SELCO Foundation

2025

Financing for Operations and Maintenance of Energy Systems at Health Facilities

Abbreviations

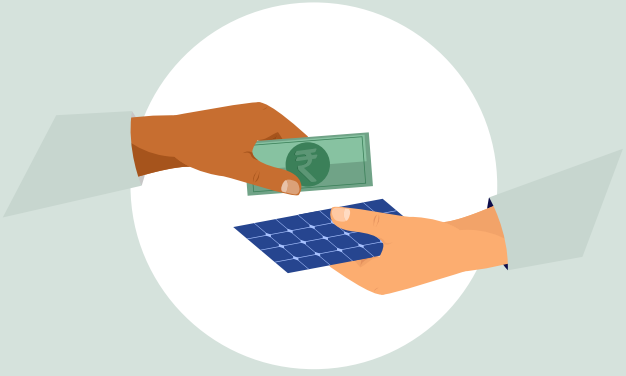
AAM	Ayushman Arogya Mandir
ABArK	Ayushman Bharat Arogya Karnataka
ARS	Arogya Raksha Samitis
ASHA	Accredited Social Health Activist
CHC	Community Health Centre
CHO	Community Health Officer
CMO	Chief Medical Officer
CRM	Customer Relationship Management
DC	Deputy Commissioner
DMHO	District Medical and Health Officer
DRE	Decentralised renewable energy
E4H	Energy for Health
HMIS	Health Management Information Systems
HWC	Health and Wellness Centre
JAS	Jan Arogya Samitis
MCH	Maternal and Child Health
MHSSP	Meghalaya Health System Strengthening Programme
MO	Medical Officer
NCD	Non-Communicable Disease
NHM	National Health Mission
NPCCHH	National Programme for Climate Change and Human Health
NQAS	National Quality Assurance Standards
O&M	Operations & Maintenance
PCB	Power Control Boards
PD	Principal Director
PHC	Primary Health Centre
RMS	Remote Monitoring System
SC	Sub-Centre
SF	SELCO Foundation
SLA	Service Level Agreements
ZPCEO	Zilla Panchayat Chief Executive Officer

Context

Decentralised renewable energy (DRE) through solar plays a catalytic role in enabling healthcare delivery at the last mile. Various programs have been implemented across the world to meet the need for energy at last mile health facilities through decentralised solar energy systems. However, programs often focus on investing in the capital expenditure required to set up DRE, without accounting for operational expenditure required to keep it running over the long term. This crucial investment remains left out - resulting in limited ownership within public institutions cascading into limited support post-warranty with undefined processes for maintenance and limited or no monetary allocation for resolution of issues. Consequently, systems have high downtime, and therefore the quality of healthcare suffers due to limited access to energy. Millions of dollars invested in development are failing to deliver lasting impact—not due to poor system design or implementation, but because of a systematic failure to finance Operations & Maintenance (O&M). A silent danger grows – lack of maintenance erodes trust at all levels of the healthcare sector, which could have long term implications on the adoption of sustainable and efficient energy solutions.

The Energy for Health (E4H) program by SELCO Foundation aims to provide reliable energy for health delivery through uninterrupted energy supply, with an emphasis on enhancing local ownership and creating long-term sustainability of the system to address the very challenges faced by multiple programs across the world. The program aims to power 25,000 health facilities in India with decentralised renewable energy. The program leverages partnerships with key stakeholders including government departments at multiple levels (state, district, block) as well as local communities and facility managers (medical officer-in-charge, nurses, guards, etc.) Creating ownership among these stakeholders along with capacitating them to take forward crucial sustainability measures is a key focus of the E4H program.

With partnerships across 12 states in India, this report attempts to reflect on the learnings from E4H program in building community ownership to sustain health-energy interventions at scale. The following section delves into the specific challenges surrounding financing for O&M and discusses certain strategies which have emerged from the ground and succeeded in unlocking finances for O&M in different contexts in India.



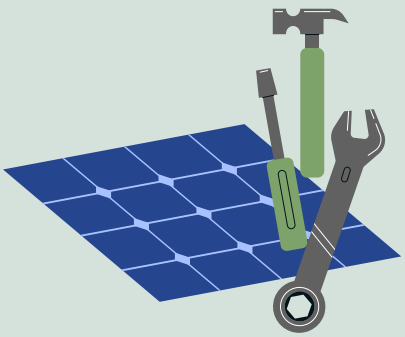
Challenges in financial allocation for O&M

Financing for Operations and Maintenance (O&M) requires understanding different types of technical issues, streams of available fund and also processes for issue resolution. Technical components that require repair or replacement necessitates dedicated financial resources. To enable effective financial allocation, it is essential to establish clear roles and responsibilities, along with defined budget lines specifically earmarked for O&M activities. These mechanisms are closely tied to fostering a strong sense of ownership among stakeholders.

Defining Operations and Maintenance for E4H Program

A set of activities carried out to enhance the energy system's performance, functionality and longevity through effective, timely and proactive issue identification, reporting and rectification.

This includes effectively coordinating and allocating resources for system sustainability needs that arise over time. Effective operations and maintenance includes capacity building, management platforms for issue life cycles, with clearly defined ownership.



