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Enabling Resilient Health Systems using Decentralized Sustainable Energy

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Enabling Resilient Health Systems using Decentralised Sustainable Energy

A collection of stories showcasing integration of solar energy, energy efficiency and green built environments for sustainable delivery of healthcare in low-resource settings.

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CONTENTS

Page 1 INTRODUCTION

OUTCOMES AND STORIES

Page 5 IMPROVING ACCESS TO HEALTH SERVICES

Page 21 PROMOTING EFFICIENCY OF HEALTH SERVICE PROVISION

Page 32 ENHANCING CLIMATE RESILIENCE AND ACTION

Page 39 DRIVING HEALTH CARE INNOVATIONS FOR THE LAST MILE

Page 53 DRIVING HOLISTIC AND SUSTAINABLE SOLUTIONS FOR SCALE

Page 68 CONCLUSIONS

STORIES

1	Improving access to health services	A	Improving quality and reliability of maternal and neonatal care
		B	Strengthening last mile cold chain for immunisation
		C	Enabling telemedicine and diagnostics in low resourced settings
2	Promoting efficiency of health service provision	A	Transforming the work environment for health staff
		B	Strengthening service provision
		C	Creating model labour and delivery units with efficient built environment
		D	Reducing expenditure for the health facility
3	Enhancing climate resilience and action	A	Strengthening climate resilience and adaptation at health centres
		B	Reducing carbon footprints and mitigating climate change
4	Driving health care innovations for the last mile	A	Enabling last mile vaccination with portability
		B	Deploying modular facilities for emergency response
5	Driving holistic and sustainable solutions for scale	A	Establishing mechanisms for sustainable maintenance and ownership
		B	Integrating climate-resilient building structures, energy efficiency and clean energy systems with Government partnerships

INTRODUCTION

Reliable and affordable provision of healthcare is at the heart of achieving Sustainable Development Goal 3 (SDG3), which aims at ensuring good health and well-being for all. But the needs across different countries for health provision and access differ. There is however agreement that providing these services requires energy, water, transportation, infrastructure development. Most of these are dependent on fossil fuels or are highly carbon intensive.

If healthcare were a country, the global health sector would be the fifth largest emitter on the planet despite nearly half the world's population still lacking access to essential health services. This segment is also disproportionately affected by the adverse impacts of climate change, facing the brunt of chronic impacts such as heat stress and unpredictable rainfalls, and the acute impacts of natural disasters such as floods and cyclones. With increasing incidence of such climate risks and emergencies, public health provision for these communities is particularly crucial.

Ensuring universal health coverage for under-served, rural and vulnerable populations while respecting planetary boundaries requires a transformative approach that moves beyond traditional resources and systems; one that takes note of the interconnectedness between the health of the Planet and its People. Resilient health systems can be catalysed with sustainable energy and can ensure continued and uninterrupted provision of critical care services for communities affected by climate risks and disasters, while also contributing towards current and future climate mitigation efforts.

Health Care Climate Footprint Report (2019), Health Care Without Harm.
Website: https://noharm-global.org/documents/health-care-climate-footprint-report

Independent of the energy source and supply scenario, be it un-electrified, under-electrified or electrified contexts, reliable and affordable energy combined with efficient medical appliances for public health systems can significantly contribute to improving the efficacy and access to healthcare provision. Today, with the maturity of solar energy systems, decentralised models designed with local ownership and Operations and Maintenance can significantly decrease transaction costs and ease operations for end-users, healthcare providers, and governments.

The stories captured in this book are selected from a representative set of SDG7 driven solutions (i.e. Decentralise Renewable Energy (DRE) solutions, combined with efficient medical appliances and climate-resilient, green built environments) deployed across 1000+ public health facilities in India in some of the most climate vulnerable districts. The stories capture qualitative and quantitative impacts, from the implications for end users on their timely access to health services and reduction of out-of-pocket expenses, to the implications on health facility staff and health centre operations. The cases bring out carbon offsets that the centres can drive. Furthermore, they also portray strengthening of health care innovations for low resource settings and building ecosystems for local ownership and maintenance of SDG7 solutions within public health overtime.

The compendium is aimed at sharing key learnings, insights and successful processes for furthering the health, clean energy and climate nexus.

#1
Improving access to health services

Communities living in under-resourced settings often lack access to timely, reliable and affordable healthcare services. With remote primary healthcare facilities often lacking energy or facing interruptions in power supply, service provision for communities accessing them is compromised. The inability of the health centre to provide essential medical services due to unreliability increases uncertainty for end users, waiting times, repetitive visits and delayed diagnosis resulting in increased out-of-pocket expenditure.

Reliability of service provision via clean energy combined with necessary medicines, human resources and capacities, improves overall delivery of services and reduction in costs incurred over healthcare needs.

“Emergencies can happen anytime, we need electricity to deal with them effectively. Due to insufficient and erratic power supply we often had to deliver babies under torch or candle light and ask relatives to boil and bring water. Everytime I go through such an experience, I feel miserable.”

Auxiliary Nurse and Midwife at Ramdurga PHC

A. Improving quality and reliability of maternal and neonatal care

The Challenge

A key driver of a safe delivery room is the provision of functional medical appliances such as spotlights, baby warmers, suction apparatus and phototherapy units. In the absence of these, the risk of infections and chances of fatality increase significantly. Primary Health Centers (PHC) in rural areas, such as the one in Ramdurga in North Karnataka, serves a population of 22,000 individuals and faces frequent power failures for 4-5 hours, sometimes lasting 3-4 days and in many instances, even longer. This affects maternal and neonatal service provision with serious consequences for the mother and new-born child.

