Submitted by
Impact Practice
by CSRBOX

ICICI Foundation for Inclusive Growth

ICICI Lombard

Impact Assessment Report

Solar Panel Installation in Schools

Disclaimer

- This report has been prepared solely for the purpose set out in the Memorandum of Understanding (MoU) signed between Renalysis Consultants Pvt Ltd (CSRBOX) and ICICI Foundation dated February 2025 to undertake the Impact Assessment of the programme 'Solar Panel Installation Project' implemented in the financial year 2023-24.
- This impact assessment is pursuant to the Companies (Corporate Social Responsibility Policy) Amendment Rules, 2021, notification dated 22nd January 2021.
- This report shall be disclosed to those authorised in its entirety only without removing the disclaimers.
- CSRBOX has not performed an audit and has not expressed an opinion or any other form of assurance.
- Further, comments in our report are not intended, nor should they be interpreted as legal advice or opinion.
- This report contains an analysis by CSRBOX considering the publications available from secondary sources and inputs gathered through interactions with the leadership team of ICICI Foundation, project beneficiaries, and other key stakeholders. While the information obtained from the public domain has not been verified for authenticity, CSRBOX has taken due care to obtain information from sources generally considered to be reliable.
- Specific to the Impact Assessment of the Solar Panel Installation Project under ICICI Foundation (FY 2023 - 2024), CSRBOX has used and relied on data shared by the ICICI Lombard's team, implementing agencies, secondary research through the internet, research reports, and project target beneficiaries.

With specific regards to Impact Assessment of Solar Panel Installation Project under ICICI Foundation (FY 2023 - 24):

- CSRBOX has neither conducted an audit nor due diligence nor validated the financial statements and projections provided by the ICICI Lombard team.
- Wherever information was not available in the public domain, suitable assumptions were made to extrapolate values for the same.
- CSRBOX must emphasise that the realisation of the benefits/improvisations accruing out of the recommendations set out within this report (based on secondary sources) is dependent on the continuing validity of the assumptions on which it is based. The assumptions will need to be reviewed and revised to reflect such changes in business trends, regulatory requirements, or the direction of the business as further clarity emerges. CSRBOX accepts no responsibility for the realisation of the projected benefits.
- The premise of an impact assessment is 'the objectives' of the project along with output and outcome indicators pre-set by the programme design and implementation team. CSRBOX's impact assessment framework was designed and executed in alignment with those objectives and indicators.

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List of Abbreviations

A	Amperes
AC	Alternative Current
BRSR	Business Responsibility & Sustainability Reporting
CO_2	Carbon Dioxide
CSR	Corporate Social Responsibility
DC	Direct Current
ESG	Environment, Social and Governance
FY	Financial Year
IC	Intangible Costs
IDIs	In-Depth Interviews
ISI	Indian Standards Institute
ISO	International Organisation for Standardisation
KIIs	Key Informant Interviews
KW	Kilo Watt
KWH	Kilo Watt Hour
MNRE	Ministry of New and Renewable Energy
MSEB	Maharashtra State Electricity Board
NPV	Net Present Value
PID	Potential Induced Degradation
PR	Performance Ratio
SDGs	Sustainable Development Goals
SEBI	Securities & Exchange Board of India
Sq. Ft	Square Feet
SROI	Social Return on Investment
SSY	Solar Specific Yield
TC	Tangible Costs
tCO_2	Total Carbon Dioxide
TI	Total Investment
TOC	Theory of Change
V	Volt
%	Percentage

Executive Summary

This impact assessment report evaluates the **Solar Panel Installation Programme**, an initiative by **ICICI Lombard**, implemented by **ICICI Foundation** during **FY 2023-24**. The programme aimed to **provide reliable electricity access** to schools across **Bihar, Maharashtra, and Tripura**, improving **learning conditions, student engagement, and school infrastructure**.

In **FY 2024**, ICICI Lombard facilitated the installation of **186 solar panels**, with a total capacity of **213 kW in Maharashtra, 165 kW in Bihar, and 207 kW in Tripura**, in underprivileged schools. The impact assessment of this project was undertaken to evaluate the effectiveness and long-term benefits of the intervention. The study was conducted using a **mixed-method approach**, including **surveys with students and teachers across multiple schools** and **in-depth interviews with key stakeholders**, to measure the **programme's impact on education and school operations**.

Relevance

- 7-8 hours of daily power outages in Bihar and Tripura, with entire-day shutdowns in Maharashtra.
- 76% of teachers noticed improved lesson delivery during power cuts, with 39% reporting significant improvement.
- 79% of respondents learned about the project through school administration.
- 60% of teachers reported greater job satisfaction due to fewer disruptions.
- 46% of teachers observed increased frequency and efficiency of school events.

Effectiveness

- 85% reduction in carbon emissions per school per month, with 32 kgs of CO_2 removed due to solar panel installation.
- 78% of teachers observed an improvement in digital learning, with 39% noting significant use of smart boards and projectors.
- 77% of respondents reported better classroom comfort, with 47% seeing a significant boost in student focus and attentiveness.

Efficiency

- Off-grid solar panels provided a consistent power supply in rural schools, reducing dependence on unreliable grid electricity.
- 72% of teachers observed improvements in conducting school events due to reliable electricity.
- 68% of respondents reported no challenges during installation, indicating an efficient rollout.
- 46% of respondents noted a significant increase in the frequency and smooth execution of school activities.
- Installation was completed without major disruptions, with only minor technical and weather-related delays.

Coherence

- Aligned with SDG 4, 7, 12 and 13.
- Aligned with ESG principles 2, 6 and 8.
- Aligned with national policies like PM JANMAN
- Aligned with Sub-sections (ii), (iv), and (ix) of Schedule VII of the Companies Act, 2013

Impact

- 80% of schools were selected as board examination centers, recognising their improved infrastructure and reliable electricity.
- 79% of teachers reported fewer lesson disruptions, with 46% observing significant improvements.
- 79% of respondents noted increased study hours, with 47% experiencing a significant positive change.
- 79% of teachers observed higher participation in extracurricular activities, with 46% reporting substantial growth.
- 79% of teachers acknowledged improvements in academic performance, with 47% noting a significant positive impact.

Sustainability

- Solar panels have a lifespan of 27 years, with efficiency decreasing from 90% to 80% over time; panels will be replaced for free if efficiency drops below 80%.
- 60% of schools reported uninterrupted power supply, improving digital learning and school operations.
- 58% of schools benefited from better classroom lighting, creating a more comfortable learning environment.
- Schools clean panels 2-3 times a week, but water is not used, which may affect efficiency over time.
- 91% of respondents are aware of ICICI Lombard, with 88% recognising its role in funding the project.
- 68% of respondents hold a very positive view of ICICI Lombard after the intervention, with 14% viewing it somewhat positively.
- 98% of respondents are willing to recommend ICICI Lombard, reinforcing trust and credibility in the community.

Chapter 1

Introduction and Project Background

1.1 Background and Context

India possesses an immense potential for harnessing solar energy, with approximately **5,000 trillion KWH of solar radiation** received annually across its landmass. Most regions in the country experience solar energy levels ranging between **4-7 KWH per square meter per day (Solar Overview, 2025)**, making solar electrification a highly scalable and viable solution for energy generation.[1]

In recent years, solar energy has significantly reshaped India's energy landscape. Decentralised and distributed solar applications have brought tangible benefits to millions, particularly in rural areas, by providing clean and sustainable solutions for lighting, cooking, and other essential energy needs. These advancements not only contribute to energy security but also promote environmental sustainability, enhancing the overall quality of life for communities across the country.

1.2 Need of the Project

Many schools in rural and remote areas face frequent power cuts, **limiting the adoption of digital tools, restricting study hours, and affecting the overall learning experience**. Solar electrification offers a sustainable and cost-effective solution by providing a reliable power supply, reducing electricity costs, and lowering carbon footprints.

Recognising this need, ICICI Lombard took the initiative of providing access to clean and reliable electricity to schools through the installation of solar panels in schools across Maharashtra, Tripura, and Bihar. The project aims to ensure uninterrupted electricity to schools to provide a better learning environment and experience for the students while contributing to a greener future at the same time.

1.3 About the Project

The solar panel installation project is designed to create a meaningful and lasting impact on both education and the environment. The project intervention specifically focuses on the three states of **Maharashtra, Tripura, and Bihar.**

In FY 2024, ICICI Lombard facilitated the installation of **186 solar panels (with a capacity of 213 Kw in Maharashtra, 165 Kw in Bihar and 207 Kw in Tripura respectively)** in underprivileged schools across these states. The project also includes an impact assessment to evaluate the effectiveness and long-term benefits of these installations.

1.4 CSR Initiatives of ICICI Lombard

ICICI Lombard is deeply committed to making a positive impact on communities across India through its CSR initiatives. With a strong focus on **preventive healthcare, road safety, and disaster relief**, these programmes provide crucial financial support to individuals during difficult times. The company also encourages employee volunteering activities, fostering a culture of

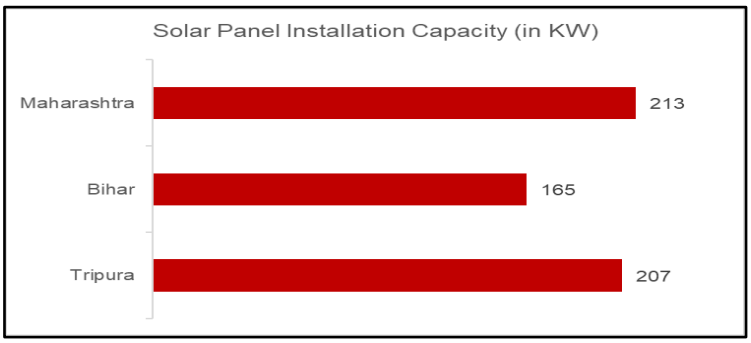


Figure 1 Capacity of Solar Panel Installed in the 3 locations of India

[1] Solar Overview | Ministry of New and Renewable Energy | India (mnre.gov.in)

giving back. In collaboration with the ICICI Foundation, ICICI Lombard has successfully implemented several projects that strengthen community engagement and promote social responsibility. These initiatives reflect the company's dedication to driving meaningful change and improving lives across the country.

1.5 Alignment with CSR Policy

Schedule VII (Section 135) of the Companies Act, 2013 outlines the activities that companies can incorporate into their CSR policies. The table below highlights how the intervention aligns with the approved activities specified by the Ministry of Corporate Affairs.

Sub-Section	Activities as per Schedule VII	Alignment with Intervention
(ii)	Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and the differently abled and livelihood enhancement projects.	**Completely** **Uninterrupted power supply** and **decrease in electricity bills** in schools due to solar electrification is improving the quality of education
(iv)	Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources, and maintaining the quality of soil, air, and water	**Completely** Using solar energy as a resource for school's electricity needs, the project is ensuring **environmental sustainability.**
(ix)	Rural development projects	**Completely** Since the schools involved in the project are in rural and remote areas, this project in a way is supporting and upscaling rural development by improving the standards of schools.

1.6 Alignment with ESG

The project's intervention also aligns with the **ESG Sustainability Report** of the corporate. Particularly, concerning the **Business Responsibility & Sustainability Reporting (BRSR)** Format shared by the **Securities & Exchange Board of India (SEBI),** the project aligns with the principle mentioned below:

PRINCIPLE 2	PRINCIPLE 6	PRINCIPLE 8
Businesses should provide goods and services in a manner that is sustainable and safe.	Businesses should respect and make efforts to protect and restore the environment.	Businesses should promote inclusive growth and equitable development.

1.7 Alignment with National Priorities

ICICI Lombard's programme intervention is well aligned with a major national-level policy—the New Solar Power Scheme (for PVTG Habitations/Villages) under PM JANMAN. The table below illustrates the project's alignment with the policy.

National Priorities	Details of the Priority	Alignment
New Solar Power Scheme under PM JANMAN	• The Scheme focuses on eleven critical interventions through the Nine Line Ministries for implementation. • The Mission, inter-alia, covers the implementation of New Solar Power Scheme (for Particularly Vulnerable Tribal Groups (PVTG) • Habitations/Villages) with the approved financial outlay of Rs.515 Cr. for electrification of one lakh un-electrified households (HHs) in PVTG areas located in 18 States.	**Partially** Solar electrification has been implemented in underprivileged schools having some proportion of tribal students studying.

