



Rural Electrification using Solar Home System: Towards Better Sustainability for Rural Community

Presented by:

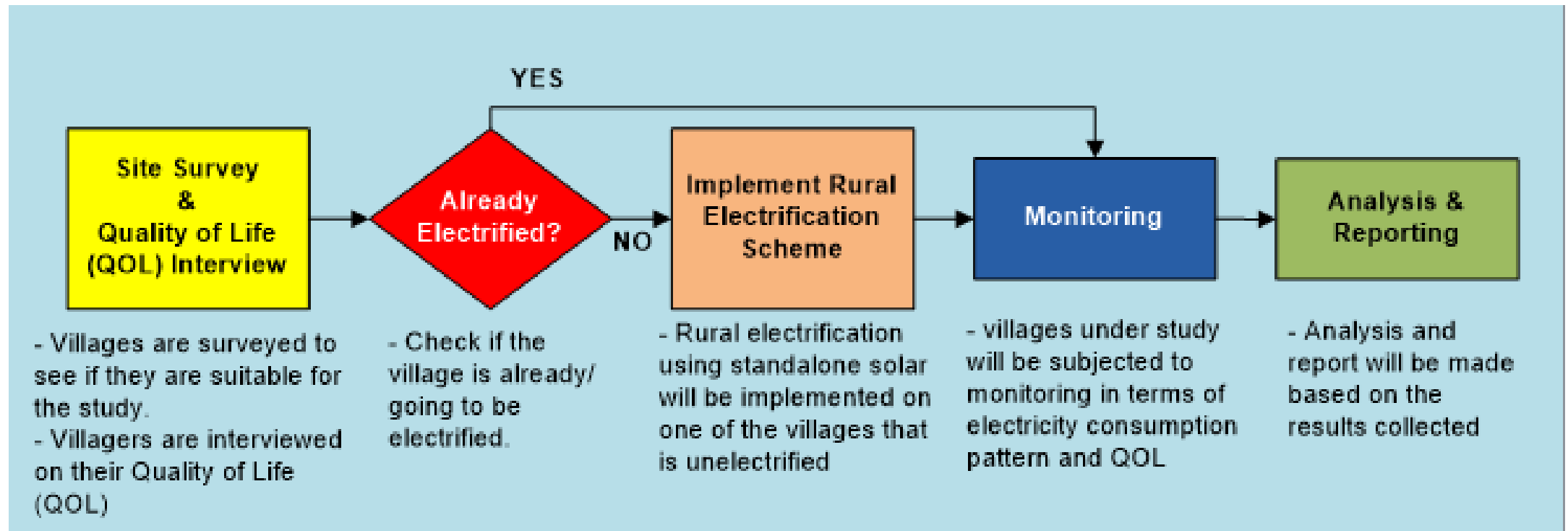
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Project Background

- This is part of an on-going collaborative research between University of Malaya and Kyoto University.
- To study on rural electrification for remote aboriginal communities, particularly the *Iban* Community in Sarawak.
- Activities supported by several funding such as:
 - UM High Impact Research Grant
 - JASTIP grant
 - UM Cares Community Research Grant