Similarly, Community Health Centers (CHCs) like the one in Charmal in rural Odisha, faced serious challenges in conducting deliveries in the face of frequent power disruptions. Cases were referred to the sub-divisional hospital, increasing time and cost for end-users, and increasing the burden on the next level of health facility.

“Performing deliveries in the dark is dangerous, the situation becomes even worse if the infant is born with hypothermia or jaundice or is a Low weight baby (LWB) and we have no light or access to neonatal, radiant warmers. We had no option but to refer such cases to the sub-divisional hospital. Some also had to use private hospitals”

Mr Abhilash Nandan, Block Program Manager, National Health Mission

The Solution

Solarizing the PHC in North Karnataka with efficient lighting, water pumping and solar water heating has enabled the facility to extend better maternal, post natal and neonatal care. Reliably powering the maternity wards now ensures deliveries are conducted hassle free at any time of the day or night.

The facility is also reporting an increase in the number of women coming in for deliveries since the intervention and resulting improvements in sanitation and hygiene with access to hot water.

“With the use of the solar water heater, we are now able to use warm water for patients and new-born infants in addition to using it to disinfect essential medical equipment,”

In the case of the Charmal CHC in Odisha, solar lighting has eased the process of conducting deliveries with round-the-clock availability of uninterrupted and reliable access to power. The efficient medical equipment has also strengthened the CHC's capacity to effectively deal with high-risk neonatal cases resulting in fewer referrals to the block hospital. This has also reduced the out-of-pocket expenses for patients who earlier had no option but to travel over 15 kms to avail these services.

Watch here:
how energy access has improved provision of affordable care at a hospital for tribal communities in Tamil Nadu, Southern India.

B. Strengthening last mile cold chain for immunisation

“At a given time over 150 ice-packs are stored in the refrigerator; if there is no electricity it loses potency and cannot be sent to the Sub-Centers for use. It has a huge impact on our vaccination goals,”

Dr. Ginthianlal Tonsing, Medical Officer, Singngat CHC.

The Challenge

Despite adequate vaccine supply, vaccine maintenance in rural and remote parts of the country is challenging and their efficacy easily compromised due to a lack of 24*7 power. The CHC in Singngat in the hill regions of Manipur is specifically prone to frequent power cuts because of timber logging that happens all year round. During logging, power transmission lines are disconnected to reduce the risk of accidents. Singngat CHC serves as a last mile storage point of vaccines for 7 Sub-Centers (SCs). With rampant power cuts, this cold chain storage point saw significant vaccine wastage and delays in the community immunization process.

The Solution

The facility was solar powered with efficient appliances including an Ice-Lined Refrigerator (ILR) and Deep Freezer to successfully maintain and supply vaccines to all other last mile health centers. Over 150 ice-packs and 15 types of vaccines consisting of over 200 vials are stored in the ILR at any point in time and dispatched from there to the Sub-Centers. Vaccines at all the sub-centers are dispatched on time helping them meet their monthly immunization targets.

Singngat CHC represents a case where commercial activities (in this case timber logging) partly compromised health service delivery. Decentralised solar solutions have not only improved services at the facility level but also ensured sustainability of the cold chain for vaccination.

"We never talk of things like ice-packs, but they are significant while delivering vaccines. It is a must to pack the vaccine with an ice-pack to maintain its efficacy. Now we are able to do that as we always have the power to freeze these packs"

Nurse Ninglianmawi, Singngat CHC.

C. Enabling telemedicine and diagnostics in low resourced settings

The Challenge

As part of the Indian government's initiative on Ayushman Bharat, over 150,000 Health and Wellness Centers (HWC) are being established across the country, including upgradation of some Sub Centers to expand service delivery. This service delivery is expected to 'go beyond maternal and child health care services to include care for non -communicable diseases, palliative and rehabilitative care, Oral, Eye and ENT care, mental health and first level care for emergencies and trauma, including free essential drugs and diagnostic services'

The HWC in Mata village of Manipur is one such last-mile point of contact, required to extend the Chief Minister's Health For All scheme including door-to-door screening and chronic disease management. The scheme mandates the use of electronic devices for screening and consulting via Telemedicine, both of which require reliable power supply to charge devices. In the absence of any electricity, a considerable population were unable to receive treatment and had to bear the expenses to receive such diagnosis and treatment at a health facility located farther away.

The Solution

To support extension of government schemes, alleviate the heat stress and enable appropriate health service access, the facility was solar powered with efficient lighting, fans and digital appliances critical for telemedicine and chronic disease management. This would otherwise have been unimaginable in an unelectrified health facility.

The CHO is able to charge the digital tablets provided through the scheme and her smartphone to carry out the telemedicine consultation with doctors from the Command Centre seamlessly. Powered by sustainable energy, the health facility has also successfully rolled out their doorstep Electrocardiogram (ECG) services under the scheme, in addition to using ECG machines within the facility.

“Now, we can easily charge our devices and equipment and use it the entire day without worrying about running out of power. I don’t think we had a chance at that without decentralized energy systems”

Ms. Ruthi, the CHO at Mata HWC.

Watch here:
as energy access enables better last mile healthcare in unelectrified areas of tribal Odisha.

