



IMPACT ASSESSMENT

CSR PROJECT- IMPLEMENTATION OF LED BASED (HIGH MAST) SOLAR PUBLIC LIGHTING & SOLAR STREET LIGHTS IN NEARBY AREAS OF KANPUR DISTRICT, OF UTTAR PRADESH.



CSR Impact Assessment Report

Submitted to:

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Acknowledgment

This Impact Assessment Report is prepared with considerable consultation and engagement with Mr. U S Sahi (Executive Director), Mr. R. K Agrawal (Group GM, Civil, CSR and SD) and other officials of the CSR & SD division, NHPC. The impact assessment team had also interacted with implementing agencies and met beneficiaries in all the project sites in the state of Uttar Pradesh.

This impact assessment exercise would not be possible without the help of good souls who have readily offered their support for the successful completion of this project. We are very grateful to the entire team of NHPC Limited at various project sites for providing valuable insights and support throughout the evaluation and impact assessment process. We are also very much thankful to all the stakeholders for parting their valuable time, and sharing inputs and information for making this assessment very insightful.

Birendra Raturi
International Director, SR Asia.
June 2022

CSR Project:

Implementation of LED based (High Mast) Solar Public Lighting & Solar Street Lights in nearby areas of Kanpur District, of Uttar Pradesh.

Project Proponent

M/s Energy Efficiency Services Limited.

Project Executioner

M/s Gautam Solar Pvt. Ltd. New Delhi
M/s Eon Electric Limited, Noida

Start Date

24 March 2017

Completion Date

15th January 2019

State / UT

Uttar Pradesh

Activities

Installation of 188 nos. of LED based High Mast Solar Lights & 420 nos. of Solar Street Lights

Total Expenditure

Rs. 2,75,16,950/-



Preface

This is an Impact assessment report of a CSR project on 'Implementation of LED-based (High Mast) Solar Public Lighting & Solar Street Lights in nearby areas of Kanpur district, of Uttar Pradesh' funded by NHPC Ltd. This project was developed to meet the basic need for street lights and high mast lights in the area. This improved the ease of living in the area. It improved the safety and security of the area and helped in reducing the crime level.

This report briefly introduces NHPC Ltd., its CSR policy, and its objectives. Further, the aims and objectives of this CSR project are detailed by giving information about the key findings of the study and project impact.

The impact assessment results are derived from quantitative and qualitative data collected and analyzed using ZOHO analytics along with success case studies and stories.

The conclusions and way forward are specific to the intervention and learning which may be used in the future endeavor.



Impact Assessment Team

The assessment team comprised of subject experts, experienced CSR professionals from public sector enterprises, social scientists, environmentalists, health professionals, energy experts in renewal energy domain etc.

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List of Abbreviation

CSR	:	Corporate Social Responsibility
SDG	:	Sustainable Development Goals
IA	:	Impact Assessment
CD	:	Community Development
CSR & SD	:	Corporate Social Responsibility and Sustainable Development Division
EESL	:	Energy Efficiency Services Limited
OECD	:	Organization for Economic Cooperation and Development
ToR	:	Terms of Reference
MLA	:	Member of Legislative Assembly
RLG	:	Rural Local Governance
ULG	:	Urban Local Governance
PHC	:	Primary Healthcare Centre
NGO	:	Non Governmental Organization

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Executive Summary

The CSR project 'Implementation of LED based (High Mast) Solar Public Lighting and Solar Street Lights in nearby areas of Kanpur District, Uttar Pradesh' is framed and implemented under rural development initiative. About 420 Solar Street Lights and 188 High Mast Lights were installed and commissioned in Arya Nagar, Govind Nagar, Kanpur Cantt. and Maharajpur.

This project impacted positively in the overall well being of the people living in the identified areas. This project found in aligned with NHPC's corporate social vision, and will also promote green and energy efficient technologies thus modernizing societies in accordance with the DPE guidelines on CSR and sustainability. Local people have access to high quality, sustainable lighting solutions of renewable energy due this project.

