Sevea is a Cambodian consulting company offering strategic and operational support to Corporations, Organizations, Projects & Social Entrepreneurs that seek to develop their impact strategies in the Water & Energy sector and/or engage with BOP markets. Since the beginning of this project, one of its objectives is to measure the impacts and the development brought by a 100% solar electrification of a rural village. To make sure that this could appropriately be measured, the Solar Energy Foundation worked with Sevea to define an appropriate methodology for the monitoring, evaluation and impact assessment of this project.

Solar Energy Foundation works for rural development and poverty alleviation by providing solar energy in rural and marginalised areas worldwide. Their aim is to provide full power access with reliable maintenance and after sales-service. Their role in this project is to fund the solar village and assure the coordination.

NRG Solutions is a Cambodian social enterprise providing sustainable and affordable energy to rural areas. In this project, their role is to install Solar Home Systems in the households, and put in place a reliable service for the operation and maintenance of the systems.

Camkids is a Cambodian NGO helping children in Cambodia who are either poor or whose parents are not there for them. Their role is to understand the needs of the targeted community and to identify how to integrate solutions in the community. This is what they have already done in Chbar Chros for years with the development of education infrastructures. They are the local presence of the project in the village.
Solar electrification in a village of 112 households with an affordable energy solution for all.

- Alleviation of poverty by improving education and health access with solar energy:
  - **Household level**: lighting kit affordable due to strong subsidies and 15 months installment
  - **Community level**: solar solutions for public infrastructures donated by the foundation

- **Pay-As-You-Go** (PAYG) training of the local solar company about this new payment technology
- **Maintenance and after sale service** guaranteed by the local solar company Kruosar Solar

### Results overview

- **Households electrified**: 81
- **Monthly instalment for households**: $2

**Greatest benefits** from the project: local people point of view 8 months after the project

- **Households**: decrease of energy expenses
- **Community**: health & job creation
- **Kruosar Solar**: company development
- **Environment**: carbon emission reduction

### Village description  Before the project

#### Activities
- **99%** Households are rice farmers

#### Economics
- **$156** Average monthly income per family

**$9** Average monthly energy expenses

#### Energy behavior
- **83%** Lighting systems were bulbs plugged to a car battery
- **60%** Households charged the battery once a week, $0.4/charge, 1.3 hours/charge

#### Education
- **71%** Households sent their children to school
- **36%** Parents are illiterate

#### Public infrastructures: financed by Camkids, the local NGO
- Clinic for basic illness care and monthly dental activity
- Accommodation for Camkids’ staff
- **1 School**
- **4 Classes**

### Assessment methodology

This impact assessment is based on a **Before / After** analysis. An initial assessment was done prior to the beginning of the project.

- **Statistical method**: Simple Random Sample
- **Population Size**: 112 households
- **Confidence level**: 90%
- **Confidence interval**: +/-10%

**Sample**: 41 households.
- **1st Assessment**
- **41 households surveyed**
- **2nd Assessment**
- **38 same households**
- **+5 new households**
**Social Impact**

**Lighting Comfort**
- +2 lights per household
- Average number of indoor lights (candle, kerosene lamp, bulb) used by a family: 1.6
- Better quality of light
- Entire village has access to electricity
- Assurance to have light at home every night

**Service Comfort**
- Time saving: 1h20/month
- Effortless: not necessary anymore to carry the battery
- Time saving: The process to pay and activate the system is easy & fast

**Education**
- 8% of the households quoted education as the greatest change of the solar village
- Twice as many students sleeping at the school because of light and entertainment
- English classes by night thanks to a better light. Before a noisy generator was used.
  - Facilitate & boost future job application

**Security**
- +31% increase in security
- 100% of the households are feeling safer
- Walking by night is safer due to streetlights and lights from homes
- Security guards: team led by the local solar technicians to ensure the security of the village and the solar installation by night

**Health**
- 2 Fridges for the clinic
- 1.3kW Solar power
- New medical services will be developed by Camkids:
  - Vaccines: access planned for 1000 people
  - Extension of the clinic scheduled to offer new medical services to more people
SROI

**Energy expenses**

- **Households:** 51%
- **Community:** 23%
- **Kruosar (Solar):** 21%

- **$106** per household per year
- **$63** per household per year

- **92%** using a car battery
- **37%** using a solar battery

- **$6,720** reduction in energy expenses per year
- **$21,870** subsidy for lighting kits
- **$7,604** subsidy for public infrastructures

- **Fixed installments:** Turning it easier for households to manage their budget

**Energy savings:**

- **$6,720** on energy expenses per year for the 81 households
- **$21,870** subsidy for the lighting kits
- **$7,604** subsidy for public infrastructures