#2
Promoting efficiency of health service provision

While the lack of electricity has life-threatening consequences on those seeking treatment, it also has detrimental impacts on the health facility and its staff. Poor working conditions, combined with the frustrations of providing healthcare in the absence of reliable power affects staff wellbeing and reduces morale, resulting in increased levels of workplace stress. In under-resourced health centres with more severe energy crises, it also results in low staff retention and performance levels. The limited budgets of these facilities is made more scarce with higher energy expenditure for diesel used as a back-up source.

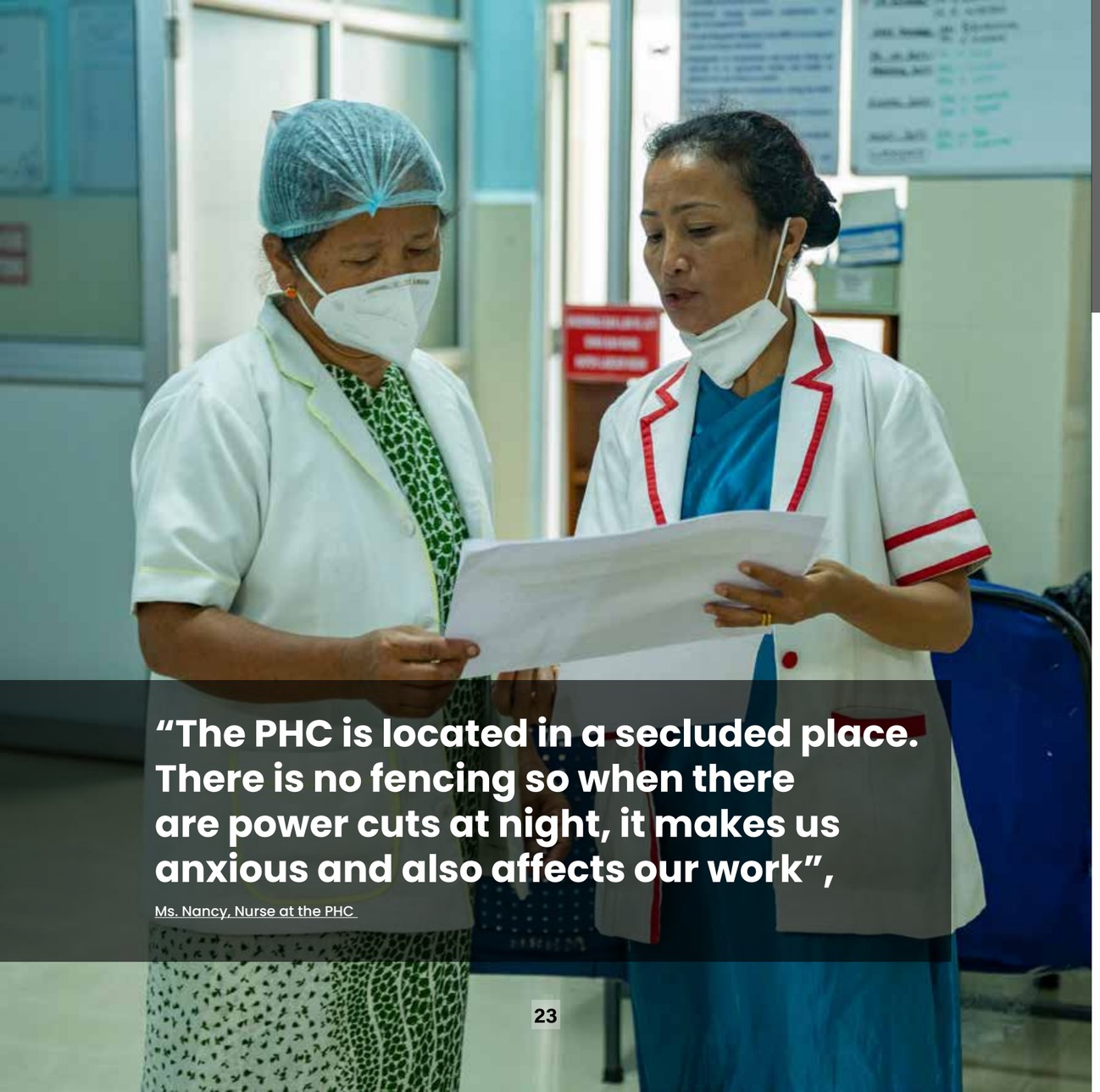
Staff residential quarters which are often co-located with the health facility are also in need of reliable power for the well-being of staff and has been considered as a critical load while designing solutions for primary health facilities.

The cases outlined in this section highlight how decentralized sustainable energy is strengthening health systems by transforming the working environment, the physical safety and mental well-being of staff, positively influencing their morale and retention levels. It also reflects the reduction in costs for health facilities and the health system in general.

A. Transforming the work environment for health staff

The Challenge

Saikawt Primary Health Center in the hill district of Churachandpur in Manipur in North East India faces frequent power outages 4-5 times a day ranging between a few minutes to a few hours. With the PHC serving more than 100,000 people, staff often have to work round-the-clock to manage the heavy patient load. The safety of female staff is also a concern.
The PHC has a diesel generator on standby used mainly during emergencies. Starting the generator is also a difficult task, especially for female staff given the poor ergonomics.