NHPC awarded the work of Impact Assessment to SR Asia. The study was initiated with the formation of Impact Assessment team, preparation of research tools and methodology based on the guidelines given by the CSR & SD division of NHPC Limited.

Planning and training of Investigators were done by Impact Assessment experts of SR Asia. SR Asia has deployed teams in selected constituencies where the project was implemented. During the fieldwork, the team covered all project sites in the Kanpur district and performed surveys as per the random sampling method.

The study concluded that the implementation of the project was satisfactory but its maintenance and sustainability is an issue. It was observed that at few places solar street light an high mast light is not in operation because of poor maintenance. Project beneficiaries and local stakeholders are happy with the initiative of providing these infrastructure. But people are not satisfied with its maintenance. As per local community it has improved safety and security at night time. There has been increase in economic and other activities in night time. This initiative also enhanced beautification of roads in the project area. NHPC may take steps towards maintenance and management of solar infrastructure created in Kanpur district of UP, to make this project a resounding success.

CHAPTER I

Impact Assessment

1.1 Introduction

Impact assessment (IA) is a structured process for considering the implications for people and their environment, of proposed actions while there is still an opportunity to modify (or even, if appropriate, abandon) the proposals. It is applied at all levels of decision-making, from policies to specific projects. The process involves the identification and characterization of the most likely impacts of proposed actions (impact prediction/forecasting), and an assessment of the social significance of those impacts (impact evaluation).

Overall, the CSR project implemented by NHPC is in line with Schedule VII of Companies Act 2013. The CSR policy of NHPC is also in line with the Companies Act 2013. This is well identified in view of the national policy, CSR policy and needs and aspirations of the people and project areas they operate. This project had positive impact in the respective areas implemented and may need some attention to plan some work towards sustainability aspects.

The impact is assessed and compared against the planned benchmarks fixed at the time of planning to gauge the degree of success or failure of the CSR initiatives. Team used ZOHO survey tool for conducting the survey and its real-time monitoring. Video-graphic and Photographic records of the progress, achievements and impacts are systematically documented. The research team also noted the fieldwork observations and prepared case studies as per given instructions. The team conducted stakeholder consultation with implementing partners, local representatives and other line departments to understand more about the projects, its impact and sustainability strategy to ensure long term goals. SR Asia has used the OECD DAC framework for evaluating the impact created by the CSR projects of NHPC. It scores all the projects under study based on its relevance, effectiveness, efficiency, impact and sustainability parameters. The project efficiently utilized the inputs (funds, expertise etc.) to achieve the intervention outcomes and had a target achievement rate between 90-100%.

1.2 About Impact Assessment Agency

Social Responsibility Asia (SR Asia) is an ISO 9001: 2015 Certified international Non-Profit organization registered with Ministry of Corporate Affairs (MCA) New Delhi, India in the year 2012, and has legal entities in Bangladesh and Indonesia. SR Asia has country representative offices in Mongolia, Malaysia, Philippines and Vietnam. SR Asia is an affiliate to Asian Productivity Organization (APO) Japan and also works closely with APO member National Productivity Organization in complementing and promoting CSR, Sustainability and Sustainable Development.

SR Asia's mission is to conserve natural resources for the welfare of current and future generations by promoting change. SR Asia wants to work with all stakeholders to create awareness among consumers and manufacturers. We want to reach out to consumers through campaigns and work with companies in the design, development, and production of sustainable goods and services.

1.3 Scope of work as per ToR

As per the guidelines of NHPC and scope of the work, the Impact Assessment team framed impact assessment tools and carried out extensive fieldwork. The Scope of the Impact Assessment study is given below:

- To carry out Impact Assessment Study of CSR Programs/Projects/Activities as per given list.
- To determine the impact of CSR activity/ Projects in the applicable dimensions of social/cultural/economic/environmental/education/health conditions, etc. on the people in communities or on the environment and suggest steps for better implementation in future.
- To assess the changes in the quality of life and environment in the geography.
- To undertake an assessment of the project design in terms of its relevance and contribution to the development of the community.
- To assess the performance of the project in terms of effectiveness and efficiency and bottlenecks.
- To analyze and underlying factors beyond NHPC's control that affect the project achievement result.

