.

"At least two or three major accidents happened every year."

These kerosene lamps together with the early sunsets between six and seven o'clock lead to several problems. Firstly, their use can be life-endangering. They produce health-hazardous smoke, which can cause respiratory problems. Moreover, books often catch fire when schoolchildren fall asleep while they are reading. The following statement from a local teacher puts it in a nutshell: "There used to be a lot more fire accidents caused by spilling kerosene. Especially while students were studying they would knock over the lamp and a fire would start. At least two or three major accidents happened every year." Secondly, people have to walk for hours to get to the next town with power connectors in order to charge their mobile phones. Thirdly, only having these weak lamps and mostly being in the dark limits the activities of the inhabitants. Or as one programme participant states: "Before the arrival of solar light, I couldn't do any work at night. Whatever I was doing, I had to finish it during daylight. When I was using kerosene lamps, I used to spit out black smoke every morning and get sick a lot." Finally, kerosene is expensive: its price has increased a lot in recent years.

Indicator	Ethiopia	Switzerland
Total area (in km²)	1,133,380	41,285
Population (2011)	84,734,262	7,459,000
GDP in USD per capita (2011, nominal)	344 USD	58,050 USD
Share of population living below the national poverty line (2011)	38.9 % (2004)	6.9 %
Energy use per capita (kg of oil, 2010)	400 kg	3,349 kg
CO_2 emissions per capita (2009)	0.1 t	5 t

Ethiopia vs. Switzerland (Source: World Development Indicators, World Bank [2012]; Fischer Weltalmanach, S. Fischer Verlag [2013]; The World Factbook, Central Intelligence Agency [2013])



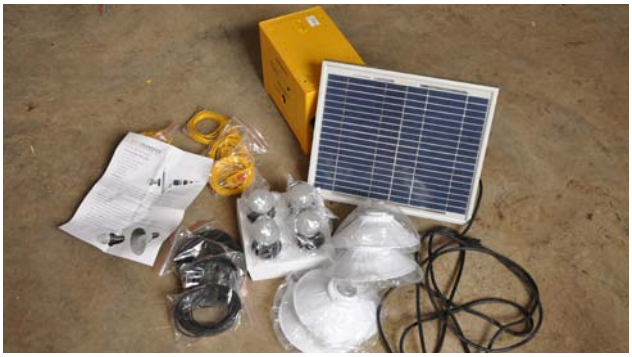
The weak kerosene lamps limit activities of all kinds after dusk.

Goal and technology of the programme

The programme's aim is to provide households in rural Ethiopia that have no access to the electricity grid with light and electricity, and thus to improve the local quality of living. Therefore, four different types of solar lighting PV products, namely two portable solar lamps and two stationary solar home systems, are being sold to households. All four types are of high quality, are easy to repair and are adapted to fit life in rural Ethiopia. To ensure that every individual household finds a suitable lighting model for its needs and its financial situation, the respective prices take the income level and solvency of the rural communities into account. The small solar lamps are sold for approximately USD 15 to 20 and directly for cash, whereas the solar home systems are priced from USD 80 and are either sold for cash or for credit that can be paid back over time. The systems' prices equal a monthly salary and can be redeemed within one year. Through the financial support of myclimate, which invested in and will buy carbon certificates from the programme, SEF has been able to scale up its activities to supply more people in Ethiopia with lighting systems even in remote areas.

How the programme is implemented

myclimate works with Stiftung Solarenergie – the Solar Energy Foundation Switzerland, which implements and coordinates the programme. In order to manage the sale, distribution and installation as well as the maintenance of the solar systems, "solar centres" are being established in rural Ethiopia. After a trial between January 2009 and August 2010, the implementation of the programme started on 13 August 2010. Since then, 14 solar centres and more than 8,000 systems have been installed successfully. These centres are located all around Ethiopia, from Humera to Melka Soda. A critical aspect of the programme is the availability of well-trained specialists who work at the local solar cen-



A solar home system consists of three or four LEDs that save up to 0.9 kg CO_2 a day.

Every solar lamp has one LED, which reduces 0.225 kg CO_2 a day.

tres and who are able to install and maintain solar systems on site. Knowledge of this modern and environmental-friendly technology is a decisive requirement if it is implemented professionally. For this reason, the "International Solar Energy School", the first professional solar training facility in East Africa, was founded in autumn 2007. It is located to the west of the capital, Addis Abeba, and recruits male and female technicians from all over the country. The regular training lasts six months.

