

Border Green Energy Team: Concept paper



Presented by:

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Overview

The Border Green Energy Team works in a variety of complementary ways to:

- *Build a core team of technicians working together in a coordinated manner to enhance the sustainability of 15,000 “parachute project” government-installed solar home systems (SHS) in remote communities in Tak province in Thailand.*
- *To increase access to replacement parts and reduce bottlenecks to SHS warranty claims for these systems.*
- *Use Thai solar home systems as hands-on classroom for high level, real-world training on solar system construction, maintenance, and repair to build capacity of Thai technicians, refugee vocational students, and medics from inside Burma.*
- *Use low-cost community-based micro-hydro and solar electricity to provide electricity for high-value community applications (clinics, schools, community centers) in villages in ethnic minority areas on both sides of the border.*

Problem Statement:

The Border Green Energy Team (BGET) brings together Karen Thai villagers, Karen IDPs from Burma, and Karen refugees to further the sustainable deployment of renewable energy. The project is based on our team’s experience training and providing solar electric systems for medical clinics in Karen areas of Burma, our experience helping villagers in Thai-side villages in the area to build community micro-hydro systems, and our work training Karen Thai villagers to operate, maintain and repair solar electric systems.

The project includes plans for an active team of technicians working to maintain and repair 15,000 Thai government-installed solar home systems in Tak province as well as build, maintain and repair community micro-hydro systems in some of the same Thai villages. These solar and micro-hydro systems in their village setting also serve as an ideal classroom for periodic trainings for Karen technicians from Burma on practical and theoretical skills necessary for sustainable deployment of these technologies now and in the future when Burma becomes free.

Karen villages in Thailand

Starting in mid-2004, the Thai government began installations in an ambitious two-year US\$200 million program to provide solar home systems to 203,000 remote households. Of these, an estimated 15,000 are located in Tak province, mostly in the western part along on the Thai/Burma border. Remarkably, there is no maintenance and repair program in place to ensure that these systems work in the long term, nor are operations and maintenance instructions provided to system recipients.

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Initial estimates based on a survey of 105 homes in 3 Tak province villages indicate that about 7% of systems fail within the first several months of operation. Based on system design and our experience in other countries with similar systems, we expect failure rates to rise to at least 30% and 50% by the end of the first and second years, respectively unless substantial steps are taken to improve operation and maintenance. While our research has determined that the government contract with installation companies includes provisions for equipment warranty¹, *no information* about the warranty or claims procedures appears to have been given to villagers. Efforts over the past two months to enforce the warranty for broken system parts by a few villagers with broken systems have so far yielded no response.

The Thai government solar home systems are only available for houses with official government registration. This leaves out important non-household load centers including schools, clinics, temples, churches, and other community buildings. It also leaves out households without official house registration.

In sum, the Thai government has committed significant sums of taxpayers' money for solar electric systems that, while appreciated and useful, do not provide universal benefits for the whole community, and which will likely largely fail unless steps are taken to ensure their sustainability. As they fail, decision makers will form opinions about the usefulness of solar electricity or other renewable energy for future rural electrification initiatives. Since Thailand plays an important business and policy leadership role in the region, especially regarding technology adoption, this experience may lessen the chance that renewable energy will be used in the future to electrify rural areas in the region (Laos, Cambodia and Burma all have very low electrification rates).

Three years before the government solar home system program was initiated, we began working with villages to build micro-hydro systems² for community buildings (schools, clinics, temples and churches). We have constructed three so far. Costs for these projects are already remarkably low, especially when compared with solar electricity. Our latest project generates 1500 watts 24 hours a day for a total cost (not including labor contributions from villagers) of 60,000 baht (\$1500). A typical solar home system, by contrast, generates about 1/50th this amount of electricity for the same cost. Reliability and repairability are also high. All systems we built remain functioning after several years, and villagers have demonstrated that they are willing and able to make repairs. The

¹ The terms of the warranty are as follows: solar panel is warranted against manufacturing defects for 5 years; controller/inverter: 3 years; battery: 2 years.

² A separate government program, managed by the Department of Alternative Energy and Energy Efficiency (DEDE) has also built micro-hydro systems, including one built in Tak province. The DEDE program, however, only considers systems of 10 kW and above. Most villages do not have sufficient water resources for this scale installation. Our installations are sized below 10 kW. If we encounter villages with sufficient resources for the DEDE scale systems, we will coordinate with them to develop these projects.

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arrival of the government solar home system program is complementary to these micro-hydro systems, as micro-hydro focuses on community buildings, while the SHS systems provide electricity for residences; and since micro-hydro provides the most electricity during the rainy season when solar panels are least effective.

