



# Impact and Learnings Document on Vulnerable Community Institutions

**SONY**



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## KEY HIGHLIGHTS



**47** Institutions  
Powered



**13000+** Direct End-users  
Benefitted



**800+** Indirect End-users  
Benefitted

## Solar Powering



Healthcare



Basic Energy Appliances



Administration



Education










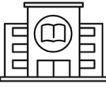
Skilling



Food Services

**Summary Table of Impact According to Typology:**

TYPOLOGY	END USER LEVEL	FACILITY AND STAFF LEVEL	ENVIRONMENTAL LEVEL
 <b>Old Age Homes</b>	<b>Safety and Well-being</b> Preventing nighttime accidents Mobility Assistance Access to health services Enhanced convenience and safety for residents	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	<b>Sustainability</b> - Minimized reliance on the grid - Reduced CO2 emissions - Strengthened local ecosystem - Annual maintenance contracts for regular servicing
 <b>Orphanage</b>	<b>Child Safety and Learning</b> Ensuring child safety at night Facilitating school activities Providing safety lighting Enhancing recreational activities	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	
 <b>Health Centre</b>	<b>Healthcare Continuity</b> Uninterrupted healthcare services Reliable administration Access to clean water Enhanced convenience for patients	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	
 <b>Livelihood Centre</b>	<b>Productivity and Safety</b> Improved productivity Reduced heat stress Enhanced safety Convenience for livelihood activities	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	
 <b>Rehabilitation Centre</b>	<b>Education and Well-being</b> Facilitating education Addressing mental health Ensuring food distribution Uninterrupted electricity for equipment	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	

TYPOLOGY	END USER LEVEL	FACILITY AND STAFF LEVEL	ENVIRONMENTAL LEVEL
 <b>Low Income Schools</b>	<b>Improved Learning</b> Enhanced education Reliable power for smart classes Uninterrupted meals Efficient kitchen operations	<b>Convenience and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	<b>Sustainability</b> - Minimized reliance on the grid - Reduced CO2 emissions - Strengthened local ecosystem - Annual maintenance contracts for regular servicing
 <b>PWD Institution</b>	<b>Productivity and Comfort</b> Improved productivity Convenience for livelihood activities Ensuring comfort for therapy Enhanced convenience for individuals	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	
 <b>Special Schools</b>	<b>Education and Comfort</b> Facilitating education Ensuring temperature control and lighting comfort Uninterrupted food service	<b>Comfort and Efficiency</b> Improved built environment Ergonomic design Reduced electricity bills Enhanced staff well-being	

## Background and Context

Vulnerable groups can be defined as those who are vulnerable under any circumstances, and those whose resource endowment is inadequate to provide sufficient income from any available source. Generally, vulnerable populations are groups of people who are at a higher risk of experiencing adverse outcomes due to various factors, such as socio-economic status, health conditions, age, disability, and more.

In the Indian context, some broad categories of vulnerable populations might include:

- **Economically Disadvantaged:** Those living below the poverty line or without access to necessities.
- **Children and Adolescents:** Particularly those who are orphaned, street children, or those engaged in child labour.
- **Elderly:** Especially those without social support, financial resources, or access to healthcare.
- **Women and Girls:** Especially those from marginalized communities who face gender-based discrimination and violence.
- **Persons with Disabilities (PWD):** Those who face physical, sensory, intellectual, or mental health challenges.
- **Scheduled Castes and Scheduled Tribes:** Historically marginalized communities who have faced social and economic disadvantage due to caste-based discrimination.
- **Migrant Workers:** Those who move from rural to urban areas for work, often lacking proper legal protection and access to services.
- **LGBTQ+ Community:** Due to societal stigma and discrimination, this group can face various challenges.
- **Rural and Remote Populations:** Those who lack access to basic services like healthcare and education due to their geographical location.
- **People with Chronic Illnesses:** Those who have limited access to healthcare or who may face discrimination due to their health conditions.
- **Homeless Individuals:** Those who lack stable housing and are often excluded from social safety nets.

SELCO Foundation's program of "**Energising Vulnerable Community Institutions**" focuses on institutions that cater to the above broad categories of vulnerable groups.

## Overview of Vulnerable Community Institutions:

Vulnerable Community Institutions (VCIs) are institutions which serve the most susceptible members of society. These institutions provide critical social welfare services to otherwise disadvantaged populations including people with disabilities, tribal communities, infants, young mothers, pregnant women and so on. They are typically located in rural and remote areas and run on bare minimum resources. These institutions need support on energy interventions and will most likely champion sustainable energy solutions.

Vulnerable community institutions provide underprivileged and marginalized communities with essential social welfare services. The institutions provide care for a variety of groups, including people with disabilities, babies and children who are at risk, senior citizens from low-income families, marginalized women, indigenous communities, and others. The institutions include low-income residential schools, orphanages, nursing homes, centers for skill development and rehabilitation, special healthcare facilities, and facilities for auxiliary maternal care, all of which have various energy needs. For example, Vulnerable Community institutions can include orphanages and adoption homes, old-age homes, Anganwadi, Bridge schools, Residential schools for differently abled students, Skilling and livelihood centers, Auxiliary maternal facilities, amongst others.

A lot of these institutions are in places where grid-based power supply is sparse or inconsistent, forcing them to divert their limited funding toward backup sources that have a negative impact on the economy and the environment

## Energy - linked challenges faced by VCIs:

Access to energy or SDG 7 plays a key role in enabling the achievement of many of the other Sustainable Development Goals. Solutions based on SDG7 are becoming increasingly significant in remote locations with limited resources. Vulnerable institutions that work to offer communities with essential services like maternal and childcare, education, and skill development; access, dependability, and affordability of energy become crucial to be able to improve service delivery.



## Some of the key energy related constraints are outlined below:

- Energy poverty (inaccessibility, unreliability and unaffordability) in remote and resource- constrained settings: Energy poverty has a particularly negative impact on many of these institutions since they often operate in rural areas and/or with limited resources. The effectiveness and impact of healthcare provision are diminished by the lack of accessible, inexpensive, and reliable medical and electrical equipment in these settings. Another issue in these settings with limited resources is the high expense of running facilities on diesel.
- Lack of reliable energy affecting regular operations and running of the facility: Lack of electricity makes it difficult for these institutions to carry out their usual operations, including offering fundamental health care, basic education, and training and skill development.
- Socio-economic benefits of women, children and disadvantaged communities: The lack of energy access in these vulnerable institutions located in the area results in an inability to provide the required service, worsening socioeconomic indicators of the local communities, whether it be for children in an Anganwadi or in bridge schools, youth and women accessing skill training and livelihood opportunities, or women in remote areas accessing maternal care

## Program Overview:

The program, “Energising Vulnerable Community Institutions,” aims to address the challenges related to energy access through the utilization of decentralized renewable energy solutions and showcase its importance in improving healthcare services, enabling educational opportunities and opening new avenues for livelihood opportunities besides providing access to basic lighting and cooling. Depending on the needs in each facility, the energy efficient equipment replacement/ integration could range from basic energy needs (lights, fans, basic audio-visual aids) to high energy consumption appliances such as those used in healthcare centers- physiotherapy kits, baby warmers, suction apparatus, or energy-livelihood appliances such as flour milling or processing machines, sewing machines etc. in skill training centers. The effort is to create resilient Community Institutions that can become models for other institutions that cater to vulnerable populations.

The period of the program is from 2021 to 2023 covering 47 institutions across the states of Karnataka and Tamil Nadu.