“The PHC is located in a secluded place. There is no fencing so when there are power cuts at night, it makes us anxious and also affects our work”,

Ms. Nancy, Nurse at the PHC

“I almost started to cry out of anxiety when I was unable to start the machine and it took me a while to manage and operate it.”,

Ms. Mangliankim, another Nurse at the PHC describing her desperation during an emergency case

The Solution

Solar powering basic energy access including lights, fans, mobile charging in addition to medical appliances has equipped health care providers at the PHC to carry out their activities, and improved their mental well-being. The energy reliability has created safer working conditions particularly for female staff and boosted staff morale with direct implications on retention levels in this remote region.

“I don’t have to work hard to turn on the generator. I can turn on a switch and there will be light.”

Nurse Mangliankim.

“The campus is lit all the time in the evenings now. I do not worry about being left in the dark while waiting for electricity to come back. I feel safer to live and work here now.”

Nurse Nancy.

B. Strengthening service provision

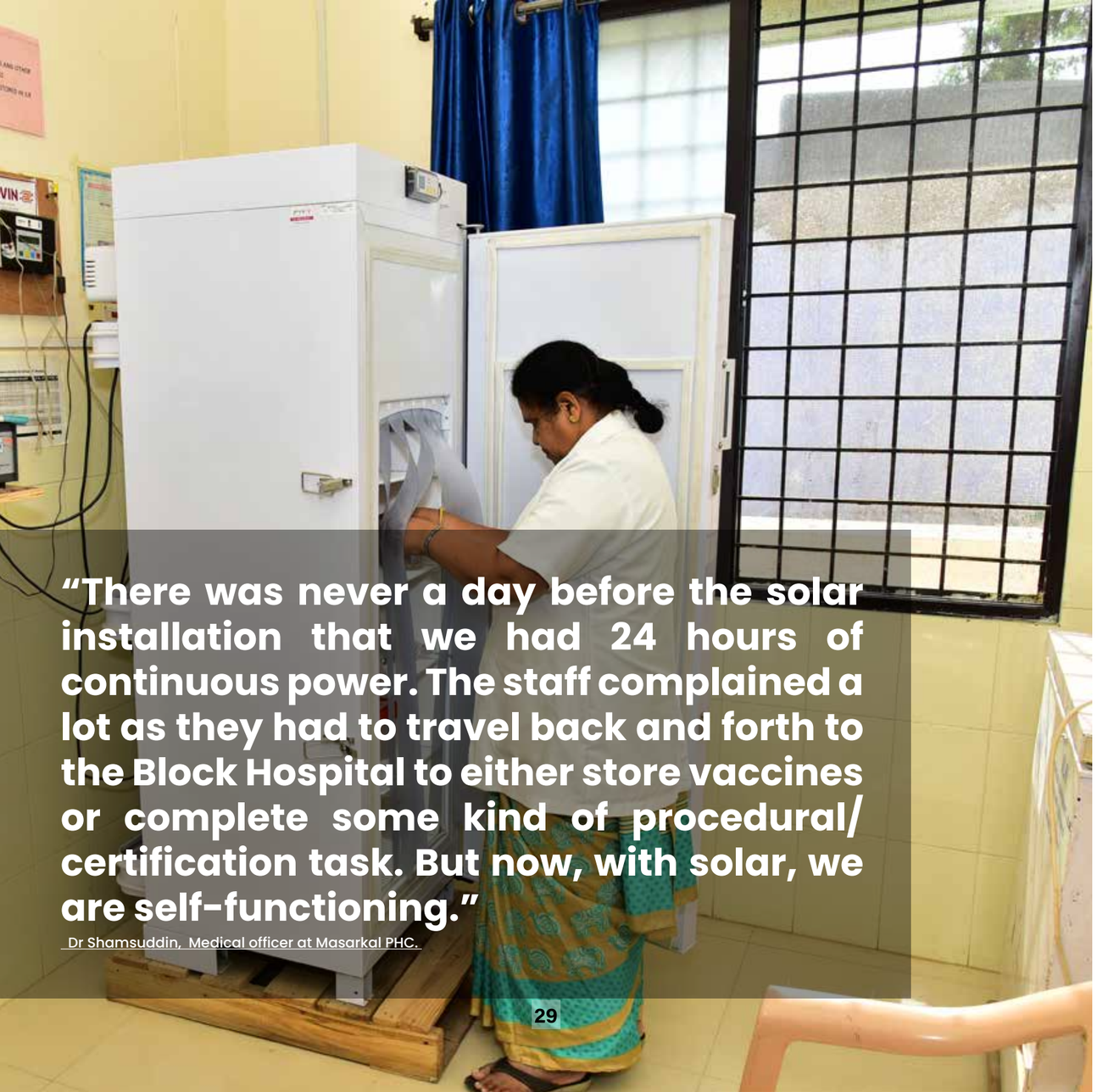
The Challenge

The PHC in Masarkal of North Karnataka faces severe power disruptions with over 8- 9 hours of power cuts on certain days. In the case of longer duration outages, all available vaccines had to be shifted to the nearest Block-level hospital. The situation affected the overall functioning of the PHC, hindering labour room operations and making data entry and management particularly difficult for staff at the centre.

The Solution

In the process of identifying gaps that were affecting the functioning of the health facility, the Medical Officer who had been posted at the PHC began to probe the health-energy nexus and realised that many of the gaps could be bridged if the facility were to receive reliable power supply. With his continued interest and initiative, the facility was solar powered including lighting, fans, water pumping, digital services and solar water heating systems to support deliveries and basic care.

The initiative has enhanced the efforts of the proactive officer in ameliorating the conditions at the PHC with a positive impact on the staff's ability to undertake their activities.



