
Developing a Strategy to Improve Solar Home System Sustainability in Rural Thailand

February 28, 2007

Gabriel Baldwin
Benjamin Childs
Carolyn Hunter
Victoria Urrea

Thai Solar Home Systems



- Solar home systems (SHS) have been placed in rural villages by Thai government
 - Initial studies indicate approximately 20% are failing
 - Repairs are *not consistent*
-

Goal

***to develop a strategy to enhance
the sustainability of solar home
systems in rural Thailand***

Solar Home Systems in the World

- Small photovoltaic system
 - Used for lighting and small appliances
 - Over 1.3 million SHS installed in the world
 - In programs with donated systems:
 - Long term maintenance is a common problem
 - Users are less likely to take care of their systems
-

SHS Locations

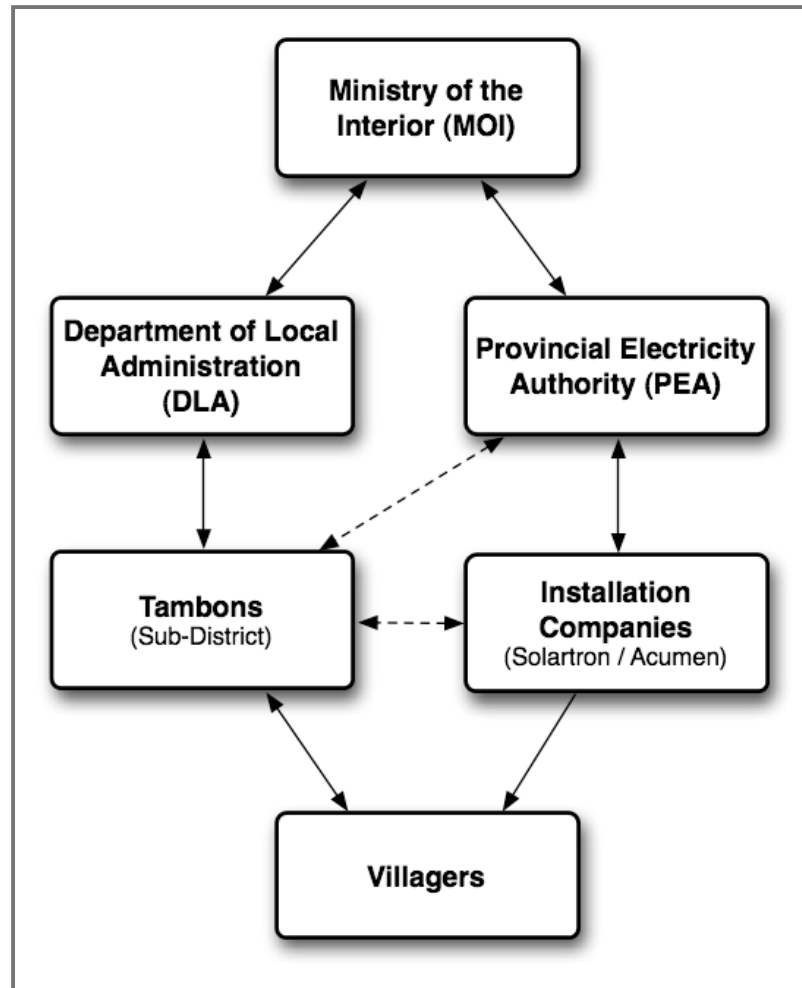
- **Remote Areas**
- **No Grid Access**
- **National Forests**



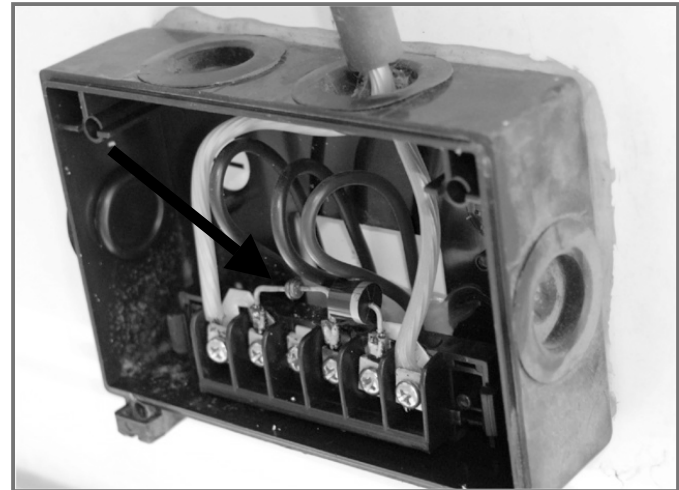
Background

- 1970's
 - Thailand starts rural electrification program
 - 2004
 - Program financed by Ministry of the Interior
 - Implemented by Provincial Electricity Authority
 - SHS ownership transferred to local governments (tambons)
 - Present
 - Warranties expiring
 - Systems failing
 - No long term (post warranty) plans
-