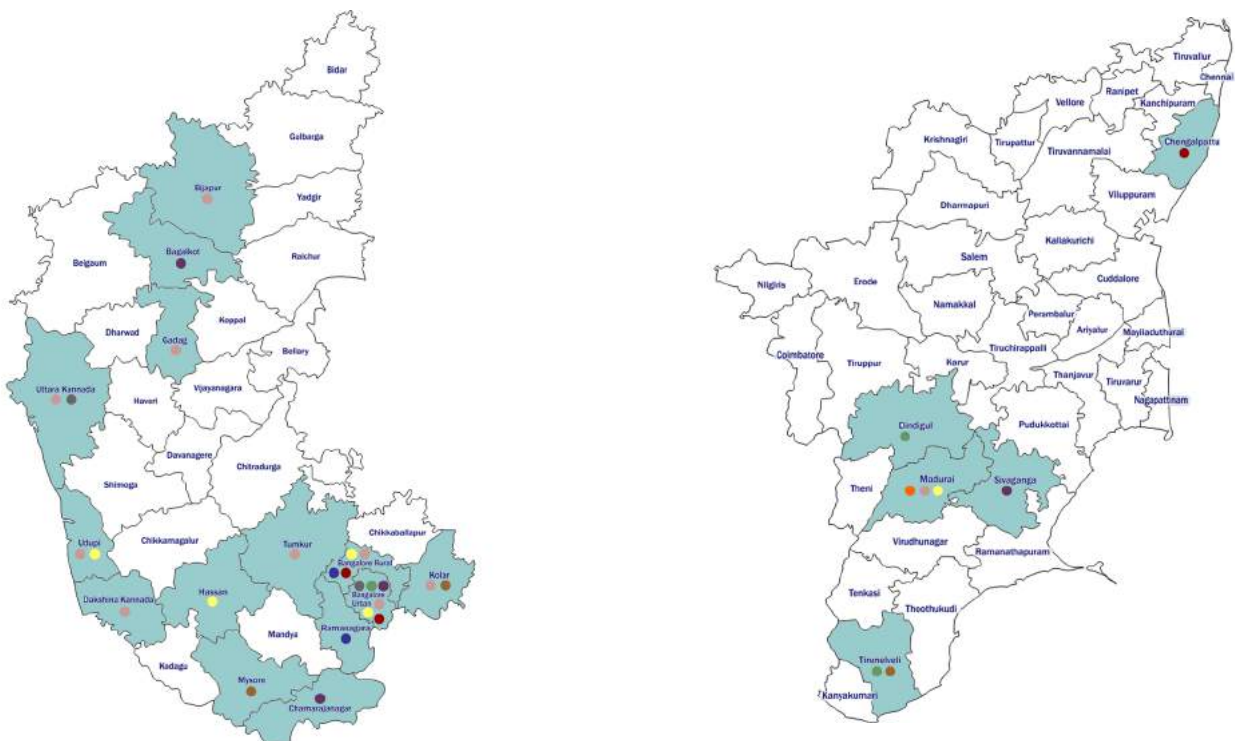
## Program Approach:

The overall approach of this programme focuses on holistic end-user centric solutions based on the specific services and energy needs at each institution and creating a strong local ecosystem for implementation and maintenance including energy system maintenance and after-sales servicing with local energy enterprises, allocating funds for annual maintenance and enabling linkages to livelihood promotion and healthcare partners for further innovation. This program included:

- Mapping key partners with best practices across focus districts that could help identify institutions with the potential to become Model centers.
- Understanding the services being provided through each institution to determine the energy and infrastructure needs; undertaking in-depth site surveys to identify critical loads, the potential for energy efficient equipment and new innovations based on typology of the institution.
- Designing holistic solutions (which would be a combination of decentralized clean energy systems, efficient equipment and green built environment where relevant) that can ensure reliable, quality energy provision for the institution.
- Implementing solutions by facilitating procurement through local clean energy enterprises, efficient technology suppliers and establishing strong mechanisms for after-sales servicing and maintenance, including fund allocation.
- Monitoring facilities to evaluate the impact, capture field stories and learnings on processes that can enable greater replication and scale including through government agencies and ecosystem actors.

The Learnings Document seeks to capture the key impacts gained from program experience from the perspective of end-users, institutional, and environmental level, and document key learnings to facilitate replication in other similar institutions. The first section starts with a concise overview of Vulnerable Community Institutions, underscored by a geographic understanding of the distribution of the institutions. Subsequently, it delves into an explanation of the typology of the institutions elaborating on their distribution and categories of end-users they cater to. The ensuing part of the document explains the key impacts and outcomes derived from the program with the best practices. It concludes by summarizing the major challenges encountered during the program's trajectory, with the mitigation strategies deployed to overcome them, and encapsulating learnings from the program.

## Geographical Overview



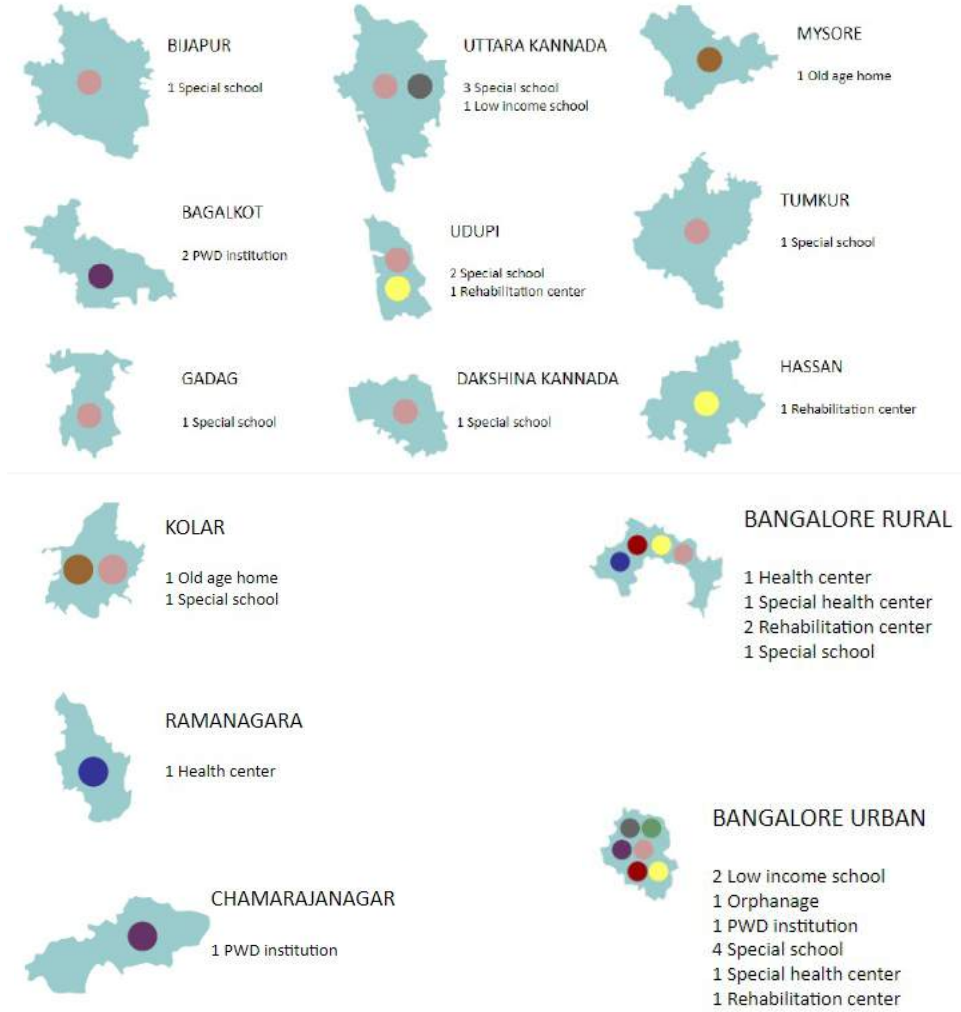
Karnataka

Tamil Nadu

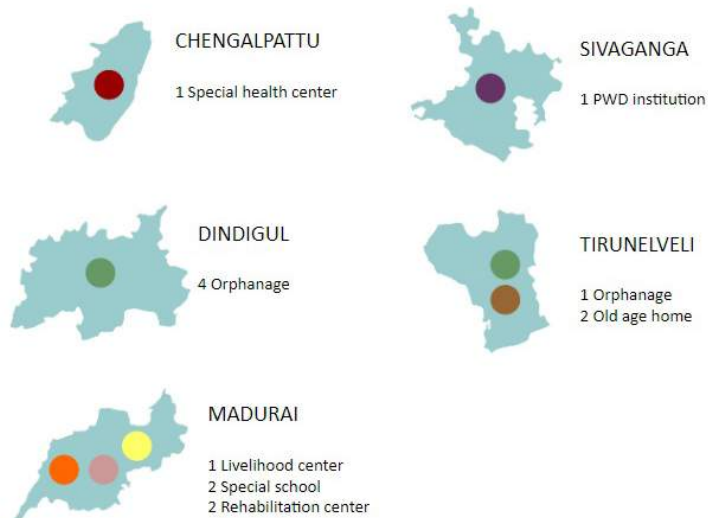
- Special school
- Rehabilitation center
- Orphanage
- PWD institution
- Old age home
- Low income school
- Special health center
- Health center
- Livelihood center

