Decentralised Renewable Energy Solutions to strengthen public health facilities

SELCO Foundation in partnership with
State Health Department Manipur

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Background and Need

Stronger primary health care systems are essential to achieving Sustainable Development Goal 3 (SDG3) which aims to ensure healthy lives and promote well being for all, of all ages, including through universal health coverage. This in turn affects the attainment of other SDGs. Primary healthcare systems in rural, remote and vulnerable contexts often lack the resources integral to provide affordable, accessible, quality healthcare.

Reliable and affordable electricity access, alongside appropriate medical and electrical appliances contributes to increased efficacy and impact of healthcare provision. The need for energy is critical when it comes to storing vaccines; using medical equipment such as baby warmers, suction apparatus and lighting especially during deliveries; powering diagnostic services and accessing basic lighting and communication for regular operations. With the onset of the COVID 19 pandemic, it has become extremely important to strengthen the primary health care system and equip health facilities with independent, reliable energy access. Strengthening cold chains for vaccines in the last mile, for example, is critical to curbing the spread of COVID 19 and containing the pandemic.

Manipur in North East India, given its difficult terrain and hilly geography, faces a combination of energy poverty, resource constraints and climate and disaster risks that adversely affect the population's access to healthcare in the last mile. 80% of the 3.1 milion population in Manipur reside in rural, hilly areas and depend on public health centers. Close to 17% of health facilities remain unelectrified while 29% face regular power cuts, and are dependent on diesel with implications on costs. The state is particularly prone to landslides, heavy rains and floods, disrupting access to the main hospitals or larger heatlh facilities in the district.

Given the Manipur context, the role of independent, decentralized and reliable energy systems becomes increasingly significant.
Decentralized solar energy systems, powering energy efficient appliances can contribute significantly to creating more resilient health systems in an efficient manner, enabling health staff to better deliver services to last mile communities.

About SELCO Foundation:

Established in 2010, SELCO Foundation's mission is to develop holistic solutions that use sustainable energy as a catalyst to address poverty alleviation alongside ensuring environmental sustainability. SELCO's interventions enable the delivery of essential services such as healthcare and education, and enable improvements in livelihoods productivity, impacting more than 5 million people across 12 states in India. It also works with key stakeholders to build the ecosystem for long term sustainability of these solutions and to enable their adoption and scale.

SELCO Foundation's efforts broadly include:

1. Inclusive innovation and implementation of holistic technology- finance-ownership models based on a clear understanding of end-user needs
2. Ecosystem building on aspects of financing, skills, policy and entrepreneurship for interventions to be sustainable in the long run
3. Incubation of grassroots level clean energy enterprises and local technology enterprises to enable decentralization of services at the last mile
4. Replication of learnings and sharing of knowledge across regions and contexts.

Specifically on healthcare, the Foundation has worked across levels within the health system, with sustainable energy and efficiency interventions at around 800 sites in the Health Value chain including Anganwadis (child care centers), Primary Health Centers, Sub centers, NGO-run hospitals and mobile health units, reaching more than 3 million end-users across 12 Indian states.

Integrating sustainable energy for improved healthcare delivery: SDG7 for SDG3

The National Health Mission of Manipur and SELCO Foundation, along with key health and energy partners have embarked on a mission to strengthen primary healthcare in the state with improved energy access. The goal of the program is to make the delivery of health services reliable and sustainable through climate resilient, energy efficient and clean-energy driven solutions for public health infrastructure. The objectives include:

- To prove a model for the State on SDG7 and SDG3 integration by showcasing DRE solutions with efficient appliances in 11 public health facilities across 6 districts of Manipur district. The first phase is to inform the design of the next phase which would include DRE interventions across 100 health-centres in Manipur
- To develop templates, processes for procurement, training on ownership and management, which would equip SELCO Foundation and NHM, Manipur to scale up the solutions across different health facilities in the State

The program covered the following components:

1. **Health-Energy assessments:**

These are employed to better understand health-energy gaps at the health facility through consultations with staff and patients.