Groups involved with the SHS

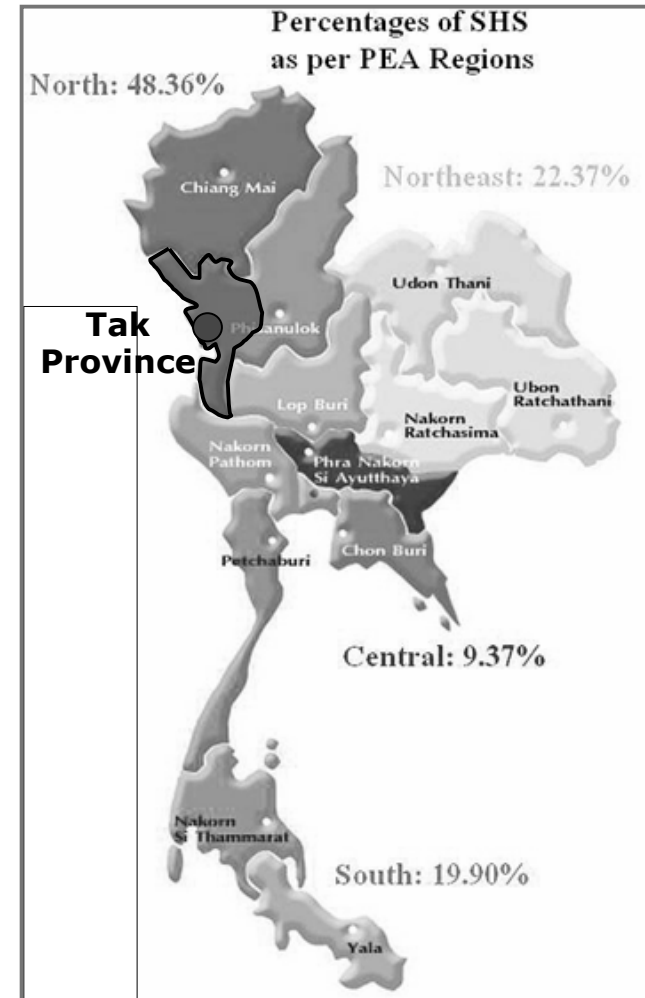


Common Problems with SHS



Location and Our Focus

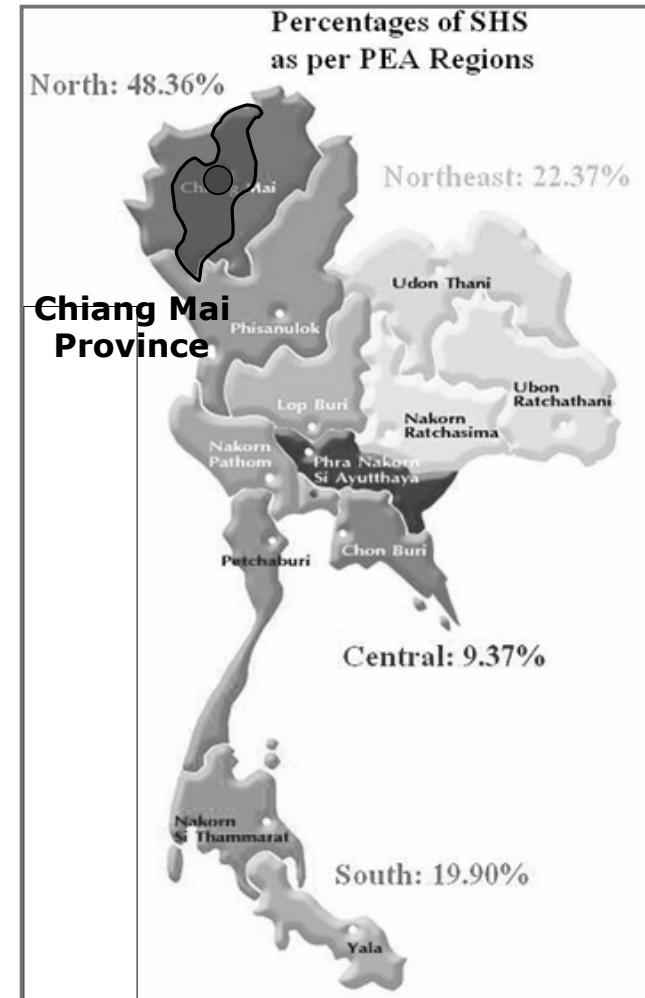
- Tak province
 - *Goudatah and Khun Huay Mae Thaw*
 - Karen Ethnic Minorities
 - Located in national forest