Project Background

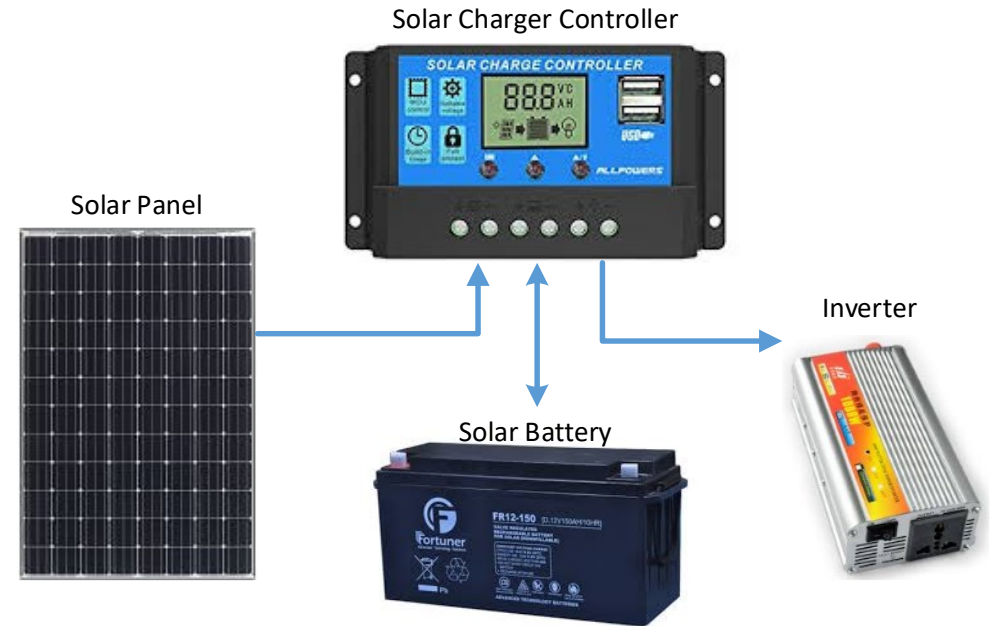


- A) Study on the Quality of Life based on survey conducted before and after rural electrification
- B) Study on the rural electrification schemes that can have improved sustainability and impact

Types of Rural Electrification Schemes in Malaysia

Technology	Investment	Operation and Maintenance
Grid extension	State Utility Company	<ul style="list-style-type: none"> State Utility Company responsible for O&M Community pay for usage
Diesel/Gasoline Genset	Government Agency	Government Agency
	Community	Community
RE Systems (Solar/hydro)	State Utility Company	<ul style="list-style-type: none"> State Utility Company responsible for O&M Community pay for usage
	State Utility Company/ Private/NGO	<ul style="list-style-type: none"> CSR based, usually one-off Some might have maintenance for short durations (1-2 years) after installation
	Community	Community

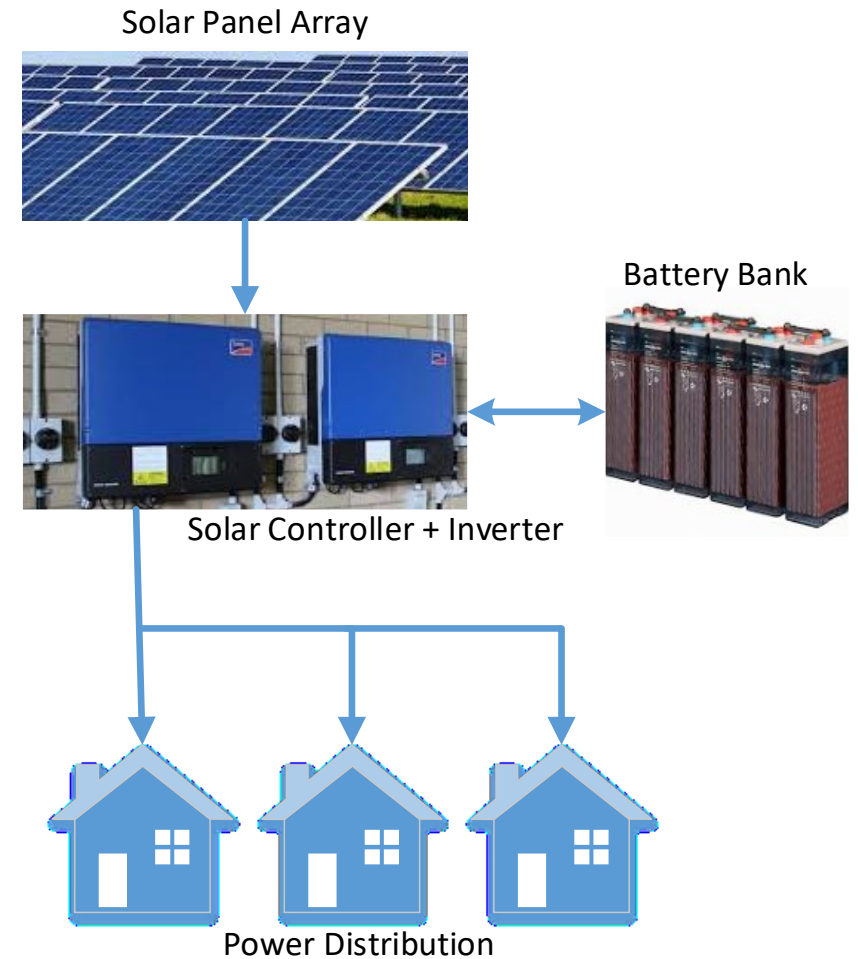
Solar Home Systems (SHS)



- Smaller system that caters for single household
- Individual (or single family) ownership
- Usually around 300W-1kW
- Less expensive to maintain
- Less optimized usage of components

Centralised Solar System (CSS)

- Bigger system that caters for multiple households
- Collective ownership
- Usually $\gg 1\text{kW}$
- More expensive to maintain
- Better usage of components
- Possible to drive higher power loads