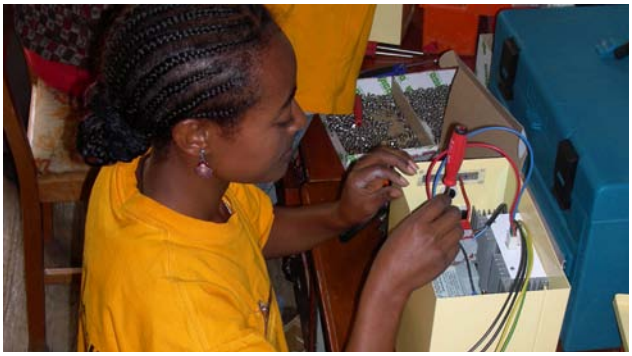
The workday of a technician

The business day of the technician team working at a solar centre normally starts at 8:00 am with the assemblage of the necessary systems and the organisation of tools needed for the particular day. Then, they hike to one of the surrounding villages, which can take up to several hours. After arrival at the respective village, they walk from tukul to tukul, from house to house, and do whatever needs to be done. This includes the installation of new photovoltaic cells on the thatched roofs of the Ethiopian houses, the maintenance or the upgrade of existing systems, or the wiring of several cottages with the house that possesses a solar system. The workday of the technicians ends when all is done, which is normally between 6 and 8 pm. As the technicians report, technical problems and problems with the customers are very rare. On the contrary, the communities appreciate the team's service. However, the residents are often sceptic in the beginning, which is why the technicians often give talks to the villagers about the systems' benefits. Sometimes, the absolution of the local pastor is also needed, as one example proves. In this particular village, families only started to install solar systems after the pastor installed one on his church.

Gold Standard: environmental and socio-economic benefits

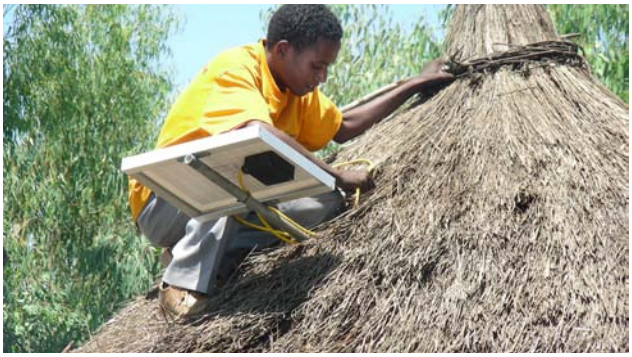
myclimate will develop the projects as a carbon offset programme under the Gold Standard. Projects and programmes under the Gold Standard have to fulfil strict criteria regarding the involvement of stakeholders in the project development process and the documentation of environmental and socio-economic impact. Gold Standard projects must employ renewable energy and/or energy-efficient technologies to be eligible for carbon credits. Furthermore, they must prove that they have a positive effect on the economy, health, welfare and environment of the local community. As this project was officially registered as a Gold Standard programme, it fulfils all these requirements.

Solar technicians are educated at the International Solar Energy School.



Solar technicians getting hands-on experiences at the Solar Energy School.

The International Solar Energy School offers test equipment such as solar panels.



The installation of photovoltaic cells on the thatched roof of an Ethiopian house.

A technician clarifies the benefits of solar panels to villagers.

Environmental benefits

The programme reduces the consumption of non-renewable natural resources such as fossil fuels and further decreases the GHG emissions that cause air quality problems. The programme's impact on the environment and other elements of the sustainable development matrix were also discussed in detail during two local stakeholder consultation meetings in June 2010. The discussions revealed that the vast majority of stakeholders were looking forward to the programme's

"We have light for the first time in our life."

launch and no negative comments were raised. Only a minority was concerned with the polluting effects of batteries. These fears, however, are ungrounded since there are mitigation measures for used batteries in place. Firstly, used batteries are taken back for recycling to avoid any pollution to the soil and, secondly, they are completely sealed and therefore leak-proof.