Source: PEA, May 2006

Location and Our Focus

- Chiang Mai province
 - *Hoi Som Poi 1* and *Hoi Som Poi 2*
 - Karen Ethnic Minorities
 - Located in national forest
 - Have micro-hydro



Source: PEA, May 2006

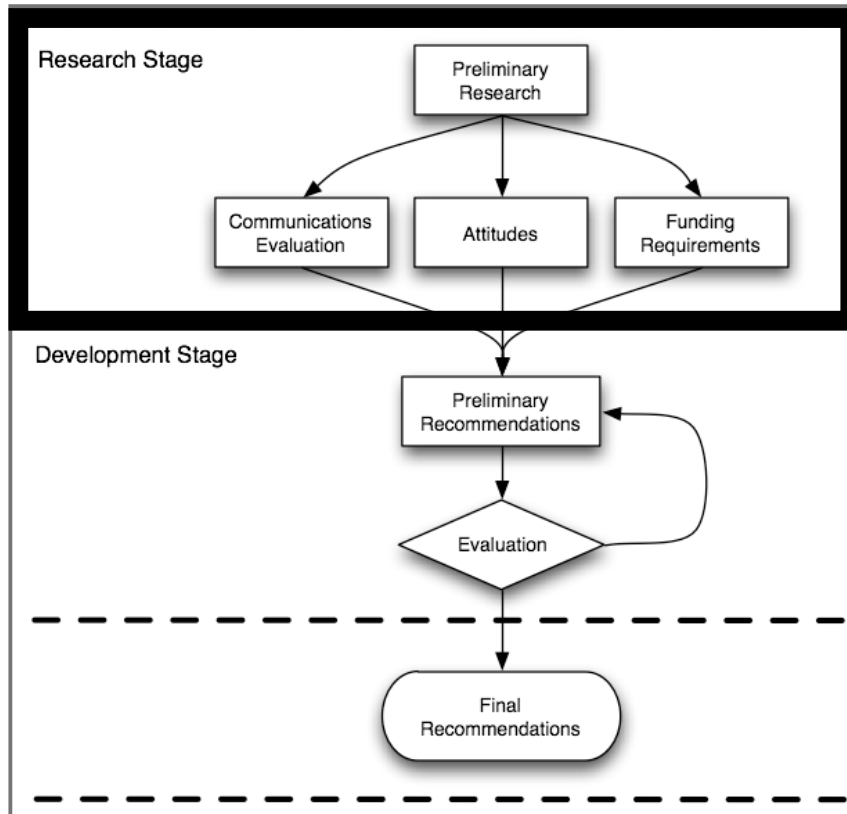
Research Questions

What are the weakest existing communication links and how can they be improved?

How do individual and organizational attitudes affect the sustainability of solar home systems?

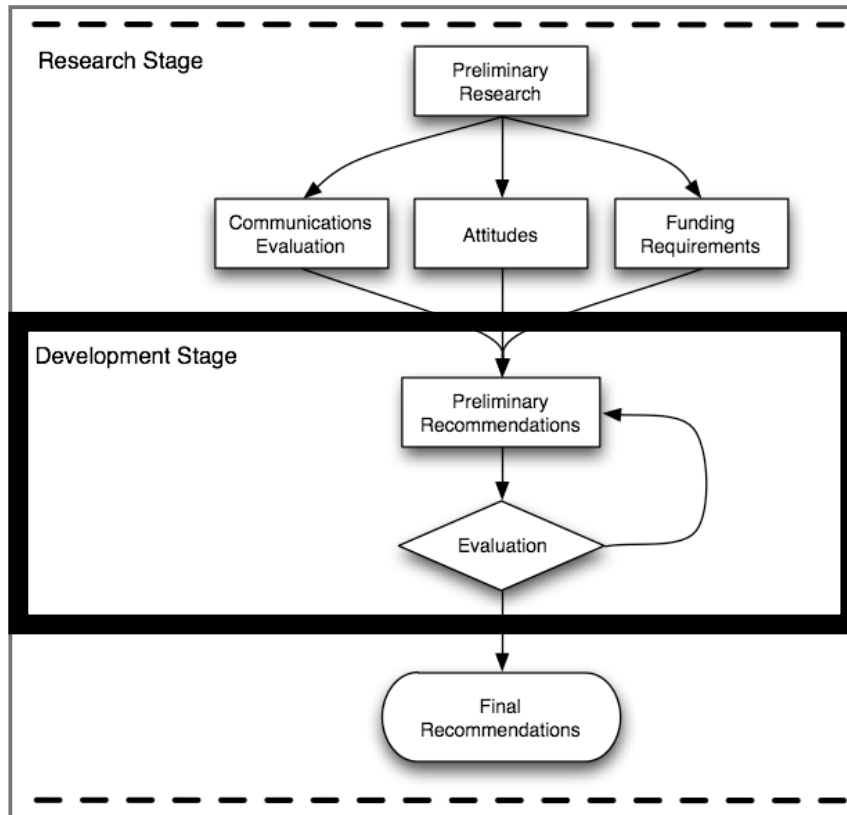
How can improvements in solar home system sustainability be funded?

