

Improving the energy supply by going solar

In Mali the potential for solar energy is vast and the possible applications are numerous: insolation is high, and the low population density is a clear pointer towards distributed solutions. As yet, though, only a small proportion of this potential is being utilised.

Oumou Salé tosses back her head and laughs. “For night-time births I used to have to wedge a torch between my chin and shoulder.” By way of demonstration the midwife in the green patterned headscarf raises her shoulders and tilts her head sideways. It’s not a good position for assisting effectively at a birth. But now all Oumou Salé needs to do is flick a switch. A 13-watt bulb then casts its light on the stone floor and simple furnishings of the delivery room, the iron bars of the cot and the wooden frame on which the ampoules of drip solution are hung.

Oumou Salé is in charge of the health centre at Dialakoro, a village in the commune of Tielé in the south of Mali. The centre – housed in a small, mud-walled building with a window, a door and a crumbling veranda – stands on the edge of the village. It treats not only the 600 villagers but also patients from numerous surrounding farms and villages. The sluggishly turning fan suspended from the ceiling is another new piece of equipment. “Some of the women were lying here for hours, waiting for the all-important contractions, in temperatures of over 40 degrees in the shade”, explains Oumou Salé. In

such circumstances, even the slightest movement of air brings great relief.

Both improvements are made possible by a 65-watt solar panel that is mounted on a pole in front of the building. The small electrical system that makes such a big difference was installed through the ELCOM project, which is promoting the electrification of rural communities in Mali. ELCOM is part of Energising Development, a global electrification programme operated by the Dutch and German governments. The project is being implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ – German International Cooperation).

■ A central energy supply is too expensive

According to the Direction Nationale de l’Énergie (DNE), only seven percent of Mali’s rural population has access to electricity. In remote rural regions the figure falls to almost zero. Cooking is carried out on wood fires, lighting involves petroleum lamps, radios and televisions are powered by batteries. These types of energy are harmful to health and the environment – and they are inefficient.

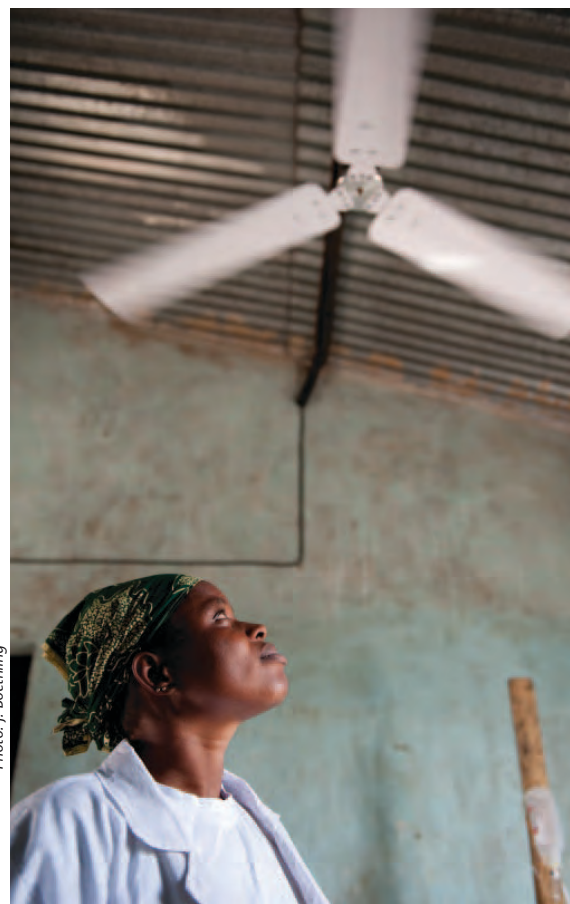
Mali covers an area almost four times larger than that of Germany but has a population of only twelve million. In most rural regions, providing a connection to the central supply grid is not a realistic option. “With ELCOM we are going straight to the heart of the areas that have no electricity supply”, says Moussa Doumbia, GIZ renewable energy expert in Mali. Through ELCOM, town halls, health clinics, schools, public spaces and battery charging stations are being electrified. GIZ is relying solely on solar energy to achieve this.