“There was never a day before the solar installation that we had 24 hours of continuous power. The staff complained a lot as they had to travel back and forth to the Block Hospital to either store vaccines or complete some kind of procedural/ certification task. But now, with solar, we are self-functioning.”

Dr Shamsuddin, Medical officer at Masarkal PHC.

C. Creating model labour and delivery units with efficient built environment

The Challenge

Energy expenditure forms a significant part of the total recurring expenses for a health facility, especially those dependent on traditional back-up fuels. To run critical equipment during emergencies and appliances needing 24*7 power, health facilities in poorly electrified areas have no option but to depend on diesel generators for back-up. Poor quality electricity and voltage fluctuations can also damage appliances and increase expenses for the health facility, worsening the situation.

In the case of larger hospitals such as the Civil hospital in Nongpoh in Meghalaya, they were spending a staggering amount of over INR. 2,00,000 (USD 2,400+) per month on the electricity bill and the cost of diesel-back up to power the blood bank, Maternity block, Intensive Care Unit (ICU), wards and Operation Theatre.

D. Reducing expenditure for the health facility

The Solution

Solar powering the larger Civil hospital in Nongpoh in Meghalaya, with efficient equipment for the different critical loads is resulting in cost savings of more than USD 110,000 over a 5 year period, by reducing diesel costs on critical loads by 76.46% and total energy costs by 68%. This can now be allocated to provide out-patient services for nearly 100,000 patients over 5 years. In addition to the cost implications, this also contributes significantly to reducing carbon emissions- avoiding 18,000 liters of diesel usage annually amounting to carbon savings of more than 81.8 tonnes of CO2 over a 20-year period for this hospital alone.

By integrating solar energy with efficient appliances, facilities not only see a reduction in their electricity bills and expenditure on diesel but also avoid expenditure to replace damaged appliances (affected by voltage fluctuations).

These savings can be further enhanced with efficient built environment in these facilities, as outlined in the table below of a COVID care hospital, Vistex, in the Masarhi block in Bihar. In the case of public health facilities, all of these amount to savings for the health department and the government at large, with positive implications on health budget availability for direct service provision.

System	Efficient appliances with Green Building Design	In-Efficient appliances with Green Building Design	In-Efficient appliances with standard typical building designs
Total Load Connected	4290 W	5749 W	5749 W
Total Units Required	21.8 Units	30.63 Units	52.34 Units
Solar Panel Capacity	12 kWp	16.2 kWP	26 kWp
% of Savings (Energy)	28.82% (solution without energy efficient appliances and with green building design)		
	58.34% (savings with both- energy efficiency and green building design)		

#3
Enhancing Climate resilience and action

The use of diesel as a back-up source to power the most basic services contributes directly to increasing carbon emissions and thereby, accelerating climate change. Healthcare delivery is also directly affected by climate change and natural disasters, curtailing options for timely care during emergencies, particularly for the poor. Disasters such as floods and cyclones that plague the country cause significant damage to infrastructure including grid-based power supply. In their aftermath, it may take weeks or months before grid lines are restored.

Decentralized SDG7 driven solutions with energy efficiency and green built environments can enable both climate mitigation and adaptation. On the one hand, by displacing fossil fuels, they help to mitigate current and future CO2 emissions from energy-use in health facilities. On the other hand, they can ensure that emergency care and routine primary healthcare could continue to be provided in the face of climate stresses and disasters.

A. Strengthening climate resilience and adaption at health centres

The Challenge

Heat stress and extreme weather conditions can result in adverse effects such as increasing the chances of high risk pregnancies, premature deliveries, and incidence of heat strokes and bed sores in elderly populations and persons with disabilities. Higher temperatures also increase the health risks and wellbeing for staff.

The Bhojpur Health and Wellness Center (HWC) located in rural Odisha experiences extreme weather conditions - heat stress, humidity, incessant rainfall followed by extremely chilly winters. Power outages are common throughout the year which further aggravates the impact of such climate extremities. This primarily affects the Out-Patient service delivery in the HWC where the footfall is considerably high and both patients and health staff are subjected to uncomfortable, not to mention dangerous conditions given the high temperatures.

“Sometimes at a time 40 people also wait to avail OPD services; the waiting room can get crowded and there is a chance that some patients may feel even more sick. Imagine if they were to stand for their turn without a fan or light”,

Dr. Sharad Kumar Dehuri, Medical Officer at Bhojpur HWC

The Solution

Clean energy powered fans in the facility, especially in the main building and in the porch, used as a waiting area for patients, has enabled access to basic cooling. In addition to the increased levels of comfort for patients and staff, sustainably powering space cooling needs and basic energy access has enabled the facility to remain functional irrespective of extreme seasonal vagaries.

For this initiative on solarization, in addition to its past efforts in cleanliness, hygiene, the health center has now been nominated for the national level Kayakalp Clean Hospital award, a Government-initiative intended to encourage and incentivize Public Health Facilities (PHFs) in the country to demonstrate their commitment for cleanliness, hygiene and infection control practices. The prize money from such an can be used to further improve services in the facility.

B. Reducing carbon footprints and mitigating climate change

The Challenge

As climate-induced outbreaks become more frequent, health care facilities will suffer from a dual burden of not just catering to larger volumes of patients but having to do so with expensive, uncertain, and/or un-clean energy supply.