1. **Appropriate design, implementation (efficient equipment + decentralized solar systems):**

Based on service needs identified, the intervention is designed as a combination of efficient medical, electrical equipment, powered by decentralized solar energy. The services and relevant energy systems include:

- Medical-care and basic diagnostics: lighting for operations, energy for microscopes, instrument sterilizers, Non-Communicable Diseases kits.
- Maternal and Child-care: Suction machines, baby warmers; Refrigerators and deep freezers for vaccines.
- COVID-19 preventive and therapeutic care: Energy and built environment for space heating, cooling; basic energy for testing, quarantine facilities; Cold chains for vaccine storage and delivery.
- Basic administrative services: General needs including lights, fans, computers, mobile charging etc.

As part of the program, we work closely with health partners to identify, procure appropriate, efficient equipment from technology suppliers.

1. Ownership, maintenance and capacity building, includes engagement with
    a. health partners, facility staff to ensure ownership, proper equipment utilization
    b. local energy enterprises for regular maintenance and servicing
    c. health officials of local, state government for strong ownership of assets, leverage of funds towards capex and committing fund allocation towards system upkeep.

The following pages showcase the completion of the first phase of the program, which includes implementation of DRE and Energy Efficient interventions across 11 health centres.

District Hospital Ukhrul

Health Centre : District Hospital Ukhrul
District and Location : District Hospital Ukhrul , Ukrul, Manipur - 795142
Population served: 200000

38	268	16000	1818	364	2-6
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	3180W
Max units(kWh) of energy usage per day	29.450 KWh

No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	15+18
2	Solar Battery	200 Ah, 12 V	16+20
3	Solar Inverter/PCU (Sys 1)	6 kW, 96 V	1
4	Solar Inverter/PCU (Sys 2)	7.5 kW, 120 V	1
5	Suction Apparatus		1
6	Spotlight		1
7	Radiant Warmer		5
8	Phototherapy		3

EFFICIENT ENERGY CONSUMPTION: 14.72 KWH — 49.59% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 30.42 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹ 2,182,844 — 44.68% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹ 3,946,000

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 9983.5 gm — 49.59% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 20628.15 gm

EFFICIENT ELECTRICITY CHARGES : ₹ 8540.5 — 50% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹ 17646

Pictures of District Hospital Ukhrul

A view of District Hospital Ukhrul which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered Cold Chain

Solar powered laboratory

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer, phototherapy, Suction Apparatus, Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at Ukhrul District Hospital

Solar System

Sl. No.	Products	Capacity	Quantity
1	Solar Module	330 Wp, 24 V	33
2	Solar Battery	200 Ah,12 V	36
3	Solar Inverter	6 kW, 96 V 7.5 KW,120V	2

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	5
2	Phototherapy	3
3	Suction Apparatus	1
4	Spotlight	1

Medical Superintendent

Ukhrul District Hospital

Medical Suprindentent
District Hospital Ukhrul
Manipur

"We keep an ILR in the Immunization Room. This ILR needs constant electric supply, without which there are chances of our medicines (vaccines) going bad. Also, even if we have a generator, at times when we are not present, we are unable to use it. Now that solar power has come, we are very happy. There are no days/instances where we are unable to give vaccination to children, so we would like to express our gratitude."

Staff Nurse, Ukhrul District Hospital

District Hospital Churachandpur

Health Centre : District Hospital Churachandpur
District and Location : District Hospital. IB Rd, Hiangtam Lamka, Churachandpur, Manipur 795128
Population served: 274143

62	325	10000	800	60	2-6
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	3180W
Max units(kWh) of energy usage per day	29.450 KWh
System Voltage	240DC*2

No.	Products	Capacity	Qty
1	Solar Module - 6 in series	330 Wp, 24 V	48
2	Solar Battery- 10 in series	200 Ah, 12 V	40
3	Solar Inverter/PCU	7.5 kW, 120 V	2
4	Radiant Warmer		2
5	OT Light		1
6	Spotlight		4

EFFICIENT ENERGY CONSUMPTION: 12.72 KWH 43.57% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 22.55 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹2,137,147 40.04% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹3,564,000

CO2 EMISSION WITH EFFICIENT EQUIPMENTS: 8624.16 gm 43.57% CO2 Emissions Savings

CO2 EMISSION WITH INEFFICIENT EQUIPMENTS: 15288.9 gm

EFFICIENT ELECTRICITY CHARGES : ₹7377.6 44% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹13,079