# Districts Overview

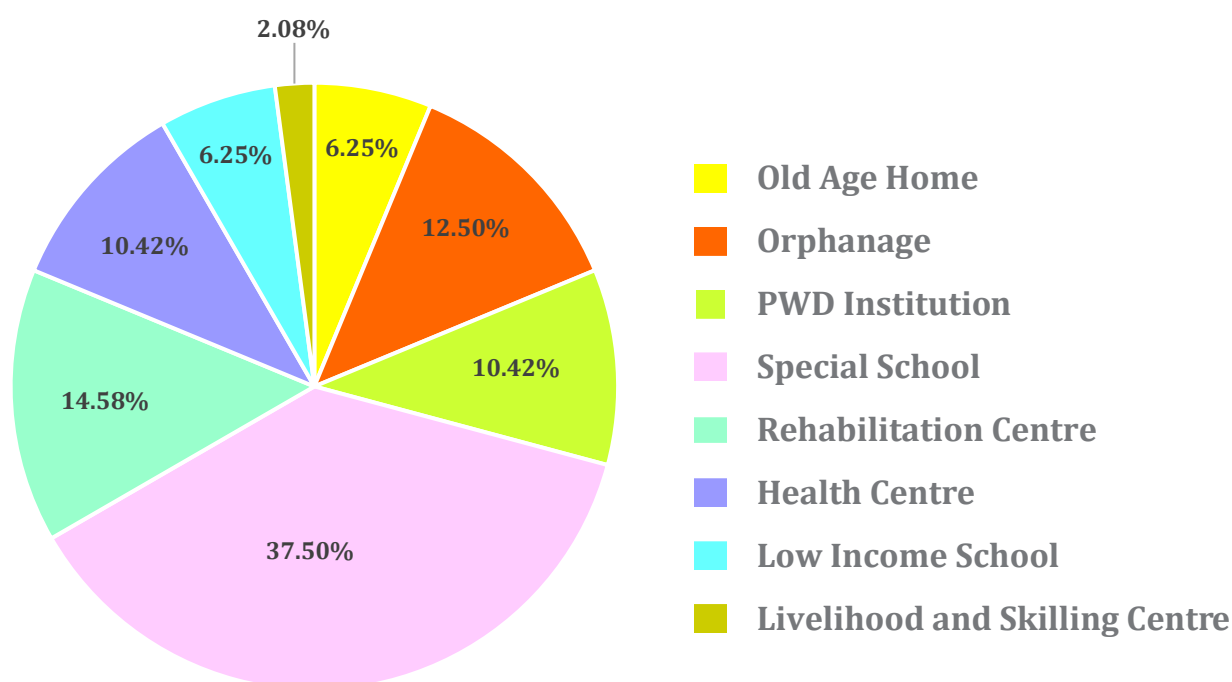
## Karnataka



## Tamil Nadu



## Distribution of Typologies of Institutions



### Typology of Institutions and end-users catered to

Vulnerable Community Institutions bring much needed services and opportunities closer to the communities that need them the most, reducing disparities between rural and urban areas.

The types of Vulnerable Community Institutions provided with Decentralized Renewable Energy solutions under this program include the following: -

- 1 **Old Age Homes:** For elderly individuals who are unable to live independently due to various reasons such as social isolation, health issues, lack of support, or financial constraints; old age homes provide a safe and caring environment, supporting them to overcome vulnerability due to old age.
- 2 **Orphanage:** Orphaned or abandoned children who lack family support and are vulnerable to neglect, abuse, and exploitation. Orphanages offer a nurturing environment, education, and emotional support to these children, helping them grow into well-adjusted adults.
- 3 **Health Center and Special Health Center:** Individuals with specific health conditions, such as Thalassemia patients or those living with HIV/AIDS, who require specialized medical care and support. These health centers focus on the unique needs of these vulnerable individuals, providing them with essential medical treatment and emotional assistance.
- 4 **Livelihood and Skilling Center:** Unemployed or underprivileged individuals, often from marginalized communities, who lack access to skills and resources needed to secure gainful employment. Livelihood and skilling centers offer vocational training and support to enhance their employability and economic prospects.

5

**Rehabilitation Center:** People recovering from substance abuse, physical injuries, or mental health challenges, who require assistance and guidance to reintegrate into society. Rehabilitation centers provide the necessary care, counseling, and rehabilitation programs to help them rebuild their lives.

6

**Low Income Schools:** Children from economically disadvantaged backgrounds who may lack access to quality education. Low-income schools aim to provide a nurturing and conducive learning environment, addressing the vulnerability of these children and offering them educational opportunities.

7

**PWD Institution:** Individuals with physical or mental disabilities who may face various barriers in society, limiting their access to education, employment, and social integration. PWD institutions offer specialized care, education, and vocational training, empowering them to lead independent and fulfilling lives.

8

**Special Schools:** These institutions cater to children with intellectual and physical disability. These children majorly suffer from Autism, Cerebral palsy, Down Syndrome and locomotor disability.

## Key Impacts and Outcomes

The various interventions done across the institutions have had a range of positive impacts which can be grouped in 3 categories: End User Level, Staff and Facility Level, and Environmental Level.

### 1. End User Level - Building Capacity and Resilience of Individuals within Institutions

By harnessing solar energy to provide uninterrupted power supply, the solutions providing solar installations have been successful in building capacity and resilience among individuals at the end-user level.

#### End Users Benefitted:

	Phase 1	Phase 2
	2021 - 22	2022 - 23
	Total Institutions: 23	Total Institutions: 25
Direct	3243	9825
Indirect	369	474
No. of Trainings Provided	68	



### (i) Reduction in Drudgery:

Frequent power interruptions result in high drudgery and reduced productivity for the residents of the institutions. Uninterrupted power supply has increased productivity through improved infrastructure and reduced drudgery.

To illustrate an example, in Karnataka Holy Cross Sisters Society, the students needed to travel to a nearby village to get printouts and exchange emails. The solarization of the centre and computer lab has alleviated the necessity of travelling outside the centre and curtailed expenses related to travel and time spent.

In the same institution, the task of timely food distribution and storage, including the preparation of spices for children's meals, was marred by the risk of spoilage from frequent power outages, and thus, the caretakers were involved in the drudgerous task of preparation of spices daily. However, the introduction of solar energy has allowed for spice preservation in a solar-powered refrigerator.

Solar powering the food lifting machine in the centre of Jeevan Jyothi Trust has successfully reduced drudgery. The machine was previously not connected to the UPS inverter system and power cuts posed challenges in simultaneously arranging food and attending to the children with limited mobility. This would lead to increased staff time and effort required for their care. However, with the current setup, power interruptions no longer disrupt the food service for children and have eliminated the need for physically carrying food upstairs.