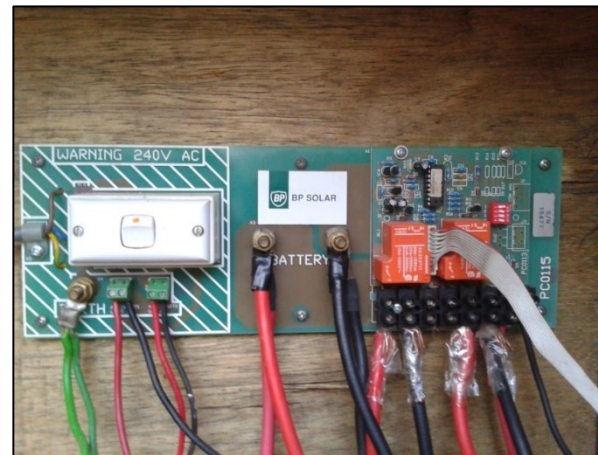
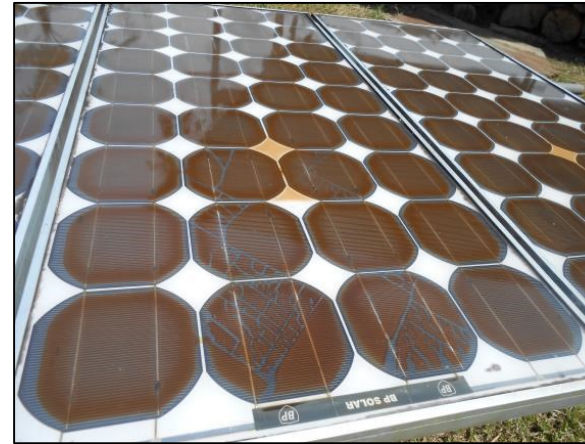


Surveyed Rural Electrifications Projects Using Solar Energy

Village	Location	Solar System	Duration	Status
Long Pasia	Sabah	SHS	< 5 years	intermittent
Kpg Meganik	Sabah	SHS	< 3 years	intermittent
Kerangas	Sarawak	SHS	< 5 years	abandoned
Lawin Selatan	Perak	SHS	< 5 years	abandoned
Rh Manggat, Batang Ai	Sarawak	SHS	2014-??	N/A
Jenggin, Batang Ai	Sarawak	SHS	2016 - ??	N/A
Lubuk Antu, Batang ai	Sarawak	SHS	2016 - ??	N/A
Sarawak Forest Cooperation	Sarawak	CSS	2016-now	working
Kampung Sungai Merah	Sarawak	SHS	2017-now	working

Main Causes of Premature Failure

- 1. Low quality system**
- 2. Lack of ownership**
-> lack of care
- 3. Lack of knowledge**
-> misuse/mishandling
- 4. Lack of funding**
-> unable to replace faulty component