1.8 Alignment with Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2016 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

Sustainable Development Goals (SDGs)	Target	How is it aligned
	**Goal 4: Quality Education** Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. **Target 4.1** By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes	The project has led to **improvement in the quality of education in schools**. Due to **savings in electricity bills and uninterrupted power supply**, there has been an extensive **adoption of digital learning models and tools in schools.** Through this, the students are able to understand the key concepts and learnings in a

	Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non- violence, global citizenship and appreciation of cultural diversity and culture's contribution to sustainable development.	clearer fashion with better understanding. This is resulting in **improvement in performances and level of engagement in classes** by students. The schools were also able to understand the importance of solar energy as a renewable energy resource.
	**Goal 7: Affordable and clean energy** Ensure access to affordable, reliable, sustainable and modern energy for all. **Target 7.1** By 2030, ensure universal access to affordable, reliable and modern energy services **Target 7.2** By 2030, increase substantially the share of renewable energy in the global energy mix.	The project has led to solar electrification in schools of remote and rural locations **shifting to renewable energy as the resource** for power supply.
	**Goal 12: Responsible consumption and production.** Ensure sustainable consumption and production patterns. **Target 12.2** By 2030, achieve the sustainable management and efficient use of natural resources. **Target 12.7** Promote public procurement practices that are sustainable, in accordance with national policies and priorities.	The intervention is helping in **sustainable consumption of natural resources** by shifting schools towards solar electrification – a renewable energy resource.

Chapter 2

Impact Assessment Strategy and Approach

This section provides an overview of the objectives of the study, the adopted research methodology and other details revolving around the study.

2.1. Objectives of Study

- Assess the extent to which the project has met its objectives, including targets, outputs, and outcomes, as outlined in the project documents.
- Assess the effectiveness, efficiency, impact created and sustainability of the intervention.
- Identify the best practices and processes in the project and give recommendations to address shortcomings, if any.

2.2 Geography of the Study

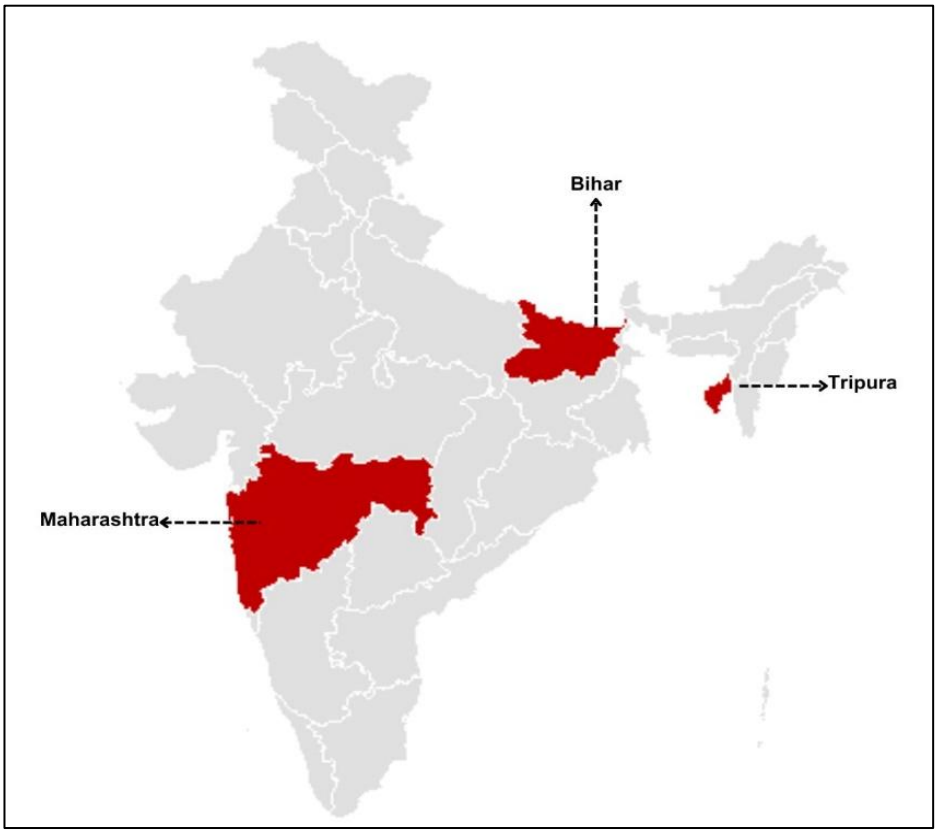


Figure 2 Geography of the Project

2.3. Sampling

The sampling approach adopted for the study was aligned with the mixed-method approach to data collection. The key stakeholders were chosen and sampled for the study in the following manner:

2.3.1 Quantitative Sampling:

For quantitative sampling, a **stratified random sampling** approach has been used. A total of three teachers and one headmaster from each sample school were selected to provide diverse insights into the programme's impact. The following table illustrates the sampling.

Primary Beneficiary	State	Districts to be covered	Universe Schools	Sample Schools (10%)	Survey Sample	Mode of Data Collection
School Teachers, School Headmaster	Bihar	Nawada	62	6	**24**	On-field
	Tripura	Gomti	53	5	**20**	Telephonic
	Maharashtra	Pune	71	8	**32**	On-field
	Total		**186**	**19**	**76**	

2.3.2 Qualitative Sampling:

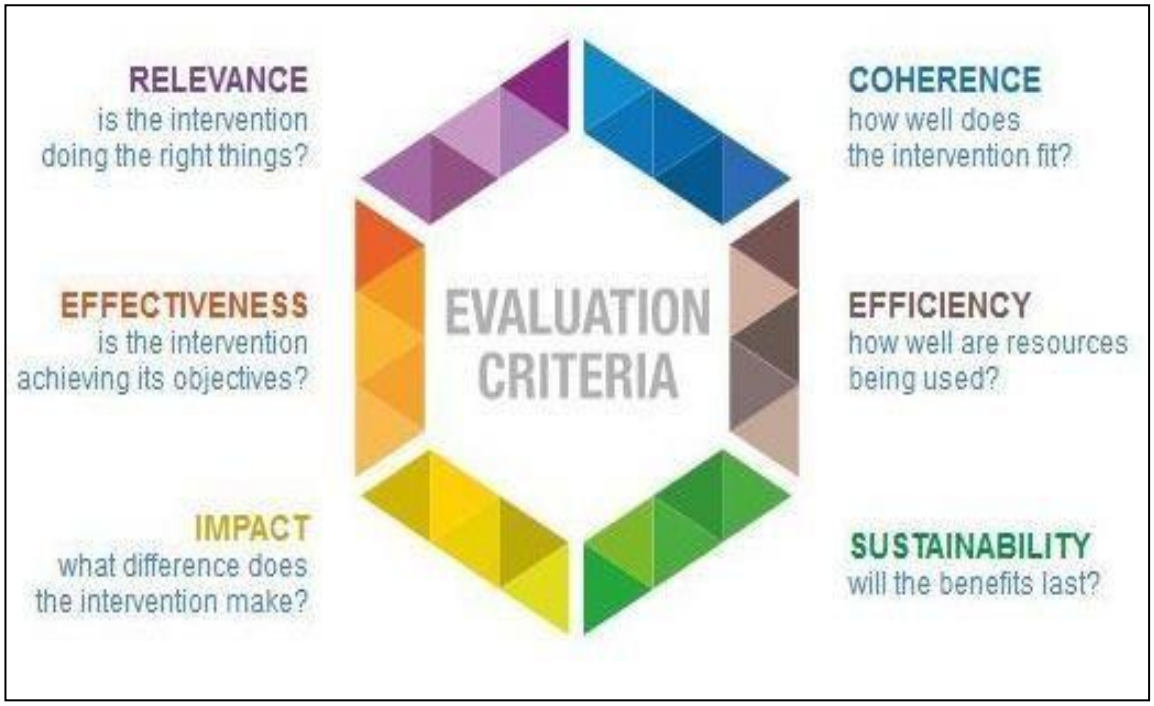
Detailed interactions with the key stakeholders were conducted to get detailed insights into the impact of the project.

The data was collected from the following stakeholders

Stakeholder	Mode of data collection	No. of Interactions
Students	FGDs	8
Non-teaching staff	IDIs	5
Maintenance Staff	IDIs	6
ICICI Foundation CSR team	KII	2
Implementation agency Team	KII	2
TOTAL		**23**

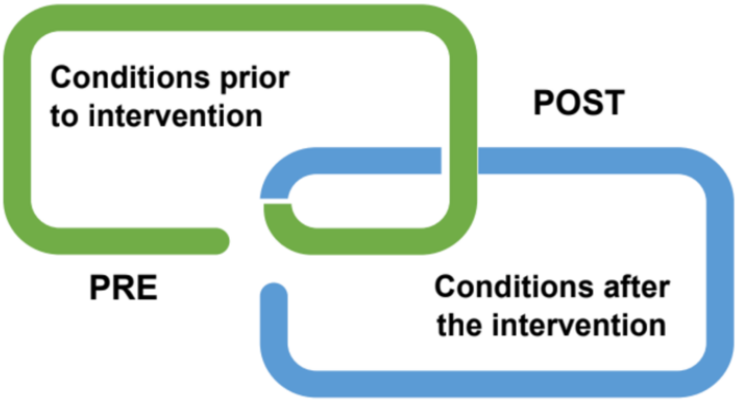
2.4. Assessment Approach and Evaluation Framework

To assess the relevance, efficiency, coherence, effectiveness, impact, and sustainability of the project, the evaluation utilised the OECD-DAC framework. This framework enabled the evaluation to measure the ICICI Lombard CSR Team's contribution to the results while considering the multiple factors that may have influenced the overall outcome. The social impact assessment hinges on the following pillars



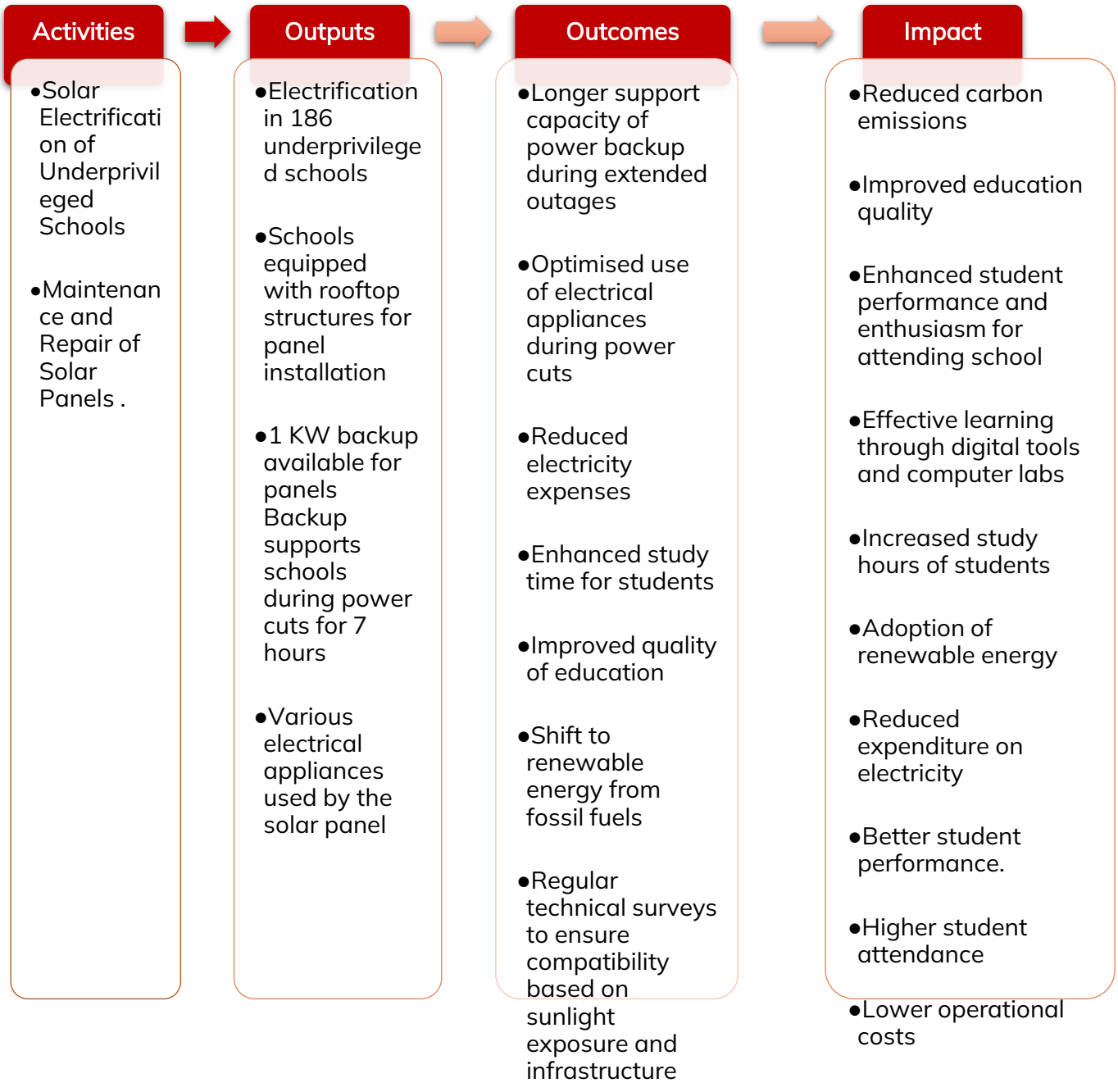
The evaluation framework is designed to provide a comprehensive understanding of the programme's impact while maintaining flexibility and result-oriented assessment. It aligns with the study's objectives and key areas of investigation, ensuring a structured yet adaptive approach to evaluation.