Research Method



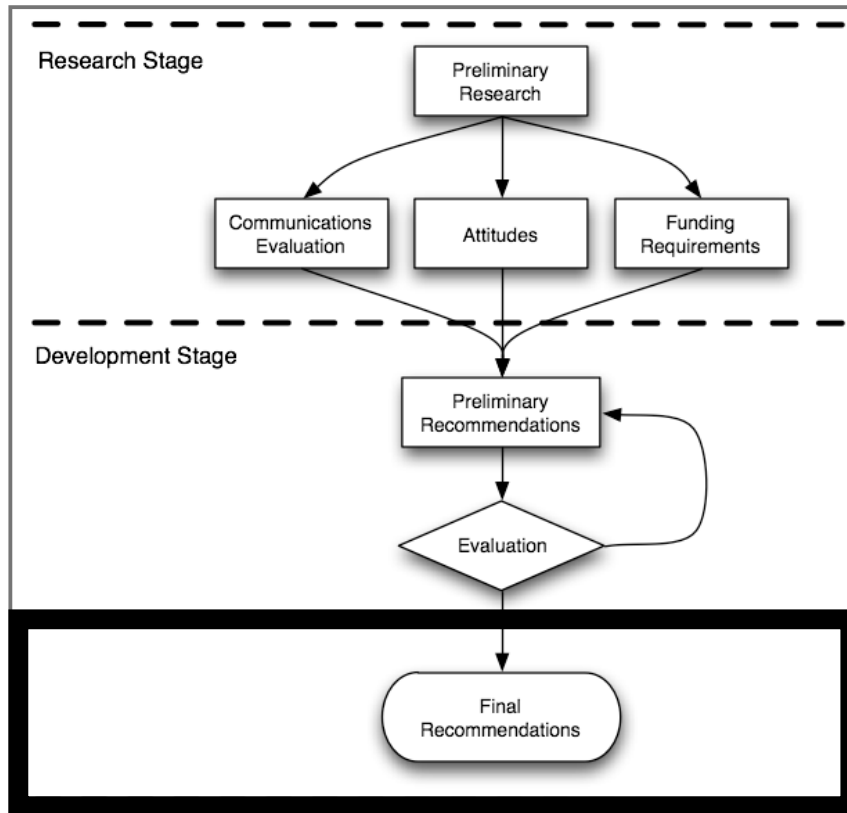
- Conducted semi-structured interviews
- Analyzed data using coding

Research Method



- Conducted semi-structured interviews
- Analyzed data using coding
- Developed recommendations
- Modified recommendations

Research Method



- Conducted semi-structured interviews
- Analyzed data using coding
- Developed recommendations
- Modified recommendations
- Presented final strategy

Interviewed Parties

- Tak Province
 - Nine users with:
 - SHS that had never failed.
 - SHS that had failed.
 - SHS that had been repaired.
 - Tambon SHS Representative
 - Local PEA Representative

- Chiang Mai Province
 - Nine users with:
 - SHS that had never failed.
 - SHS that had failed.
 - Tambon Engineer and President



Interviewed Parties

- Government Agencies
 - Provincial Electricity Authority
 - Department of Local Administration

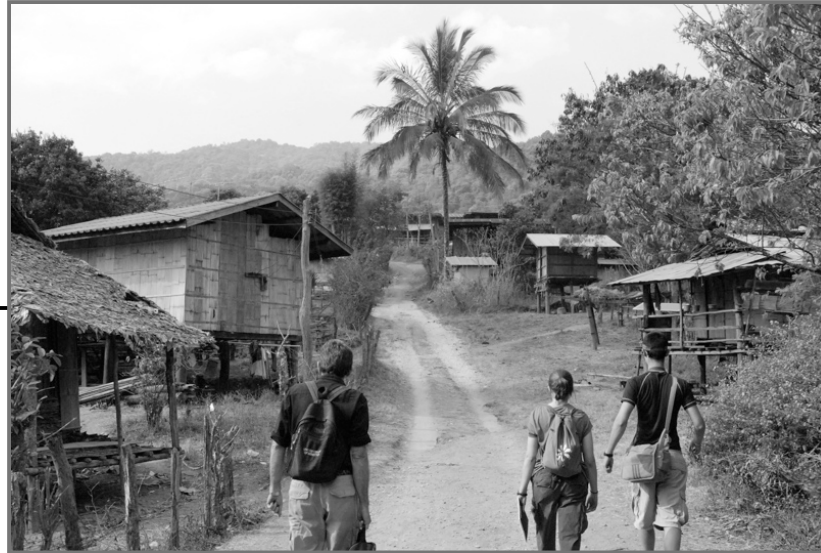
- Installation Companies
 - Solartron
 - Acumen