Pictures of Distrcit Hospital Churachandpur

A view of DH Churachandpur which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered nursing station

Solar powered OT

Spotlight

Radiant Warmer

Acknowledgement Letter

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We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at Churachandpur DH

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	48
2	Solar Battery	200 Ah,12 V	40
3	Solar Inverter	7.5 kW, 120 V	2

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	Ceiling Fan	32W, 230V	4
2	Exhaust Fan	20W, 230V	1
3	LED Bulb	5W, 230 V	1
4	LED Tube light	10W, 230V	5
5	Pedestal Fan	32W, 230V	1

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	2
2	OT Light	1
3	Spotlight	4

Medical Superintendent

Chur Chandpur DH

Medical Superintendent
District Hospital
Churachandpur, Manipur

" Having Solar system in place in the District Hospital is really useful for us, It is serving us good back-up when there are power cuts.

Dr Vanalalkungi, Medical Superintendent, Churachandpur District Hospital

Community Health Center Kamjong

Health Centre : Community Health Center Kamjong
District and Location : Kamjong CHC, Kamjong Block, Kamjong District, Manipur, 795145
Population served: 16383

7	57	1800	150	25	4-6
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	3008 W
Max units(kWh) of energy usage per day	13.86 KWh
System Voltage	192 VDC

No.	Products	Capacity	Qty
1	Solar Module- 5 in series	330 Wp, 24 V	30
2	Solar Battery- 8 in series	200 Ah, 12 V	16
3	Solar Inverter/PCU	6 kW, 96 V	2
4	Radiant Warmer		1
5	Phototherapy		1
6	Suction Apparatus		1
7	Spotlight		1
8	Centrifuge		1
9	Microscope		1

EFFICIENT ENERGY CONSUMPTION: 13.92 KWH 40% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 23.2 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹1,138,558 43.35% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹2,009,857

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 9437.76 gm 40% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 15729.6 gm

EFFICIENT ELECTRICITY CHARGES : ₹8073.6 40% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹13456

Pictures of CHC Kamjong

A view of CHC Kamjong which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar-powered laboratory

Solar inverter and batteries

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer, Suction Apparatus, Spotlight

Acknowledgement Letter

Decentralized Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at CHC Kamjong

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	15
2	Solar Battery	200 Ah,12 V	8
3	Solar Inverter	6 kW, 96 V	1

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	LED Bulb	9 W,230 V	10
2	LED Bulb	7 W,230 V	14
3	LED Tube light	5 W, 20 W	4

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Phototherapy	1
2	Suction Apparatus	1
3	Spotlight	1
4	Centrifuge	1
5	Microscope	1

Chief Medical Officer CHC Kamjong

Chief Medical Officer
Kamjong District

" You must be knowing that in our region electricity cuts are an everyday story, But now the scenario has changed, Solarization of the centre has given us the opportunity to use lights, equipment all the time, now we are not dependent on electricity."

"If I can give you a recent example, last week we did not have light for three days, that time also we function normally without any hurdle only Because of solar, this is something we always needed. The best part is, its impact, the patients, and staff. We all are happy as now we don't need to wait every time for electricity to resume. Solar is saving our time and efforts."

Dr. Mascot, Medical Officer, CHC Kamjong

PHC Jessami, Ukhrul

Health Centre: PHC Jessami
District and Location (address): PHC Jessami, Ukhrul District, Manipur
Population served: 17498

2	16	120	12	8	4
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	1864 W
Max units(kWh) of energy usage per day	8.048 kWh
System Voltage	96 V

No.	Products	Capacity	Qty
1	Solar Module - 5 in series	330 Wp, 24 V	15
2	Solar Battery - 8 in series	200 Ah, 12 V	8
3	Solar Inverter - Luminous Solar NXT PCU	6 kW, 96 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 8.04 KWH — 45.19% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 14.67 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹ 735,516 — 41.01% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹ 1,246,758

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 5451.12 gm — 45.19% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 9946.26 gm

EFFICIENT ELECTRICITY CHARGES : ₹ 4663.2 — 45% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹ 8508.6

Pictures of PHC Jessami

A view of Jessami PHC which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar-powered laboratory

Solar-powered OPD

Solar inverter and batteries

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer

Suction Apparatus

Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at PHC Jessami.