To assess the programme's effectiveness, a **pre-post evaluation approach** will be employed. This method relies on beneficiaries' recall of their experiences before and after the intervention, enabling a comparative analysis of changes in their circumstances. While this approach offers valuable insights into the programme's contribution to improving living conditions, it acknowledges that external factors may also influence the observed outcomes. Therefore, the assessment will focus on measuring the programme's impact rather than establishing direct causation.



The evaluation will incorporate both **retrospective and prospective perspectives**, ensuring a well-rounded analysis of the programme's processes, outcomes, and overall effectiveness. By systematically examining the intervention's design, implementation, and results, the evaluation will provide evidence-based insights that support strategic decision-making and contribute to continuous improvement.

2.5. Theory of Change



2.6. Ethical Considerations

- As part of qualitative data collection, team members adhered to ethical protocols by informing participants of the purpose of the study and ensuring informed consent from the participants.
- The IDIs were conducted in an environment that ensured the privacy of respondents.
- The respondents were assured about the confidentiality of their personal information and the usage of data for research purposes only.

2.7. Limitations to the Study / Challenges During Data Collection

- The study relies on a pre-post evaluation method, requiring participants to recall past conditions, which may lead to inaccurate responses.
- Some school staff may have minimal awareness of solar panel functioning, affecting the reliability of responses related to energy usage and efficiency.
- Variability in how schools maintain records of energy consumption and student performance may impact the consistency of data collected.

Chapter 3

Findings of the Impact Assessment Study

The following section of the report presents the key findings and insights derived from the impact assessment study, guided by the OECD DAC standard parameters. These insights have been gathered using a comprehensive 360-degree approach, combining quantitative and qualitative data collection methods through engagement with various stakeholders of the programme.

3.1 Relevance

The programme concentrated on installing solar panels in schools located in rural areas across Bihar, Maharashtra, and Tripura. This initiative targeted regions where the existing energy infrastructure posed significant challenges, aiming to provide reliable and sustainable energy solutions for local students.

3.1.1 Need of the Project

The project aimed to drastically cut down the schools' electricity bills while ensuring a continuous power supply, crucial for quality education. The savings from reduced electricity costs can be redirected towards other essential needs such as administrative expenditures, covering exam fees for economically disadvantaged students, and supporting the education of students, particularly those from tribal communities.

3.1.2 Frequent Power Disruptions

Schools in remote areas faced **prolonged power cuts**, with outages lasting **7-8 hours daily** in Bihar and Tripura and **entire day shutdowns** in Maharashtra for maintenance. Monsoons further worsened the situation, extending blackouts for **several days**. High electricity costs also burden financially weak schools, especially residential ones. The **solar electrification project** addressed these issues by ensuring **reliable power and reducing financial strain**, improving overall school operations.

With regular access to electricity supply, overall, **76% of teachers noticed an improvement** in delivering lessons during power cuts out of which **39% reported significant improvement**. By ensuring reliable power and reducing financial strain, the intervention has enhanced overall school operations and learning continuity.

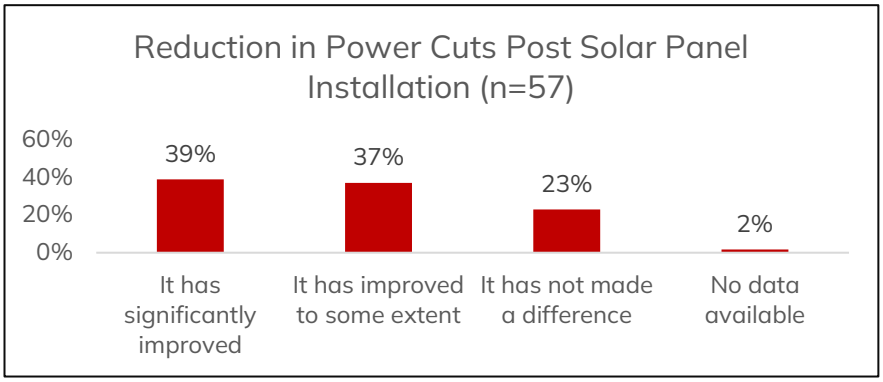


Figure 3 Changes in power cuts after project installation

3.1.2 Awareness about the Intervention

Most respondents (79%) learned about the project intervention through school administration, facilitating seamless implementation. Only 18% became aware through **community meetings and awareness campaigns**.

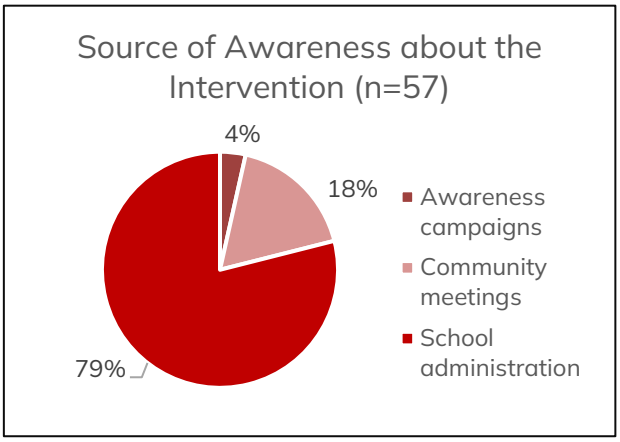


Figure 4 Awareness on the intervention

3.1.3 Teacher Motivation

A **stable power supply** directly influenced **teacher motivation and performance**. **60%** reported **greater job satisfaction** due to **fewer electricity disruptions** leading to a **better teaching environment**. While some noticed only **moderate improvements**, a few saw no change as a result of the intervention.

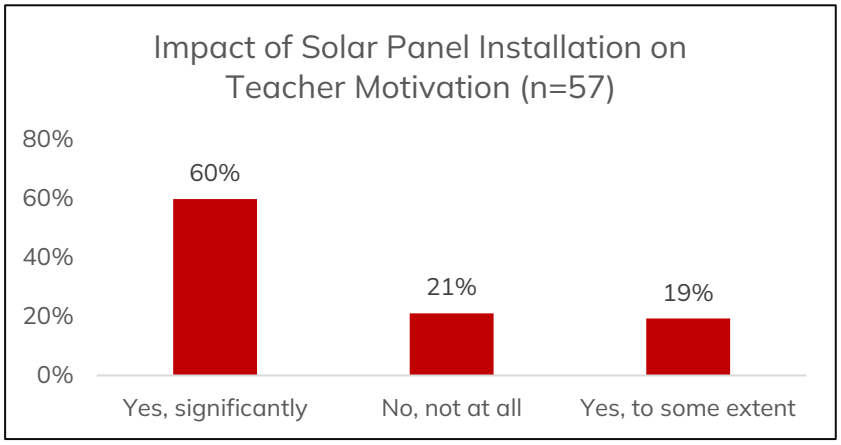


Figure 5 Impact of the project of teacher motivation

3.1.4 Influence on School Events

Reliable electricity supply also led to an enhancement in **overall school engagement** beyond academics. It was reported that schools have started to organise **events and extracurricular activities more efficiently**, with **46%** of teachers reporting increased frequency of the events conducted and better management considering reliable electricity supply for organising events. This has led to **greater student participation** and a **more dynamic learning environment**.

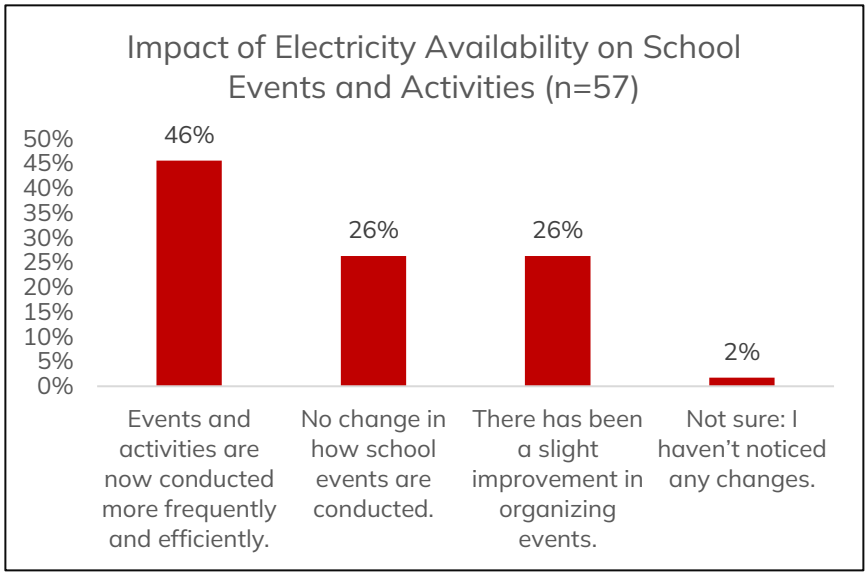


Figure 6 Electricity availability on social events

The solar electrification project has effectively addressed frequent power disruptions, ensuring reliable electricity, reduced costs, and improved learning conditions. Increased teacher motivation, and enhanced extracurricular activities highlight its positive impact. Support from the school administration has facilitated the smooth adoption of the intervention, reinforcing the project's relevance and long-term benefits.

3.2 Effectiveness of the Programme

The effectiveness of the programme is assessed by determining how well its objectives have been achieved and identifying the processes and systems that have contributed to this success. The observations made by the assessment team regarding the programme's effectiveness are outlined below.

3.2.1 Panel Power Backup

A significant number of schools are supported by **solar panel backup**, ensuring an **uninterrupted power supply** to essential areas such as the **principal's office, admin office, halls, and labs**. With **63% of respondents reporting savings in electricity bills**, the backup system has helped schools **reduce electricity bills while maintaining critical operations**. However, due to the **low capacity (about 1-2KW)**, the system supports only specific rooms. Only a few schools benefit from full-building coverage. To maximise efficiency during power cuts, the **technical team provides guidance on the optimal use of electrical appliances**, ensuring **balanced energy consumption** and preventing early battery drainage.