- To ascertain the sustainability of the project after its completion.
- To evaluate the level of awareness of CSR projects/initiatives amongst the target beneficiaries/concerned stakeholders.
- To identify the consistency in the process of project implementation together with fulfilment of stated objectives.
- To identify the gaps in the project identification, beneficiary's involvement, implementation of projects and recommendations for improvements.
- To provide separate reports of each of the CSR activities/projects as per CSR activities listed at Annexure-1 in stipulated timelines.

1.4 Methodology Guidance for conducting Impact Assessment

- To produce a high-quality impact assessment report for wider dissemination and future reference, the research methodology should involve both qualitative and quantitative techniques.
- Qualitative methods should include techniques like questionnaire survey, focused group discussion, in-depth interview with targeted beneficiaries/end user community representatives/ Panchayati Raj Institutions (PRIS) and govt. officials etc.
- Quantitative method will include collection of secondary data available with project implementing agencies, district administration, and NHPC.
- Other stakeholders may be involved for tertiary inputs.
- Survey/data findings should be interpreted and analyzed using statistical software such as SPSS (Statistical Package for the Social Sciences).
- The impact assessment study should be well supported with the relevant geo-tagged photographs.
- The NHPC location concerned will provide the details/documents of CSR Programs/Activities undertaken and completed for carrying out Impact Assessment studies.

1.5 *Assumptions and Limitations*

- It was expected that the NHPC, implementing agencies would facilitate the field work.
- The facility/infrastructure created will have proper addresses/geo-tagged to locate and carry out assessments.
- The data regarding CSR projects will be made readily available by the NHPC Limited and implementing agencies.

CHAPTER II

About NHPC Limited

2.1 Introduction

NHPC Limited is a Mini-Ratna Schedule-A Enterprise committed to plan, promote and organize an integrated and efficient development of power through conventional and non-conventional sources in India and abroad. As on date, NHPC Limited has become the largest organization for hydropower development in India, with capabilities to undertake all the activities from conceptualization to commissioning in relation to setting up of hydro projects. NHPC Limited has also diversified in the field of solar & wind power.

NHPC's commitment towards environment and people is affirmed through its Corporate Vision and Mission, policies and practices adopted by the organization. NHPC is also a member of the United Nations Global Compact (UNGC) and subscribes to the principles of human rights, labour standards, environmental consciousness and anti-corruption.

Vision

To be a global leading organization for sustainable development of clean power through competent, responsible and innovative values.

Mission

- To achieve excellence in development of clean power at international standards .
- To execute & operate projects through efficient and competent contract management and innovative R&D in an environment friendly and socio-economically responsive manner.
- To develop, nurture and empower the human capital to leverage its full potential.
- To practice the best corporate governance and competent value based management for a strong corporate identity and showing concern for employees, customer, environment and society.
- To adopt & innovate state-of-the-art technologies and optimize use of natural resources through effective management.

Scope

- Schemes/activity chosen under CSR/Sustainability should primarily benefit stakeholders other than the staff of NHPC Limited.
- In case the benefits of the initiative are extended to NHPC employees and their families also, the proportionate expenditure incurred on other than NHPC employees and their families shall be considered under CSR.
- NHPC will have an appropriate organization structure both at corporate level and NHPC's projects/field units for identification & selection of CSR & Sustainability schemes, guidance in implementation, monitoring and review of the schemes/activities.
- NHPC will take steps to sensitize and impart training to its employees regarding CSR & Sustainability policies of the Corporation and to bring about the desired attitudinal change towards environmental protection, social development & the need to adopt ethical business practices.
- NHPC will take up schemes/activities which would give visible social, economic or environmental benefits to the society.
- NHPC will also make efforts, to the extent possible, to involve the Suppliers and Contractors associated in the adoption of sustainable technologies as a part of its CSR/Sustainability endeavours.