**Sustainable Energy for All:**

- Before the project, 52% of households had only access to 1 light or no access at all
- After the project, 100% of households have more than 2 lights

**Financing options**

- **1 time payment:** $300
- **PAYG:** $20/month
- **PAYG + Subsidization (Solar Village):** $2/month

- **Budget for households:**
  - 34 months of energy expenses
  - 2.3 months of energy expenses
  - 0.23 month of energy expenses

- **Households reached**

**Job creation**

- Installation, basic maintenance & system activation
- Payment Collection

- **Training of 2 local technicians**

- **$40 Additional Salary** per month per technician (+26% of the average monthly income per family)

**Better solar recognition** in the village

**Impacts:**

- **Households**
  - $6,720 reduction of energy expenses
  - $21,870 new property for households (lighting kit)
- **Community**
  - $1,200 technicians salary
  - $4,350 Health & Security
  - $7,604 infrastructures
- **Kruosar Solar**
  - $6,195 development & capacity building
  - $5,420 PAYG training
- **Environment**
  - $2,797 value of the ton of CO2 emissions avoided

**SROI (Social Return On Investment):** A measure of how much social & environmental impact is created for every dollar invested into the project

**1.64**

- $1 invested → $1.64 social impact
ENVIROMENTAL IMPACT

**CO₂** 15.6 Tons of CO₂ emissions avoided per year

**Solar energy produced** 9,630 KWh/year

**Waste**

1. **Bulb waste**
   - Bulb waste used to end in the environment. Now they are collected by Kruosar Solar

2. **Toxic electronic and battery waste**
   - Electronic components and battery fluids are collected but recycling is not guaranteed because technical solutions are not available in Cambodia

3. **Raw materials**
   - Even if the solar panel is recycled, the electronic components are made from rare and non-renewable metals that can not be recycled

**Reparability**

1. **92% Kruosar Solar on-site-intervention**
   - Kruosar Solar is able to fix the small technical problems locally but relies on warranty from suppliers when the lighting kit has a default

2. **Life Time**
   - **20%** The led lights last 20% longer than the one available on the market
   - **X2** lifetime of the battery of the solar home system is 2 times superior than the ones on the market

**Video presentation** on Youtube, “Cambodia’s First Solar Village” : https://youtu.be/BKh30802H3g
"My name is SOL LENG, I am the solar village technician..."

"...I live in a rural village in Cambodia. The only electricity access we used to have was bulbs plugged to car batteries. The Solar Village project brought an affordable and high-quality solar solution in the village. It impacts our day-to-day of life. Let me tell you my story!"

SOL LENG

46 Years old
Daily Job
Sugar palm and rice farming

"...During the installation, as I had some background for electrical installation, I volunteered to assist the installation team. When they asked me to be technician for my village, I immediately accepted."

"...I am the local contact of the solar provider."

I inform NRG about problems and new customers opportunities

They train me and let me spare parts for basic maintenance

They send me codes for system activation

"I am in charge of the basic maintenance..."

Spare parts (bulbs, charge controller, wires) at my home

To change a bulb

To obtain and a new charge controller

"...and the payment system to recover the money and activate the lighting kits."

I inform the village about the coming payment

Each household pays $2

After 15 months all the households own definitely their lighting kit

"What I have gained from the Solar Village"

$40 Additional monthly salary

New skills developed

Pride: recognized by the village as the solar supervisor

"During the installation, as I had some background for electrical installation, I volunteered to assist the installation team. When they asked me to be technician for my village, I immediately accepted."

Meeting with the technician

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Meeting with the technician

"What I have gained from the Solar Village"

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New skills developed

Pride: recognized by the village as the solar supervisor
“My name is Phorn Chouch,...”
“...6 months after the installation, we signed up for solar.”

“We did not choose to go for the solar at the first installation. But we saw the brightness in the village and how people were happy about the system. All my friends told me life is easier with no battery to charge. So we signed up for solar!”

Relief for the young boy who used to charge the battery
Family convinced by the lighting kit

“My name is Chhoeurng Chhun,...”
“...I work less and spend more time with my family.”

“Before the project, my wife and I had to work at night for sugar farming with head lights. With the lighting kit, we now save time because of better conditions and our children can stay with us and are proud to help us.”

Saving time for parents
Children proud to help

“My name is Ek Shantha,...”
“...I have opened a new shop with my family.”

“There are only a few shops in the village, and they used to close very early. Yet since we had new lights, I have decided to open a shop to sell food even at night. Now I am able to generate an additional income for my family.”

Ancillary income
New night time services available

“We are proud to change the life of the village”

PHA NIPIDOUR
Solar Village project manager from Kruosar Solar

“I learned a lot from this mission. I had to manage the payment system. With the entire team, we overcame challenges and are now able to use an innovative payment service.”

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