Karen Internally Displaced People in Burma

Across the border to the west in the Karen territory of Burma is a more serious and longer running crisis. The Karen inside Burma are violently oppressed by the ruling “State Peace and Development Committee (SPDC) military dictatorship. They are forced to work as labor for the Burmese military as porters or as human landmine sweepers, their villages are burned, and thousands of people have been tortured and killed. An estimated one million Internally Displaced People (IDP) remain in hiding in Burma in forests riddled with landmines and exposed to ongoing fighting between armies of the SPDC and the Karen National Union (KNU). Spartan clinics staffed by Karen medics are the only source of medical care. Our work in three separate trainings for Karen medics from Burma over the past several years has now supplied 18 clinics with ruggedized solar electric systems for lighting and basic medical equipment. The systems are specially designed to be easily transportable on foot deep into the jungle, and can quickly be disassembled and hidden in the event that it is necessary to evacuate the clinic. Each system recipient builds the system themselves, as part of a comprehensive 3 to 5-day hands-on trainings on system construction, operation and maintenance. For the latest training (Feb '05), it was possible to arrange permission for six Karen medics from Burma to travel to a Thai village for training along side Thai Karen villagers.

We are also pursuing possibilities of helping some of these communities to develop micro-hydro power, focusing on small units in which the turbine/generator could be quickly removed and hidden if necessary. As Burma becomes free, however, larger systems will be possible, and are well-suited to the hilly terrain within Karen areas of Burma.

Karen refugees

Also in need of training on practical renewable energy are tens of thousands of Karen refugees who have fled to Thailand and have lived, many for as long as a decade, in half a dozen camps along the Burma/Thai border. Encircled by the Thai military, the occupants in these camps have limited access to education and even less access to meaningful occupations. Many bright young refugees are interested in learning about solar electricity in preparation either for return to their homeland, or to work as specialists on solar electricity within the Thailand. It is not clear when repatriation will occur, nor when it may be possible for these refugees to legally work in the Thai economy. But many who closely monitor politics in Burma and the politics of Burmese refugees in Thailand believe that changes are likely within the next several years, if not sooner. The director of the Thailand Burma Border Coalition (TBBC), a non-profit

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organization that runs all of the Karen refugee camps, says that rapid increase in relevant vocational training is the highest priority now for the camps. In the latest training, 6 Karen refugee vocational students also obtained permission to travel to a Thai village, and trained along side villagers and IDP medics from Burma.

The situation described above provides a variety of compelling opportunities. Karen villages in Thailand with thousands of solar home systems are in need of on-going maintenance and repair services, and at the same time these systems provide ideal “classrooms” for Karen from both sides of the border to learn in a hands-on environment how to maintain, repair, and adapt systems.

Team composition:

The Border Green Energy Team (BGET) works in a variety of complementary ways to address both the sustainability concerns of the Thai government-installed systems, and the training needs of IDP and refugee communities.

The foundation of the program is the establishment of a team of dedicated, competent professionals with the skills and resources to repair systems, teach villagers about ways to ensure that their systems last as long as possible, provide services for removing and recycling dead lead acid batteries from villages, helps with warrantee claims, and helps ensure the sustainability of all renewable energy electricity generation within villages. Building on this Thai-based technical core, the program offers periodic trainings to refugees and IDPs from Burma.

The composition of the proposed team is shown in Figure 1 below. At least two team members (the project coordinator and community mobilizer) will be based in the central provincial town of Mae Sod. We also expect to have frequent (volunteer) technical experts based in Mae Sod. Another five team members are stationed in each of Tak provinces’ districts (Amphur). Key responsibilities of the team members are discussed below:

The Project Coordinator is skilled at negotiating with Thai authorities and interacting with English-speaking donors. She will write reports, help look for funding, and be able to organize the entire effort. She also will provide technical support knowledge to all members of the team. To fill this position starting September 2005, we have hired Salinee Tavaranan, a Thai national who is taking an extended leave from a PhD program in solar energy at University of Massachusetts, Lowell.

The Community Organizer works in the communities to get their support for the project, organize the trainings, find the right people for the responsible positions, organizing work projects, etc. Watit Hathaipassorn, a Karen with extensive experience in community mobilization in Tak province, will fill this position.

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Technical volunteers will work to identify problems and work with the team to find solutions. We have made arrangements with one renewable energy technical expert volunteer (and are making arrangements with a second) who will be based in Mae Sod. He/she will help with trainings, repairs, and coordinate on technical issues with the Provincial Electricity Authority and with technicians and engineers from installation companies and from local government. We imagine this as a rotating position engaging volunteers from around the world.