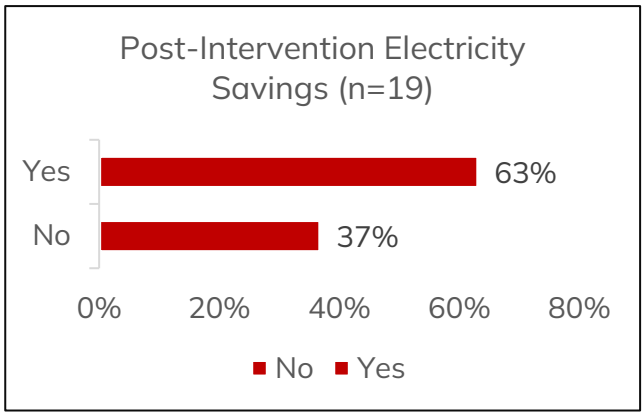


Figure 7 Electricity savings after the intervention

3.2.2 Integration of Digital Learning

Reliable electricity has encouraged schools to adopt digital learning tools in classrooms. **78% of teachers reported the adoption of digital learning as a result of the intervention,** of which 39% noted a significant increase in the regular use of smart boards and projectors for interactive lessons. While some still experience occasional limitations, the overall shift toward technology-driven education has been substantial and one of the noteworthy findings of the study.

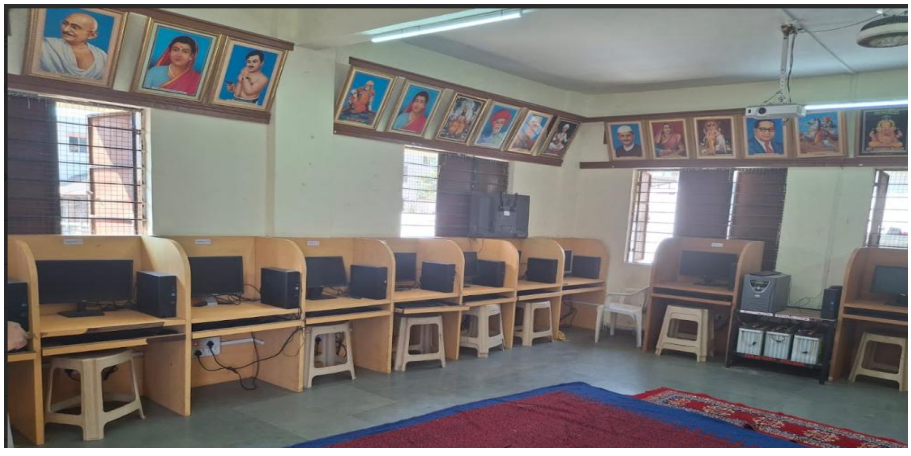


Figure 8 Computer Lab at a school in Bihar supported by the solar

3.2.3 Student Focus and Classroom Comfort

Improved lighting and fan facilities have transformed classrooms into more comfortable spaces, significantly enhancing student focus and attentiveness. According to the feedback, **77% of respondents noted an improvement in the academic focus of students**, with 47% reporting a significant boost in concentration levels. The addition of these facilities has allowed students to maintain focus for extended periods, even during extreme weather conditions such as hot summers or heavy monsoons.

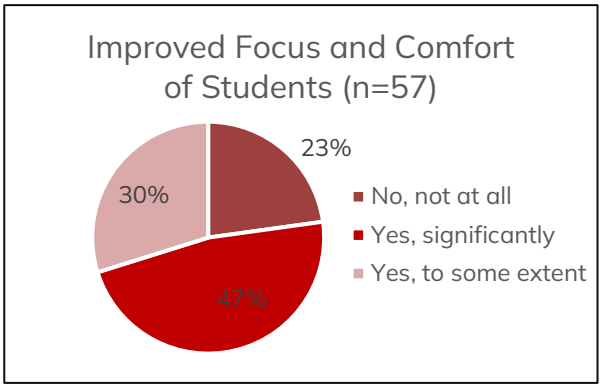


Figure 9 Improved focus of students

3.2.4 Impact on School Attendance

The availability of electricity has contributed to **higher attendance (46%)**, especially during the summer months. For students without fans at home, classrooms now provide a cooler and more comfortable environment, encouraging both students and teachers to attend classes more regularly.

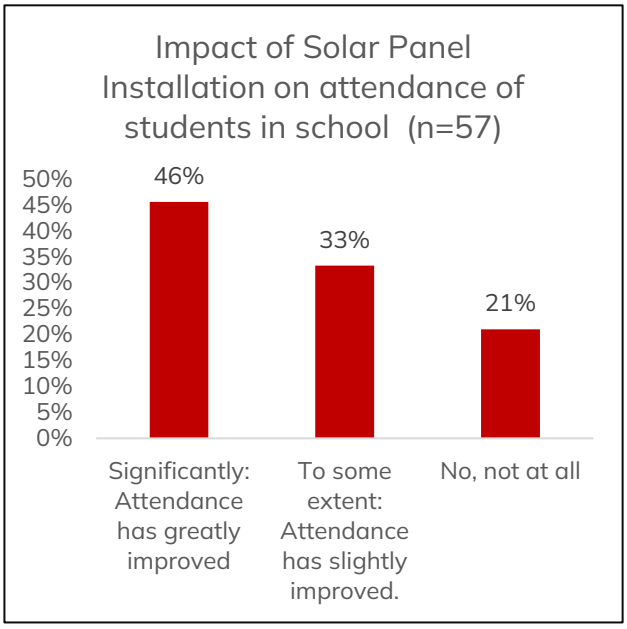


Figure 10 Attendance of students impacted by the solar panel installation

"During the summer season, student attendance is noticeably higher as many come from economically weaker backgrounds and do not have fans at home. With the installation of solar panels, classrooms now provide both proper lighting and ventilation, making school a more comfortable space for them."

------Mr. Kamal Kr. Bhowmik, PGT, Palatana High School, Gomati, Tripura.

The solar electrification project has significantly **enhanced learning conditions, student engagement, and overall school operations**. The availability of **uninterrupted electricity** has improved **digital**

learning, classroom comfort, attendance, study hours, and academic performance. With students now benefiting from **better infrastructure and extended learning opportunities**, the intervention has proven to be **highly effective in creating a more conducive and sustainable educational environment**.

3.2.5 Average Carbon Emission

Average Carbon Emission Accounting per school in Maharashtra – Pre and Post Intervention[3]. For the **carbon emission estimation Maharashtra** has been chosen as the study area.

Pre-Intervention

Particulars	Value	Data Source	Units
Average Monthly Cost of Electricity Bills per school	INR 1,500	Stakeholder interactions	Rs
Unit Electricity Cost[2]	575 Paise = 5.75 INR	Secondary Data	INR
Average Monthly Net Electricity Consumption per school	1,500 / 5.75 = 261	Secondary Data	KWH
Carbon emission per KWH of electricity generated[3]	820 grams = 0.82 Kgs	Secondary Data	Kg
Carbon emission per school per month	261 x 0.82 = **214 Kgs of Carbon emission**	Secondary Data	Kg

214 Kgs of carbon emission in the atmosphere per school per month *before the intervention.*

Post Intervention

Particulars	Value	Data Source	Units
Average Monthly Cost of Electricity Bills	INR 1100	Stakeholder interactions	Rs
Unit Electricity Cost[4]	575 Paise = 5.75 INR	Secondary Data	INR
Average Monthly Net Electricity Consumption (from Solar Electrification)	1100/5.75 = 191	Secondary Data	KWH
Reduction in electricity consumption post-intervention	261 – 191 = 70	Secondary Data	KWH

[2] Tariff-Booklet-low-may07.pdf
[3] Electricity Generation and CO2 Emissions | Planète Énergies (planete-energies.com)
[4] Tariff-Booklet-low-may07.pdf

Per cent reduction in Carbon emissions from Solar Panel installed	20 % = 0.2 = 1-0.2 = 0.8	Secondary Data	Kg
Carbon emission per KWH of electricity generated[5]	820 grams = 0.82 Kgs	Secondary Data	Kg
Carbon emission per school per month[6]	(0.82 x 191 x 0.8) + (0.82 x 69) = **182 Kgs of Carbon emission**	Secondary Data	Kg

182 Kgs of carbon emissions per school per month after the intervention.

Reduction in Carbon Emission per school per month as a result of the intervention = 214 – 182 = **32 Kgs**

% of Carbon emission removal per school per month from the intervention **= 182 / 214 x 100**

= 85 %

The intervention resulted in the removal of around 32 Kgs or 85 % of Carbon emissions from the atmosphere per school per month.

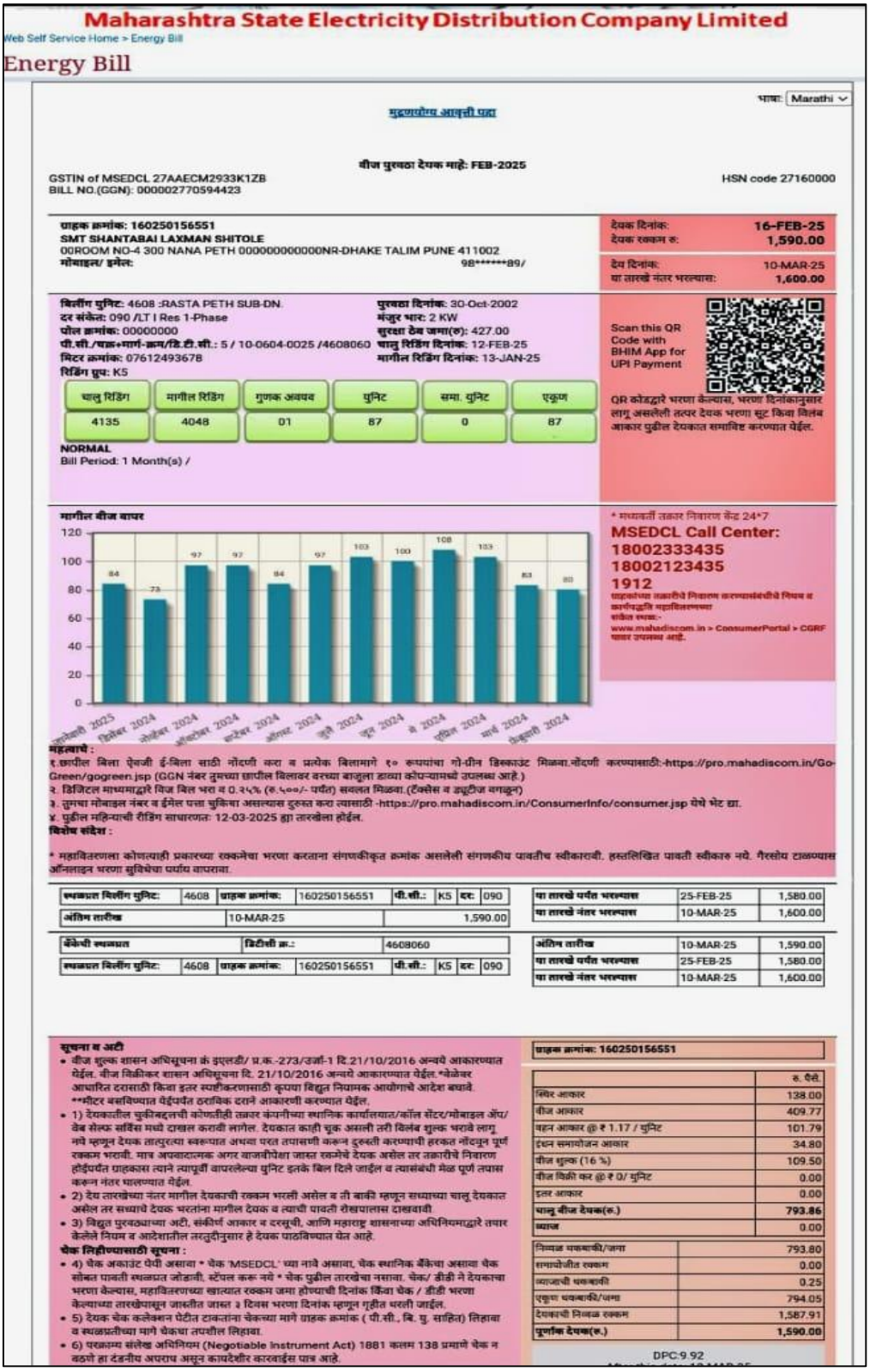
Figure 11 Interaction of the CSRBOX team member with the principal of a school in Bihar

"After the installation of solar panels, our school's electricity expenses have significantly reduced, allowing us to allocate more resources to student learning. This sustainable solution ensures uninterrupted power for classrooms, creating a better environment for both students and teachers."