Consulted Experts

- Chris Greacen, Ph.D, director of Palang Thai
 - Herbert Wade, International Renewable Energy Consultant
 - Bruce Countryman, SHS Specialist
 - School of Renewable Energy Technology (SERT)
 - Dr. Wattanapong Rakwichian, Director
 - Dr. Prapita Thanarak, Head of International Cooperation
 - Jamal Gore, director of Carbon Clear
-

Findings

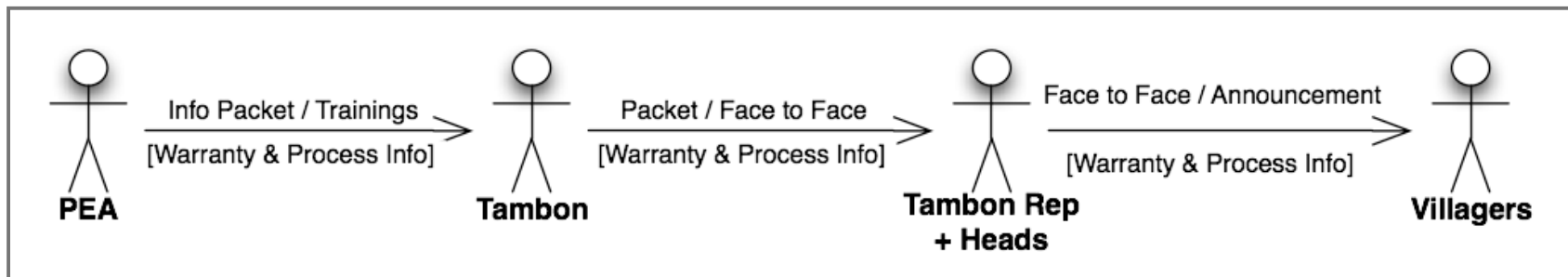


Communication Findings

Tambons have not been consistently trained and informed for the management of SHS.

Information on SHS maintenance, warranties, and procedures is not consistently and uniformly distributed among the villagers.

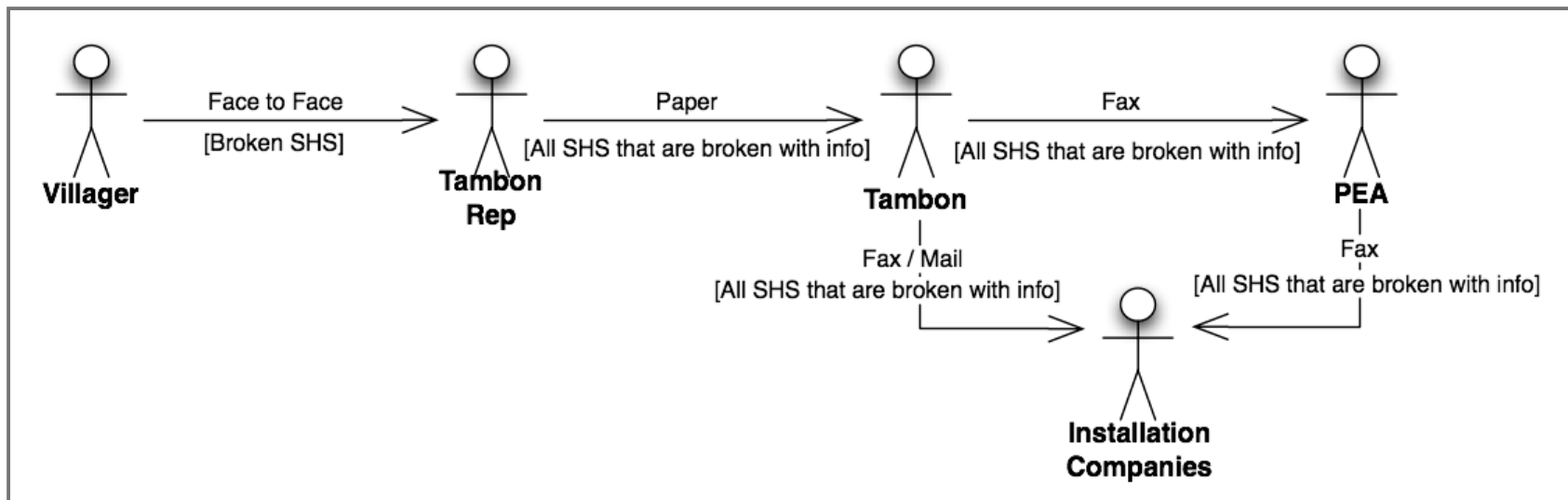
Warranty Information Distribution



Communication Findings

The standard procedure for following warranty requests is not always followed by the tambons.