Solar System

Sl. No.	Products	Capacity	Quantity
1	Solar Module	330 Wp, 24 V	15
2	Solar Battery	200 Ah, 12 V	8
3	Solar Inverter	6 kW, 96 V	1

List of Luminaries

Sl. No.	Products	Capacity	Quantity
1	Ceiling Fan	32 W	12
2	LED Bulb	9 W	22
3	LED Bulb	5 W	4
4	LED Tube light	20 W	4

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

Medical Officer In-Charge

PHC Jessami

Medical Officer
In-Charge
PHC, Jessami
Govt.of Manipur

We are grateful to Health Department and SELCO Foundation for solarizing the PHC, because as this PHC located at the rural area it was difficult to provide health services due to poor power supply specially during the rainy season. Now we are confident provide the service at any time as we have un interrupted power supply. Medical Equipment provided part of the project, is really helpful to conduct the deliveries.

-Dr. Thotchanhor, Medical Officer, PHC Jessami

Primary Health Center Kasom

Health Centre: Primary Health Center Kasom
District and Location: Kasom HWC, Kasom Village, Kamjong District, 795149
Population served: 12360

7	36	1800	60	1-2	1-3
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	1995 W
Max units(kWh) of energy usage per day	9.844 KWh
System Voltage	96 V

No.	Products	Capacity	Qty
1	Solar Module- 5 in series	330 Wp, 24 V	15
2	Solar Battery- 8 in series	200 Ah, 12 V	16
3	Solar Inverter/PCU	6 kW, 96 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 9.85 KWH 50% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 19.9 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹797,662 42.15% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹1,378,913

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 6678.3 gm 50.50% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 13492.2 gm

EFFICIENT ELECTRICITY CHARGES : ₹5713 51% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹11542

Pictures of PHC Kasom

A view of PHC Kasom which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered Emergency room

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer

Suction Apparatus

Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at PHC Kasom.

Solar System

Sl. No.	Products	Capacity	Quantity
1	Solar Module	330 Wp, 24 V	15
2	Solar Battery	200 Ah,12 V	16
3	Solar Inverter	6 kW, 96 V	1

List of Luminaries

Sl. No.	Products	Capacity	Quantity
1	LED Bulb	5 W, 230 V	6

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

Dr. Varuso T
Medical Officer In-Charge

PHC Kasom
Medical Officer i/c
PHC Kasom Khullen
Kamjong District

PHC Kasom is located at hilly region, in this region sometimes power goes for a few hours, so solar Installation at the PHC is very useful especially now to keep the COVID 19 vaccine safe.

Dr Moshil, Medical Officer, PHC, Kasom

Primary Health Center Tamei

Health Centre: Primary Health Center Tamei
District and Location : Tamei, Tamei sub division , Tamenlong, Manipur 795125
Population served: 25480

3	41	900	65	10-12	6-8
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	2349 W
Max units(kWh) of energy usage per day	8.129 KWh
System Voltage	96 VDC

No.	Products	Capacity	Qty
1	Solar Module- 5 in series	330 Wp, 24 V	20
2	Solar Battery- 8 in series	180 Ah, 12 V	16
3	Solar Inverter/PCU	6 kW, 96 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 8.13 KWH 38.96% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 13.32 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹ 831,416 48.90% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹ 1,627,126

CO2 EMISSION WITH EFFICIENT EQUIPMENTS: 5512.14 gm 38.96% CO2 Emissions Savings

CO2 EMISSION WITH INEFFICIENT EQUIPMENTS: 9030.96 gm

EFFICIENT ELECTRICITY CHARGES : ₹ 4715.4 39% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹ 7725.6

Pictures of PHC Tamei

A view of PHC Tamei which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered IPD

Solar-powered labour room where new critical energy-efficient equipment was introduced

Spotlight

Radiant Warmer

Suction Apparatus

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at PHC Tamei.

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	20
2	Solar Battery	180 Ah,12 V	16
3	Solar Inverter	6 kW, 96 V	1

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	Ceiling Fan	32 W, 230 V	12
2	LED Bulb	9 W, 230 V	3
3	LED Bulb	5 W, 230 V	4

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

Dated/Tamei
4/August/2021.