While O&M includes multiple activities for issue identification and issue resolution, which require fund allocation for carrying out the activities; effectively, an Energy for Health program should include softer components of institutional and stakeholder capacity building as well to ensure overall sustenance of the program. Thus, O&M should not be viewed as issue identification and rectification alone, but rather as:

- Building technical capacity and processes for **servicing and maintenance**
- Monitoring and supporting the **utilisation of infrastructure**
- Processes and guidelines for **fund allocations and approvals**
- Building **program management capacity** for monitoring utilisation, maintenance and servicing
- Incentives for improving **ownership and motivation** (stakeholders and communities at large- especially since the program activities deal with public infrastructure)

Thus, financing for O&M can be looked at through the following lenses: technical capacity, institutional capacity, and behavioural capacity. Each of these components require programmatic interventions and thus, financial allocations. For example, when an inverter fails due to a lightning strike, the health facility must allocate funds to rectify the inverter to keep the system running. However, the facility may lack the required funds due to limited budget at that level and is required to raise a request to the district level. In other cases, the health facility might think that the issue will be addressed when a technician visits the facility, with no need for setting aside budget. Therefore, to understand O&M financing, it is essential to understand that it is a multidimensional issue, with nuances associated with various ecosystem factors.

Components of O&M that require financial allocation are elaborated in Table 1

Table 1: Components that require financial allocation along the issue lifecycle

O&M FUNCTIONS	OPERATIONALISED BY
 **Building technical capacity and processes for servicing and maintenance**	• Trainings to health staff on reporting process • Scheduled Maintenance – Service Level Agreements (SLA) • Corrective Maintenance SOPs– theft of components, disasters damaging the system, damage not covered under warranty – requiring repair/replacement, components not defined under scheduled maintenance or once SLA lapses
 **Monitoring and supporting the utilisation of infrastructure**	• Customer Relationship Management (CRM) • Remote Monitoring System (RMS)
 **Processes and guidelines for fund allocations and approvals**	• SOPs for fund allocations
 **Building program management capacity for monitoring utilisation, maintenance and servicing**	• Asset Management Platform
 **Incentives for improving ownership and motivation**	• Powering staff quarters

It is important to also scope out the relevant context to understand the needs, opportunities, willingness and existing capacity in the ecosystem to sustain O&M activities appropriately[1]. This will help gauge if certain components and O&M functions can also be merged with existing structures.

For example, an asset management platform for solar components can be merged with existing government platforms such as digital Health Management Information Systems (HMIS). Similarly, if strong village committees exist, they can serve as an accountability measure for ensuring O&M functions are conducted.

1.Powering the Future: A Sustainability-Focused Maintenance Guide for Decentralised Solar Energy in Public Institutions, SELCO Foundation (2025), https://selcofoundation.org/powering-the-future-a-sustainability-focused-maintenance-guide-for-decentralised-solar-energy-in-public-institutions/

O&M hinges on strong institutional processes with clear roles and responsibilities, driven by adequate financial allocation for overall program management and capacity within the ecosystem. Programs that struggle with inadequately defined roles and responsibilities for O&M result in ambiguity regarding accountability, which extends to funding mechanisms as it remains unclear which parties are responsible for allocating resources to cover both recurring O&M expenses and capital expenditures. The above challenge further compounds a prevalent perception issue with ownership, where stakeholders view systems as belonging exclusively to the implementing organisation, thus demarcating all associated maintenance actions to them. This requires clear processes and standard operating procedures for different functions such as who approves expenditures, who manages procurement processes, who oversees quality control, and how performance is monitored. Effective institutional arrangements reduce transactional costs and minimise delays, thus ensuring effective execution of maintenance activities. It also includes incorporation of line items for maintenance activities within the budget at different levels, such as state and district.

Further, technical capacity within the ecosystem ensures that O&M activities can be executed efficiently and cost-effectively. At the state level, it includes establishing capacity for quality checks, creating spare parts supply chains and developing maintenance protocols. At the district level, capacity building must focus on organising trainings for medical officers as well as ensuring local technical capacity, which is essential for faster turnaround time. At the health facility level, it is necessary for the health staff to be trained in carrying out preventive maintenance activities as well as reporting issues. Enhanced local capacity reduces dependency on external providers and lowers long-term maintenance costs.

Despite effective institutional mechanisms and program finance to resolve issues, O&M requires adaptive financing mechanisms to provide flexibility to address unexpected maintenance needs and system failures.

Existing fund sources are typically used for executing priority programs to deliver health services to populations, and also include maintenance of equipment and health facilities to ensure proper functioning of the same. These financial allocations are diverse in nature and are not restricted to a single source. There is potential for tapping into these available institutional mechanisms to account for long-term O&M for solar energy systems. The typical current usage of different available funds is highlighted ahead, along with how each source can be utilized for clean energy infrastructure operations and maintenance.

Table 2: Source of Fund and its Utilisation

SOURCE OF FUND	HOW IT IS USUALLY UTILISED	HOW IT CAN BE UTILISED FOR ENERGY INFRASTRUCTURE MAINTENANCE
Line item in the NHM Budget maintenance	This is generally used for programs, providing healthcare services, including transportation and outreach activities. A line item has been proposed in certain states to manage maintenance costs for solar.	• Continuous capacitating of staff for awareness and preventive maintenance • Maintaining O&M management platforms/ dashboards and HR associated with them • Service Level Agreements (SLA) with vendors • Out-of-warranty replacement of components such as battery/inverter
Untied Funds – JAS / RKS / ARS	The health facility can determine how to utilise the funds, including upper limit for fund utilisation, generally used for maintenance of the facility, such as repairing a fence wall, replacing bulbs, buying cleaning agents for the facility.	• Purchase of low-cost components for corrective maintenance. • Allocation for labour charges for maintenance visits (if no SLA is in place)
Infrastructure development funds (eg. MHSSP)	As energy is considered to be an integral component of health infrastructure, facilities allocate maintenance funds from these funds based on need	• Expanding systems or repair/replacement of components • Decommissioning and recommissioning systems post-repair at the facility
User fees	The health facility staff convene to decide the priority of the facility and determine the usage of user fees collected.	• For cases of theft, urgent repair, and replacement of components
Village contribution	A designated bank account is opened by the village head to maintain funds for O&M and is approved for use by the village head.	• For cases of theft, urgent repair, and replacement of components
Prize money (eg. for meeting Kayakalp standards, NQAS)	The health facility decides the use of the funds received for meeting Kayakalp and NQAS for priorities at the health facility necessary for maintaining the award standards.	• Dependent on prize amount and level of facility - for meeting climate resilience/ Green Facility goals under NPCCHH and NQAS by allocating for expanding systems or repair/replacement of components

It is important to also scope out the relevant context to understand the needs, opportunities, willingness and existing capacity in the ecosystem to sustain O&M activities appropriately.