More than 45,000 primary health facilities (PHCs and Sub Centers) across India are in completely unelectrified areas - often in geographically difficult terrain including hilly, remote and forested regions. An additional 42,000 such facilities are yet to be built.

The energy supply and infrastructure systems for these new facilities can play an important role in India's climate mitigation plans and emissions reduction targets, contributing to the country's larger vision of an Atmanirbhar Bharat (or a self-reliant India).

The Solution

There is an opportunity here to leapfrog the grid and traditional fuels by adopting decentralised sustainable energy solutions for facilities yet to be established, while unreliably electrified facilities can benefit from sustainable solar-based backup sources.

On average, across primary health facility levels, there is a potential to mitigate 42 tonnes of CO_2 for each facility over a 20-year period (life of the asset) by using decentralized sustainable energy with efficient equipment . This amounts to mitigating more than 3.6 million tonnes of CO_2 equivalent across the 87,000 facilities over a 20-year period. This would be much higher if larger facilities and hospitals running more critical care equipment and those requiring 24*7 power were also sustainably powered.

#4
Driving healthcare innovations for last mile

Context and need-based innovations are of vital importance in providing last mile health-care. Where traditional systems fail, innovations around technology portability and modularity, built environment structures and processes for operations and ownership become important. Emergencies such as COVID 19 have emphasized this. There is a need to push for innovations that can be inclusive for people with varying health conditions or disabilities, for people affected by different kinds of climate stresses and for people in varying terrain and geographies.

Decentralized energy systems when coupled with innovations such as portable vaccination, physiotherapy and maternal care kits, efficient and low cost oxygen generation appliances and so on render themselves ideal for inclusive healthcare provision, by supporting healthcare workers to reach the last mile. To complement this, improved climate resilient built environments can help create modular structures, using local material, and support customization based on specific geographic or service needs.

A. Enabling last mile vaccination with portability

The Challenge

Decentralizing health care services beyond the primary health facilities and strengthening door-step care requires last-mile healthcare workers to be better equipped. Passive vaccine carriers used by the Auxiliary Nurses and Midwives travelling to villages and individual households can only ensure vaccine efficacy for 4 hours requiring them to travel back and forth between the primary health center and the village.

In the absence of reliable power at the center, all available vaccines have to be shifted to another facility, with many instances of vaccine wastage.

The Leishang Health and Wellness Center (HWC) located in the hill regions of Manipur experiences heavy rainfall and is one such facility. Despite having vaccine carriers provided by the government, in the absence of power, charging them to ensure vaccine efficacy on longer journeys was a recurring issue.

The Solution

Innovations in portability such as solar powered maternal kits, physiotherapy kits and vaccine carriers can ensure doorstep delivery of much-needed diagnostics and treatment. They enhance the ability of last mile health care workers to undertake immunisation within the community, recognize high-risk pregnancies and support treatment. Active vaccine carriers powered by solar can help ANMs cover more ground in a day, last longer and avoid issues of compromised vaccine efficacy.

Solar powering the HWC in Manipur and providing adequate energy to charge the portable vaccine carriers has enabled the facility to extend immunization services. Now the facility is able to use the refrigerator, freeze ice packs and power vaccine carriers which last up to 24 hours per charge. This has greatly extended their doorstep immunization activities to some of the farthest, unmotorable villages like Tonsen and Komsen which are approximately 5 - 6 kms away from the health facility and would take over 2-3 hours to reach by walk.

“We had chargeable vaccine carriers but there was always a fear of temperature drop (because they were never fully charged). But since the solar installation we are relieved as we can charge the carriers fully and head out to provide doorstep vaccination without any worries”

Ms. K Premlata Lamkang (ANM)

Watch here
as solar energy is used to run boat clinics for last mile healthcare to communities across riverine islands of the Brahmaputra.

Watch here
the impact of portable, solar powered maternal and child healthcare kits:

The Challenge

The National Health Mission has called for the District Hospital and Sub-Divisional Hospital to strengthen labour rooms to benefit every pregnant woman and newborn delivering in public health institutions. Among other things, providing quality maternal care requires functioning medical equipment and comfortable conditions to ameliorate the discomfort that women face during delivery. For women to have a healthy and comfortable labour, the temperature should be between 22.8°C-29.3°C at all times.

The Sub-Divisional Hospital in Yellapur, North Karnataka, mandated to provide quality maternal care, is characterized by high temperatures, high humidity, heavy rainfalls, and is home to a socio-economically vulnerable tribal population. The facility conducts more than 90 deliveries on a monthly basis.

"We experience heat stress during the summer and rainy seasons. Many times we get frustrated while conducting deliveries in a closed environment during these seasons. While performing an operation, there are at least 4-5 people around with high intensity lighting and equipment. This causes constant heat within the space and it is exhausting and uncomfortable if the ventilation is not adequate.

The number of patients experiencing dehydration, diarrhoea and other similar cases are high in the summer season, especially in the maternity ward. These are a direct result of the heat in the environment which also leads to exhaustion. Good ventilation and air circulation is extremely important for mother's health in ensuring no such complications prohibit the mother's health and the growth of the newborn."