— Mr Bhawar Singh, Teacher, ZPPS Kuruli, Pune

[5] Solar Photovoltaics - Cradle-to-grave analysis and environmental cost. (renewableenergyhub.co.uk)

[6] Electricity Generation and CO2 Emissions | Planète Énergies (planete-energies.com)


Maharashtra State Electricity Distribution Company Limited

Web Self Service Home > Energy Bill

Energy Bill

भाषा: Marathi

मुद्रणयोग्य आवृत्ती पान

बीज पुरवठा देयक माहे: FEB-2025

GSTIN of MSEDCL 27AAECM2933K1ZB
BILL NO.(GGN): 000002770594423

HSN code 27160000

ग्राहक क्रमांक: 160250156551
SMT SHANTABAI LAXMAN SHITOLE
00ROOM NO-4 300 NANA PETH 000000000000NR-DHAKE TALIM PUNE 411002
मोबाइल/ ईमेल: 98******89/

देयक दिनांक: 16-FEB-25
देयक रक्कम रु: 1,590.00

देय दिनांक: 10-MAR-25
या तारखे नंतर भरल्यास: 1,600.00

बिलींग युनिट: 4608 :RASTA PETH SUB-DN.
दर संकेत: 090 /LT I Res 1-Phase
पोल क्रमांक: 00000000
पी.सी./पाळ+मार्ग-क्रम/डि.टी.सी.: 5 / 10-0604-0025 /4608060
मिटर क्रमांक: 07612493678
रिडिंग ग्रुप: K5

पुरवठा दिनांक: 30-Oct-2002
मंजुर भार: 2 KW
सुरक्षा ठेव जमा(रु): 427.00
चालु रिडिंग दिनांक: 12-FEB-25
मागील रिडिंग दिनांक: 13-JAN-25

चालु रिडिंग	मागील रिडिंग	गुणक अवयव	युनिट	समा. युनिट	एकुण
4135	4048	01	87	0	87

NORMAL
Bill Period: 1 Month(s) /

Scan this QR Code with BHIM App for UPI Payment

QR कोडद्वारे भरणा केल्यास, भरणा दिनांकानुसार लागू असलेली तत्पर देयक भरणा सूट किंवा विलंब आकार पुढील देयकात समाविष्ट करण्यात येईल.

मागील बीज वापर

* मध्यवर्ती तक्रार निवारण केंद्र 24*7
MSEDCL Call Center:
18002333435
18002123435
1912
ग्राहकांच्या तक्रारीचे निवारण करण्यासंबंधीची नियम व कार्यपद्धती महावितरणच्या संकेत स्थळ:-
www.mahadiscom.in > ConsumerPortal > CGRF यावर उपलब्ध आहे.

महत्वाचे :
१.छापील बिला ऐवजी ई-बिला साठी नोंदणी करा व प्रत्येक बिलामागे १० रुपयांचा गो-ग्रीन डिस्काउंट मिळवा.नोंदणी करण्यासाठी:-https://pro.mahadiscom.in/Go-Green/gogreen.jsp (GGN नंबर तुमच्या छापील बिलावर वरच्या बाजुला डाव्या कोपऱ्यामध्ये उपलब्ध आहे.)
२. डिजिटल माध्यमाद्वारे बिज बिल भरा व 0.२५% (रु.५००/- पर्यंत) सवलत मिळवा.(टॅक्सेस व ड्यूटीज वगळून)
३. तुमचा मोबाइल नंबर व ईमेल पत्ता चुकिचा असल्यास दुरुस्त करा त्यासाठी -https://pro.mahadiscom.in/ConsumerInfo/consumer.jsp येथे भेट द्या.
४. पुढील महिन्याची रीडिंग साधारणत: 12-03-2025 ह्या तारखेला होईल.

विशेष संदेश :

* महावितरणला कोणत्याही प्रकारच्या रक्कमेचा भरणा करताना संगणकीकृत क्रमांक असलेली संगणकीय पावतीच स्वीकारावी. हस्तलिखित पावती स्वीकारु नये. गैरसोय टाळण्यास ऑनलाइन भरणा सुविधेचा पर्याय वापरावा.

स्थळप्रत बिलींग युनिट:	4608	ग्राहक क्रमांक:	160250156551	पी.सी.:	K5	दर:	090
अंतिम तारीख	10-MAR-25					1,590.00	

या तारखे पर्यंत भरल्यास	25-FEB-25	1,580.00
या तारखे नंतर भरल्यास	10-MAR-25	1,600.00

बँकेची स्थळप्रत	डिटीसी क्र.:	4608060					
स्थळप्रत बिलींग युनिट:	4608	ग्राहक क्रमांक:	160250156551	पी.सी.:	K5	दर:	090

अंतिम तारीख	10-MAR-25	1,590.00
या तारखे पर्यंत भरल्यास	25-FEB-25	1,580.00
या तारखे नंतर भरल्यास	10-MAR-25	1,600.00

सूचना व अटी
- बीज शुल्क शासन अधिसूचना क्र. ईएलडी/ प्र.क.-273/उर्जा-1 दि.21/10/2016 अन्वये आकारण्यात येईल. बीज सिकीकर शासन अधिसूचना दि. 21/10/2016 अन्वये आकारण्यात येईल. *जोडभार आधारित दरासाठी किंवा इतर स्पष्टीकरणासाठी कृपया विद्युत नियामक आयोगाचे आदेश बघावे. **मीटर बसविण्यात येईपर्यंत ठराविक दराने आकारणी करण्यात येईल.
- 1) देयकातील चुकीबद्दलची कोणतीही तक्रार कंपनीच्या स्थानिक कार्यालयात/कॉल सेंटर/मोबाइल ॲप/ वेब सेल्फ सर्विस मध्ये दाखल करावी लागेल. देयकात काही चूक असली तरी विलंब शुल्क भरावे लागू नये म्हणून देयक तात्पुरत्या स्वरूपात अथवा परत तपासणी करून दुरुस्ती करण्याची हरकत नोंदवून पूर्ण रक्कम भरावी. मात्र अपवादात्मक अगर वाजवीपेक्षा जास्त रकमेचे देयक असेल तर तक्रारीचे निवारण होईपर्यंत ग्राहकास त्याने त्यापूर्वी वापरलेल्या युनिट इतके बिल दिले जाईल व त्यासंबंधी मेळ पूर्ण तपास करून नंतर घालण्यात येईल.
- 2) देय तारखेच्या नंतर मागील देयकाची रक्कम भरली असेल व ती बाकी म्हणून सध्याच्या चालू देयकात असेल तर सध्याचे देयक भरताना मागील देयक व त्याची पावती सोबतास दाखवावी.
- 3) विद्युत पुरवठ्याच्या अटी, संकीर्ण आकार व दरसूची, आणि महाराष्ट्र शासनाच्या अधिनियमाद्वारे तयार केलेले नियम व आदेशातील तरतुदीनुसार हे देयक पाठविण्यात येत आहे.

चेक लिहीण्यासाठी सूचना :
- 4) चेक अकाउंट पेयी असावा * चेक 'MSEDCL' च्या नावे असावा, चेक स्थानिक बँकेचा असावा चेक सोबत पावती स्थळप्रत जोडावी, स्टॅपल करू नये * चेक पुढील तारखेचा नसावा. चेक/ डीडी ने देयकाचा भरणा केल्यास, महावितरणच्या खात्यात रक्कम जमा होण्याची दिनांक किंवा चेक / डीडी भरणा केल्याच्या तारखेपासून जास्तीत जास्त ३ दिवस भरणा दिनांक म्हणून गृहीत धरली जाईल.
- 5) देयक चेक कलेक्शन पेटीत टाकतांना चेकच्या मागे ग्राहक क्रमांक (पी.सी., बि. यु. सहित) लिहावा व स्थळप्रतीच्या मागे चेकचा तपशील लिहावा.
- 6) पराक्राम्य संलेख अधिनियम (Negotiable Instrument Act) 1881 कलम 138 प्रमाणे चेक न वठणे हा दंडनीय अपराध असून कायदेशीर कारवाईस पात्र आहे.

ग्राहक क्रमांक: 160250156551

	रु. पैसे.
स्थिर आकार	138.00
बीज आकार	409.77
वहन आकार @ ₹ 1.17 / युनिट	101.79
इंधन समायोजन आकार	34.80
बीज शुल्क (16 %)	109.50
बीज विक्री कर @ ₹ 0/ युनिट	0.00
इतर आकार	0.00
चालू बीज देयक(रु.)	793.86
व्याज	0.00
निव्वळ थकबाकी/जमा	793.80
समायोजीत रक्कम	0.00
व्याजाची थकबाकी	0.25
एकुण थकबाकी/जमा	794.05
देयकाची निव्वळ रक्कम	1,587.91
पूर्णांक देयक(रु.)	1,590.00

DPC:9.92

Figure 12 Electricity bill of a school of Maharashtra

From the user experience perspective, the solar electrification project has significantly enhanced teaching efficiency, student focus, and school attendance. With an uninterrupted power supply, digital learning has expanded, study hours have increased, and classroom conditions have improved, allowing students to stay engaged for longer periods.

3.3 Efficiency

The **off-grid solar panels used in the Solar Panel Installation project** operate independently of the main electricity grid. These panels store generated energy in batteries, ensuring a continuous power supply even during long power cuts, especially during monsoons. **This eliminates dependence on the Department of Electricity for energy storage and reduces electricity bills by providing a reliable and self-sustaining energy solution for schools.**

3.3.1 Working of the Panels:

The cells of the panel consist of silicon, composed of electrons and protons, which generate current, enabling the panel to function. The **silicon-based solar cells** absorb **sunlight**, where **photons excite electrons**, creating **DC power**. This energy is **stored in batteries** and later converted into **AC power** by an inverter for use in schools.

For optimal performance, **panels require 5-6 hours of shadow-free sunlight**, with the stored energy powering essential systems during **non-sunlight hours**. A **shadow analysis report** is regularly monitored to ensure **maximum sunlight exposure**. Typically, **1 kW of solar panels generates about 2 units per day**, but with **proper maintenance**, this can increase to **3-5 units per day**, ensuring a **reliable and sustainable power supply** for off-grid schools.

These off-grid solar panels were installed in rural schools in **Maharashtra, Bihar, and Tripura**, to provide a consistent and sustainable power supply.

Figure 13 Off Grid Solar Panel Inverter (on the left) and Stored Inverter Batteries (on the right)

"The solar panels are working effectively. We sometimes face a slight issue during long weeks of continuous rain, but otherwise, there have been no problems till date."

---------- **Chanakya Kalai, K.B.T. Debendra R/P English Medium School, Tripura.**

3.3.2 Basic Technical Details of the Solar Panel Installed

Specifications	Details
Capacity Utilisation Factor	17% (+/-) based on geographical location
Warranty	1 Year System Warranty
Type of Panel	335 Wp Polycrystalline Modules
Soiling Loss	2%
Soiling Ratio	1:1
Transmission Loss	< 1%
Incident Angle	10 degrees
Position of PV panel	Varies as per roof type
Module Temperature	25 Degree (STC)
Potential induced degradation (PID)	< 1 %
Open Circuit Voltage	46.42V
Short Circuit Current	9.41A
Current Voltage	36.87V
Performance Ratio (PR)	72%
Characteristics of Solar Module	17.24%
Total Number of inverters	1 No. of inverter per System
Strings per inverter	As per design
Inverter Power	2kVA to 12.5kVA
Solar Area Breakup Details (Ha) - PV Module Area Balance of Plant Open Area Total Area	100 sq feet per kW 10-15 sq feet per kW 125 sq feet
Solar Module Parameters (MLD) - a) No. of the Solar module b) Area of individual module c) Water required to clean each module	 a. 3 modules per kWp b. 1 meter x 2 meters c. 4 liters per panel

d) Number of cycles per year e) Total Water Requirement,	d. 16 e. 12 Litre per kWp
Type and Module of PV	Poly Crystalline
Plant Load Factor (%)	0% (AC: DC 1:1)
Time of Installation	45-60 Days

Key Terms Glossary[7]

Soiling Loss - Losses due to soiling (dust or snow and bird droppings, etc.) on the modules for long periods, and depending on the environmental conditions, rainfall frequency, and cleaning strategy37an impact the performance ratio.