Learning from Field Experiences

Encouragingly, there are already examples across the E4H program where resource-constrained communities and governments have explored existing mechanisms to finance O&M activities for maintaining clean energy infrastructure. Two northeastern Indian states, Meghalaya and Manipur, provide examples of how innovative bottom-up financing methods have worked for O&M execution, with institutional arrangements developed to address O&M funding gaps.

These cases demonstrate the importance of diversified funding sources, clear institutional mandates and structures, and fostering local ownership to ensure sustainable maintenance of healthcare infrastructure. The case of Karnataka and Nagaland highlights how a top-down approach can facilitate access to funds and timely resolution, while the case of Sikkim, also a top-down approach, indicates the prioritisation of financial allocation for O&M right at the time of program inception.

CASE STUDY 1:

Utilising facility-level flexible funds for maintenance

Untied Funds under the National Health Mission (NHM) are flexible financial grants allocated to various levels of government-run health facilities to enhance local healthcare delivery and community participation. These funds, meant to provide autonomy to health facilities to allocate resources for requirements at a decentralised level, allow the facility to respond to facility-specific needs more effectively and in a timely manner. These funds are usually used towards maintenance of the facility, such as repairing a fence wall, replacing bulbs, buying cleaning agents for the facility. Untied funds are also a mechanism to ensure proper representation of issues faced by the community and strengthen community participation and ownership in healthcare. This is done through delivery and management of funds via formal community groups set up for the same such as the Jan Arogya Samitis (JAS) in Meghalaya and Manipur, and the Arogya Raksha Samitis (ARS) in Karnataka.

The JAS committees in Manipur and Meghalaya constitute of health facility staff, village heads, and representatives from the primary health centre (PHC) and serve as the primary decision-making body for fund allocation at the first-mile facility, i.e. the Sub Health Centre or Ayushman Arogya Mandirs (AAMs). These committees have access to untied funds of up to 50,000 specifically designated to maintenance activities within a health facility. The fund allocation under this line item varies between INR 10,000 to 50,000 per year for the lowest level (SC/AAM) and INR 25,000 to 1,50,000 at the PHC level.

For energy system components requiring replacement, such as inverter components costing approximately 8,000, untied funds provide immediate access to necessary resources to ensure timely replacement, leading to better functioning systems and thereby facilities that can respond to the needs of the population.

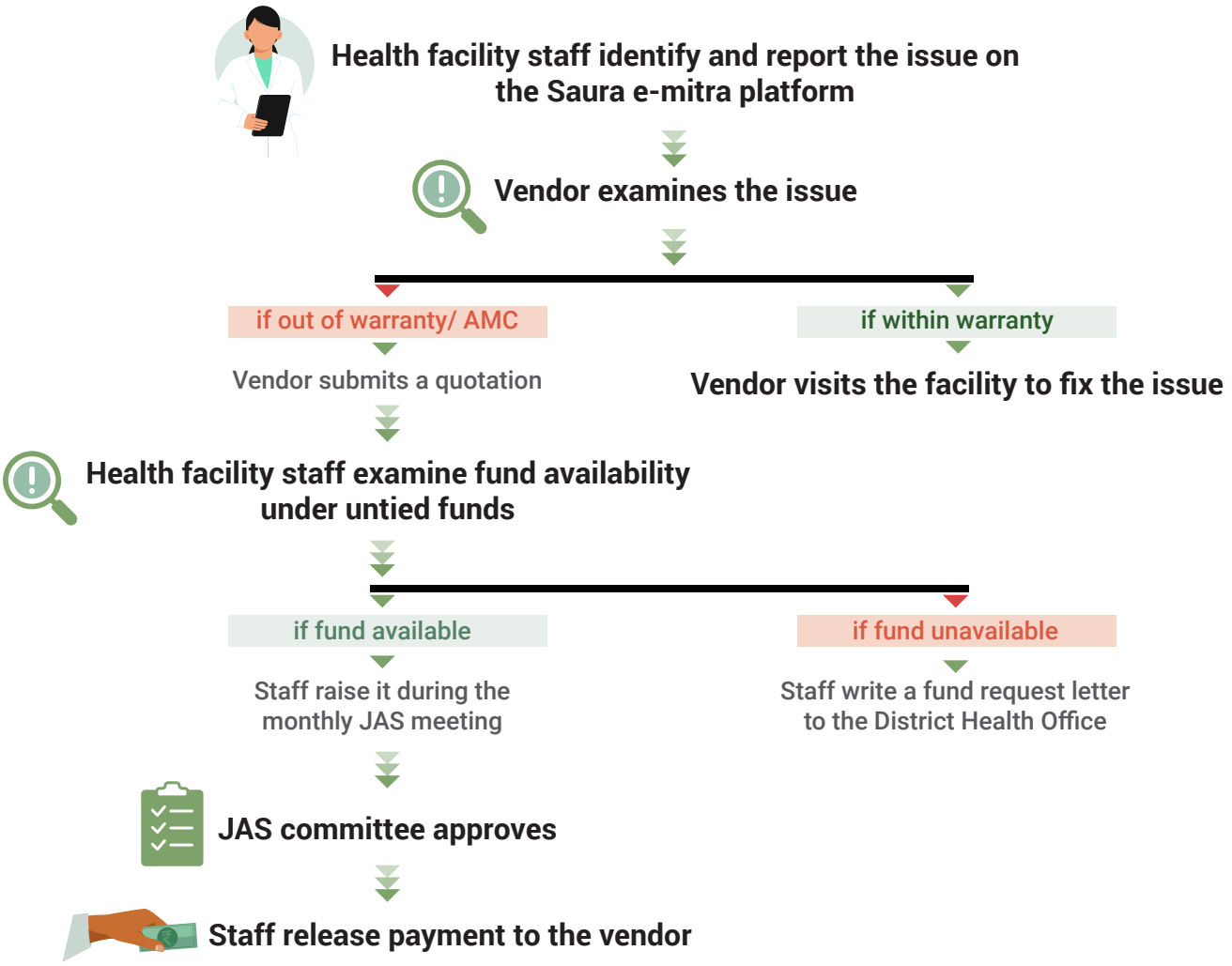
HWC Unopat located in Chandel district of Manipur serves approximately 3000 people in the vicinity, with a wide range of services. From vaccination to antenatal checks and non-communicable diseases (NCDs) screening, it serves a critical role in delivering maternal and child health (MCH) and NCD services. Prior to solarisation, the health facility carried out its services during the day with long power cuts, sometimes lasting a week or even a month. This restricted the services provided by the health facility. The health facility was powered during the pilot phase of the Energy for Health program with a 1.5 kWp system, with battery and inverter.