Medical Officer In-Charge
PHC Tamei

(Dr. P.D. Robin Chiru
Medical Officer
PHC Tamei. Manipur)

I have been working for more than ten years at PHC Tamei. Earlier, we used to face a lot of hardship. When there is no light at night, we used candles and a torch during deliveries and emergency cases.
It's very convenient nowhere, we received inverters, baby warmer, suction apparatus for the PHC. With all this equipment, it has lift up the whole PHC. When there is no light in the village, our PHC shine alone. The only place in Tamei where there is light 24x7 is Tamei PHC. Thank you very much for giving us all this equipment, it has helped us a lot in the treatment and services of the people.

Dr. RobinChiru, Medical Officer, PHC Tamei

PHC Tousem

Health Centre: Primary Health Center Tousem
District and Location: Tousem HWC, Tousem Village, Tamenglong District, Manipur, 795141
Population served: 14324

5	32	1800	28	12	6-8
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	1924 W
Max units(kWh) of energy usage per day	6.033 KWh
System Voltage	96 V

No.	Products	Capacity	Qty
1	Solar Module- 5 in series	330 Wp, 24 V	10
2	Solar Battery- 8 in series	150 Ah, 12 V	16
3	Solar Inverter/PCU	6 kW, 96 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 6.03 KWH — 47.84% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 11.56 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹720,796 — 48.44% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹1,398,005

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 4088.34 gm — 47.84% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 7837.68 gm

EFFICIENT ELECTRICITY CHARGES : ₹3497.4 — 48% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹6704.8

Pictures of Health Center Tousem

PHC Tousem which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered OPD

Solar-powered labour room where new critical energy-efficient equipment was introduced

Solar Panel at PHC Tousem

Radiant Warmer

Spotlight

Acknowledgement Letter

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SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at PHC Tousem

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	10
2	Solar Battery	150 Ah,12 V	16
3	Solar Inverter	6 kW, 96 V	1

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	Ceiling Fan	32 W, 230 V	15
2	LED Bulb	9 W, 230 V	31
3	LED Bulb	5 W, 230 V	14