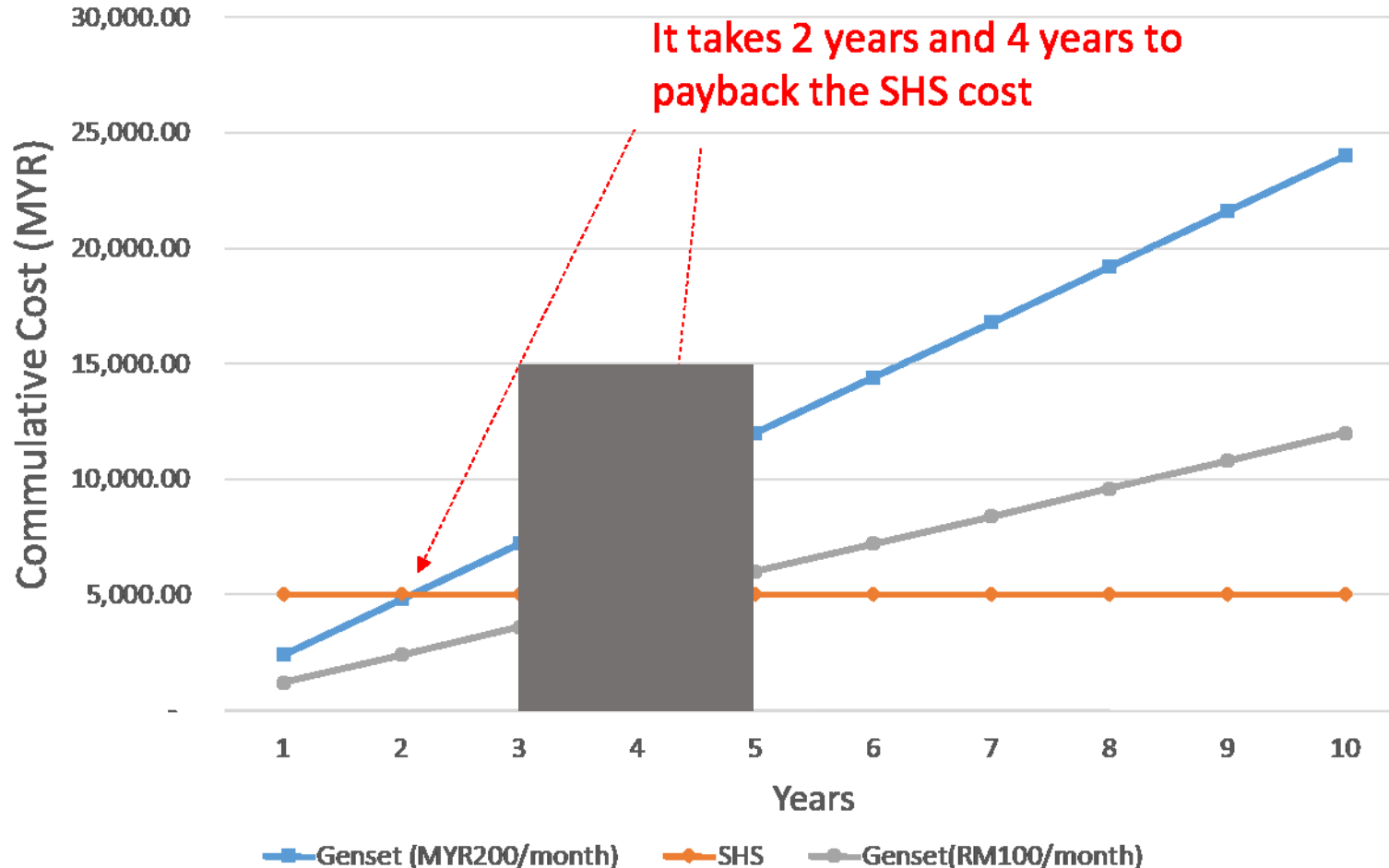


Serious Sustainability Issues in One-off SHS for rural electrification

Simple Payback Period of SHS

- Most existing rural communities rely on Genset for electricity.
- Based on the survey, the operation time for Genset is 6-10pm, i.e. 4 hours.
- The survey feedback fuel consumption cost of MYR100-200 per month.
- Assuming 1 TV, 2 fans and 4 lights in a rural household, running with 2 hours, 3 hours and 4 hours respectively, the daily energy consumption will be 840 Wh.
- This is equivalent to a 300Wp SHS with one 12V 1000Ah battery.
- The cumulative cost of Genset fuel versus that of SHS