**Food Lifting Machine Solar powered which carries food from the kitchen, Jeevan Jyothi Trust**



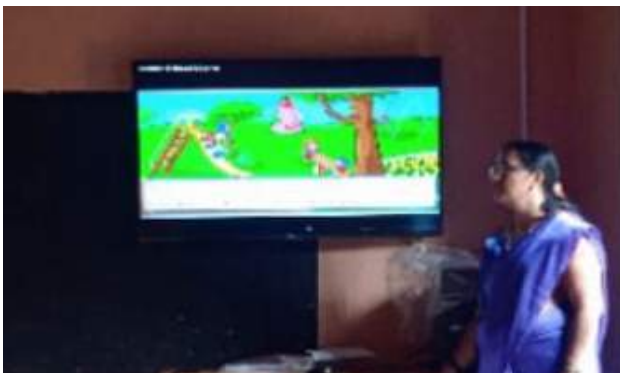
**(ii) Improved access to service delivery:**

**For students' better infrastructure to enhance learning outcomes**

**Enhanced Time Management and Increased Study time:** The interventions successfully implemented solar-powered solutions to increase study time for children in institutes. Providing uninterrupted power supply through solar inverter systems has facilitated better time management by students, enabling them to judiciously allocate their study hours. This newfound flexibility in time management accommodates their academic pursuits alongside a comprehensive engagement in extracurricular undertakings.

In institutions like Jyothi Seva School, Pudu Udhayam School for Differently Abled, Leonard Special School for the Hearing Impaired to name a few, the provision of solar powered inverters, batteries, and solar panels have been provided, which have resulted in students engaging in a wide spectrum of activities. Furthermore, by increasing their convenience, these initiatives permit students to seamlessly integrate daytime extracurricular engagements into their schedules, with the assurance that they can return and resume their studies after sunset as well since electricity is available at night.

**Continuous Smart Classes Program:** The implementation of a smart classes program, powered by solar inverter system, transformed the educational experience for the end users. With projectors, speakers, and screens available for use, teachers were able to conduct engaging and interactive lessons, fostering a deeper understanding of subjects and promoting sustainability education.

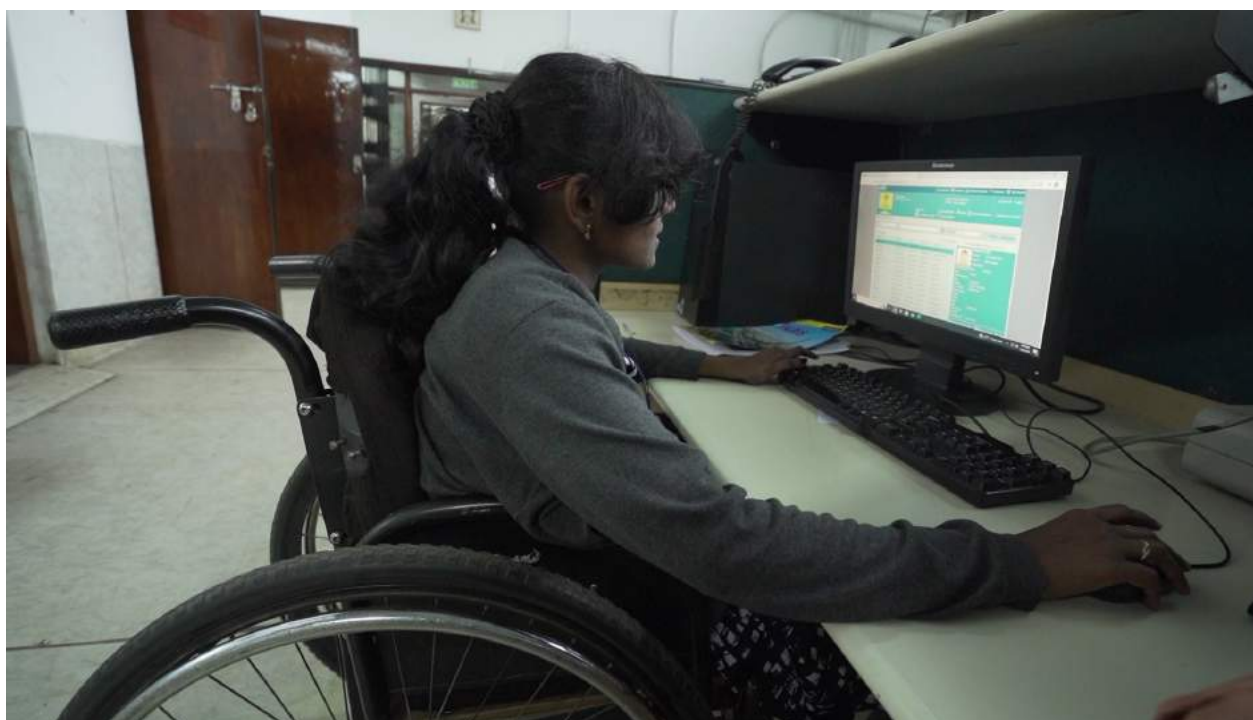


**Smart Classes Program ongoing in MHPS**

In Madhari Hiriya Prathmika Shale (MHPS), a Digital Education program system has been provided under the program. The students are now enthusiastic to learn from the engaging smart classes. The issue of teacher scarcity also finds resolution since the lessons can seamlessly proceed even in the absence of instructors due to the smart classes.

In Jyothi Seva Society, the power cuts would cause interruptions in the studies. The lessons which would have to be postponed to the following day tend to be forgotten by the visually impaired students, necessitating reinitiating of classes. After solar powered interventions, the visually impaired children there are now able to attend classes regularly without getting interrupted.

In Parikrama Centre for Learning, to enhance education quality, the school conducts smart classes alongside traditional teaching, facing challenges with time-consuming projector setup, grid-dependent power for 3 periods/day, and frequent 2–3-hour power cuts disrupting classes. A solar powered inverter system has been installed in the center to power fans, lights, projector and speakers. Post-intervention, the number of smart classes conducted in a day has risen and the centre is able to allocate time for all grades to use the space. The installation of solar-powered inverters has also facilitated computer training in the institutes.



A wide range of educational resources and fundamental digital skills in using tools such as MS Office and basic computer learning are being imparted to both students and residents alike. Institutions like Manasa Rehabilitation and Training Centre have also set up a computer data entry center for the gainful employment of the intellectually disabled children. These foundational digital skills hold significant relevance, bearing in mind their potential utility which could facilitate forthcoming employment. The issue of classes being interrupted by power cuts has been alleviated, thus creating conducive conditions that have facilitated the acquisition of skills essential for future employment by the end-users.

### **(iii) Improved Convenience and Safety:**

#### **For differently abled individuals, leading to basic wellbeing as well as skilling for rehabilitation and better income opportunities**

Through the adoption of solar-powered solutions, the interventions significantly improved the safety and well-being of residents within the institutes. Uninterrupted power supply for healthcare services ensured the continuous and reliable operation of medical equipment, enhancing the quality of healthcare provided and safeguarding the health of the residents.

The integration of solar-powered lighting and equipment enhanced the safety and convenience for both children and staff within the institutes. Well-lit spaces reduced risks of nighttime accidents in old age homes and institutions for special needs children during visits to the restroom. The solutions have enhanced comfort, fostering a conducive space for rest, meals, learning, and work.

Antharagange Vidhya Samsthe is an institution which caters to senior citizens and children with intellectual and physical disability. Situated in a rural location, the institution grapples with potential snake and leopard hazards. After sundown, power cuts necessitate reliance on candles for lighting, further compromising the safety of the residents. The installation of a solar inverter system which ensures uninterrupted power supply allows the residents to freely traverse the premises devoid of any fear, even amidst instances of power outages. Similarly, in other institutions like Karnataka Sisters Holy Cross, the incorporation of solar inverter system has mitigated risks of insects and snake menace on their premises while conducting outdoor activities during evenings or nights.



**Outdoor Areas in Karnataka Sisters Holy Cross**

#### **(iv) Increased Health & Well-being:**

**For people with special healthcare needs (Visual Impairment, HIV, Leprosy, Thalassemia etc.) leading to uninterrupted healthcare services for under-served communities on health.**

Interventions providing solar water heaters have resulted in reducing the discomfort caused by cold weather during winters. The intervention significantly reduced illnesses associated with exposure to cold temperatures, further improving the well-being of the end-users.