Because of distances involved, and particularly the difficulty of travel in the rainy season (about 50% of the time), each district (Ampur) should have a local technician. Initially the project we would start out with one county tech person, and build to 5 – one for each district. There is a significant chance that these technicians may be employees of the Tambon (county) government.

Local Technicians will have the skills to repair solar electric systems. They will spend much of their time in communities in his district, systematically surveying government installed solar home systems, making basic repairs, helping with warranty claims, and teaching villagers about operation and maintenance. They would often work alone, traveling to village by motorcycle. Karen language is essential, and Thai would be useful. One promising possibility is to work with local Tambon (county) governments to integrate this job responsibility into the existing corps of Tambon local civil technicians.

In addition, technical, logistical and strategic support will be provided by Chris Greacen (Palang Thai, based in Bangkok, Thailand), Sirikul Prasitpianchai (IIEC, based in Bangkok), and Walt Ratterman (Green Empowerment, based in Portland, Oregon). Both Chris and Walt each have over 15 years of practical experience working with teams to develop, teach, build, repair, and maintain renewable energy systems. Sirikul has 6 years experience in the solar electric industry in Thailand and a graduate degree on solar electric engineering.

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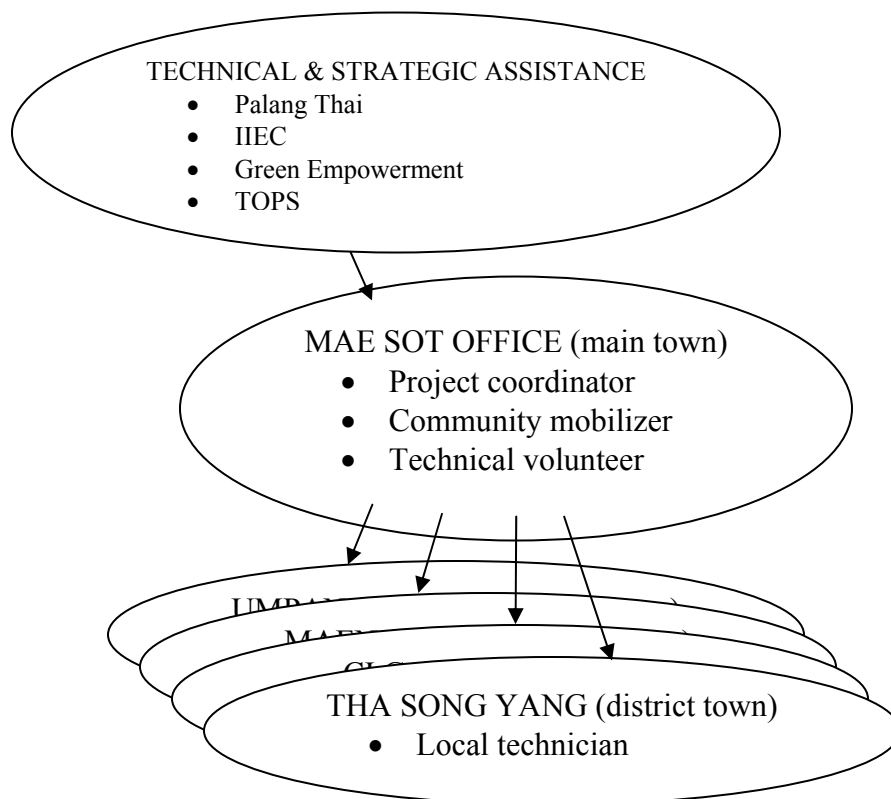


Figure 1: Suggested structure for Border Green Energy Team.

Proposed activities:

The Border Green Energy Team works to provide conditions for sustainable operation of solar home systems and other renewable energy systems in the Thai/Burma border area. Key tasks (order in list does not indicate importance) include:

1. Surveying Thai SHS: Systematically surveying and maintaining a database of every solar electric system encountered including information about date of commissioning, GPS coordinates, date of each visit, status of system, repairs made.
2. Helping improve conditions for maintenance: This includes teaching villagers about proper operation and maintenance, helping to encourage local sale of distilled water and basic supplies to ensure longevity, ensuring proper removal and recycling of dead batteries.
3. Fixing: Repairing systems that can be easily repaired. This includes fixing basic manufacture or installation defects, increasing average annual sunlight exposure (usually by moving module to better location at house), replacing broken lights, as well as processing parts that fail under warranty. Repair work also includes

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discussing options for more expensive repairs such as replacement of equipment or system modifications in the event that the warrantee has expired or is not applicable.