List of Medical Equipment

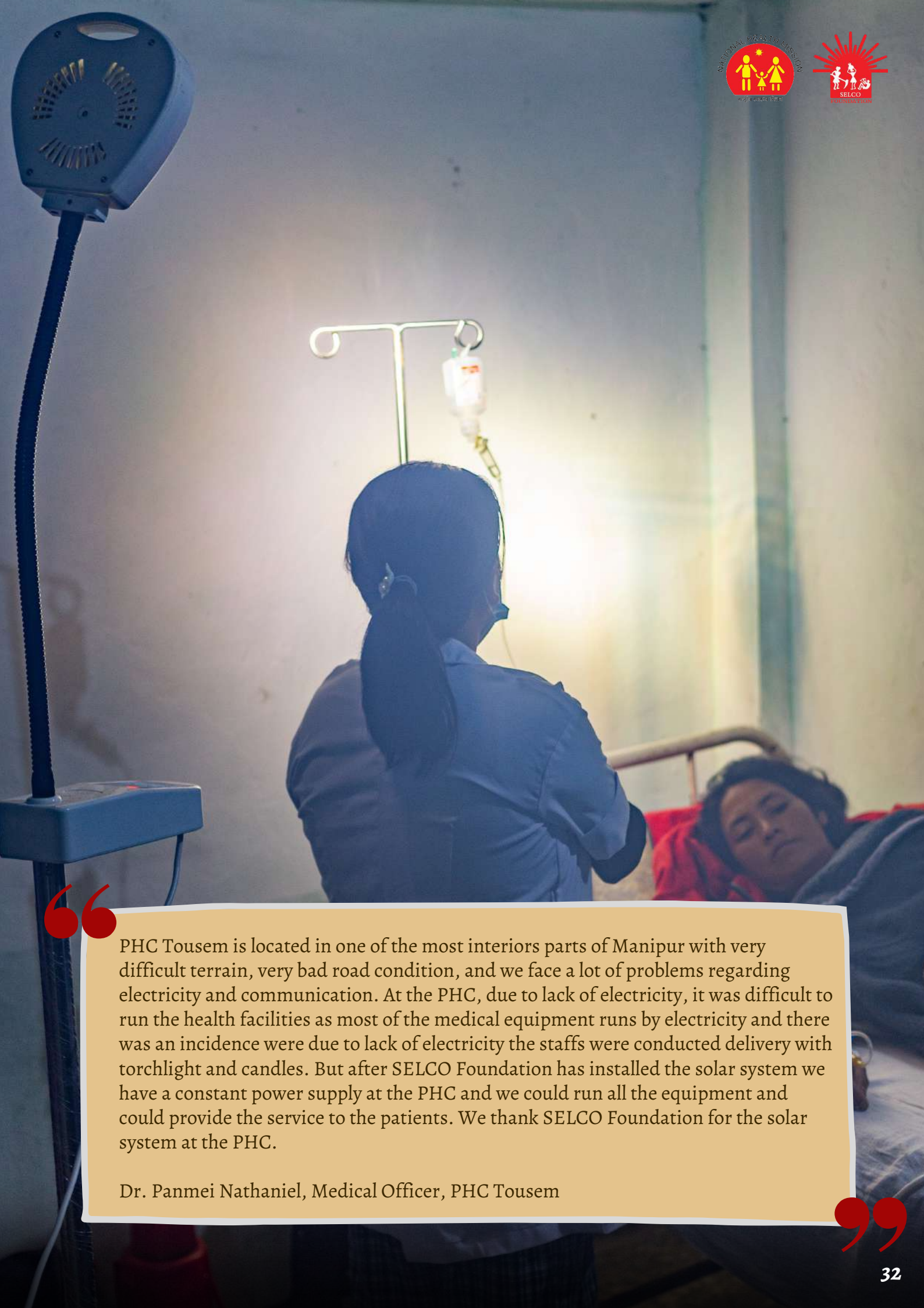
Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

(Dr. DAIMAI NATHANAEL)

Medical Officer In-Charge

PHC Tousem

Medical Officer I/C.
PHC Tousem, Tamenglo
Manipur



PHC Tousem is located in one of the most interiors parts of Manipur with very difficult terrain, very bad road condition, and we face a lot of problems regarding electricity and communication. At the PHC, due to lack of electricity, it was difficult to run the health facilities as most of the medical equipment runs by electricity and there was an incidence were due to lack of electricity the staffs were conducted delivery with torchlight and candles. But after SELCO Foundation has installed the solar system we have a constant power supply at the PHC and we could run all the equipment and could provide the service to the patients. We thank SELCO Foundation for the solar system at the PHC.

Dr. Panmei Nathaniel, Medical Officer, PHC Tousem

PHC Oniamlong

Health Centre: Primary Health Center Oniamlong
District and Location: Oniamlong HWC ,Taosem Sub Division, Tamenglong Distict Manipur 795141
Population served: 12000

6	26	710	25	4-5	6-9
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	2103 W
Max units(kWh) of energy usage per day	5.890 KWh
System Voltage	96 V

No.	Products	Capacity	Qty
1	Solar Module- 5 in series	330 Wp, 24 V	10
2	Solar Battery- 8 in series	150 Ah, 12 V	16
3	Solar Inverter/PCU	6 kW, 96 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 5.9 KWH — 59.03% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 14.4 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹ 702,600 — 40.72% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹ 1,185,217

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 4000.2 gm — 59.03% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 9763.2 gm

EFFICIENT ELECTRICITY CHARGES : ₹ 3422 — 59% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹ 8352

Pictures of PHC Oniamlong

A view of PHC Oniamlong which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar-powered office

Solar-powered IPD

Solar inverter and batteries

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer

Suction Apparatus

Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at PHC Oniamlong.