For instance, in institutions such as Sneha Sadan Boys Home, 2 units of evacuated tube solar water heaters were installed, with a total capacity of 500 Liters Per Day. The availability of hot water for bathing during winters has reduced the frequency of children falling sick. The hot water generated by the solar water heaters is not only used for bathing but also for cooking purposes, reducing their heavy reliance on LPG cylinders for boiling water.



**Visual Impairment:** SELCO Foundation has provided educational tools to aid visually impaired children have been provided like the Annie device. Annie Devices are tactile hardware modules tailored to teach Braille, coupled with a soft human voice guiding students through lessons eliminates the need for handholding and constant supervision. A total of 8 Annie devices have been deployed in Jyothi Seva School. In the same school, the centre had a UPS inverter system, but it was not connected to the educational tools like the computer lab.

The power cuts would cause interruptions in the usage of Annie device also. After the solar powered interventions, the visually impaired children there are now able to use the computer labs and Annie devices without getting interrupted due to power cuts. Solar powering braille embosser also has critical impacts of making braille production efficient and cost-effective.



**HIV / AIDS:** In institutions which serve HIV / AIDS patients, power cuts would cause interruptions in their mandatory counselling and therapy sessions. In New Creations Trust and Sumanahalli Society for instance, the HIV/AIDS centre would earlier face upto 4 hours of power cut every day, which would cause inconvenience for the residents. Solarization of the centres has ensured steady power supply and sustained therapy sessions.



**Leprosy:** In Sumanahalli Leprosy and Rehabilitation Centre, solar powered portable physiotherapy kits have been provided under the program. The institution provides in house physiotherapy for leprosy patients and conducts community-based rehabilitation (screening of leprosy and HIV/AIDS infected patients), wherein, they provide physiotherapy for leprosy patients, based out of community. The new physiotherapy kit has made the process more efficient, without any extra expense on energy. Further, the physiotherapist is able to recommend the solar powered physiotherapy kit, in places where he is providing services externally.



**Physical and Locomotor Disability:** Institutions such as Antharagange Vidhya Samsthe and Hands of Compassion Trust which cater to senior citizens and children with intellectual, physical disability, and / or locomotor disability, were dependent on conventional equipments for physiotherapy. These equipments lack efficiency which makes the process slow and inconvenient. Under the program, solar powered portable physiotherapy kits have been provided to these institutions, making the process more efficient, without any extra expense on energy. Furthermore, the solution is being replicated in other places as well due to the recommendation of the physiotherapist who also provides services in other locations.

**Thalassemia:** A Thalassemia day care center runs in the premises of Rashtrrothana Blood Center. The quality of the services provided in the center is directly proportional to consistency of the power supply. Power cuts would pose a problem and a diesel generator as a source of power backup was cost intensive. Solar powered inverter system has been provided in the blood transfusion centre to power up fans, lights and lab equipments. The intervention has ensured uninterrupted energy access to the institution without incurring extra cost. The amount saved on the electricity bill and diesel is being utilized by the center to cater to a larger number of end-users.



**Rashtrrothana Blood Center**



**Physiotherapy Kit in use**

**Mental Health:** Institutions like Asha Kiran Residential School for Mentally Handicapped Children, Bethany Sanjivini Kendra, and Asha Nilaya School and Vocational Rehabilitation Centre for Mentally Challenged amongst others, offer community-based therapy and counselling sessions for individuals with mental and physical health issues followed by institutional physiotherapy. Other institutions such as Ganesh Seva Trust, Bubbles Centre for Autism, etc. cater to individuals with special mental needs, including children with Autism, offering specialized education and training. However, these institutions face daily power cuts of 5-6 hours, exacerbated during monsoons. The solar interventions have ensured uninterrupted power supply for conducting the institutional based counselling, physiotherapy, and inclusive education & training programme.



**Asha Nilaya**



**Asha Kiran**



**Bubbles Computer Classes**



**Ganesh Seva Trust**

**Powering Primary Health Centres:** The program has solar powered several Primary Health Centres with considerable benefits for the end-users of the PHCs. In Doddahalli PHC, during extended power cuts (over 48 hours), the vaccine stock is relocated to the nearest PHC to prevent spoilage. An UPS inverter system was in place for their office and laboratory, with torches used during power interruptions for deliveries. The solar inverter system to power up LED lights, fans, and hospital equipments have ensured resolution of the problems including vaccine storage.

In Ardeshanahalli PHC, power outages lasting up to 24 hours severely disrupted critical healthcare services, including deliveries and immunizations. In case of power cuts, the baby warmer would not work, and the deliveries would not run smoothly. Additionally, this situation posed a significant vaccine wastage risk for around 12 villages dependent on the facility. Consequently, villagers had to journey 12 to 15 km for basic healthcare at the nearest facility. A solar powered portable vaccine carrier Emvólio has been provided which enables storage and preservation of vaccines. Installation of solar system has prevented vaccine wastage and eased healthcare access for end-users reducing their need to travel.



### **Emvólio Vaccine Carrier and Solar Powered Baby Warmer in Ardeshanahalli PHC**

Thus, solar-powered lighting and equipment significantly improved the overall health, convenience and comfort of end-users. With uninterrupted power supply, end-users could carry out daily activities smoothly, enhancing their overall quality of life.



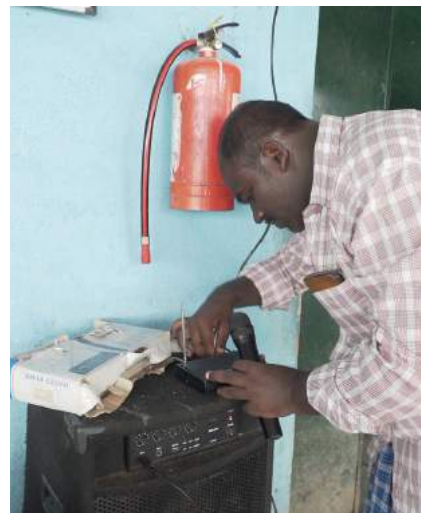
**(v) Added Recreational Facilities and Cultural Events:**

With a reliable power supply, the project facilitated the organization of cultural events for children in the institutes. Uninterrupted power ensured the smooth execution of these events, enriching the end-users' experiences and promoting a sense of community and cultural exchange.

To illustrate an example, in Jeevan Jyothi Trust the institution used to experience daily power cuts of 4-5 hours, affecting essential services and disrupting recreational activities for children. However, an intervention of a solar powered inverter system utilizing a Decentralized Renewable Energy (DRE) solution has provided uninterrupted power supply, ensuring the smooth operation and execution of cultural events where they can play music with sound amplification and run digital projectors without interruptions.



**Children Engaging in Recreation Activities in Jeevan Jyothi Centre**



**Recreation during leisure time, Hands of Compassion**

## **(vi) Building Skills and Entrepreneurship Abilities of End-Users:**

**Seamless Vocational Training:** The installation of solar inverter systems has facilitated seamless vocational training opportunities within the institutes. Through the use of solar-powered equipment, vocational training opportunities expanded within the institutes. End-users received training on various livelihood skills, enabling them to explore diverse career paths and increasing their income potential. The interventions increased training opportunities, empowering them with valuable skills and knowledge. By minimizing grid dependency by almost 70%, the institutes were able to offer diverse vocational courses, fostering self-sufficiency and sustainability.

**Potential for Solar-powered Business:** Solar-powered tailoring training opened potential business opportunities for end-users. By retrofitting sewing machines with solar-powered electric motors, end-users were trained in sustainable tailoring practices, enabling them to discover their skills for potential employment opportunities

In Trust for Handicapped Humanitarian Assistance of India (THHAI), the addition of a wet grinder for retailing idli/dosa batter has boosted the centre's income-generation potential. The uninterrupted power supply to the refrigerator through solar-based inverter system has curbed milk spoilage losses, allowing them to store and sell more milk daily. As a testament to its success, the institution's monthly electricity bill has been reduced by 50%, making this solar-based intervention a commendable and sustainable solution for powering the centre's operations.