4. Micro-hydro installation and sustainable operation. Working with villagers in hands-on training programs to install micro-hydropower and set up community level institutions for long-term sustainable operation of micro hydro power for community buildings.
5. Provide training to IDPs and refugees. The project will train IDP medics, IDP radio technicians and other interested people from Burma, and vocational students from refugee camps on solar electricity and micro-hydropower. Sometimes these will involve providing equipment -- consistent with our work so far that has provided 18 solar electric systems for remote clinics in Burma; and/or will involve trainings inside refugee camps. If we remain successful in securing permission for refugees and IDPs to travel within Thailand, some of these trainings may be within Thai villages. Sometimes they may happen inside refugee camps. We are in discussions now to build six solar/diesel hybrid systems computer classrooms inside refugee camps (no refugee camps are electrified). Conditions permitting, we may also work inside Burma.

Completed Activities:

In Burma we began teaching hands-on workshops on renewable energy in 2001, 2002 and 2003 covering solar electricity, micro-hydroelectricity and biogas for cooking (see www.palangthai.org/bsep). In 2003, 2004 and 2005 we conducted hands-on workshops on solar electricity for Karen IDP medics from the Karen Health and Welfare Department. These workshops trained over five dozen participants in theory and practice of installation, operations and maintenance. The workshops also provided ruggedized solar electric systems that provide electricity for lighting and basic medical and communication equipment for 18 medical clinics.

Starting in year 2001 we also have worked with communities on the Thai side of the border to build community micro-hydroelectric projects. We have built 3 so far, all of which are currently providing electricity for community buildings including schools, clinics, temples, churches and battery charging for household lighting.

The latest training, in February 2005, brought together all facets of our work. We provided training on solar electric and micro-hydro systems for six Karen medics, six vocational training students from Karen refugee camps, and more than a dozen Thai villagers. Training included hands-on construction of solar electric systems for medical clinics inside Burma and maintenance and repair of solar home systems installed by the Thai government in the village, as well as hands-on installation of a micro-hydropower system.

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We surveyed over 100 systems installed in villages in Tak province under the Thai program, documented problems, and gave a Thai-language presentation/discussion at the central offices of the Provincial Electricity Authority (PEA) responsible for implementing the program. The presentation was very well received, and PEA has offered to coordinate with us by providing data about solar home systems in Thailand and joining in future trainings that we conduct.

We have hired staff, starting in September, for the positions of project coordinator and community mobilizer. We also have a commitment from one volunteer, an engineer from the USA experienced in renewable energy systems, to join the project for several months.

Deliverables – year 1 (September 05-06)

- Train local technicians
 - identify technicians
 - develop training curriculum
 - provide on-going training
- Initiate SHS database and procedures for systematic data collection to track status of each system visited.
- Put in place battery recycling arrangements
- Develop supply network for SHS system equipment replacement
 - Warrantee
 - Non-warrantee
- SHS sustainability team engagement with 30 villages
 - Identify systems & problems
 - First pass at fixing problems
 - Training to villagers on operations and maintenance
 - Establish procedures for battery replacement & recycling
 - Establish procedures at local level for warrantee & non-warrantee equipment replacement
- Communicate SHS status and BGET activities results in report.
- Built 2 micro-hydro systems with trainings
 - Identify villages
 - Work with villagers to form sustainability committee
 - Feasibility study
 - Design system
 - Procure equipment
 - Install / training
 - Provide conditions for sustainable long-term operation
- Conduct 4 hands-on camp trainings
 - Identify camps
 - Identify training opportunity/priority (solar home systems, micro-hydro, computer centers)
 - Develop curriculum
 - Design systems
 - Procure equipment
 - Conduct trainings

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- Conduct 3 hands-on trainings for IDP clinics (inside Burma)
 - Identify clinics for new systems or follow-up
 - Modifications to system design
 - Procure equipment
 - Conduct trainings
- Summarize all activities in year-end report.

Deliverables – 3-year

Broad achievements that result from several deliverables

- Well-established Border Green Energy Team including corps of competent technicians active in repairing solar home system problems and educating users for enhanced system sustainability.
- Improved sustainability of most of the 15,000 solar home systems in Tak province
- Comprehensive tracking data collection system covers all solar home systems
- Initial steps towards replication in other provinces
- 6 new community micro-hydro systems sustainably in operation
- Trained corps of a dozen technicians in each of six refugee camps able to build and repair solar home systems
- Solar power for 30 additional medical clinics and/or other high-value community applications inside Burma

Budget Summary:

Component	Cost
PV Capacity Building in Thai Villages	\$ 77,289
PV Community Centers in Thai Villages	\$ 41,957
Micro Hydro in Thai Villages	\$ 44,165
PV Capacity Building in Refugee Camps	\$ 22,083
PV Clinics for Internally Displaced People in Burma	\$ 35,332
Totals:	\$220,826

Participating Organizations:

A coalition of local and international partners is collaborating on this effort. This partnership brings together technical expertise in renewable energy design, implementation, and training with a sound track-record of grassroots experience of working closely with Karen people in Burma, in refugee camps, and in Thai villages.