After a few years of installation, the health facility faced an issue where the inverter of the system stopped working. Through analysis of the issue, it was found that the issue was within warranty, and the inverter was replaced. However, the vendor identified that the wiring of the facility was very old and could damage the inverter once again. The SELCO Foundation (SF) team highlighted this issue to the heath facility staff and suggested that the health facility should change the wiring if they want to continue using the DRE system. They were also informed that the health facility would have to bear the cost for the load-wiring. Recognising the disruption of services due to unreliable power, the Community Health Officer (CHO) (staff nurse) at the health facility brought up the issue during their monthly JAS meetings and highlighted the gap in providing healthcare services faced due to interrupted energy at the facility, such as inability to store vaccines, discomfort for patients and staff due to heat and poor lighting to carry out activities such as suturing. Recognising the difference that lights and fans made to patients visiting the facility, the CHO made the decision to spend INR 10,000 for rewiring the facility. As untied funds was the source of fund that was most accessible to the staff at the centre, they presented the case before the JAS and informed them about the allocation of funds for replacement of the wiring system. After the wiring was completed, the inverter was reinstalled to successfully run the energy system at the health facility.

Another example of the usage of untied funds is from PHC Byrnihat in Meghalaya. PHC Byrnihat, located at the heart of the world's most polluted city, Byrnihat, sees a high footfall of patients as it is on the border between the states of Meghalaya and Assam. The region faces heavy rainfall and storms for approximately four months of the year. During this time of the year, the facility faces frequent power outages. In this context, the installation of a DRE system proved to be highly beneficial for the functioning of the facility. Post installation, the Medical Officer (MO) along with Grade IV staff (cleaner) underwent training for maintenance of the system. Recognising the benefit of the system, the MO ensures the participation of his staff in regular maintenance of the system.

During construction of a wing at the facility, the earthing of the DRE system was damaged. The issue was raised by the Grade IV staff to the MO. Recognising the benefits that the DRE system provided to the facility and to ensure safety, the MO raised a request during the JAS meeting to utilise the untied funds for replacement of the earthing rod. Due to timely maintenance of the system, with adequate precautions and quick redressal of issues, the energy system at the facility continues to function well even in its sixth year since installation.

PROCESS FLOW



Key Learnings

The case of HWC Unopat and PHC Byrnihat highlight the ownership of the system by the health facility staff. Ownership by local staff is essential for sustainability as they recognise the benefits of the system and therefore are willing to invest in the maintenance of the system. Additionally, building their technical knowledge on various components of the system increases the willingness to allocate funds. However, differentiated financing approaches are required for predictable maintenance costs (like battery replacement) versus emergency repairs (like storm damage). Through untied funds, the allocations are limited to unpredictable situations.

One of the challenges with considering untied funds for maintenance activities is that certain health facilities in Manipur and Meghalaya set an arbitrary upper limit on a single spending. For example, a health facility in Chandel mentioned that they have set a limit of INR 6,000 as the maximum spend in one go, to ensure availability of untied funds for the entire year/until the next disbursement. This means that when repairs/replacement cost higher than this limit, the health facilities are forced to look at other channels of funding. However, these funds are easily accessible for addressing low-cost corrective maintenance indicating the reliability of this source of funding.

CASE STUDY 2:

Community Members Come Together to Build a Maintenance Fund

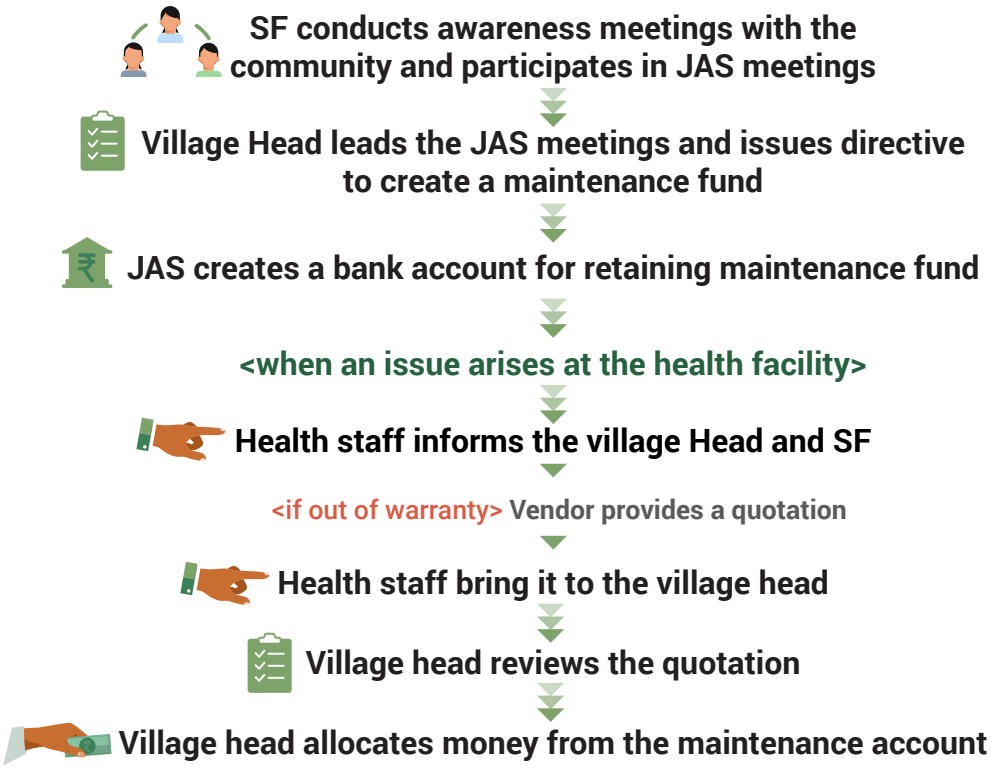
Mawlyndep, situated in Ri-Bhoi district of Meghalaya, is known for its strong community participation, similar to many other villages in the Northeast Region of India. The installation of DRE system at HWC Mawlyndep took place in 2022. Following the installation, the SF team visited the facility to interact with the staff and also participated in the JAS meetings to increase awareness about the solar system installed at the facility. Since then, the health facility had been able to cater to the villages under its purview with increased energy reliability. However, in February 2024, the lightning arrestor was stolen from the facility, following which the health facility staff informed the SF team as well as the Village Head. As the issue falls out of warranty, the SF team informed the staff that they would have to bear the cost of replacement.

The role of the village head is one that involves managing community affairs, settling disputes and petty crimes, as well as organise community funds by levying fees on households.

When the issue of theft of a system component came to light, the village head, through JAS meetings, informed that every household will contribute an annual fee of INR 50 towards maintenance of solar system at the health facility. To account for the same, a bank account was opened for depositing the maintenance funds. The ASHAs (Accredited Social Health Activists) who visit the villages for regular checks will collect the fee from every household and hand it over to the village head, who would deposit it in the bank account created for this purpose.

This creates a sustainable, community-owned financing mechanism with proper institutional structure - including a dedicated bank account and a collection system through ASHAs who already have regular contact with households. This example demonstrates how local leadership can mobilise community resources to ensure long-term sustainability of DRE systems, moving beyond initial installation to address ongoing maintenance needs through collective responsibility and organised fund management.

PROCESS FLOW



Key Learnings

Ownership at the village level, particularly in off-grid regions where healthcare staff may not be present daily, is imperative to prevent theft of systems. Rather than viewing the solar system as an asset owned by an external agency, the village head transformed it into a shared community asset that everyone has a stake in maintaining. This shift from passive beneficiaries to active stakeholders is crucial for long-term sustainability. Village secretaries and chiefs engaged in system monitoring occasionally utilise village-level funds for maintenance activities. Creating a separate maintenance fund results in a predictable stream of funds which can be quickly accessed for out of warranty cases. In some cases, community members have contributed from personal resources with the understanding that they would be reimbursed when official funds become available. Sustainable energy access requires building local capacity for ownership, management, and financing - turning communities from consumers into custodians of their energy infrastructure.

CASE STUDY 3:

Allocation from District Level Funds

As the state has established a robust institutional hierarchy for fund allocation decisions, at each level, there are different decision makers. At the district level, the District Medical and Health Officer (DMHO) or Chief Medical Officer (CMO) plays a central coordinating role, working closely with maternal and child health officers, district nodal officers, and district program managers to prioritise funding requests. This collaborative decision-making process ensures that resource allocation aligns with health service priorities.

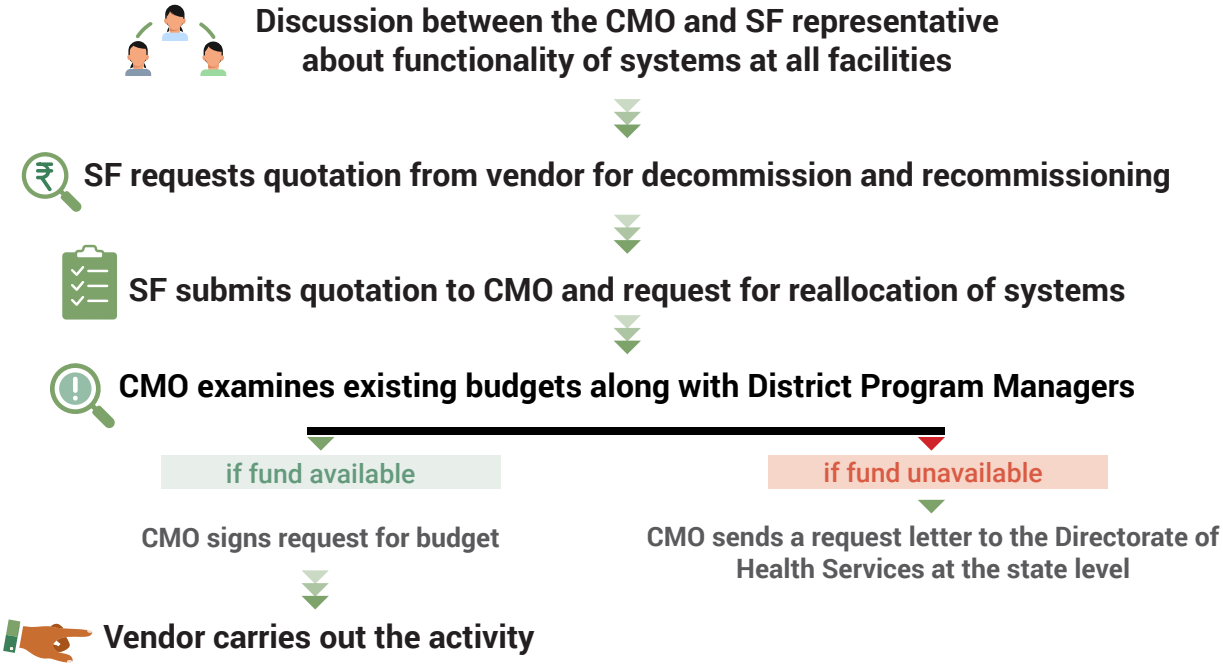
The prioritisation framework gives precedence to active health facilities, particularly those conducting deliveries and serving high patient volumes. Sub-centres conducting regular deliveries receive the highest priority, while those providing only outpatient services are assigned a lower priority. Urban or peri-urban facilities with high patient footfall also receive special consideration in funding decisions.

