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Camp Solar / Diesel “Hybrid” System Project

Installations, Trainings, Equipment and Capacity Building for Refugee Camps

Training location

Ban Don Yang Refugee
Camp, Thailand
Tham Hin Refugee Camp,
Thailand

Project dates

Feb. 19 through Mar. 16,
2007

Technicians trained

3 ESP Students,
1 ESP Teacher,
3 Generator Operators,
6 Computer Center
Trainers,
1 VT Chairperson

128 Participants received 1
Day Solar Training

Instructors

Arie Jongejan
Angie Beier
E' Maw Lay
ESP Students
ESP Teacher

Project Funded by
UNHCR

Implemented by
ZOA Refugee Care
BGET

Written by
Angie Beier

The Border Green Energy Team (BGET) worked in Ban Don Yang (BDY) refugee camp and Tham Hin (TH) Refugee Camp to install a solar PV / diesel hybrid system and to train local technicians in solar energy. The solar system and equipment will upgrade the power system for the computer training center. These were the sixth and seventh of seven refugee camps to be similarly outfitted.

The Border Green Energy Team (BGET) is working with ZOA and UNHCR to provide training, equipment and installation services to upgrade these systems to solar / diesel “*Hybrid*” power systems. Diesel is a non-renewable polluting fossil fuel, expensive and difficult to transport. The “Hybrid” system will increase the available power supply, allow computer training class hours to be expanded, reduce diesel costs, and offer an option to expand the number of computers and / or size of solar system to further increase aforementioned items.

The sixth installation took place in BDY Refugee Camp and the seventh installation took place in TH Refugee Camp, which are located about 4-6 hours north-west of Bangkok along the Thai / Burma border in Thailand. The Installation team consisted of three BGET staff members including Arie Jongejan & Angie Beier (Foreign Volunteers), and Saw E Maw Lay. Saw E Maw Lay is our BGET intern technician and also a graduate of the Engineering Studies Program (ESP) at Mae La Refugee Camp. The principal of the ESP school, Saw Loh Doh, joined the team for the TH installation. The install team also consisted of 1 ESP Teacher, Naw Si Si Poe, and 3 ESP students

including Saw Nyi, Saw Blessing, and Saw Ler Kyaw Say from Mae La Refugee Camp. The team began the back to back two week each installations on Monday, February 19, 2007.



Angie Training the Generator Caretaker and Computer Center Trainers



Engineering Students Mount Solar Panels lead by 3rd Year ESP Student Saw Nyi

The solar system installations consist of installing 15 – 64W panels on a stainless steel PV rack, 12 – 12volt and 125AH batteries, an Outback Inverter and an Outback Charge Controller.

The installation included the following tasks: choosing the site for the different components of the system, preparing the site, installing the PV rack and panels, wiring the panels together, running conduit and wire from the panels to the inverter room, building the battery house, filling batteries with acid, wiring batteries together, installing and wiring Outback equipment together, programming the system, and turning power on to the hybrid system. Some additional components of the installation in TH included rebuilding and rewiring of the computer center, thoroughly cleaning, re-wiring, and organizing the generator room. The rewiring of the center entailed wiring outlets for plugging in the computers and wiring all the lights.



Saw Loh Doh (Engineering Headmaster's Motto: "I never saw a job I didn't like")



Naw Si Si Poe, ESP teacher, wires the inverter and charge controller.

There are three separate components to the training for this project:

- 1) Hands-on, practical training as we work as a team to install the system. This includes on-site technical training as well as classroom training. The topics discussed with the students include solar fundamentals, how our system

works, how energy flows, electricity, AC vs. DC electricity and how this applies to our MRML system, wiring series vs. parallel, wiring design for our system, system components, safety, and how to use the tools and equipment. BGET also discussed safety on the worksite, professionalism, organization, and cleanliness. The students of this hands-on training include three ESP students and one ESP teacher, the computer center trainers and generator caretakers at each of the two camps. Four laborers were also hired to assist the install team with land clearing.

- 2) Teach the generator caretakers and the computer technicians in system attendance, system maintenance, and their role in this system. The individuals are also present throughout the installation and at the one – day renewable energy training. These individuals are requested to keep a log of data on the system and provide this to ZOA and BGET on a monthly basis. They are also provided with a tool kit that will allow them to perform maintenance on the system.

- 3) Provide a solar training for all interested members of the refugee camp. BGET held a one-day solar and renewable energy training at BDY on February, 28, 2007 and at TH on March 13, 2007. There were 73 participants from the BDY community and 95 participants from the TH community that attended these trainings. Below is the make-up of these participants:

Ban Don Yang Refugee Camp Solar Training Participants						
Age Group	Female	(in %)	Male	(in %)	Total	(in %)
15-20	2	7%	3	7%	5	7%
20-40	21	70%	28	65%	49	67%
40-60	6	20%	11	26%	17	23%
>60	1	3%	1	2%	2	3%
Total	30	100%	43	100%	73	100%

Tham Hin Refugee Camp Solar Training Participants						
Age Group	Female	(in %)	Male	(in %)	Total	(in %)
15-20	5	36%	18	22%	23	24%
20-40	7	50%	56	69%	63	66%
40-60	1	7%	7	9%	8	8%
>60	1	7%	0	0%	1	1%
Total	14	100%	81	100%	95	100%

The topics discussed included sustainability of this system and the cooperation between BGET and ESP, the role and responsibility of the camp community, a tour of the system and a discussion of each of the parts of the system, system design, solar fundamentals, basic electricity, the flow of electricity, the role of the batteries and battery safety, installation of the system, maintenance of the system, solar cooking, and other ways to use renewable energy in their Community. The trainings were taught by the BGET Staff, ESP Intern, ESP Principal, ESP Teacher, and ESP Students.



Angie teaches about solar cooking at the solar training and these students are testing food from the solar cooker.



Saw Blessing teaches the TH community about the installation process and introduces them to system parts and components

Training is a critical part of this project for the sustainability of this knowledge and the system. We teach these engineering students about solar and renewable energy and provide them with the practical experience as part of the install team. Throughout the seven camps, we have trained approximately 30 Engineering Studies Program students on solar energy and the engineering aspects of installing this system. We similarly have trained several members at each camp including computer center trainers and generator caretakers on these systems, the maintenance of the system, and solar energy. This will provide the camp members with the knowledge to maintain the system, log data, and troubleshoot the system upon Bet's departure. The BGET and ESP team completed these installations and trainings on Friday, March 16, 2007.



Female Computer Trainers, Engineering Teacher, and BGET Volunteer