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	10
2	Solar Battery	150 Ah,12 V	16
3	Solar Inverter	6 kW, 96 V	1

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	Ceiling Fan	32 W, 230 V	14
2	LED Bulb	9 W, 230 V	39
3	LED Bulb	5 W, 230 V	38
4	LED Tube light	20 W, 230 V	2
5	LED Bulb	7 W, 230 V	12

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

24/7/21

Medical Officer In-charge

Oniamlong PHC

Medical Officer
P.H.C. Oinamlong
Tamenglong District
Manipur

We would like to express our thanks to Selco Foundation. Before they installed the solar system, our PHC faced a lot of difficulties. Even for conducting deliveries, we had to use candles because of the lack of electricity. In these Covid times,even though the government has given oxygen cylinders, there is a lack of places to refill them. The oxygen concentrators have been provided, but if there is no electricity, they also cannot be used even if we have them. Once Selco Foundation has come and implemented their solar system, the power supply has been regular. Now if Covid patients or any other patient requires oxygen, even if we have shortage of oxygen cylinders, we are able to use the concentrators directly and provide care to the patients. In the case of deliveries, even in emergency cases, we are able to conduct it properly since we don't have any power issues. Not only that, even in terms of our campus, patients had trouble moving in the dark, now I can proudly say that,we do not have that problem anymore. As the incharge, I would like to thank Selco Foundation on behalf of our PHC.

Incharge, PHC Oinamlong

HWC Puruamthamphak

Health Centre: Health and Wellness Center Puruamthamphak
District and Location : Puruamthamphak Health and Wellness Centre, Puruamthamphak Village ,Chandel Sub Division, Chandel District, Manipur, 795103
Population served: 2886

1	9	230	20	1-2	1-2
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	1240 W
Max units(kWh) of energy usage per day	3.201 KWh
System Voltage	48 VDC

No.	Products	Capacity	Qty
1	Solar Module- 3 in series	330 Wp, 24 V	6
2	Solar Battery- 4 in series	150 Ah, 12 V	8
3	Solar Inverter/PCU	2 kW, 48 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 3.21 KWH 42.58% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 5.59 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹476,947 27.10% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹654,219

CO2 EMISSION WITH EFFICIENT EQUIPMENTS: 2176.38 gm 42.58% CO2 Emissions Savings

CO2 EMISSION WITH INEFFICIENT EQUIPMENTS: 3790.02 gm

EFFICIENT ELECTRICITY CHARGES : ₹1861.8 43% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹3242.2

Pictures of HWC Puruamthamphak

A view of HWC Puruamthamphak which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered OPD

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer

Suction Apparatus

Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at Puruamthamphak HWC.

Solar System

Sl. No.	Products	Capacity	Quantity
1	Solar Module	330 Wp, 24 V	6
2	Solar Battery	150 Ah,12 V	8
3	Solar Inverter	2 kW, 48 V	1

List of Luminaries

Sl. No.	Products	Capacity	Quantity
1	Ceiling Fan	32 W, 230 V	5

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

Staff In Charge

Puruamthamphak HWC

CHO
HWC, Puruamphak
Chandel

I am very grateful to the Health Department and SELCO Foundation for providing solar power, Radiant Warmer, Spotlight and Suction Apparatus. Before we didnt have this equipment. In future I hope other centres also get the same support because when there is a power cut solar is very useful and now we can use all the equipment during day and night.

Maryboi Community Health Officer, HWC, Puruamthamphak

HWC Pearsonmun

Health Centre: Health and Wellness Center Pearsonmun
District and Location: Pearsonmun Health ura Wellness Centre, Pearsonmun village, Samulamlan Block, Churachandpur District, Manipur - 795128
Population served: 8423

1	5	450	10	3-4	1-2
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	1002 W
Max units(kWh) of energy usage per day	2.674 KWh
System Voltage	48 VDC

No.	Products	Capacity	Qty
1	Solar Module- 3 in series	330 Wp, 24 V	6
2	Solar Battery- 4 in series	150 Ah, 12 V	8
3	Solar Inverter/PCU	2 kW, 48 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 2.67 KWH — 45.51% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 4.9 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹ 471,867 — 24.35% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹ 623,758

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 1810.26 — 45.51% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 3322.2 gm

EFFICIENT ELECTRICITY CHARGES : ₹ 1548.6 — 46% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹ 2842

Pictures of HWC Pearsonmun

A view of HWC Pearsonmun which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Suction Apparatus

Solar-powered labour room where new critical energy-efficient equipment was introduced

Radiant Warmer & Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at HWC Pearsonmun.

