

# PROVIDING AFFORDABLE SOLAR SYSTEMS TO PEOPLE

## *Zara Solar, Tanzania*

Tanzania has one of the lowest rates of electrification in the world. Only 10% of the population has access to the electricity grid, and in rural areas only 2% has access, leaving people dependant on increasingly expensive kerosene for lighting. The recently expanded mobile phone network is opening up new business opportunities for people and enabling them to stay in touch with family, provided that they can recharge their phones. Even small solar PV systems are able to provide people with enough power to light their homes, and larger models can run televisions. These services also bring great benefits in health care, education and social welfare. As well as eliminating kerosene lamps, the use of solar PV allows businesses such as mobile phone charging to be started, and cafes can bring in more business when they have good lighting and TV in the evening. Zara Solar and its sister company Mona-Mwanza Electrical & Electronics both based in Mwanza provide high-quality, affordable PV systems in Northern Tanzania. Zara Solar is a rapidly growing business that uses a network of self-employed technicians to reach out to the remote rural areas.



Recognizing that the customer base is poor and difficult to reach for servicing, Zara Solar insists on high-quality equipment that is less likely to break down, but buys it in bulk to get good prices. The next step is offering micro-credit facilities to make solar PV available to people who can afford monthly payments but do not have the money to pay up-front. To date over 3600 systems have been sold.

### **Background**

Mwanza, with a population of around 717,000, is the largest city in the north of Tanzania, and the second largest city overall. The population

of the whole Mwanza region is about 3.7 million. People are drawn to the town for employment in fishing, fish processing, manufacture and trading, and many live in informal settlements on the hills around the city, with no mains services. The rural population in the surrounding areas are involved in subsistence agriculture growing rice, maize, fruit and vegetables, and selling an surplus in the city. Only 10.5% of the population of Tanzania has access to grid electricity and this is mainly in the cities, in rural areas the access is only 2%. Even in Mwanza where there is grid supply, there is a large backlog of applications for grid connection, and it may take many years to get connected. Many people are therefore dependent

on expensive kerosene for lighting. There is considerable demand for the services of electricity in the region, for homes, health centres, schools and businesses.

The recent arrival of mobile phone and television networks has increased demand. The availability of mobile phones increases business opportunities, and enables people in rural areas to keep in touch with family members who have moved to paid employment in the towns and cities. Zara Solar and its sister company Mona-Mwanza Electrical & Electronics, both based in Mwanza provide high-quality, affordable PV systems in Northern Tanzania.

### Technology and use

The technology used by Zara Solar is standard solar PV equipment. The most popular system for homes uses a 14 Wp amorphous silicon solar panel, a lead-acid battery of 25–50 Ah and two fluorescent lights, which can be used for

about three hours each night. Although Zara Solar always recommends buying a charge controller it adds about 17% to the system price so many customers choose not to use one. Customers who choose not to buy one are given careful instructions about how to avoid over-discharging the battery. Flooded batteries tend to be used, supplied dry, and the acid is purchased separately. Zara Solar encourages customers to buy sealed lead-acid batteries if they can afford them, as they are designed for deep discharge and are safer. Most domestic users buy systems in the 14–60 Wp range, while systems of 100W and above are usually bought by institutions, and may include an inverter for powering mains devices such as televisions.

Amorphous silicon PV modules are used because for small power demand they are cheaper than crystalline modules. Amorphous silicon has

a poor reputation in some parts of the world because in the past modules degraded rapidly in use, usually because poor sealing of the edges led to water absorption into the thin layer of silicon. Zara Solar will buy amorphous modules only from reputable manufacturers who offer a warranty on their products, and currently imports from Europe and the USA. The batteries, charge controllers, inverters and lights are also imported. Zara Solar buys in bulk to keep costs low.

### Benefits

The 3600 systems sold by Zara Solar and Mona-Mwanza Electrical & Electronics bring electric light and power for small appliances to about 18,000 people. Most users report that the availability of adequate lighting, mobile phone charging and television are the key benefits of using solar PV. Mobile network coverage has recently reached this part



of Tanzania, as has the availability of TV, so there is a growing demand for access to these services in rural areas, especially as fixed-line telephone communications are so poor. Quite a number of Zara Solar's customers are in places which are covered by the grid and have applied for grid connection and had grid wiring installed in their homes. However, because of the long delays in getting a connection they have bought a PV system instead.

Because of the poor road access, the cost of kerosene for lighting – about 1000 Tsh/litre in Mwanza – is much higher in the rural areas, typically 2000 Tsh/litre. For a typical family using 6–9 litre/month (as found in a UNDP survey) this represents a monthly cost of 12,000 to 18,000 Tsh (£4.80 to £7.20), a substantial burden in a region where the minimum employed wage is only 50,000 Tsh (£20) a month. Thus the cost of a 14 Wp system could easily be paid off in less than two years from savings in kerosene alone, if suitable financing methods were available. Some other companies in Mwanza sell similar systems through hire purchase agree-



ments, but they cost between two and four times as much as the Zara Solar systems depending on the repayment time. The use of PV provides significant social benefits for health, welfare and education.

In health centres, improved lighting and mobile phone charging are very useful: one centre found that more women came to give birth after kerosene lamps were replaced by PV lighting in the delivery room. Where solar PV is used in schools the students benefit

from better lighting in the evening and the use of some electrical equipment. One of the many organizations caring for street children has used PV-powered TV as one way to make life more attractive off the streets.

According to the coordinator of Up-end Daima family home for street children, 'Having electricity for lighting and TV gives a more enjoyable life for the children, its one of the things which encourages them not to go back to the streets.'

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## SPV home-lighting systems in Assam

The ASEB (Assam State Electricity Board) has been identified as one of the three nodal agencies for implementation of the Remote Village Electrification Programme in Assam. The ASEB and the state forest department are the other two agencies involved in the programme. Out of 2139 villages identified for coverage under the programme, 1058 have been allocated to ASEB, which has so far taken up 360 villages in the districts of Barpeta, Darang, Goalpara, Karbi, and Anglong hills. Model-II home-lighting systems are being provided to the villagers under the programme. Apart from nominal upfront payments from the beneficiaries, a monthly contribution of up to Rs 40 is being planned. Awareness camps for the villagers and other stakeholders have helped in proper sensitization. Due to its organizational reach, ASEB is well equipped to service the beneficiaries in the long run. The experience of ASEB in this endeavour could become a model for other state electricity boards also.