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Solar-powered fans ease conditions for women in child-birth.

Photo: J. Boethling



■ Sunlight charges batteries

It is market day in Tielé and the battery charging station is bustling with activity. People drop by to leave their car batteries, which they collect before going home again. "My whole family uses the electricity from this battery for light and for watching a bit of television." Ousmane Diarra is just heaving a battery onto his donkey cart. How big is his family? The wiry farmer needs to think for a moment. "There are fifteen of us living in three huts, although sometimes we are more." He used to take his batteries to the corn mill for charging. In the mills, modified farm machinery engines clatter away with flapping drive belts. The mill operators top up their income by charging batteries, using an extra belt to drive a truck alternator. The unregulated charge usually lasts no longer than two or three days and shortens the life of the batteries. Sometimes a battery explodes as a result of overcharging. By contrast, a battery charged at the solar station lasts for one to two weeks.

At the battery charging station in Tielé all eight charging points are in use. "We have charged forty batteries here in the past month." Demba Marico points to the notebook with squared pages that lies open on the counter. He has meticulously recorded the monthly takings in long columns. As a self-employed electrician he is responsible for servicing and maintaining all the ELCOM facilities in the commune of Tielé, comprising four schools, three health centres, the town hall and twelve street lights. In return he is entitled to the income from six charging stations. Charging a battery at the ELCOM station costs the equivalent of between 1.2 and 2 euros, depending on size. The tariffs have been drawn up with community representatives: they are designed to take account of prices at the corn mills and the costs of using a petroleum lamp, which amount to around 70 cents per week. The charging stations bring in a

Solar cookers mean a considerable drop in CO₂ emissions. Moreover, they save scarce wood resources.

total of around 200 euros per month, from which Demba Marico pays two assistants. He is left with a salary that is equivalent to nearly 80 euros. Some of the money is paid into a community account and is reserved for repairs. "The income is intended to secure the long-term maintenance and care of the facilities and provide an incentive to expand the module system", explains Moussa Doumbia of GIZ.

■ The gap between potential and uptake

Mali has a great need for island solutions, and this is combined with good solar insolation potential – ideal conditions, therefore, for solar energy. But are the opportunities being utilised?

Nobody knows how many solar facilities are installed in Mali. Even the energy ministry's Centre National de l'Énergie Solaire et des Énergies Renouvelables (CNESOLER), which is responsible for renewable energies, is unable to quote a figure. But if you travel about the country with your eyes open, you will see solar systems in use. Remote TV stations and mobile phone masts use electricity from their own solar units. Solar panels are mounted on the roofs of schools and hospitals. Many of these systems have been financed by development banks, aid organisations, or manufacturers such as the Bonn/Germany-based company Solarworld. Many are also the result of investment



Photo: J. Boethling

by migrants. Four million Malians live abroad, a quarter of them in Europe, Canada and the USA. Whole villages live on their remittances. The migrants frequently invest in the development of schools and mosques or in solar irrigation systems.

■ A leasing system for solar lamps

Eberhard Mohr, too, relies on photovoltaic modules to advance electrification in remote rural regions. For the last six years the retired engineer has, in cooperation with a local association, been selling solar lamps in the rural district of Bandiagara, near the border with Burkina Faso. Only one-third of the three thousand inhabitants of the district town of Bandiagara have an electricity supply. In the surrounding villages there is no electricity at all. This rural district includes the villages of the Dogon tribe, which are among the most important tourist destinations in Mali.

In a small solar workshop the association's technicians assemble lamps from components donated in part by the German environmental foundation Deutsche Bundesstiftung Umwelt and the Freilassing Solar Project. Eberhard



Photo: J. Boehling

After charging for six hours, the solar lamps provide light for ten to twelve hours.

Mohr has been continually tweaking the design of the lamps; he has improved the storage technology and replaced the energy-saving bulbs with LEDs. "After charging for just six hours the lamps provide light for ten to twelve hours", the engineer reports with visible pleasure. The lamp system can also be used to charge mobile phone batteries, although there is also a charging kit just for telephones.