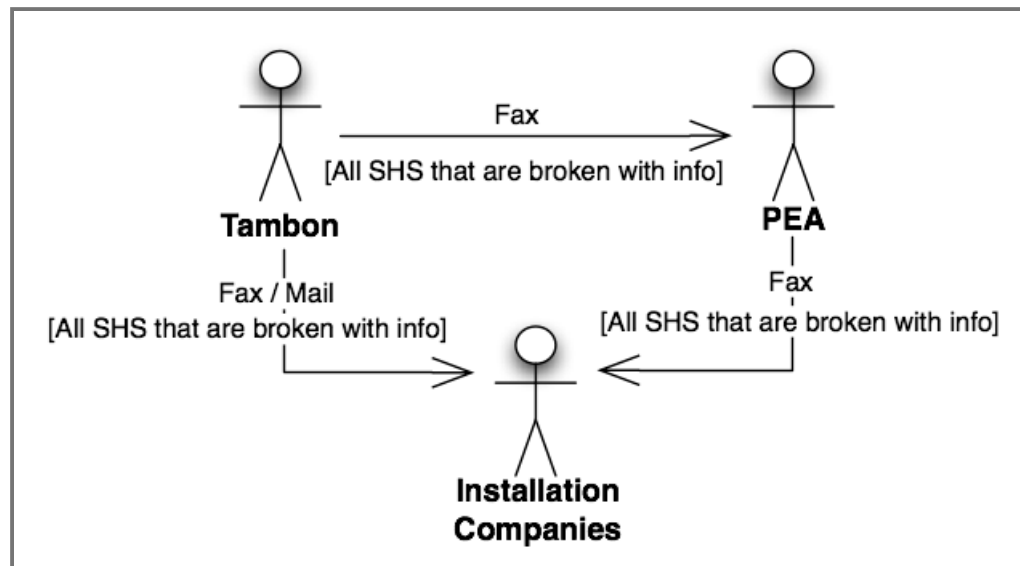
Warranty Request Process



Communication Findings

Information distribution pertaining to SHS may be facilitated by use of computers and internet.

Warranty Request Process



Attitude Findings

Villagers want the solar home systems to work.

*Sometimes I can't see with the candles.
When it isn't working I get frustrated.*

-Female Villager, Goudatah

Attitude Findings

Villagers do not urgently pursue repairs when their systems break.

The tambon representative said I needed to fill out a form. He didn't give me the paper and I never asked again.

- Male Villager, Hoi Som Poi 2

Attitude Findings

The villagers' opinion of the importance of personal responsibility for SHS maintenance and operation affects their willingness to subsidize each other.

*Each house is responsible for their own SHS ...
What if one house didn't take care of it well?*

- Village Chief, Hoi Som Poi 2

Attitude Findings

The tambons have many responsibilities, among which SHS are not their highest priority.

*I also plan roads, construction laws,
and wells for the Tambon.*

- Chan Khasm, Engineer
Doikeaw Tambon.

Attitude Findings

The Department of Local Administration wants to provide general recommendations to tambons but will not be directly involved.

*There is a new policy of decentralization.
Control is now at the local level.*

-DLA, Bangkok

Attitude Findings

The PEA is primarily concerned with the installation of the SHS.

We will no longer be involved once the two year warranties run out.

- PEA, Bangkok

Funding Findings

Villagers have limited resources for purchasing equipment and providing long term funding for the systems.