2.2 CSR & Sustainability Policy

CSR has been an integral part of NHPC's business philosophy. NHPC is conducting the business in a socially responsible way by maintaining high level of organizational integrity and ethical behaviour, in conformity with expected standards of transparency in reporting and disclosing the performance in all spheres of its activities, demonstration of concern for social welfare, adoption of best management practices and effective operational methods to win the trust and confidence of all stakeholders.

2.3 CSR Vision and Mission

CSR Vision

- To contribute to sustainable development and inclusive growth while taking care of people , planet and organizational goals/ growth.

CSR Mission

- To become socially responsible corporate entity committed to improving the quality of life of the society at large.
- To create and develop facilities for the communities where NHPC has presence.
- To balance social, economic and environmental development objectives through collective and unified efforts of all stakeholders.

2.4 Objectives of NHPC's CSR Policy

Objectives

- To address the social, economic, environmental and welfare concerns of key stakeholders including those directly impacted by NHPC's operations & activities.
- Adopt green technologies, processes and standards that contribute to social and environmental sustainability.
- Contribute to inclusive growth and equitable development through capacity building measures, empowerment of marginalized and underprivileged sections/communities.

CHAPTER III

Research Methodology

3.1 Introduction

This chapter gives a brief introduction to the study, its rationale, its objective, survey questions, sampling, data collection and limitations. This becomes pertinent to have thorough understanding about the research process followed so as to give a rationale and background to the findings of the study.

3.2 Objectives of Impact Assessment

The objective of this study is to assess the impact and sustainability of the projects being implemented, find the strength, weakness and deficiencies in the project implementation, benefits received by the targeted groups so that its impact can be measured and learning can be used in further CSR project designs and implementation. Some of the key areas are

1. Assessment of NHPC CSR Policy, its alignment with outcomes at different project locations.
2. Process and approach followed by NHPC in CSR project identification, implementation, monitoring and impact assessment.
3. Stakeholder engagement, site visit and meeting direct and indirect beneficiaries.
4. Analyzing the successful implementation and degree of benefits received.

3.3 Methodology

An explorative research was conducted to understand the nature, design, and aspects of implemented projects for which impact assessment has to be done. This was completed primarily through desk study. Various literatures are referred to get a comprehensive knowledge about CSR project implemented areas and objectives, parameters, goals, structure, and sustainability criteria of the implemented project.

- The literature review of secondary data and literature available such as NHPC website, baseline reports, sample monitoring and evaluation report, implementation agencies, beneficiary data and CSR Annual Reports of NHPC, media reports etc.
- Preparation of data collection tools, preparation of survey questionnaires (computer and internet enabled), training of field investigators, pilot testing of tools, and data collection on site etc.
- The assessment process which involves segregation of data and data analysis, evaluation, or comparison with the planned guidelines and the standards available.

Fig 3.1 Methodology



3.3.1 OECD DAC Framework for measuring sustainability

The Organization for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) first laid out the evaluation criteria (relevance, coherence effectiveness, efficiency, impact, and sustainability) in 1991. These six criteria serve as the core reference for evaluating international development and humanitarian projects, programs, and policies. These evaluation criteria have been defined below:

Fig 3.2: Six criteria of OECD DAC Framework



Source: oecd.org

- **Relevance:** The extent to which the intervention objectives and design respond to beneficiaries' needs, policies, and priorities, and continue to do so if circumstances change.
- **Coherence:** the extent to which other interventions (particularly policies) support or undermine the intervention, and vice versa. Includes internal coherence and external coherence.
- **Effectiveness:** The extent to which the intervention achieved, or is expected to achieve, its objectives, and its results, including any differential results across groups.
- **Efficiency:** The extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way.
- **Impact:** The extent to which the intervention has generated or is expected to generate significant positive or negative, intended, or unintended, higher-level effects.
- **Sustainability:** The extent to which the net benefits of the intervention continue or are likely to continue.

The IA team has identified some key parameters and components as necessary to apply this framework to this study, and they are indicated in table.