Soiling Ratio – For a completely clean panel, the SR is 100 % and for a soiled panel, it is closer to 0 %.

Transmission Loss - Transmission loss is the loss of transmission of solar irradiation to the solar module. Dust deposited on the module reduces the light transmission, and hence, the incident solar irradiation decreases. Reduced incident radiation may slow down the temperature enhancement of the PV panels. Thus, the open-circuit voltage is not much affected.

$$\textit{Transmission Loss}\ (\%) = 100 - \textit{Soiling ratio}\ (\%)$$

Shading effect - Shading occurs due to mountains, buildings, or other obstructions affecting rows or columns of cells in a module, either permanently or temporarily, significantly reducing output power. This power loss may cause a hotspot in the cell, potentially damaging the module. When an entire panel is under shadows or in the shade, it simply stops generating power. However, if the panel is under partial shading, then the power generation depends on the orientation of the panel and shadow area.

Incident Angle - This is the angle between the line that points to the sun and the line that is normal to the surface of the panel. Solar panels are most efficient when pointing perpendicular to the sunlight.Position of PV Panel - It is crucial to position the PV panels to capture solar irradiation for the maximum duration throughout the day. Ideally, PV panels should face south or south- south-facing direction, as the sun rises in the east and moves towards the south before setting in the west.

Figure 14 Suitable position of PV Panel

[7] 14_Booklet on Factors affecting efficiency of Solar plants and Ways to improve(1).pdf (indianrailways.gov.in)

Module Temperature - For every degree rise in Celsius temperature above 25-degree Celsius, crystalline silicon modules reduce inefficiency and vice versa.

Potential Induced Degradation (PID) - Whenever a conductive path is formed between cell and frame through encapsulation, glass, or back sheet, a leakage current will flow from cell to earth. This is known as PID.

3.3.3 Challenges in Installation and Implementation

The majority of respondents reported **no challenges (68%)** during installation, indicating an **efficient rollout of the project**. However, some schools **(14%) faced delays in implementation due to weather conditions**. Despite these hurdles, the installation was **completed without major disruptions**. Technical issues and interruptions due to power supply problems were minimal.

3.3.4 Impact on School Events and Activities

The availability of reliable electricity has resulted in **72% of teachers observing improvements** in conducting school events. Many schools now organise **activities more efficiently**, with **46% of respondents noting a significant increase** in frequency and smooth execution. As evident from the interaction with the secondary stakeholders, in many schools, the **prayer assembly** has become more engaging, as students now enjoy using **microphones and sound systems**, which were previously limited due to power cuts. The enhanced facilities have contributed to a **more vibrant school environment**.

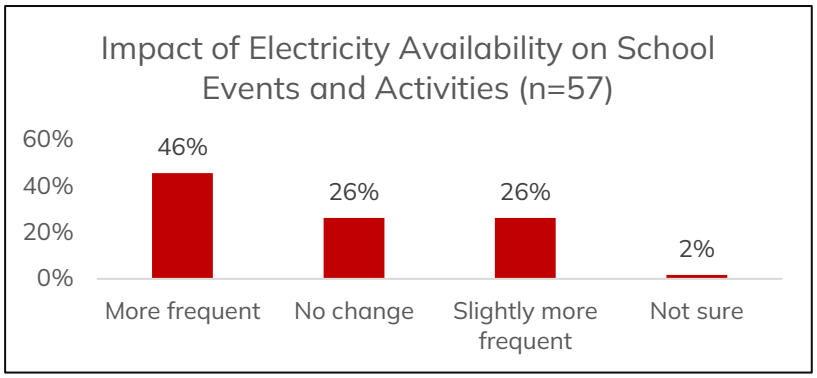


Figure 15 Impact of the project on the school events

The project has been efficiently implemented, with most schools experiencing minimal challenges during installation. Reliable electricity has enhanced school events, improved nighttime security, and optimised operational efficiency. Despite minor maintenance needs, the overall benefits far exceed the challenges, making the intervention a valuable and sustainable addition to school infrastructure.

"Earlier, power cuts lasting two to three days made it difficult to monitor the school premises, and I had to rely on a torch. Now, with consistent lighting, I can see across the campus, complete my duties effectively, and sleep more comfortably with a working fan. While maintenance has increased, the benefits of continuous lighting and security far outweigh the effort,"

----------Subhash Prasad, Night Guard, Government Senior Secondary School Punaul, Bihar.

3.4 Coherence

3.4.1 Panel Registration

The solar panels installed in schools are **all Ministry of New and Renewable Energy/ ISO certified** and approved. The technical teams and implementation team virtually stay in regular contact and touch with all the schools where they have installed the solar panels.

Figure 16 (1) Electricity meter box (2) Off-grid solar inverter (3) Meter box of solar panel

3.4.2 Alignment with SDGs

3.4.3 Alignment with ESG Principles

PRINCIPLE 2

Businesses should provide goods and services in a manner that is sustainable and

PRINCIPLE 6

Businesses should respect and make efforts to protect and restore the environment

PRINCIPLE 8

Businesses should promote inclusive growth and equitable development

3.5 Impact

The installation of solar panels has had a **positive impact** on school operations, student engagement, and academic performance. With fewer power disruptions, students and teachers can now focus better, schools conduct more extracurricular activities, and learning environments have significantly improved.

3.5.1 Reduction in Disruptions

Reliable electricity has **reduced power-related disruptions**, with **79% of teachers reporting improvements** in lesson continuity. Of these, **46% noted a significant improvement**, ensuring that power cuts no longer affect their teaching. Teachers also confirmed that students are now **more focused** in class due to better lighting and ventilation.

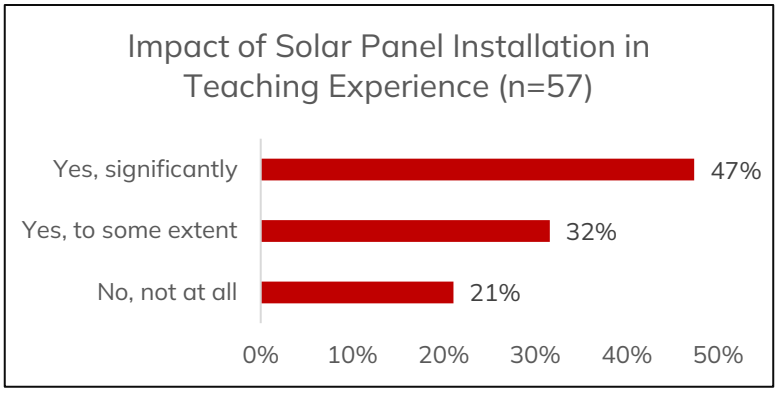


Figure 17 Impact of teaching experience of project

> *"Earlier, students would get distracted and restless due to power cuts, but now, with continuous electricity, they stay engaged for longer periods."*
>
> -------- Mr Aditya Sarkar, PGT, Twisa Rangchal TMC high school

3.5.2 Improvement in Study Hours and Extracurricular Activities

Uninterrupted power supply has enabled students to study longer, especially in the evenings. **79% of respondents observed an improvement**, with 47% reporting a significant increase in study hours. Many teachers note students stay after classes, enhancing academic engagement. **Improved facilities have boosted extracurricular participation, with 79% noticing an increase**, of which 46% saw significant growth. Better lighting and extended study hours have led to academic improvements, reinforcing the project's effectiveness in enhancing learning and overall development.

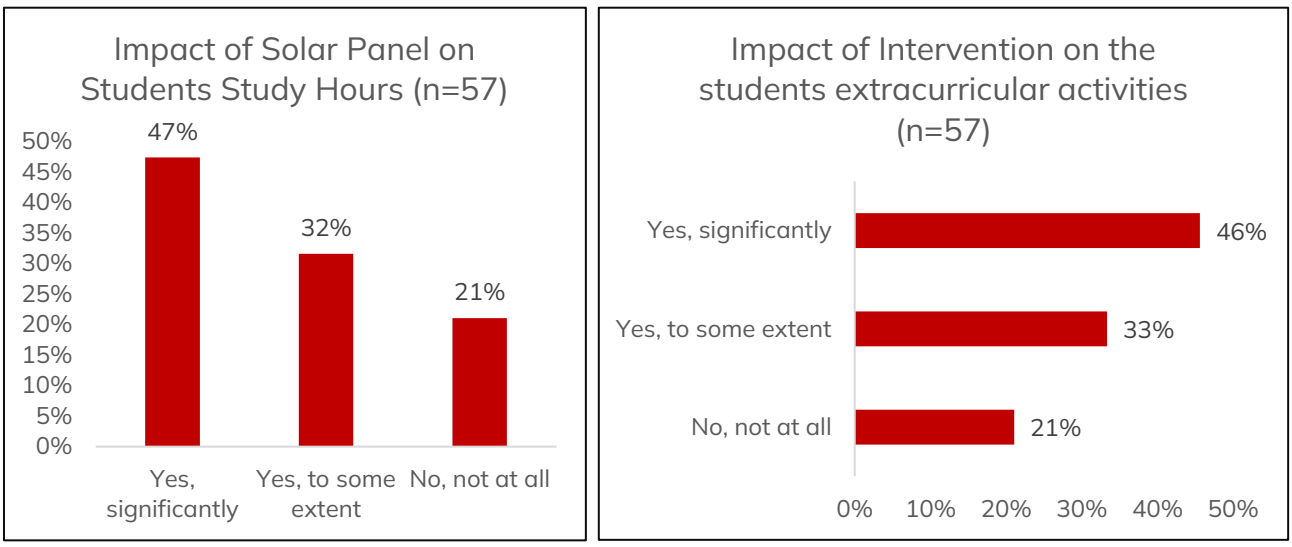


Figure 18 Impact of the project on students' study hours (on the left) and extracurricular activities (on the right)

"Before the installation of solar panels, power cuts would often leave our classrooms in darkness, making it difficult to focus on our lessons. We would end up playing or sitting idle, unable to see our books or the blackboard. However, with the solar-powered lights, we no longer face this issue. The classrooms remain bright and well-lit, allowing us to continue our studies without any interruptions. It has made a significant difference in our learning environment, and we look forward to coming to school every day,"

----------Rani Kumari, Class 7, Middle School Orhanpur, Bihar

3.5.3 Academic Performance and Classroom Environment

The improved **learning environment** has contributed to **better academic performance**, with **79% of teachers noticing an improvement** and **47% reporting a significant positive impact on the academic performance of students**. The availability of fans has also **helped students stay in class longer**, especially during summer. Teachers have also found it **easier to conduct lessons**, as the improved conditions allow for **smoother teaching and learning experiences**.