Since March 2023, a solar powered e-Seva centre has also been started in the institution which offers services like PAN Card, Aadhar Card, voter ID, revenue department work, and some applications for machines from the government for the farmers. The center serves 10 departments and plans to expand with new printer and lamination machine purchases. It has gained popularity among villagers and customers and is an additional income generation source for the facility.



**e-Seva Centre, THHAI**

**2. Facility and Staff Level - Enhancing Convenience and Improving Quality of Institutions:** Various positive outcomes were achieved through the implementation of solar-powered interventions in various institutions at the facility level and for the staff.

**(i) Enhanced Comfort from Changes in Built Environment Practices:** Uninterrupted power supply ensured convenience and safe mobility for visually impaired elderly residents in old age homes, reducing the risk of accidents during the night. This reduces efforts from the staff and increases comfort provided at a facility level. Special schools and blind schools saw improved handling of children and smooth teaching processes, as uninterrupted power supply eliminated disruptions caused by power cuts during classes and tuition sessions.

In Association for Promoting Social Action (APSA) insufficient natural light in the shelter home caused challenges for children during power cuts and hindered staff's office tasks and training at daytime. Solar interventions have enhanced lighting in the centre. Under the program, in Ardeshanahalli PHC, a dedicated breastfeeding area has been constructed using aluminum, ensuring a dedicated space for infant feeding. Additionally, individual cubicle curtains have been integrated around each bed, facilitating privacy and isolation. Moreover, illuminated LED nameboards have been strategically installed at the entrance of the centre, effectively raising awareness among the local community about the institution's presence, particularly during nighttime.



**LED Nameboard, Dedicated Breastfeeding Area, and Cubicle Curtains in Ardeshanahalli PHC**

**(ii) Ergonomic Design:** Ergonomic design improvements have enhanced convenience in synergy with heightened safety considerations. Renovation and design improvements were undertaken to optimize facility layouts, ensuring easy access to power outlets and switches for staff and residents, even during power cuts.

For example, in the Trust for Handicapped Humanitarian Assistance of India (THHAI) which works for people with locomotor disability, the residents were dependent on crawling to move from one place to another, restricting their mobility severely. Previously, in order to switch on the fans, residents had to crawl and reach out to access the switch board. The integration of remote-controlled ceiling fans for individuals with crawling disabilities and the strategic provision of accessible lighting for both residents and differently-abled staff during nocturnal hours when facilities like bathrooms are utilized, collectively engenders a safer milieu. These thoughtful interventions markedly mitigate the risk of accidents and falls, particularly crucial for the elderly population.

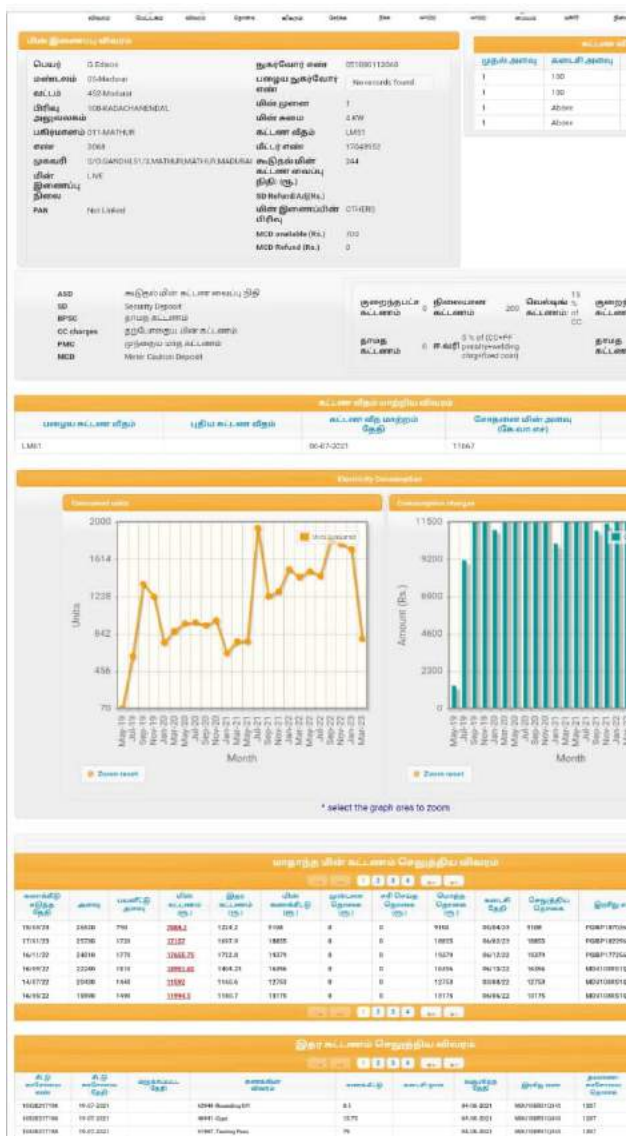


#### **Remote controlled fans in THHAI**

In centres like New Creations Trust, the kitchen lacked natural lighting, making it difficult for the staff to work there. Solar power inverter system powering up critical loads makes the daily chores of the center run seamlessly post intervention.

**(iii) Reduction in Electricity Bills:** Solar-powered solutions led to significant reductions in electricity bills, providing financial relief to institutions and allowing them to allocate saved funds for other welfare activities or infrastructure development. Institutions experienced reduced energy expenses due to solar interventions, allowing them to focus resources on various programs and initiatives.

On average, institutions witnessed more than 60% reduction in the electricity bills post solar installations, with some institutions witnessing a reduction of upto 70% post solar installation.



Most of these institutions function as residential service providers or schools, extending cost-free education to their students. They rely on financial support from diverse charitable organizations and foundations to sustain their daily operations. The monthly electricity expenses compound their fiscal obligations, further exacerbating their challenges. Solar interventions resulted in reduced electricity bills, allowing institutions to invest in energy-efficient measures and contribute to overall energy savings. Reduced electricity bills allowed institutions to allocate funds for maintenance and upgrades.

**(iv) Increased well-being and comfort of staff:** Uninterrupted power supply at healthcare facilities ensured seamless operation of critical services, improving patient care and reducing disruptions during power outages.

Before the solar intervention, institutions like Bhoomika Centre for Learning used to borrow power from neighboring plots. Frequent daily power cuts lasting 3–4 hours disrupted classes and programs, causing discomfort to children, trainees, and staff. In centres like New Creations Trust and DINA School for Special Education and Rehabilitation, full-day load shedding resulting in a 20-hour power outage, further compounded their challenges. In these situations, students and staff faced not only inconvenience but also potential safety risks, with the residents with special needs getting anxious due to discomfort in the periods of darkness.

However, the implementation of solar-powered lights has addressed safety concerns during nighttime power cuts, while the consistent and reliable power supply has enabled staff to manage tasks more efficiently, enhancing overall operations. The interventions have eradicated the need for candles and lamps at night, streamlining childcare and reducing dependency on power backups, ultimately elevating convenience and time management for both staff and children. Previously arduous night-time care routines have become more manageable, alleviating discomfort for residents and staff alike during power outages.

#### **(v) Improvement in Quality of Institutional Care and Support:**

**Improved Delivery of Healthcare Services including for better diagnostic, maternal and childcare:** Solar-powered inverter systems ensured continuous energy supply for healthcare services, and power laboratories enabling conditions for child-birth, surgeries, and other inpatient department (IPD) services, leading to improved healthcare outcomes. A steady power supply for healthcare services ensured continuous access to critical medical facilities and equipment, leading to improved patient care and safety. In centres like Rural Women's Social Education Center (RUWSEC), substantial savings from electricity bill reduction can now be allocated towards restarting essential services such as maternity care and other IPD services.