In Churachandpur district of Manipur, the CMO encountered a complex situation that required deviation from the typical allocation of funds criteria.

Several health facilities with newly installed energy systems had become non-functional due to internal conflicts, with staff unable to operate these facilities safely or having been relocated to other areas.

In examining these cases, the CMO faced a dilemma: while these facilities did not meet the standard criteria for funding priority—having no active patient services or regular deliveries—they housed substantial capital investments in energy infrastructure. The CMO recognised that the significant public funds already invested in these solar power systems, battery storage, and related equipment could not simply be written off. Due to the absence of security personnel and the remote locations of some facilities, these valuable assets were at high risk of theft, vandalism, or weather-related damage. The CMO made the strategic decision to protect these investments despite their temporary non-operational status. After reviewing available budget allocations, the CMO creatively reallocated funds from line items originally designated for fuel costs and routine maintenance across various programs—to finance the protection and upkeep of these energy systems by proposing for relocation of the systems from sites which were unstaffed to facilities providing services.

PROCESS FLOW



Key Learnings

The experience from Churachandpur highlights an important opportunity in strengthening DRE maintenance across India's health infrastructure: while the absence of dedicated budget lines for DRE upkeep presents challenges, it also opens the door for proactive leadership within the administrative system to drive effective solutions.

When champions recognise both the significant investment these energy systems represent and the long-term benefits of their proper maintenance, they can enable timely allocation of funds necessary to ensure continued operation. Such champions play a critical role in safeguarding equipment from neglect, theft, or damage by creatively utilising existing budget resources and working within bureaucratic frameworks to overcome structural limitations.

The Churachandpur case underscores the impact that committed leadership can have in addressing system gaps while also highlighting the broader need for policy-driven, sustainable funding mechanisms to support DRE maintenance across health facilities.

CASE STUDY 4:

Solar Maintenance as a part of Infrastructure Development Funds

For major maintenance activities (related to roof or building construction) require shifting the solar panels resulting in decommissioning and recommissioning of systems. These costs typically reach INR 50,000. Such large expenses require special funding sources beyond regular operational budgets. As a result, health facilities look at funding available under different programs meant for infrastructure development.

One such example is funding for O&M received through the Meghalaya Health System Strengthening Programme (MHSSP). Energy infrastructure is integral to the overall health infrastructure, which is taken into consideration under the program. The MHSSP operates on a performance-based funding model: health facilities that meet specific quality standards receive quarterly funding.

The better their performance on key indicators like patient care quality and facility cleanliness, the more funds they receive each quarter. Achievement of a particular standard results in allocation of funds to the health facility on a quarterly basis. This financial support that the health facility receives results in availability of funds to maintain the DRE systems. Under the MHSSP, the maximum fund that each facility can earn per quarter is performance-based and varies by facility type (District Hospitals, CHCs, PHCs, etc.) and is determined by their achievement on key performance indicators as assessed each quarter. Over 120 facilities have been covered, with the program running till March 2027.

Key Learnings

This approach effectively ensures that major interventions receive the necessary resources in the short term and when required. At the same time, it presents an opportunity to build more resilient financing models, as maintenance funding is currently linked to the infrastructure development program. With the MHSSP program concluding in March 2027, there is a chance to proactively plan for a smooth transition toward sustainable maintenance financing. By doing so, facilities can secure long-term support for solar system upkeep and strengthen energy resilience beyond the duration of any single program. This approach offers a practical foundation for resource mobilisation while emphasising the importance of forward-looking strategies that promote lasting energy security for health facilities.

CASE STUDY 5:

Utilisation of Prize Money/ Incentives

National Quality Assurance Standards (NQAS) are performance-based quality certification standards developed by the Ministry of Health and Family Welfare to enhance healthcare quality across public health facilities. Under NQAS, facilities that meet certification requirements and quality indicators receive financial incentives as recognition of their performance. The incentive structure allocates 25% for individual staff incentives and 75% for staff welfare and improving the work environment at the facility.

HWC Awang Wabagai in Imphal West district of Manipur was solarised in 2023 with a DRE system. The installation provided reliable power supply to the facility, enabling the staff to make the strategic decision to disconnect from the grid to avoid electricity bills. The facility successfully maintained quality standards and received INR 1,20,000 under NQAS certification.