Dr. Deepak Bhat, Gynaecologist, Yellapur Taluk Hospital

The Solution

A model labour and delivery unit was established at the hospital to cater to the growing institutional delivery needs of the community by integrating efficient built environment designs, energy efficient equipment and solar powered systems. The state-of-the-art design includes

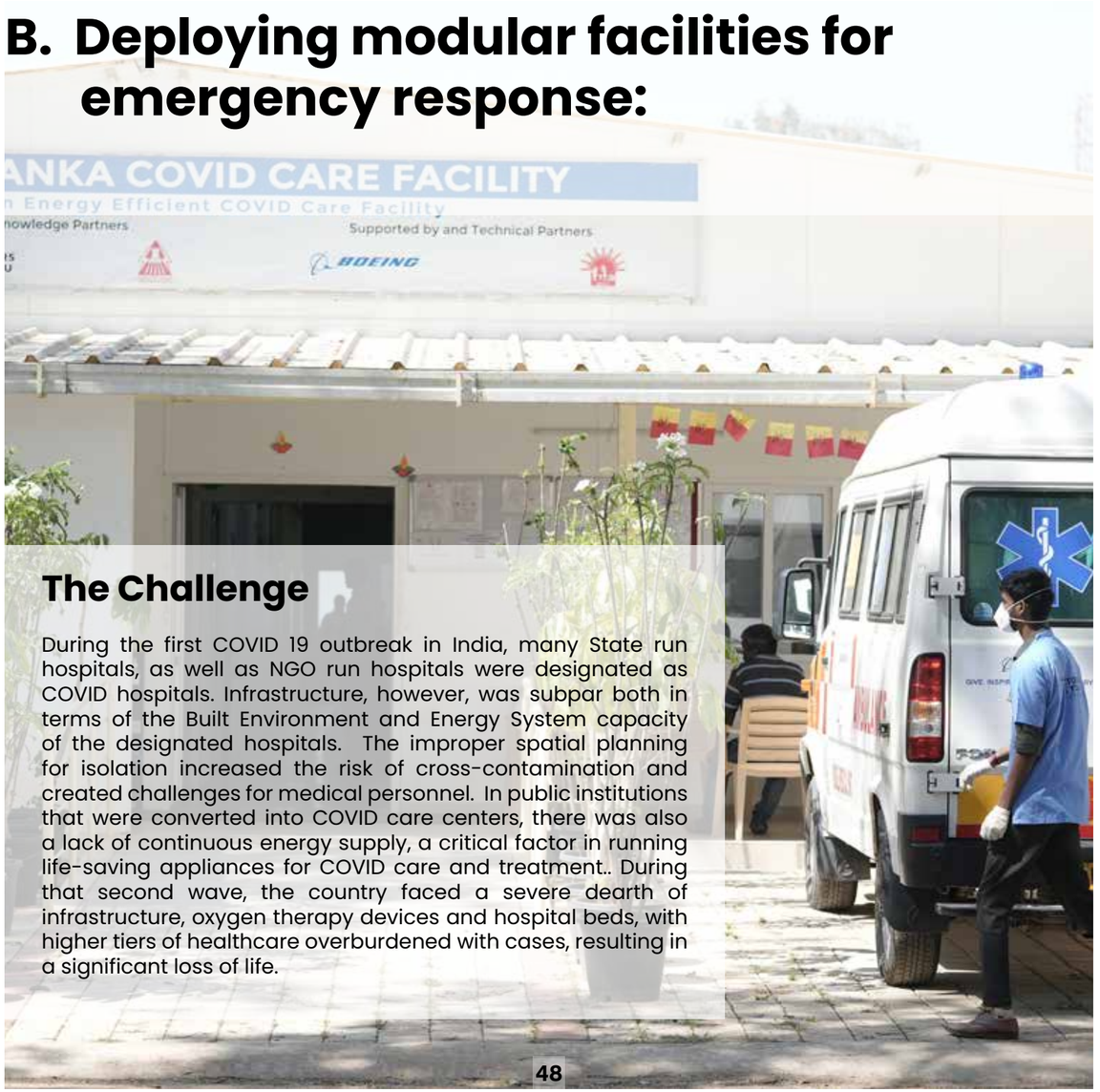
(a) roofing with brickbat coba-, a method of waterproofing the roof that also helps with thermal insulation

(b) windows around the structure to ensure adequate day lighting, all while ensuring privacy of patients

(c) sufficient shading devices for better indoor temperatures and lower energy consumption for space cooling.

These conditions are enabling improved wellbeing for mothers and new-born babies. The installation of energy efficient labour room equipment has further reduced energy bills.

B. Deploying modular facilities for emergency response:



The Challenge

During the first COVID 19 outbreak in India, many State run hospitals, as well as NGO run hospitals were designated as COVID hospitals. Infrastructure, however, was subpar both in terms of the Built Environment and Energy System capacity of the designated hospitals. The improper spatial planning for isolation increased the risk of cross-contamination and created challenges for medical personnel. In public institutions that were converted into COVID care centers, there was also a lack of continuous energy supply, a critical factor in running life-saving appliances for COVID care and treatment.. During that second wave, the country faced a severe dearth of infrastructure, oxygen therapy devices and hospital beds, with higher tiers of healthcare overburdened with cases, resulting in a significant loss of life.

The Solution

Innovations in built structure design was a critical requirement to enable faster response and to create the much-needed infrastructure in such an emergency. In response to this need, a stand-alone and modular 100-bed COVID care response facility was constructed within a short timespan of 21 days to cater to the rising caseloads. The decentralized energy system and built infrastructure were set-up on par with the care and treatment requirements of typical COVID response hospitals, including 70 oxygenated beds, 20 High Dependency Units (HDU) beds and 10 Intensive Care Units (ICU) beds.