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	6
2	Solar Battery	150 Ah,12 V	8
3	Solar Inverter	2 kW, 48 V	1

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	Ceiling Fan	32 W, 230 V	4

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

Dated 24-7-2021.

Saparn Romika Dei.
CHO.
Staff in charge
HWC Pearsonmun
S. Romika Devi
Community Health Officer
H & W.C. Pearsonmun
Churachandpur

Now that this HWC has been upgraded through the solar backup provided by Selco Foundation, all the tension is over. Earlier, since light was not regular, we could not function smoothly. Now even if we have operations at night, we do not face any issue. I would also like to thank the people who came and installed the system. Since the power output is also quite substantial, we are able to run the fans also. We would like to express our gratitude to everyone who made this happen.

Mr Zamzinthang, Male Health Supervisor, HWC Pearsonmun

HWC Pudanemai

Health Centre: Health and Wellness Center Pudanemai
District and Location: Pudanemai HWC, Pudanemai village, Senapati District, Manipur, 795150
Population served: 9472

1	4	200	2-4	1-2	3-6
No. of Sub Centres	No. of Villages	Avg. OPD/Month	Avg. IPD/Month	Avg. Deliveries/Month	Power Cut hrs/day

System Design:

Max Load that can be connected	943 W
Max units(kWh) of energy usage per day	2.159 KWh
System Voltage	48 V

No.	Products	Capacity	Qty
1	Solar Module- 3 in series	330 Wp, 24 V	6
2	Solar Battery- 4 in series	200 Ah, 12 V	4
3	Solar Inverter/PCU	2 kW, 48 V	1
4	Radiant Warmer		1
5	Suction Apparatus		1
6	Spotlight		1

EFFICIENT ENERGY CONSUMPTION: 2.15 KWH — 53.96% Energy Savings

INEFFICIENT ENERGY CONSUMPTION: 4.67 KWH

SOLAR COST WITH EFFICIENT EQUIPMENTS: ₹ 423,465 — 25.35% Cost Savings

SOLAR COST WITH INEFFICIENT EQUIPMENTS: ₹ 567,278

CO_2 EMISSION WITH EFFICIENT EQUIPMENTS: 1457.7 gm — 53.96% CO_2 Emissions Savings

CO_2 EMISSION WITH INEFFICIENT EQUIPMENTS: 3166.26 gm

EFFICIENT ELECTRICITY CHARGES : ₹ 1247 — 54% Cost Savings

INEFFICIENT ELECTRICITY CHARGES : ₹ 2708.6

Pictures of HWC Pudanemai

A view of HWC Pudanemai which was solar powered along with an energy efficiency drive providing constant and reliable access to health care

Solar inverter and batteries

Solar-powered OPD

Solar-powered labour room where new critical energy-efficient equipment was introduced

Suction Apparatus

Radiant Warmer

Spotlight

Acknowledgement Letter

Decentralised Renewable Energy Solutions to Strengthen Public Health Facilities

SELCO Foundation in partnership with State Health Department Manipur

We acknowledge the receipt of following components as part of the Decentralised Renewable Energy intervention at Pudanemai HWC.

Solar System

Sl. No.	Products	Capacity	Qty
1	Solar Module	330 Wp, 24 V	6
2	Solar Battery	200 Ah,12 V	4
3	Solar Inverter	2 kW, 48 V	1

List of Luminaries

Sl. No.	Products	Capacity	Qty
1	Ceiling Fan	32 W, 230 V	5

List of Medical Equipment

Sl. No	Name of the Equipment	Quantity
1	Radiant Warmer	1
2	Suction Apparatus	1
3	Spotlight	1

Ng. Thern

Staff In Charge

Pudanemai HWC.

Community Health Officer
Health & Wellness Centre
Pudunamei, Senapati Dist.

Onbelf of Pudunamei Health and Wellness Centre we thank health department and SELCO Foundation for your contribution such as Solar system and medical equipment we are fortunate to have this equipments at our health centre, it's really made our work more convenient and easy, it will be really benefit for the community.

Lhosa, ANM, HWC, Pudunamei

Contact us : info@selcofoundation.org
Visit us: www.selcofoundation.org