For the lamp kits, which cost the equivalent of just under 100 euros, Mohr has worked out a leasing system. The monthly instalment of 2.30 euros is less than the monthly cost of using a petroleum lamp. The initiative has so far sold 650 of the lamps. "Our lamps have even turned up already in the capital, Bamako."

In theory the 650 donated lamps should enable the association to build up some basic capital with which it

could buy spare parts, order additional lamps itself and pay the technicians. Yet by the agreed date it has raised only half the capital. Has the money been put into other projects? For example, the association of 450 members also organises the purchase of seed on a cooperative basis. Or has some of the money

ended up in the pockets of the association's officers? Pursuing that line of investigation is difficult. The problem certainly doesn't lie with the end customers, most of whom pay their instalments promptly. Mohr has therefore decided that alongside the solar lamps he will also sell solar cookers in the region. The cookers are being developed by the company EG-Solar in Altötting/Germany. "A lamp saves 80 kilos of CO₂ per year, while a solar cooker saves five tonnes", he says. He also points out that he is reducing the pressure on the region's very scarce resources of wood. Ten cookers have already been sold; another eighty are now being assembled and marketed. The frame for the cooker is made locally. Parts such as the aluminium reflector must, however, again be financed through donations. Here, too, whether this start-up financing results in a sustainably functioning business depends on the local partner.

■ Funding remains the crucial issue

Mali is one of the poorest countries in the world. Even the smallest income is regarded covetously – by the extended family, neighbours, institutions and authorities. In a good month, Demba Marico, the electrician responsible for maintaining the ELCOM system in the community of Tielé, earns twice as much as the village schoolteacher employed by the local authority. Will he be willing and able to use his income to secure and advance electrification in the community? The local authorities cannot do it. They are often unable even to pay their staff. "Further electrification must come from the private sector", says Moussa Doumbia.

There are certainly plenty of opportunities for using solar energy in Mali – from a solar refrigerator for the health centre's drugs to solar-powered corn mills. A very encouraging sight can be seen in Tielé in the evenings: the senior pupils are sitting in long rows and studying for their school-leaving examination by the light of the solar lamps. At the front the teacher is writing chemical formulae on the blackboard. Because many pupils have to lend a hand in the fields in the afternoons, they must do their learning in the evenings. At least in theory; in practice most families are unable to afford the petroleum. Now, however, the classrooms are lit almost every evening. And every place on the school benches is taken.

Zusammenfassung

Elektrizität ermöglicht wirtschaftliche Entwicklung, hilft die Gesundheitsvorsorge und die Chancen auf Bildung zu verbessern. Doch nicht einmal zehn Prozent der ländlichen Bevölkerung in Mali verfügen über einen Stromanschluss. In entlegenen Regionen geht die Anschlussrate gegen Null. Auch in Zukunft werden die Menschen dort nicht an das öffentliche Netz angeschlossen werden; nur dezentrale Lösungen bieten die Chance einer bescheidenen Elektrifizierung. Dank der sehr hohen Sonneneinstrahlung in dem westafrikanischen Land sind

die Potenziale für Solarenergie groß – doch leider größtenteils ungenutzt. Beispiele aus der Entwicklungszusammenarbeit zeigen, was sich trotz aller Schwierigkeiten erreichen lässt.

Resumen

La electricidad hace que el desarrollo económico se vuelva posible y allana el camino para las mejoras en la atención de la salud y las oportunidades educativas. Sin embargo, menos del 10 por ciento de la población rural de Mali dispone del suministro de energía eléctrica. En las regiones

remotas, la cifra cae casi a cero. Estas personas no cuentan con ninguna perspectiva de poderse conectar a la red pública en el futuro, y las soluciones distribuidas representan la única oportunidad para lograr un nivel modesto de electrificación. La irradiación solar en este país del África Occidental es altísima, por lo cual el potencial para el uso de energía solar es muy grande. Pero desafortunadamente este potencial prácticamente no ha sido aprovechado. Algunos ejemplos de la cooperación para el desarrollo demuestran lo que se puede lograr a pesar de las muchas dificultades.