



Village Goes Solar

The Economical Solar Plant

Zanzibar Solar Energy Association

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Zanzibar, Pilot Project, The Economical Solar Plant, Promoting Solar Technology in Rural Areas

1 Introduction

Zanzibar consists of two main Islands, Unguja and Pemba, as well as many small islands. About 7% of the 1.1 Mio. inhabitants are connected to the grid of the national electricity supplier Zanzibar Electricity Corporation (ZECO). Unguja is supplied by a submarine cable with a capacity of 45 MW from the mainland. This cable shall be replaced by a 100 MW cable in 2012. Pemba has an antiquated diesel fuelled generator which, by support of the Norwegian government, shall be replaced by a submarine cable from Tanga. In 2009/2010, Unguja was left without electricity for three months because of defects in the submarine cable. Those who could afford it bought diesel fuelled generators which caused a lot of noise and pollution in Zanzibar Town. But even more than in town, decentralised energy solutions are needed in rural areas, because the people lack bright light and mobile phone based communication. This is very important to the progressive Tanzanian citizen, as communication may compensate for little infrastructure.

1.1 Deutsch-Tansanische-Partnerschaft e.V. (DTP)

In March 2001, DTP started to work with SOLUX solar lamps in a school's workshop in the South of Zanzibar on cooperation with two volunteers from Germany. 14 schools received solar charging points for these lamps and rent the lamps to villagers. Based upon this, further projects on solar were carried out. From this project, the weltwärts-project "Cultural Exchange and Climate Protection through Renewable Energies in Tanzania" of DTP was developed, in course of which 16 volunteers are sent off to hosting places all over Tanzania every year.

1.2 Zanzibar Solar Energy Association (ZASEA)

In 2003, the Zanzibar Solar Energy Association was founded by teachers of those schools which had become charging points. It was registered as NGO officially in 2006. Being liberated from his teaching work, Ramadhan Said, who is a teacher of solar, has been working for ZASEA in Zanzibar Town. In order to spread the knowledge of solar energy, ZASEA and DTP developed together the "Village Presentations of Solar Home Systems" and created a "Local Technician Network" to maintain the new technology on-site.



1.3 ZASEA Activities

As a result of the 10-12 Village Presentations (VP) which are held by ZASEA every year, the Solar Energy Day 2009 and the education of Local Technicians, who can apply for training after a VP, solar technology has become well-known throughout Unguja. First trainings have been organized with interested people from Pemba Island. By the expansion of VPs to the School Program and contact with saving groups in villages, ZASEA have started to combine dissemination of information and microfinance. ZASEA's activities are focussed on rural areas, which have no connection to the grid of the national energy supplier: the demand for sustainable energy solutions is high there, as the lack of electricity impedes progress and development.

1.4 Next step

This start up phase of using solar energy could be supported very effectively by providing villages not connected to the grid with exemplary Solar Home Systems for light and other small-scale applications as an object of demonstration for villagers. These systems shall be run and kept in good condition by the Local Technician of the village.

2 "Village goes Solar"

The project pursues the aim to provide the Local Technicians who have been educated by ZASEA with further education, so that experienced and reliable ways of installing and maintaining SHS are existent when the use of Solar Home Systems expands. This is essential in order to guarantee good quality of the technology and its handling. Together with the Local Technician ZASEA and their staff create an illustrative, positive example of using solar technology and serve as a disseminator in villages without electricity.

ZASEA wish to test the pilot project "Economical Solar Plant" in order to increase the use of solar home systems by giving an example to the villagers. Only if the villagers are able to experience the advantages and limits of solar electricity themselves, they might decide to purchase their own SHS or solar lamp.

2.1 The Economical Solar Plant

The Economical Solar Plant installed in a village without electricity in the house of one ZASEA Local Technician is supposed to

- I. make people in the village aware of the chances of using the sun for electricity
- II. open the chance for charging mobile phones in the villages and avoid long travelling
- III. provide access to solar equipment for the village society as well as to show that a professional is near by who is able to take care of solar equipment

Giving a visible example of daily and sustainable usage of solar technology shall encourage villagers to trust in the new technology on the one hand and practice the Local Technician on the other hand. The additional utility of the system as a "charging

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point for mobile phones” is an incentive to keep the installation in good condition, because it offers the advantage of a small additional income and also the saving of money for further replacements of technical parts like batteries and bulbs. If the system is maintained well and runs without costs for replacement the saved money can also be used for additional system capacity by additional panels.

2.2 Sustainability of the project

In order to ensure the durability of the installation and thus the sustainability of using the solar system, well-organized means of service and money saving possibilities are required for installing systems with high quality, maintenance and replacement of expiring batteries, charge controllers, etc. To pay for these replacements, parts of the income from phone charging shall be saved up. Due to high rate of inflation in Tanzania, saved money which is not paid into a bank account loses its initial value. Therefore it is necessary to pay the monthly savings into an account of a reliable saving group.