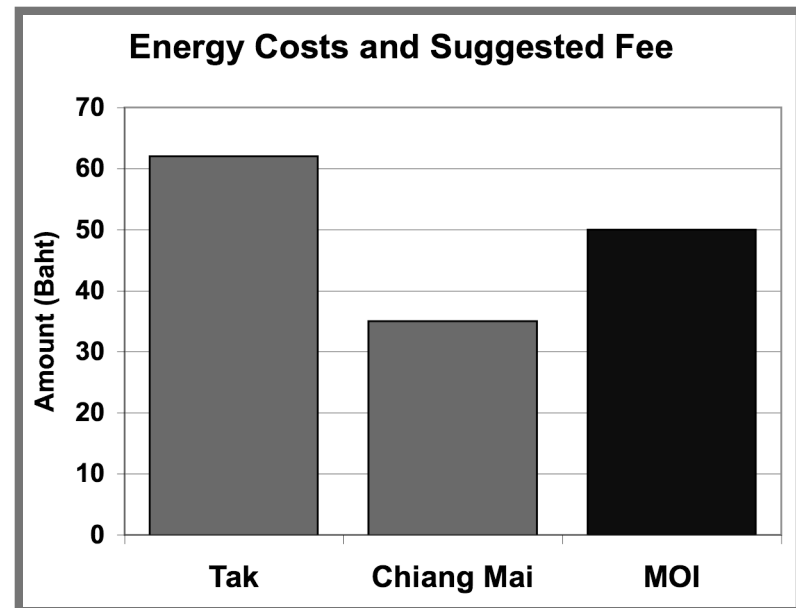
The national government is a possible source for funding solar home system sustainability.

Solar Panel: 25,000-35,000 baht

Battery: 3,000-4,500 baht

**Inverter/charge controller:
3,500-4,500 baht**

Source: Acumen Ltd.



Funding Findings

Carbon offsets cannot be the sole source of funding.



For one tambon: 1,933 baht a year

Themes



The implementation of the SHS program did not plan for sustainability

***Installation companies are not responsible
for the sustainability of SHS.***

Understanding and practice of procedures for communication vary between parties involved with SHS.

Higher level government agencies' perceptions of the SHS program are not always consistent with the actual situation.

There are individuals in the different parties that are actively interested in SHS sustainability.

BGET's efforts have made a difference for the SHS in the Tak Province.

Recommendations



Short Term Recommendations

The national government should hold additional training sessions for the tambons.

Tambons should contact villagers again to notify them about their warranty rights and procedures for filing claims.

Long Term Recommendations

A web application should be used as a centralized location for warranty requests to expedite the process of repairing malfunctioning SHS

A long-term maintenance program, funded by villages and the government, should be established in order to ensure regular maintenance and ongoing functionality of the SHS

Long Term: Web Application

- Centralized location for warranty requests.
- Improve warranty accountability.
- Improve system status awareness.
 - Locally: Improves repair scheduling and efficiency
 - Nationally: Alerts government to SHS statistics
- Provide infrastructure for repair requests beyond the warranty period.

Thai SHS Project					
Listing solar home systems					
First name	Last name	Serial number	Installation date	Group	House number
นายสุขคำ	ใจภักดิ์	1	2005-05-17	11	50
นายสมชาย	ชุมภูชา	2	2005-05-17	11	54
นายสมพงษ์	นาใจ	3	2005-05-17	11	89
นายประสิทธิ์	สายวงศ์เดียน	4	2005-05-17	11	146
นายเสกสรรค์	วรรณคำ	5	2005-05-17	11	156
นายอินทร์	พุดวงค์	6	2005-05-17	11	160
นายบุญมา	อุสาสาร	7	2005-05-17	11	129
นายคำ	ณ.สาร	8	2005-05-18	11	157
นางประภากรณ	จิณ	9	2005-05-18	5	235
นายทองสุข	กำจัด	10	2005-05-18	5	236

[Next page](#)
[New solar home system](#)

Long Term: Web Application

Logged In: Test User

Thailand Solar Home Systems

[Welcome](#)
[Request Repair](#)
[View Repairs](#)
[View_SHS](#)
[View Statistics](#)
[Edit Account](#)
[Logout](#)

New Repair Request

Search by Serial Number

Serial Number:

Search by Village

Village:

Copyright 2007 - Border Green Energy Team : Created by - WPI Solar Sustainability Team



Logged In: Test User

Thailand Solar Home Systems

Solar Home Systems in Village: แม่หลวง

House Number	First Name	Last Name	Serial Number	Installation Date	
1	ส่วยเช	อัครินภูเขา	001764290504	2004-08-01	Request Repair
1	พะดา	มรดกบรรพต	028638131104	2004-11-21	Request Repair
3	แตงดา	ทะเลสิงขร	028633131104	2004-11-22	Request Repair
4	ติอณา	ไพพรพลลภ	028335121104	2004-11-22	Request Repair
7	อี่แม่	มังกรแดนไกร	028493131104	2004-11-21	Request Repair
10	พะนอ	ทะเลสิงขร	028495131104	2004-11-21	Request Repair
13	ดิพละ	วิทยาศรี	028338121104	2004-11-22	Request Repair
15	จะตอย	รักแผ่นดิน	028379121104	2004-11-21	Request Repair

Long Term: Web Application

Thailand Solar Home Systems Logged In: Test User

New Repair Request

Found matching solar home system...