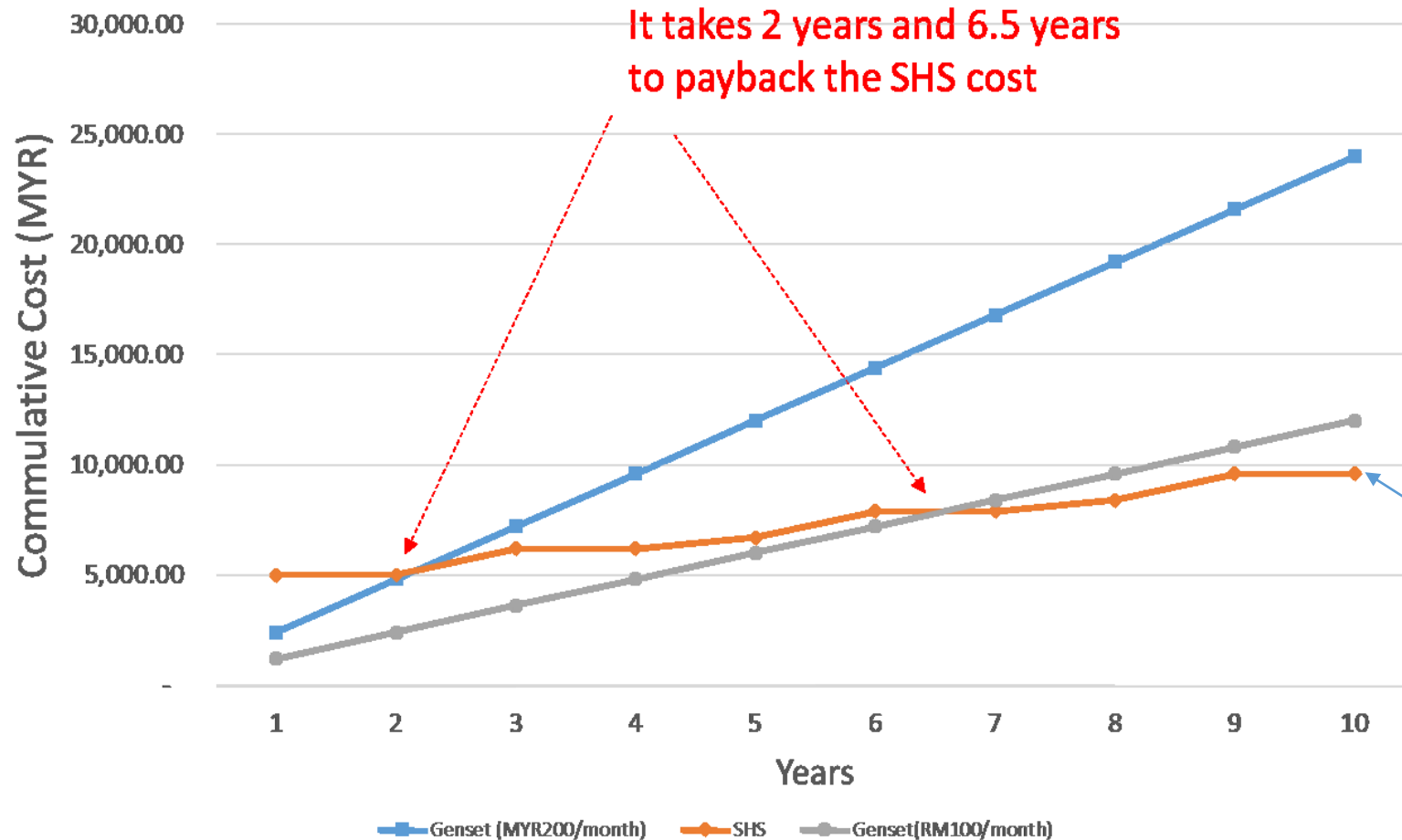
Simple Payback Period of SHS



4kVA Genset at 0.9 L/hour
Gasoline at MYR 1.93/L
Daily cost of MYR 6.95 (4 hours)
Yearly cost of MYR2536.02

Assuming One-off MYR5,000
cost of 300Wp SHS
(transport and installation
cost excluded)

Simple Payback Period of SHS



Prerequisites:

- 1) Initial system cost of MYR5,000
- 2) Battery replacement at MYR1,200 every 3 years
- 3) Inverter/charge controller replacement at MYR 500 every 5 years

Simple investment cost has almost doubled

Installation at Kampung Sungai Merah

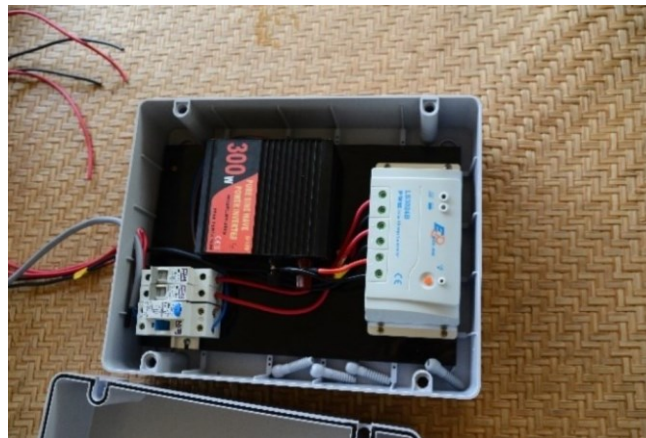
Consultation with villagers prior to installation

Consent on Fee-collection System

Involvement of villagers in the installation process

Explanation and training on operation and trouble shooting of the SHS

Continuous monitoring



Conclusion and Future Works

- Rural electrification is important, as per the SDG Goal 7 “Affordable and Clean Energy”.
- However, the issues of sustainability need to be considered and factored in as part of the project cost from day 1 of the planning stage.
- The rural electrification plan should be accompanied by an economic-uplift plan, to help reduce the living cost or improve income gain for the community.
- Purely one-off system needs to be avoided.

**THANK
YOU!**

A thick, orange brushstroke underline is positioned below the word "YOU!".