During a refresher training on Operations and Maintenance (O&M) processes conducted in 2025, the health facility staff discovered that the lightning arrestor component was missing from their solar system. The staff immediately reported the issue to the CRM team, who coordinated with the vendor for assessment and quotation. The vendor provided a quotation of approximately INR 5,000 (inclusive of labour and transportation costs) for lightning arrestor replacement.

With NQAS incentive funds available, the health facility staff convened a discussion meeting that included the CHO, the finance manager from the Community Health Centre (CHC), and the Medical Officer from the PHC under which the HWC operates. During this meeting, they prioritised facility needs and decided to allocate a portion of their NQAS funds for the lightning arrestor replacement, justifying it as improving the work environment through reliable energy access.

The decision-making process was expedited since the funds were readily available at the facility level, eliminating the need for external approvals or lengthy bureaucratic procedures. The vendor completed the lightning arrestor installation promptly, restoring the system's protection against electrical surges and ensuring continued reliable power supply.

PROCESS FLOW

Health facility staff identify and report the issue on the Saura e-mitra platform

CRM team coordinates with vendor for assessment

Vendor examines the issue and submits quotation

Health facility staff examine fund availability under NQAS incentives

Staff convene discussion meeting with finance manager and Medical Officer (PHC)

Committee prioritises spending and approves allocation

Staff release payment to vendor

Vendor completes installation/replacement e-mitra platform

Key Learnings

The NQAS incentive mechanism provides valuable benefits for energy system maintenance, particularly by promoting speed and local decision-making. Unlike other funding sources that require external approvals, NQAS allows facilities to allocate funds through internal discussions, enabling swift and responsive maintenance actions.

This approach encourages facilities to uphold high-quality standards, as eligibility for incentives is linked to consistent performance. While not all facilities may be certified, those that achieve certification are supported in maintaining excellence, fostering a culture of continuous improvement.

Additionally, the 75% allocation for work environment enhancement offers facilities the flexibility to incorporate energy infrastructure improvements as part of their broader efforts to create better workspaces. Though specific guidelines for permissible uses are not defined, this flexibility provides an opportunity for facilities to innovate and adapt funding to their unique contexts, paving the way for tailored and effective maintenance solutions.

CASE STUDY 6:

Top-down Approaches to Fund Allocation

The Energy for Health program in Karnataka demonstrates how strategic institutional partnerships can unlock sustainable O&M financing mechanisms. The program began by securing district-level support in Raichur district, which built credibility with local decision-makers. This grassroots approach provided the foundation for scaling to state-level partnerships.

As the program demonstrated effectiveness in a few regions of Karnataka, SF formalised the relationship through a Memorandum of Understanding (MoU) with the Department of Health and Family Welfare for enabling better health delivery through energy access for 5,000 health facilities. This formal partnership provided official recognition, established clear roles and responsibilities, and created an institutional framework for resource mobilisation.

The MoU opened critical access to the NHM Mission Director and Deputy Directors across all divisions of Karnataka. These relationships proved essential for program scaling and sustainability, providing direct communication channels for policy alignment, resource allocation decisions, and program integration within existing health system structures.

The Deputy Directors served as crucial intermediaries between decision makers at the state level and district implementation teams, ensuring consistent program operation across different administrative divisions. Their support provided valuable insights into administrative processes, budget cycles, and policy changes affecting program implementation.

The high-level partnerships improved processes for fund allocation and program activities. Healthcare facilities typically require explicit permissions from higher administrative levels for fund utilisation, creating delays that can compromise patient care during system failures. The institutional relationships created clear authorisation pathways that enabled facilities to access available funds without navigating complex approval processes. This streamlined approach reduced transaction time and enabled faster resolution of issues.

An example from Belgavi and Raichur district highlights how institutional partnerships translate into practical O&M solutions. The Zilla Panchayat Chief Executive Officer (ZPCEO)/ Deputy Commissioner (DC) advocacy to the district health administration providing clear directive for accessing funds from various health schemes for maintenance activities. In addition, the DC office promised support to address gaps in funding for maintenance of systems. This directive specifically addressed how facilities could utilise portions of their healthcare program allocations for infrastructure maintenance, including energy systems, specifically the health infrastructure incentives under the Ayushman Bharat Arogya Karnataka (ABArK) for maintenance activities.

Under the ABArK scheme, every health facility receives payments for the free treatments provided to patients. The funds received under this scheme are utilised to meet the needs of the health facilities.

The ZPCEO's letter served as an advanced authorisation mechanism, eliminating case-by-case approval requirements when maintenance issues arose. This proactive approach addressed a major barrier to timely O&M response: securing funds for unforeseen maintenance needs.

Many facilities were previously unaware of ABArK funding options or uncertain about utilising the funds from ABArK for maintenance expenditures. The communication provided institutional clarity on both fund accessibility and utilisation procedures, enabling immediate response to system failures without waiting for higher-level approvals.

Further, at the state level, the Deputy Director of the program conducted a meeting with all DHOs and THOs, along with other key district and block-level officials. The focus of the meeting was to orient them on the E4H program, emphasise their role in timely operations and maintenance to provide the required funding support for the installed solar systems.

Another example is from the Government of Sikkim. SF formalised its partnership with the NHM of Sikkim with the proposal to cover 158 health facilities under its Energy for Health program.

With a request to allocate 2% of the E4H program budget annually for maintenance related activities, the NHM formally approved an allocation of INR 9,34,457 per year for a period of five years under the National Programme for Climate Change and Human Health (NPCCHH) in the FY 25-26.

This allocation specifically targets out-of-warranty repairs and replacements across all solar energy systems in the state, ensuring comprehensive maintenance coverage rather than facility-by-facility crisis management. The systematic approach provides predictable funding that facilities can rely on for planned and emergency maintenance activities.