First Name: พะดา Last Name: นรตบธรรมพด
Serial Number: 028638131104
House Number: 1
Village Name: มทข

Solar Cells Failed?
Comments:

Charge Controller / Inverter Failed?
Comments:

Battery Failed?
Comments:

Warranty Status

Installation Date: 2004-11-21

Battery / Lights: Expired for 94 days
Inverter / Controller: 271 days left
Solar Panel: 1002 days left

Long Term: Web Application

Thailand Solar Home Systems

Schedule Repair

Scheduled Date:

Technician:



Thailand Solar Home Systems

Repairs

[Active Repairs](#) | [Pending Repairs](#) | [Scheduled Repairs](#) | [Completed Repairs](#)

Repair Status	Requested Date	Scheduled Date	
Requested	2007-02-22		Show Details
Requested	2007-02-23		Show Details
Scheduled	2007-02-23	2007-02-23	Show Details

<http://www.thaisolarhome.com>

Long Term: Maintenance Program

- Technician(s) in every village
 - Technicians Provide
 - SHS Information
 - Fee Collection
 - Monthly Checkups
 - Regular system maintenance
 - Addresses lack of urgency
 - Decreases failures



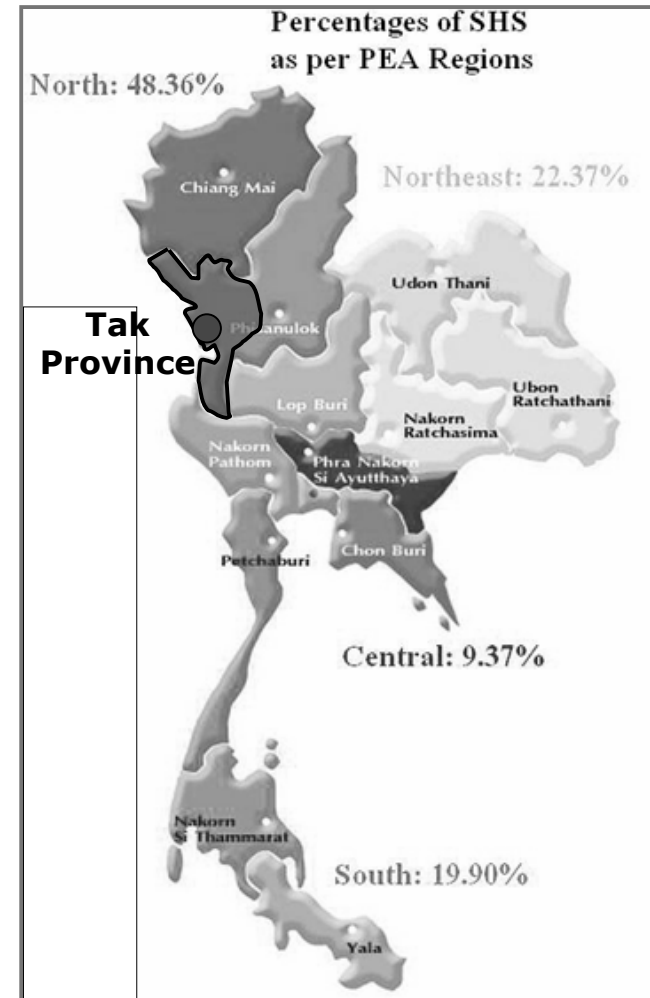
Long Term: Maintenance Program

- Villager funded
 - Affordable monthly fees
- Ministry of Interior subsidized
- Implemented at the tambon level
 - Combine village resources



Long Term: Implementation

- Pilot Program
 - In Tak Province
 - Sponsored by BGET
 - Funded by Carbon Clear



Future Research

A comprehensive survey of all the SHS in Thailand should be completed

The training of refugees as SHS technicians should be investigated

End Result

***A strategy for the improvement of
solar home system sustainability***

Acknowledgements

- **Our Sponsor Dr. Chris Greacen, Director, Palang Thai**
 - The Border Green Energy Team (BGET)
 - Miss Salinee Tavaranan, Project Director
 - Yotin Pupaolan, Technical Staff
 - School of Renewable Energy Technology (SERT), Naresuan University
 - Assoc. Prof. Dr. Wattanapong Rakwichian, Director
 - Dr. Prapita Thanarak, Head of International Cooperation
 - Bruce Countryman, PV Specialist
 - Herbert Wade
 - Jamal Gore of Carbon Clear
 - The Provincial Electrical Authority (PEA)
 - Mr. Narin Doknark
 - The Department of Local Administration (DLA)
 - Mr. Oi Chai
 - Solartron
 - Mr. Somsak
 - Acumen
 - Mr. Sutee Tunpao
 - Dr. Supawan
 - Chulalongkorn University
 - Worcester Polytechnic Institute
-

Questions?