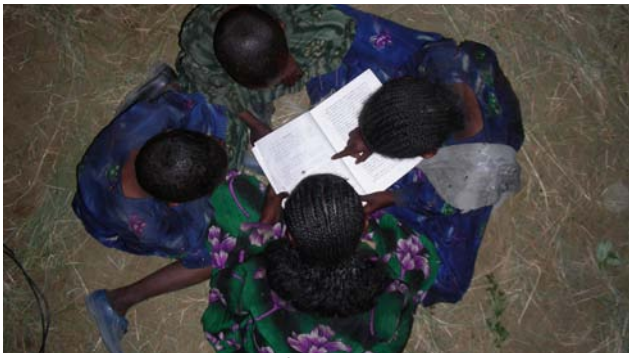
Socio-economic benefits

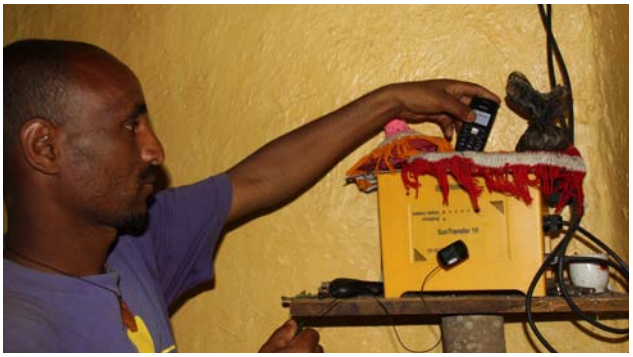
The positive socio-economic impacts of this programme are fourfold. Firstly, the improved lighting conditions allow residents to be active after dusk: children can study, workers can run their businesses, and people can socialise. Secondly, it improves indoor air quality. Kerosene lamps cause respiratory problems so the introduction of lighting from clean energy sources improves the residents' health. Third, residents can save time by charging their phones on site and avoiding long walks to other villages. Moreover, it creates new job opportunities for the employees both in the local solar centres and in the central office of the Solar Energy Foundation, and creates business opportunities such as mobile phone charging services. And finally, people can save money since they no longer have to purchase expensive kerosene anymore.

How the programme affects people's lives

The programme's benefits are very diverse, as listed above and as illustrated by the following statements of people living in the village of Mekana:

"We started life, a new life with light. We hate kerosene. It's smoky and very expensive."
Tsedale and Tsedale, two friends and female users who use the system to milk cows and brew beer after dusk.


LED lamps enable children to learn after dusk and thus support education.


The systems allow residents to charge their mobile phones on site.


Solar Centers and Solar Energy School create new jobs for residents.


Tsedale and Tsedale are hosting a dance-party at their hut.


Lighting from clean energy sources improves the residents' health.

A village elder and his family are happy about their four LED lights.

"The whole village comes to our hut and we dance!"
Tsedale and Tsedale again, highlighting one of the social benefits.

"Before, we had to carry around the kerosene lamps. It is now so much easier to do the chores with light from above and two free hands!"
A user, reporting about the work simplification.

"Batam turu. Batam turu."
Biza, a male user, describes the system as "very good, very good".

"We have light for the first time in our lives. We can now minimise costs and our children can read. We are clean now. Before, the walls of the house were black. And we can charge our mobile phones. Before, we had to walk one hour to town to charge our phones."
A village elder, who is happy for the children in his home.

Monitoring

A prerequisite for a carbon offset project certified under the Gold Standard is the existence of a stringent monitoring plan of the parameters used for the emission reduction calculation and of the sustainability indicators.

The monitoring is carried out by myclimate's project partner, the Solar Energy Foundation, and consists of checking a sample annually to ensure that it is still operating. Data is retrieved by the solar centres. Parameters monitored include nominal lumen output of solar lamps and systems, specific light output of kerosene when burnt in a kerosene lamp, average number of hours solar lamps are used per day, kerosene consumption of each kerosene lamp per hour, CO_2 emission factors of kerosene, calorific value and density of kerosene.

The final verification of a monitoring report and a site visit by independent auditors guarantee that the programme actually contributes to sustainable development and that the emission reductions claimed by the programme have really taken place.

Contact:
myclimate – The Climate Protection Partnership
Sternenstrasse 12
CH-8002 Zurich
Switzerland

www.myclimate.org
info@myclimate.org
Tel: +41 (0) 44 500 43 50
Fax: +41 (0) 44 400 43 51