PROCESS FLOW

The top-down approach typically follows this framework:

Institutional Partnership Development:
Formal MoUs establish clear roles and resource commitments

Policy Directive Issuance:
Administrative letters provide facilities with explicit authorisation for fund utilisation

Resource Identification:
Existing health program budgets are leveraged for maintenance activities

Streamlined Access:
Pre-approved processes eliminate bureaucratic delays during maintenance emergencies

Systematic Implementation:
State-wide allocation ensures consistent maintenance support across all facilities

Key Learnings

The Karnataka experience demonstrates that institutional clarity is as critical as fund availability. The ZPCEO's directive eliminated a significant barrier – not the absence of funds, but uncertainty about accessing them. This highlights how administrative guidance can unlock existing resources more effectively than creating new funding streams.

Sikkim's systematic budget allocation represents a paradigm shift from reactive maintenance funding to proactive financial planning. By dedicating a specific annual amount for five years, the state ensures maintenance continuity regardless of individual facility circumstances or performance variations.

These models highlight the importance of sustained political and administrative commitment, which strengthens long-term maintenance strategies. While centralised allocation offers structure, strong coordination between state-level leadership and facility teams ensures that funding is responsive to diverse needs across regions.

The success of these approaches underscores the value of collaboration, enabling policy decisions to translate into practical, on-the-ground maintenance solutions that enhance energy reliability and healthcare delivery.

CASE STUDY 7:

Fund Allocation for Training on O&M

Training plays an important role in the long-term viability and cost-effectiveness of solar systems in healthcare facilities. Training ensures staff can maintain systems safely while avoiding disruptions to medical services. Staff need training in system monitoring, performance evaluation, troubleshooting techniques, and preventive maintenance to identify issues before they lead to system failures that could compromise patient care. Most E4H programs conduct training post installation for the health facility staff to create awareness about the system installed and their role in maintaining it.

In Nagaland, SF carried out the installation of solar systems across all districts in a phased manner. Similarly, the trainings were also planned in a phased manner. During a meeting with district officials in Phek district, the SF team shared the plans for training across all districts. The district team suggested that it would be necessary to provide travel allowance for all staff attending the training as means of transportation are limited and expensive as well.

Given this was a need, the issue was discussed with the Joint Director of Planning, who suggested to have a discussion with the Principal Director (PD) of the Directorate of Health Services. The NPCCHH nodal officer, who was also a part of the meeting mentioned that the travel allowance for participants attending the training will be allocated from the NPCCHH budget. The funds for training would not only be allocated for Phek district, but all districts of Nagaland for all facilities with solar systems, even those covered under other programs. This allocation of funds from the NPCCHH comes from the Training budget delineated within the NPCCHH program plan. The allocation of budget from the state stems from the recognition of impact created by solar energy in delivering better healthcare facilities. The training was branded as a collaborative effort between SF and the NPCCHH, which allowed for allocation of funds for upskilling staff at facilities, which are necessary for maintaining the systems and carrying out basic troubleshooting in consultation with the CRM team.

Key Learnings

The case demonstrates the value of engaging stakeholders at multiple administrative levels. The discussions from district officials to Joint Director of Planning to Principal Director shows how systematic engagement across the hierarchy can unlock resources and support that might not be accessible at lower levels. The integration of training costs into existing government program budgets (NPCCHH's training allocation) provides a sustainable funding model. This approach leverages established funding streams rather than requiring separate budget approvals, which can be time-consuming and uncertain. This case highlights that successful solar training programs require not just technical planning, but also strategic partnership development, flexible implementation approaches, and alignment with existing government systems and priorities.

Conclusion

The experiences documented across India's Energy for Health program reveal that sustainable renewable energy systems require more than technical excellence—they demand financial systems that can withstand the complexities of public healthcare delivery.

However, the field experiences from Meghalaya, Manipur, Karnataka, Nagaland, and Sikkim demonstrate that resourceful stakeholders can navigate existing financial ecosystems to create maintenance pathways. The diversity of approaches—from village-level community funds collecting INR 50 per household to state-level budget allocations of nearly INR 10 lakhs annually—illustrates that sustainable financing is less about the resources and more about the institutional mechanisms that mobilise them.

Three critical insights emerge from this analysis. First, ownership trumps funding availability. Communities and healthcare staff who view energy systems as "theirs to maintain" consistently find creative ways to access resources, whether through untied funds, prize money, or community contributions. Conversely, facilities that perceive systems as external assets remain dependent on unpredictable donor support, regardless of available government funding streams.

Second, institutional champions at every level—from village head to Chief Medical Officers to State Program Directors—serve as the crucial bridge between policy intent and ground-level implementation. The Churachandpur CMO's creative budget reallocation and the ZPCEO's proactive authorisation letter demonstrate how individual leadership can transform systemic constraints into operational solutions. These champions don't just allocate funds; they give maintenance activities a priority within the existing bureaucratic frameworks.

Third, the most sustainable approaches combine multiple funding streams with clear institutional mandates. Sikkim's dedicated 2% allocation provides predictability, while the diversified approach in northeastern states—combining untied funds, community contributions, and performance incentives—creates resilience against individual funding source disruptions.

The broader implication extends beyond energy systems to infrastructure development philosophy. The traditional CAPEX-heavy approach that dominates development programming creates an illusion of completion at the point of installation. The transition from project-based thinking to systems-based planning becomes imperative. This means moving beyond the question "How do we fund this solar installation?" to asking "How do we create financial ecosystems that can sustain energy infrastructure over decades?" The answer lies not in creating new funding mechanisms, but in systematically unlocking and institutionalising the diverse financial resources that already exist within India's complex governance architecture. The Energy for Health program's experiences provide a roadmap for this transformation. This transformation requires deliberate policy commitment to embed O&M planning into program design from inception, ensuring that the institutional champions and community ownership documented here become systematic features.

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