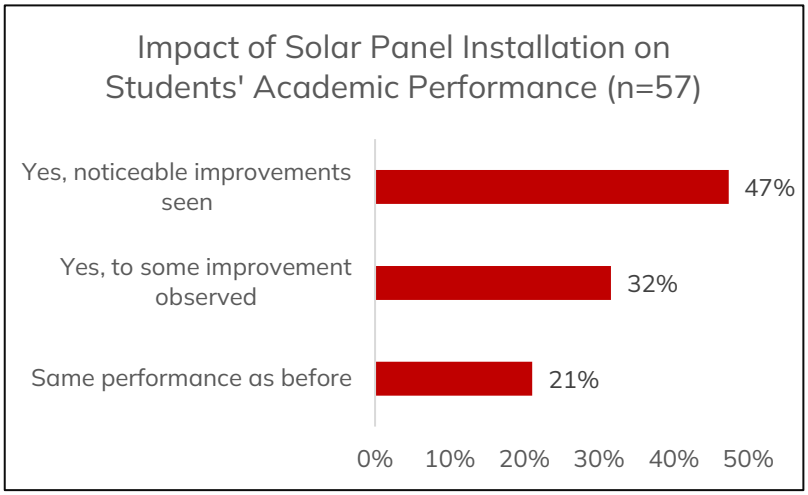


Figure 19 Impact of the project on the academic performance of students

"With the fans on, we don't feel like leaving the classroom anymore, so we focus more on studies.,"

----------Lakshmi Kumari, Class 8, Middle School Orhanpur, Bihar

3.5.4 Schools Selection as Board Examination Centres

With the installation of **solar panels**, around **80% of these schools** have been chosen by the **education department** as centres for **board examinations**. Headmasters highlighted that the **availability of reliable electricity, proper lighting, and functional fans** made these schools more **suitable and convenient** for conducting exams. This recognition underscores the **impact of the project in improving school infrastructure and creating a more conducive academic environment**.

Figure 20 A school in Maharashtra impacted by the solar panels

3.5.5 Promoting Awareness of Renewable Energy

It was evident from **qualitative interviews** that students were introduced to the **concept of renewable energy** during the installation of solar panels. Awareness sessions were conducted in every school, where students learned about **the importance of solar power, its benefits, and its role in reducing dependence on conventional energy sources**. These sessions not only enhanced their **understanding of sustainability** but also encouraged them to **embrace solar energy as a valuable resource** for the future. This initiative has **instilled a sense of environmental responsibility**, ensuring that the next generation recognises the **long-term value of clean energy solutions**.

Figure 21 Solar plates at the roof top of a school

3.5.6 Importance of Solar Energy as a Resource

Most students recognised the **importance of solar energy** through this project, gaining a deeper understanding of how **sunlight is harnessed into a clean, renewable energy source**. They acknowledged that solar power not only provides **a sustainable alternative** but also plays a crucial role in **energy conservation**. The **widespread adoption** of solar energy has helped address **key challenges** in schools, improving learning conditions and infrastructure. Reflecting its impact, **56% of teachers rated the initiative as excellent**, highlighting its effectiveness in creating a **more sustainable and efficient educational environment**.

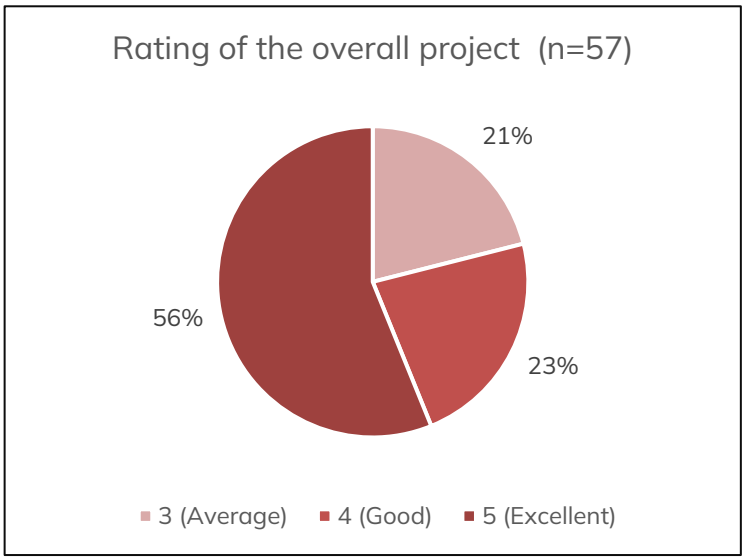


Figure 22 Rating of the overall project

The solar electrification project has significantly improved learning conditions, student engagement, and school infrastructure. With fewer power disruptions, extended study hours, and greater participation in academics and extracurricular activities, schools now offer a more conducive learning environment for students and teachers. The project's impact is further highlighted by the selection of

these schools as board examination centres and the growing awareness of renewable energy, ensuring long-term sustainability in education.

3.6 Sustainability

Ensuring the long-term viability of the solar electrification project is essential for sustained benefits in education. The initiative not only provides a reliable and renewable energy source but also reduces dependence on conventional electricity, lowering costs and environmental impact.

3.6.1 Panel Lifespan

The panels have a lifespan of 27 years. They degrade at a rate of 2.5% in functionality after the first year and 0.5% each subsequent year. As a result, efficiency decreases from 90% to 80% over the 27-year warranty period. If efficiency drops below 80% within this period, the vendors will replace the panels free of cost. Once the panels reach the end of their lifespan, a recycling company will collect them for processing at a recycling centre

3.6.2 Benefits of Solar Electrification

The project has provided an **uninterrupted power supply (60%)**, enhancing **digital learning tools** like projectors and computers. **Better classroom lighting (58%)** has created a more comfortable environment, while **cost savings** from lower electricity expenses allow schools to fund other needs. The intervention has also **extended student study hours** and supported **environmental sustainability**, reinforcing its long-term impact.

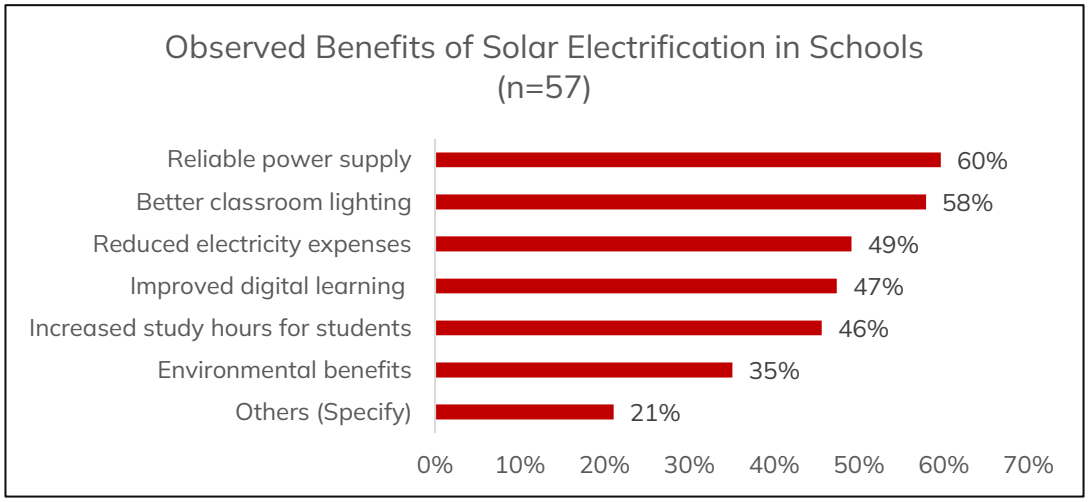


Figure 23 Overall impact of the programme

3.6.3 Panel Maintenance Cleaning

The **maintenance of solar panels** has been smooth, with no **major issues** reported since installation. Schools regularly **clean the panels two to three times a week**, ensuring **optimal performance**. Overload warnings are **monitored and managed by reducing the load**, and security measures are in place, with **restricted access to the control room and rooftop** where the panels are installed. However, **formal training on solar panel maintenance has not been provided**, and staff rely on **self-learning through observation and online resources**. Additionally, while the panels are cleaned frequently, **water is not being used for cleaning**, which may impact their efficiency over time.

3.6.4 Brand Perception of ICICI Lombard

- **Awareness and Recognition**

  A **majority (91%)** of respondents are aware of **ICICI Lombard**, and **88% acknowledge its role in funding and initiating the solar electrification project.**

- **Improved Brand Perception**

  Following the intervention, **68% of respondents hold a very positive view** of ICICI Lombard, with an additional **14% viewing it somewhat positively**, highlighting the project's **strong social impact**.

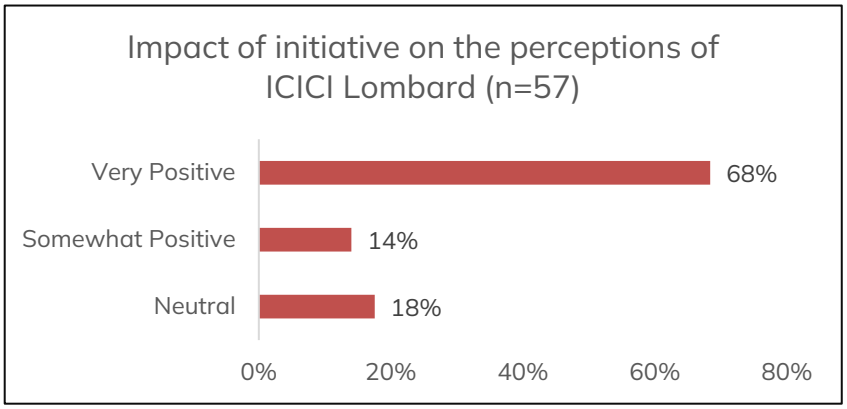


Figure 24 Impact of initiative on the perceptions of ICICI

- **Strong Advocacy and Trust** – The initiative has built **trust and credibility**, with **98% of respondents willing to recommend ICICI Lombard** to others, reinforcing its **positive reputation** in the community.

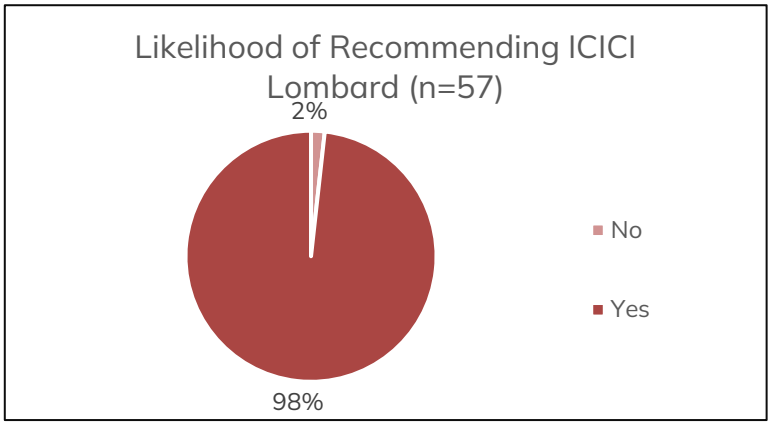


Figure 25 Recommendation probability of ICICI Lombard

The solar electrification project has provided a sustainable energy solution, ensuring uninterrupted power for schools. While maintenance is well-managed, challenges like high energy demand, lack of formal training, and cleaning practices need attention. Expanding solar capacity and training staff will further enhance efficiency and long-term sustainability.

Chapter 4

Social Return on Investments

Social Return on Investment (SROI) is both a process and a method used to quantify the social impact of projects, programmes, and policies. It provides funders with insight into the monetary value of the social and environmental benefits generated by the initiative. Going beyond standard financial measures of economic return, SROI captures both social and financial value. Here, the value has been computed based on the actual outcomes of the Solar Panel project. The data has been obtained from primary surveys and secondary sources

Social value generated on investment of INR 1

The SROI value has been computed for 20 years as the solar panels have a lifespan of 20 years post which their efficiency decreases. Given that Social Return on Investment (SROI) accounts for the longevity and duration of benefits resulting from an intervention, the SROI is forward-looking and the current valuation is diminished as it only incorporates the effects of two years.

Indicator	Rationale	Proxy Estimation	Source
Savings on school electricity bills	**The installation of Solar Panels in schools has reduced the electricity expenses of schools by about 85 %**	**Comparing the average pre- and post-monthly electricity expenses of schools (Primary Research Data)**	Primary Research
Channelisation of savings from electricity bills into school welfare	The savings generated on electricity bills are being used in school welfare initiatives such as Maintenance and repair, student exam fees, and uniforms.		
Increase in usage of digital tools and equipment for education	The savings on electricity bills are providing confidence to schools to increase or start the digital learning model.		
Uninterrupted and smooth learning experience	The backup provided through solar electrification is providing uninterrupted power supply to schools and learning experience. This prevents the interruptions caused in learning before the intervention through power cuts.		
Decrease in carbon emissions due to Solar panel installations	The installation of Solar Panels in schools has resulted in a reduction in Carbon Emissions generated from schools' atmosphere per month.	Social Cost associated with per ton of Carbon Emission Reduction	

SROI Calculation

Social Return on Investment	
Average Inflation Rate in India (IMF, 2023)	5.50%
Total Input Cost	INR 55,103,778.00
Total Net Impact	INR 100082881.4
Net Present Value (NPV)	INR 94,865,290.42
SROI	1.72

Chapter 5

Recommendations and Way Forward

The **solar electrification programme** has successfully improved **energy access and learning conditions** in schools. However, challenges such as **limited power backup, delays in approvals, panel maintenance issues, and a lack of regular monitoring** persist. Addressing these concerns will **enhance system efficiency and long-term sustainability**.