**Increased Vocational Training Opportunities:** Solar-powered equipment allowed institutions to expand vocational training programs, empowering trainees with skills that have the potential for solar-powered livelihood solutions. Vocational training centers benefited from uninterrupted energy access, enabling smooth training activities and efficient processing of customer orders.



In Manasa Rehabilitation and Training Centre, various types of vocational training are carried out such as book binding, cloth carry bag making, paper flowers making, candle making which would get stopped abruptly due to power cuts. In Asha Kiran Residential School for Mentally Handicapped Children the residents provide various services like vocational training and livelihood activities such as spice grinding, chickpea flour grinding and multigrain flour grinding. Due to power cuts, functioning of all the livelihood equipment such as pulverizers, weighing machine, packaging machine, used to get interrupted in case of power cuts. Installation of solar powered inverters in all these centres ensures that the equipment used for vocational training and livelihood continues functioning even in case of power cuts. They are able to process customers' orders on time, without worrying about the power supply.

In Pudu Udhayam School for Differently Abled following solar powered intervention, vocational training, including agriculture, goat rearing, and various livelihood skills, are operating smoothly.

### **Asha Kiran Turmeric Powder Preparation**





### **Enhancement in Delivery of Basic Food and Water Services:**

Prior to installation of solar solutions, most institutes would face cooking disruptions from spoilage of fruits and vegetables lacking refrigeration during power cuts. In Karnataka Holy Cross Sisters Society, power cuts made timely food distribution and storage challenging, but after solar powered interventions, there has been an improvement in the timely distribution of food for children. The grinder has also played a pivotal role in streamlining food distribution, eradicating delays caused by power cuts, ensuring prompt meal preparation.

In Sneha Sadan, solar water heaters enhance convenience, reduce LPG dependence, and lower costs by facilitating usage of hot water for cooking. The usage of two LPG cylinders has extended to 45 days from a month due to this intervention.

In different categories of institutions such as Rural Women's Social Education Centre (RUWSEC) which is a special health centre, Parikrama Centre for Learning, a low-income school, Jeevan Jyothi Trust, a PWD institution, and Sarvodaya Service Society which serves multiple groups, solar interventions have also powered up crucial services like water purifiers. In centres like Prachodana - Centre for Social Service, the institution maintains continuous water supply by operating the water motor according to its needs, even during power cuts in summers.

### **Water Purifier in Sarvodaya Service Society**



**The administrative tasks of several institutes would be suspended due to power cuts**, and it was difficult for office staff members to continue their jobs. Solar powering of computer labs has ensured administrative work continues without delays.

### **Solar Powering Adminstrative Systems Ensure Operational Efficiency**



**(vi) Increased Income Potential at Institutional and Community Level:** In several of the institutions, the kitchens experienced increased grinding capacity and income potential using solar-powered equipment, enabling them to serve more customers and generate additional revenue.

In Asha Kiran Residential School for Mentally Handicapped Children, pre-intervention the grinding capacity of the pulverizer was limited to 500 kg per month, which would get interrupted due to power cuts. Now, the institution is able to grind 1500 kgs per month with a reliable power supply.

They are using the profit to deposit INR 500 per month in the postal savings account of the intellectually challenged adults employed in the training center. Similarly uninterrupted power supply to the refrigerator at THAI has prevented milk spoilage losses due to extended power cuts, enabling increased daily milk storage and sales.



**Milk Refrigerator, THAI**

**Solar-Powered Livelihood Solutions in the Community:** Adoption of solar-powered sewing machines and other equipment expanded opportunities for women and communities to experience livelihood equipment powered by decentralized renewable energy solutions. In addition to catering to their residents, some institutions are actively engaged in outreach and linkages with women from the broader community. This often involves collaborating with mothers of children requiring special care or offering skill development opportunities to local women. This expansion of skilling initiatives benefits not only non-residents but also the community at large. Consequently, the center evolves into a focal point for families with special care needs, simultaneously serving as an educational platform for the broader community to witness the functioning of solar-powered livelihoods and explore avenues for their own income generation. There can be several illustrations of the point:

In several institutes like Leonard Special School for the Hearing Impaired and Awake Mercy Home, existing manual sewing machines have been retrofitted with solar powered electric motors. The machines are employed in training women who come from low-income backgrounds. In Leonard School, mothers accompanying their children to the day school are trained in stitching during their idle time to offer them a potential livelihood. This tailoring training, facilitated by solar-powered sewing machines, opens livelihood avenues for these families.

**Sewing Machines and Skill Training Session being provided in Leonard School**



In Sandesh Foundation due to reliable energy supply from solar power system, they have added mushroom farming and 3 more sewing machines in their livelihood/training center. Savings from electricity bills has enabled them to start a stitching unit for women from nearby villages.



The Bhoomika Center has been empowering young women through life and livelihood skills, including fabric dyeing and tailoring for local sales. Solar-powered inverter systems were introduced to overcome electricity costs and frequent power cuts, enabling efficient sewing machine operation. This intervention has facilitated a comprehensive tailoring training unit for intellectually disabled women, attracting interest from local entrepreneurs and showcasing the potential of decentralized renewable energy solutions.

### **Bhoomika Skill Training Centre**



Awake Mercy Home center offers care to needy children and tailoring training to girls above 14 years. Plans to extend training to nearby village women are underway. With a solar-powered inverter and retrofitted sewing machines, uninterrupted power supply enhances convenience for all. This intervention opens doors for local women to experience solar-powered livelihood training, possibly inspiring them to establish their own tailoring businesses.

In Shristi Special Academy, solar intervention's electricity bill savings enabled the addition of 15 sewing machines to the institution's training unit, with plans to establish a readymade garment unit for sustainable trainee livelihoods.



### **3. Environmental Level – Reducing Grid Dependency and Emissions:**

The solar-powered interventions have minimized grid dependency, reducing the institutions' reliance on conventional electricity sources and contributing to a more sustainable energy ecosystem.

#### **(i) Reduced CO2 emissions from avoided use of grid or back-up diesel generators to meet gaps in energy availability.**

**Reduced Grid Dependency:** Solar-powered interventions minimized grid dependency, reducing the institutions' reliance on conventional electricity sources and contributing to a more sustainable energy ecosystem.

**Reduction in CO2e Levels and Emissions:** Solar interventions resulted in reduced electricity bills, which in turn led to decreased CO2 emissions and a smaller carbon footprint for the institutions.

By minimizing grid dependency, the institutions achieved a significant reduction in CO2 levels, contributing to environmental conservation and mitigating climate change.

#### **CO2 Emissions: Reduction in CO2 emissions 100kWp of Solar energy capacity**

Total solar energy capacity of 283.08 kW has been added contributing to India's net zero targets, and displacing over 18,001.05 Tonnes of CO2 equivalent over a 20-year period (typical life of the asset) across 47 institutions. This shift towards sustainable energy sources aligns with the objectives of Sustainable Development Goal 13 on Climate Mitigation and Action.

#### **(ii) Local ecosystem for operations and maintenance of decentralized sustainable energy solutions is strengthened, including training the staff and administration at the institutions, and enabling Annual maintenance contracts for regular servicing by local energy enterprises**

As an integral part of program implementation, SELCO Foundation ensures the training of 2 – 3 staff from each institution in solar energy system maintenance. This initiative not only facilitates the fulfillment of essential energy requisites through these trained individuals but also ensures that any additional challenges are elevated to local energy enterprises for resolution. Such initiatives contribute substantially to building people's capacity for decentralised energy systems.

Central to the solar powering interventions is the significance of the service and training component. Training conducted within the institution imparts knowledge regarding system utilization and upkeep, highlighting protocols for issue escalation and rectification of any loose ends. If the staff encounters an issue beyond their purview, an appropriate escalation pathway is followed, with local energy enterprises mandated to address concerns within a 48-hour window. This holistic approach amplifies the operational efficiency and maintenance of energy systems, fortifying the ecosystem on a broader scale.