The earnings of mobile phone charging should be distributed as follows:

- ▶ **Saving group of the village**
Deposit for replacements (lamps, batteries, any other) to guarantee the durability of the system
- ▶ **ZASEA**
Rental fee for the SHS
- ▶ **Local Technician**
all other income as incentive

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2.3 Calculation of monthly income and payments

Solar Home Systems							
Unit	Size of Equipment	Pieces	TSH	EUR	Lifetime in years	Lifetime months	Monthly Savings
Panel	85 W	1	520 000	248	20	240	2 200
Charge Controller	10A	1	135 000	65	10	120	1 150
Battery	100Ah	1	323 000	155	3	36	9 000
Lamp	10W	6	102 000	49	4	48	2 150
Inverter	180 W	1					
Wire	80m	1	100 000	48			
Mounting structure			70 000	33			
Installation	3000/W		255 000	122			
Transport			20 000	9			
Service costs 15%			234 000	112			
Total DC			1 794 000	858			16 500

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Monthly Costs				Monthly Income
constant		variable		
Savings for Replacement per month	Rental fee for ZASEA per month	Income for Local Technician (anvisiertes Minimum)	Total TSH	Mobiles to charge 350 TSH per piece 20 days per month
16 500	10 000	13 500	35 000	5 per day

According to the table above, the installation of an 85 Watt Solar Home System, transport and service included, costs about **1.800.000 TSH** (900€).

For the introduction of the project with all project developments, discussions, traveling, copies, flyers, communication ZASEA needs around **2.200.000 TSH**. Therefore, a total of 4.000.000 TSH (2000€) are needed to start this project. If there should be any money left it can be used for the expansion of the project.

The income can be enlarged by charging more mobiles. Only the payments for replacing technical parts (13.000 TSH) and the administration costs for ZASEA (5.000) have to be saved.



It has to be taken into account that during the first months after the installation of the system, the number of mobile phones that have to be charged will be low. Therefore the payments made to ZASEA will start three months after the installation only, and the savings given to the SACCO will start one month after the installation.

3 Putting the project into practice

ZASEA and DTP work together on the implementation of the project. Both of the two DTPvolunteers Maike Fröhner and Maresa Bussa working with ZASEA in 2010/2011 support the start of the project and help to introduce new structures.

First steps to be taken:

- ▶ choose a Local Technician and introduce the project “Economic Solar Plant” to him; write a letter of agreement
- ▶ come into contact with the local saving group
- ▶ choose high quality equipment

For the “Economical Solar Plants” to come, an application form for the Local Technicians will be developed. For this pilot project, though, ZASEA and the leaders of the Local Technician Units will choose a Technician on their own account.

Following conditions have to be met by the applicant:

- ▶ no connection to the national grid
- ▶ ZASEA Local Technician lives in the village
- ▶ local saving group willing to cooperate in place

Some research regarding the number of mobile phones in the villages will be needed during the first months: At the start of the project, there will not be many phones in the village to be charged. It can be expected, though, that during the first month the number increases as there is a charging station available. The Local Technician will therefore count how many phones are charged on each day.

The Local Technician works on his own account in the village, but he receives his instructions from ZASEA and reports to ZASEA likewise. He has to check the system monthly and to give his checklist to ZASEA. More detailed reports will be written four times a year; the ZASEA volunteers will assist in writing these by translating and offering help with technical issues.

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3.1 Regulations

The Local Technician agrees to the following terms of contract:

- ▶ The solar system remains property of ZASEA
- ▶ An appropriate amount is paid to the local saving group monthly to save money for replacements. The saving group may use the money in the meantime, but agree to make the money available for a new battery or any other part if it is required. If any part, particularly the battery, breaks down before enough money is saved, the Local Technician is obliged to pay for the difference.
- ▶ ZASEA receive a monthly rental fee.
- ▶ All agreements are laid down in a contract. If the case should arise that the contract is not kept, the installation shall be removed entirely. Rent that has already been paid to ZASEA shall not be returned.

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4 Future of the project

The experience of this pilot project will show, whether the calculations are realistic and whether such cooperation between ZASEA and the Local Technicians is possible. If the project turns out well, it will be possible to expand it and to install more Systems in other villages.

The system will be a good example in the village which shows the installation, the maintenance through the Local Technician and the development of contacts to the saving group: The village society learn, how Solar Home Systems can be used economically and how they have to be maintained.

5 Timetable of the project

Start of the project: Middle of March 2011. With all reports and bookkeeping it can be finalized in August 2011.

(Project proposal: Ramadhan Said (ZASEA), A. Karsten, Maike Fröhner, Maresa Bussa, DTP, March 2011)