Karen Health and Welfare Department (KHWD) is dedicated to addressing the needs of internally displaced Karen people in Burma. They organize and support a network of 28 health clinics that provide crucial medical care for over 100,000 people annually living under the violent oppression of the Burmese army. In this program, KHWD is

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coordinating the medics from the clinics receiving solar electric systems and organizing key logistics of travel and trainings.

Eh Kalu Shwee Oo is a senior medic with more than twenty years of field experience in the Karen State. Eh Kalu is a Secretary of the Karen Health and Welfare Department and also a treasurer and an elected member of the leading group of Back Pack Health Worker Team.

Karen Network is a Thai NGO that supports the development of living conditions and the environment for the Karen community with combined traditional and technological knowledge. Currently, their activities include; 1) Providing leadership training for the village leaders and future leaders; 2) Empowering and reaffirming villagers of the Karen way of life and encouraging them to practice it daily; 3) Supporting and empowering people to respect the spirit of the universe and to continue with resource management, including making sure that new employment is sustainable and balanced; and 4) Documenting the Karen knowledge and beliefs. With close ties with the villages, the Karen Network will be key in building grassroots community involvement in the solar program. *Watit Hathaipassorn* is a native Karen who has worked for two decades on the twin challenges of rural development and cultural preservation for his people. He will likely be the community mobilizer for the project.

Taipei Overseas Peace Service (TOPS), is a Taiwan-based NGO, which was formed in 1996 and since that time has been providing community development and educational assistance programs to refugee camps and Thai-Karen villages along the Thai-Burmese border in Tak Province, Thailand. TOPS has a center in Mae Sot and will be central in providing coordination of the Thai-based partners and providing logistical support the trainings. TOPS will physically house the Mae Sod-based portion of the BGET. *Sam Lai* is director of TOPS and is a partner in program strategy and logistics.

Palang Thai is a Thailand-based non-profit organization dedicated to empowering grassroots communities and small entrepreneurs to use renewable energy in ways that support sustainable development and participatory democracy. Palang Thai works to promote renewable energy in Thailand on both through national policy and community projects. Palang Thai will contribute technical expertise and coordination with the government programs. *Chris Greacen* is co-founder of Palang Thai, where he works on renewable energy policy, implementation, and evaluation in South East Asia. He will provide technical assistance and logistic & strategic support for the project.

Green Empowerment is a US-based non-profit organization that promotes community-based renewable energy and water projects in rural communities around the world. Working in partnership with in-country NGOs, Green Empowerment has implemented solar lighting, micro-hydro, solar water pump, biomass, and hydraulic ram pump projects in Nicaragua, Guatemala, Ecuador, Philippines, Malaysia and the Thai/Burmese border.

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Green Empowerment will bring technical expertise, training experience, strategic organizational planning and fundraising assistance to this joint effort.

Michael Royce is founder of Green Empowerment, and will provide strategic support. *Walt Ratterman* has over 30 years experience in electrical systems and a broad background in renewable energy, and will provide technical and strategic support.

International Institute for Energy Conservation (IIEC) is an international organization focused on increasing world-wide energy efficiency and renewable energy. The Bangkok office of IIEC has played formative roles in the formation of the Thai EGAT demand side management (DSM) program. *Sirikul Prasitpianchai* has worked on solar electricity in Thailand for 5 years and has a graduate degree in solar electricity. She will provide technical, logistic and strategic support.

ZOA Refugee Care is an international NGO, with headquarters in Holland, operating in more than 10 countries worldwide. ZOA supports refugees, internally displaced persons (IDPs), returnees, and others who are affected by conflict or natural disasters. In Thailand, ZOA does extensive educational work with Karen refugees, including a hand-on vocational training program that will tie in with the solar training program.

In addition, we work closely with the Global Health Access Program (GHAP) (www.ghap.org) regarding technical issues of electric power for medical instruments in remote clinics. GHAP is a US-based group of medical doctors that has provided extensive medical training to the KHWD over the past decade.

We also coordinate closely with *Rob Landau*, an independent individual who works on renewable energy solutions for electricity challenges in the region.