1. Regular Cleaning & Maintenance

Current Scenario: Many **solar panels are dirty**, reducing energy absorption and efficiency. Additionally, **most of the schools in Maharashtra lack direct water access on rooftops**, making cleaning difficult. Some school personnel **hesitate to access the panels due to safety concerns**, leading to **inconsistent cleaning schedules**.

Recommendation:

- Install **direct water supply** on rooftops for easier cleaning.
- Ensure **safe and accessible panel installation** to reduce risks.
- **Standardise cleaning frequency**, ideally before sunrise.

2. Capacity Expansion for Power Backup

Current Scenario: The **existing power backup is limited**, primarily supporting **administrative offices and select rooms**. As a result, **classrooms and digital labs often face disruptions**, affecting the **learning experience**.

Recommendation:

- Prioritise **main educational spaces** for uninterrupted learning.

3. Increased Monitoring and Technical Support

Current Scenario: Schools currently **lack monitoring visits**.

Recommendation:

- **Increased monitoring visits can be undertaken**, ensuring enhanced supervision where potential issues are identified and addressed, leading to long-term system efficiency and performance.

4. Formal Training for Staff

Current Scenario: While **some school staff have received training** in solar panel maintenance, others continue to rely on self-learning through observation and online resources.

Recommendation:

- **Conduct targeted training programmes** on maintenance, load management, and troubleshooting for staff who require additional support.

Chapter 6

Impact Stories

Case Study 1: Student's Experience with Improved Study Conditions

(Anjali Kumari, Class 7, Middle School Pachhyadih, Nawada, Bihar)

Anjali Kumari, a seventh-grade student at Middle School Pachhyadih, recalls how classroom conditions were challenging before the installation of solar panels. Frequent power outages left classrooms dark and uncomfortable, especially on hot summer days. Many students would step out of the classroom during lessons, unable to sit through the heat and humidity. Now, with working fans and bright lighting, students remain in class throughout the day, paying more attention to their studies. On cloudy or rainy days, when classrooms used to become too dark to read and write, ***solar-powered lights now ensure uninterrupted learning****. Anjali also* ***enjoys learning about solar energy*** *and how it helps her school function without relying entirely on grid electricity. She feels more motivated to attend school every day, as the comfortable learning environment allows her to concentrate better and perform well in her studies.*

Figure 26 Interaction of the CSRBOX team member with the students

Case Study 2: A Headmaster's View on Cultural Activities and Student Engagement

(Mr. Sanjay Patil, Headmaster, Z.P. School Kanhe, Pune, Maharashtra)

At Z.P. School Kanhe in Maharashtra, ***solar-powered electricity has brought a significant shift in school activities and student participation.*** *Headmaster Sanjay Patil shared that before the installation of solar panels, power disruptions frequently affected school events, making it difficult to conduct cultural programmes and assemblies. With an unreliable power supply, students often miss out on key extracurricular activities that contribute to their holistic development. However, with* ***solar panels ensuring uninterrupted electricity, the school has been able to increase the number of cultural programmes from five to seven per year.*** *The availability of consistent power has also improved the use of sound systems and microphones, making events more engaging and enjoyable. Additionally, students have started staying back after school for extended study hours, further enhancing their learning experience.*

Case Study 3: A Teacher's Observation on Student Attendance

(Mr. Pradyut Kalai, Teacher, Tingharia High School, Gomati, Tripura)

At Tingharia High School in Tripura, Mr. Pradyut Kalai observed a dramatic improvement in student attendance and engagement. Before the solar panel installation, students often skipped school during the summer months, as classrooms were too hot and uncomfortable without proper ventilation. However, after the installation of solar-powered fans and lights, students now willingly come to school, knowing they can sit in a comfortable classroom throughout the day. This has not only increased student retention but has also allowed teachers to conduct lessons more effectively without distractions. Mr. Kalai also noted that students show interest in learning about solar energy and understanding its role in providing a sustainable power source. He believes that the initiative has significantly improved classroom learning, making education more accessible and engaging for students.

Figure 27 Interaction of the CSRBOX team member with a teacher in the school

Case Study 4: A Non-Teaching Staff's Experience with Technology Access

(Ms. Rina Debnath, Non-Teaching Staff, Debendra R/P Eng Jr. B School, Gomati, Tripura)

For Ms. Rina Debnath, an administrative staff member at Debendra R/P Eng Jr. B School in Tripura, the solar panel installation has made a significant impact on school operations. Earlier, frequent power cuts affected administrative work, often delaying important computer-based tasks. During the rainy season, load shedding made it impossible to maintain school records efficiently. Now, with solar-powered electricity, she can complete documentation, record-keeping, and communication tasks without disruptions. She noted that ***even during long weeks of rain when power outages were common, the school no longer faced any interruptions in electricity supply.*** *This has improved overall efficiency, making day-to-day operations smoother and more productive.*

Case Study 5: A Student's Perspective on Board Examinations

(Monu Kumar, Class 8, U.M.S. Baniya Bigha, Nawada, Bihar)

For Monu Kumar, a Class 8 student at U.M.S. Baniya Bigha, the installation of solar panels has given his school new recognition and importance. His school ***has recently been selected as a board examination centre, something that was not possible before due to poor electricity supply.*** *In the past, unreliable power made it difficult to conduct exams, as proper lighting and ventilation were not guaranteed. With the solar panel system ensuring continuous electricity, students now have a stable environment to take their exams. Monu feels proud that his school is now considered a reliable examination centre, giving him and his peers a greater sense of responsibility and motivation to perform well academically.*

Case Study 6: Teacher's Perspective on Maintenance and Learning Continuity

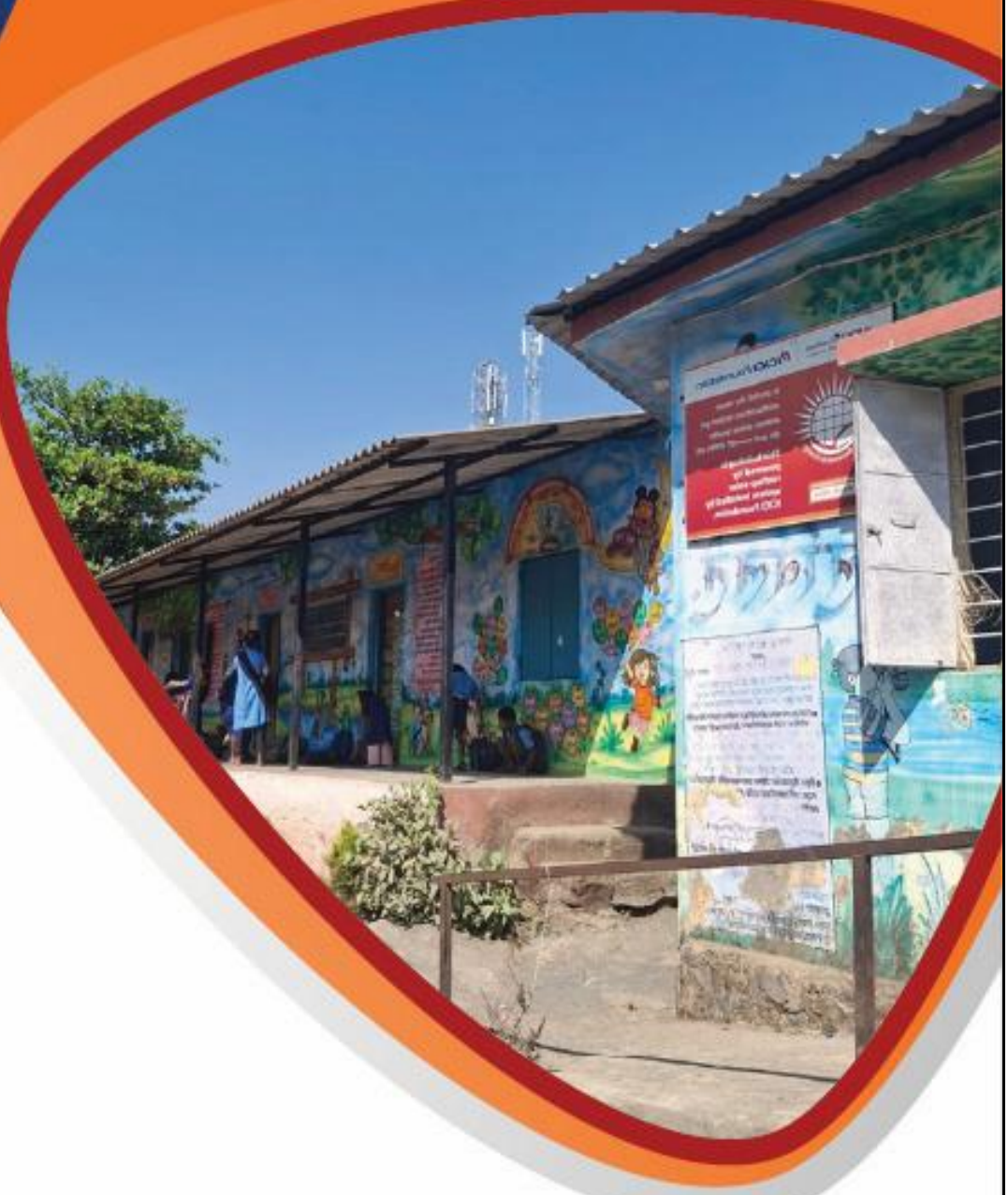
(Mr. Ramesh Kumar, Teacher, Middle School Rampur, Nawada, Bihar)

Mr. Ramesh Kumar, a teacher at ***Middle School Rampur, Bihar****, has taken on additional responsibilities following the installation of* ***solar panels in 2024****. Along with his teaching duties, he now* ***monitors and maintains*** *the system, ensuring that the* ***solar panels remain functional****. He checks for* ***overload warnings****, reduces the load when necessary, and ensures that the* ***fans and lights operate efficiently****. Before the solar panels were installed****,*** *frequent power cuts disrupted lessons****,*** *making it difficult for students to concentrate. Now, the availability of* ***continuous power has created a stable learning environment****, allowed* ***uninterrupted teaching*** *and extended* ***study hours for students****. While he has not received* ***formal training in solar panel maintenance****, his* ***prior knowledge and hands-on experience*** *have helped him manage the system effectively. He believes that* ***solar power has significantly transformed the school****, making education* ***more structured and reliable*** *for both students and teachers.*

Case Study 7: A CSR Leader's Perspective on the Programme's Success: ***(CSR Head, ICICI Foundation)***

The CSR Head at ICICI Foundation emphasised that the solar electrification initiative has had a far-reaching impact on schools in rural areas. One of the most significant achievements has been the recognition of these schools as board examination centres, proving their improved infrastructure and reliability. This milestone highlights the wider benefits of sustainable energy adoption, ensuring that students and ***teachers receive uninterrupted electricity for both academics and extracurricular activities****. The project has also raised awareness about solar energy among students and teachers, helping them understand its role in reducing dependence on conventional electricity. Seeing these schools thrive with better learning conditions reflects the long-term success of the initiative, reaffirming the foundation's commitment to enhancing education through sustainable solutions.*

*Note: For the sake of confidentiality, the identities and the name of the village of the students have been changed.



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CSRBOX & NGOBOX
Swati Trinity, Applewood Township,
A-404, Shela, Sarkhej-Okaf,
Gujarat 380058