## Learnings

A program of the proportion covering 47 institutions of diverse typologies, spanning across 2 years, naturally yields a wealth of learnings and insights specific to the program and in a general context, which are encapsulated in the next section.

**Engaging with different types of Vulnerable Institutions have provided important takeaways on the different energy requirements of various typologies of institutions, summarized in the table below:**

## Energy Needs of Vulnerable Community Institutions According to Typology

### 1. Old Age Homes

- Basic appliances for necessity and comfort
- Nighttime and outdoor movements
- Mobility assistance • Health services

- Entertainment and Recreation
- Administration
- Services like food distribution, water purifiers

### 2. Orphanage

- Basic appliances for necessity and comfort
- Infant care (0-5 years)
- School activities (above 5 years)

- Lighting for safety
- Nighttime and outdoor movements
- Street-lights
- Administration
- Services like food distribution, water purifiers

### 3. Health Centres / Special Health Centres

- Basic appliances for necessity and comfort
- Healthcare activities

- Lab equipments, preservation of medicines and vaccines
- Administration
- Services like water purifiers

### 4. Livelihood & Skilling Centre

- Basic appliances for necessity & comfort
- Operation of machines
- Daily livelihood activities

- Temperature control and lighting comfort
- Cooling solutions for machine areas
- Administration
- Services like water purifiers

### 5. Rehabilitation Centre

- Basic appliances for necessity and comfort
- Skilling linkages
- Study time

- Electricity restrictions
- Administration
- Services like Water purifiers

### 6. Low Income Schools

- Basic appliances for necessity and comfort
- Education (smart class)
- Basic appliances

- Solar kitchen
- Administration
- Services like food distribution, water purifiers

### 7. PWD Institution

- Basic appliances for necessity and comfort
- Livelihood activities
- Nighttime and outdoor movements

- Temperature control and lighting comfort
- Physiotherapy needs
- Administration
- Services like food distribution, water purifiers

### 8. Special Schools

- Basic appliances for necessity and comfort
- Education and residential needs

- Temperature control and lighting comfort
- Administration
- Services like food distribution, water purifiers

## Way Forward:

In a nutshell, the program's interventions across various institutions have led to significant impacts and outcomes categorized into three key areas. At the end user level, the integration of solar energy solutions has enhanced capacity and resilience among individuals within the institutions. This includes reducing drudgery through uninterrupted power supply, improving access to services for students, enhancing time management and study opportunities, ensuring convenience and safety for differently abled individuals, and promoting health and well-being through continuous healthcare services. Additionally, solar power has facilitated recreational events, built vocational skills, and facilitated conditions allowing end-users to learn skills useful for future employment.

At the facility and staff level, solar-powered interventions have brought about comfort improvements, ergonomic designs, reduced electricity bills, enhanced well-being of staff, upgraded institutional care and healthcare delivery, increased vocational training opportunities, and the provision of better food and water services. These interventions have also led to increased income potential at both institutional and community levels, fostering sustainable livelihood solutions.

On the environmental level, the adoption of solar power has reduced grid dependency lowered CO2 emissions, and strengthened local ecosystems for sustainable energy solutions.

The program has imparted several key learnings and Insights. It has highlighted the importance of collaboration, internal expertise, and holistic approaches. It has emphasized the significance of due diligence to ensure partner institution credibility and staff involvement in energy efficiency assessments. Furthermore, the program recognizes the value of model centers for different typologies, understanding innovation opportunities, and linking efforts to various domains like livelihood and health. Overall, the program's multifaceted impacts and learnings underscore its transformative role in creating positive change across vulnerable institutions.



## Annexure

Sl No.	Name of the institution	Type of institution	District	State
1	Sarvodaya Service Society	Special School + Old Age Home + Rehabilitation Centre	Bangalore	Karnataka
2	Jyothi Seva School for Blind Children	Special School	Bangalore	Karnataka
3	Parikrama Center for Learning	Low income school	Bangalore	Karnataka
4	Excellent English School	Low income school	Bangalore	Karnataka
5	Pudu Udayam School for Mentally Retarded	Orphanage	Dindigul	Tamil Nadu
6	Dina School for Special Education and Rehabilitation	Special school	Udupi	Karnataka
7	Prachodana Foundation	Rehabilitation centre	Hassan	Karnataka
8	Usborne Home	Orphanage	Palayamkottai	Tamil Nadu
9	Bhoomika Skill Training Centre	Livelihood and skilling centre	Madurai	Tamil Nadu
10	Karnataka Navachethana School for the Blind	Special school	Tumkur	Karnataka
11	Manasa Rehabilitation Center	Rehabilitation centre	Udupi	Karnataka
12	Holy Cross Home for Children	Orphanage	Dindigul	Tamil Nadu
13	New Creations Trust	Rehabilitation centre	Madurai	Tamil Nadu
14	Real Social Organisation of Youth Academy (2 Centres Male and Female)	Old age home	Tirunelveli	Tamil Nadu
15	Madari Hiriya Prathamika Shale (MHPS)	Low income school	Uttara Kannada	Karnataka
16	Savio Sadana	Old age home	Mysore	Karnataka
17	Jeevan Jyothi Trust	PWD institution	Chamarajanagar	Karnataka
18	Sri Ganesha Seva Trust	Special school	Dakshin Kannada	Karnataka
19	Holy Cross Special School	Special school	Vijayapuram	Karnataka
20	Leonard School for the Hearing impaired	Special school	Madurai	Tamil Nadu
21	Awake Mercy Home	Orphanage	Dindigul	Tamil Nadu
22	Trust for Handicapped Humanitarian Assistance of India (THHAI Trust)	PWD institution	Sivagangai	Tamil Nadu
23	Goodwill Children Homes	Orphanage	Dindigul	Tamil Nadu

24	Royal Vision School for Intellectually Challenged Children	Special school	Madurai	Tamil Nadu
25	Rural Women's Social Education Center (RUWSEC)	Special health centre	Chengalpattu	Tamil Nadu
26	Hands of Compassion	Rehabilitation centre	Madurai	Tamil Nadu
27	Ardeshanahalli PHC	Health centre	Bangalore Rural	Karnataka
28	Sandesh Foundation	Special school	Bangalore	Karnataka
29	Asha Kiran Residential School for Mentally Handicapped Children	Special school	Kolar	Karnataka
30	Bubbles Center for Autism	Special school	Bangalore	Karnataka
31	Mathru Foundation	Special school	Bangalore	Karnataka
32	Daya Nilaya Residential School for Intellectual and Developmental Disabilities	Special school	Uttara Kannada	Karnataka
33	Asha Nilaya School and Vocational Rehabilitation Center for Mentally Challenged	Special school	Udupi	Karnataka
34	Shrishti Special Academy	Special school	Bangalore	Karnataka
35	Mahadev Bhatt Kurse Deaf Children's School	Special school	Uttara Kannada	Karnataka
36	Ajita Manochetna Trust	Special school	Uttara Kannada	Karnataka
37	N S Hema Horticulture Training Center	PWD institution	Bangalore	Karnataka
38	Association for Promoting Social Action (APSA)	Rehabilitation centre	Bangalore	Karnataka
39	Sneha Sadan	Orphanage	Bangalore	Karnataka
40	Shree B D Tatti Memorial Charitable Trust	Special school	Gadag	Karnataka
41	Sumanahalli Society	Special health centre	Bangalore	Karnataka
42	Antharagange Vidya Samsthe	Old age home & Special school	Kolar	Karnataka
43	New Ark Mission of India	Rehabilitation centre	Bangalore	Karnataka
44	Rashthrohana Blood Center	Special health centre	Bangalore	Karnataka
45	Bethany Sanjeevani Kendra	PWD institution	Bagalkot	Karnataka
46	Bijapur Integrated Rural Development Society (BIRDS)	PWD institution	Chengalpattu	Tamil Nadu
47	ADP Center, Doddahalli PHC	Health centre	Bangalore	Karnataka

To collaborate or for more information,  
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