The design of the hospital structure also accounted for climate-resilient approaches which ensured comfort for both patients and caregivers within the space by providing appropriate ventilation and using insulated materials. The modularity, materials used, speed of deployment and decentralized clean energy-powered efficient equipment can function as a template for future emergency response- in pandemics, medical emergencies, or climate disasters.

Preview: Energy Efficient COVID Hospital, Yelahanka, Bangalore

Baljek Integrated Health Complex in West Garo Hills - A Sustainable Healthcare Facility

#5
Driving holistic and sustainable solutions for scale

In order to be able to scale decentralized sustainable energy solutions, it is critical to build enabling conditions such as need-based, efficient technology and infrastructure, on-ground capacity for utilisation and regular maintenance, appropriate financing for capital and operational expenses and linkages to other aspects of health-care provision, including leveraging government schemes and initiatives.

The ecosystem approach brings together energy and health sector stakeholders in designing and implementing solutions at scale, ensuring they are well-suited to serving healthcare needs in the region. To create enabling conditions at a local level the role of field actors - health staff, local energy enterprises, field technicians - in the design, installation and maintenance of systems needs to be strengthened in order to decentralise and sustain efforts across all aspects.

A. Establishing mechanisms for sustainable maintenance and ownership

The Challenge

The sustainability and long-term utilization of any solutions implemented is contingent on appropriate training of end-users, availability of local technical expertise for servicing, access to spare parts and financial allocations for post installation maintenance. In the absence of appropriate training for health facility staff on utilization or clear responsibilities and funds for regular maintenance and servicing, the solar system or energy efficient asset is at risk of becoming obsolete, defeating the purpose of the entire initiative.

The Interventions

Systems have been designed with state and district level governments in focus states to cover the cost of 5 years of Annual Maintenance for the energy system (which typically amounts to 2% of the total energy system cost) as part of the initial capital expenditure itself. In other cases, fund allocation for maintenance has leveraged the un-tied annual resources of the Rogi Kalyan Samitis (RKS). i.e. the health facility management committees that function at each facility in the Indian healthcare context.

Health partners like Karuna Trust run PHCs through a Public Private Partnership (PPP) model, including in the state of Karnataka in South India. They have been path-breakers in enhancing the role of the ARS (the term in Karnataka for the Rogi Kalyan Samithi or Health facility management committee) by ensuring greater ownership and involvement of the community and local representatives in the Operations & Maintenance (O&M) of these energy-health interventions.

Resolutions are passed by the ARS to cover the cost of annual maintenance (after the first year of free servicing) and the replacement of batteries, ensured longer term commitment to the performance and efficacy of the energy system. Training provided to ARS members and health centre staff (post installation) has ensured proper handover and clarity on using equipment, monitoring energy consumption, and maintaining the panel and battery. Efforts are also underway to work with the ARS in allocating untied funds to share in the capital expenditure of the systems- including for purchase of energy efficient appliances.

Linkages are facilitated with the nearest energy enterprise to provide regular maintenance and address unplanned servicing needs. Remote data monitoring systems are being piloted and benchmarked to improve preventive and corrective maintenance, in a timely and cost-effective manner.

B. Integrating climate-resilient building structures, energy efficiency and clean energy systems with Government partnerships

The Challenge

While governments allocate budgets for establishing newer facilities, the built infrastructure and energy systems typically use standard designs and procurement practices which miss out on the opportunities to inculcate pro-climate solutions, geographical contexts and cultural requirements. This results in inefficient built environment designs and energy systems.

In the context of Meghalaya state, the absence of thermal insulation or efficient building/ space design makes primary health facilities unconducive for deliveries affecting the comfort of patients and increasing drudgery for medical staff. This adversely affects operations, utilisation and sustainability of the facility.

The Solution

Under the Government's Meghalaya Health Infrastructure Strengthening Project, funds have been earmarked for the establishment of new Sub-Centers across the state. In the initial phase of the project , 300+ Sub Centers and 107 Primary health centers will be solar powered across the state- a first such initiative at a state level to strengthen health infrastructure.

As a knowledge and technical partner, SELCO Foundation and other collaborators are supporting the Government of Meghalaya's Health Mission with built environment design guidelines that are inclusive and incorporate climate resilience and local context needs. They include energy efficiency principles in building design that control indoor temperature during heat stress and cold climates. They also seek to increase natural lighting and ventilation- critical to the comfort of staff and patients. The construction plan includes 4 modules, namely the community hall, out-patient unit, maternal delivery block and staff accommodation.

A participatory design approach was taken to incorporate community and health staff requirements in terms of built environment. Here, key stakeholders such as local building contractors, masons, energy enterprises as well as health facility staff are being trained to increase their awareness and ensure effective and sustainable utilisation of the infrastructure and systems implemented. Constructed with features of disaster resilience, these centers will integrate efficient medical and electrical appliances and solar energy for uninterrupted power supply.

Sustainable and Energy Optimised Health SubCentre - Meghalaya Health Systems Strengthening Project

Conclusions

The stories documented here illustrate the criticality of integrating decentralised energy, energy efficiency and green building design solutions in primary health care provision . They highlight the myriad ways in which climate-smart solutions can catalyse change and improve overall health delivery for last mile communities and health staff.

By bringing together public health, clean energy and climate resilience the goal is to design and implement holistic programs that can strengthen public health facilities and primary healthcare provision via SDG 7 and SDG 13.

To collaborate or for more information, reach out to us

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