Table 3.1: Six criteria of OECD DAC Framework and its components

Parameters	Components
Relevance	<ul style="list-style-type: none"> • Need Assessment Report • Availability of Information on need assessment • Alignment to CSR Policy of NHPC Limited • Alignment to SDGs
Coherence	<ul style="list-style-type: none"> • Internal and External Coherence (CSR Policies and policies of Government of India)
Effectiveness	<ul style="list-style-type: none"> • Adherence to timeline • Adherence to Budget
Efficiency	<ul style="list-style-type: none"> • Target achievement (Planned vs. Actual)
Impact	<ul style="list-style-type: none"> • Baseline Assessment Report • Impact and Availability of impact indicators
Sustainability	<ul style="list-style-type: none"> • Sustainability mechanism, convergence

Weighted scores were used to develop a 6-point scale. The following criteria are applied while rating the sustainability score of the CSR project impact assessment.

85-100 % -> Extremely satisfactory

70-84% -> Satisfactory

55-69 %-> Moderately satisfactory

40-54 %-> Marginally satisfactory

20-39 %-> Dissatisfactory

< 20 % -> Extremely dissatisfactory

3.4 Research Instruments

Mixed method research design was used in order to have a comprehensive approach in data collection and stakeholder consultation. Both the qualitative and quantitative research techniques were used. Quantitative techniques like survey questionnaire were extensive in nature and covered minimum no. of sample size as per the research standards. Qualitative research tools were used focusing on the public consultation and in-depth engagement with project beneficiaries. After data collection, it was processed for analysis using ZOHO survey analysis tool, MS Excel and SPSS.

3.5 Data Collection

The following approach was adopted for the collection of primary and secondary data.

Primary Data:

- Collection of primary data was done in the field and data collection was done in both offline and online mode (ZOHO questionnaire), feedback and consultation, interviews of beneficiaries, focused group discussion and in-depth interviews. The geo-tagged photographs and short videos were also made.

Secondary Data:

- This involves literature review of NHPC website, baseline reports, sample monitoring and evaluation report, implementation agencies, beneficiary data and CSR Annual Reports of NHPC, media reports etc.

3.5.1 Sampling and sample size

The impact assessment team used mixed sampling method to conduct survey and interviews of people living in project affected area. Both direct and indirect beneficiaries of the project were covered under the covered sample size. A comprehensive approach was adopted for identifying stakeholders and project beneficiaries. Wherever Street lights and High Mast lights were installed investigators identified beneficiaries in the nearby areas and conducted research activities. Respondent sample include men, women, children, old age people, Shopkeepers, Street vendors, auto and taxi drivers, etc.

Table 3.2: Sampling plan

District	Name of Constituency	Sample size (%)	Solar based street light		Solar based High Mast Light	
			Total no of streetlight	Total No of Survey	Total No of High Mast Light	Total No of Survey
Kanpur	Govind Nagar	30	100	30	24	10
	Arya Nagar	30	100	30	40	12
	Kanpur cantt	30	100	30	88	26
	Maharajpur	30	120	36	36	10
Total			420	126	188	58

3.5.2 Data Collection Tools

- Survey Questionnaire :

An intensive questionnaire (as per the requirement of project) to assess the impact of projects upon villagers lives was developed. A significant number of responses were recorded to collect quality data for each project. ZOHO survey tool was used to facilitate online and offline data collection depending on internet connectivity in the areas. Procedure for conducting survey is as follows:

- 1.Participants were identified by the method of random sampling as per the inclusion criteria.
- 2.The participants were made comfortable and briefed about the purpose of the survey and in the process their consent was obtained.
- 3.The responses were recorded by the investigator manually.
- 4.Debriefing was done after the completion of the questionnaire.

- Stakeholder's consultation:

Stakeholder consultations were also conducted for assessment of all the projects. Participants in this activity were very specific and included local people, public representatives, implementing agency representatives and local administration. During stakeholder consultation, the impact assessment team has also ensured equal proportion of engagement of women and men.

- Semi structured Interviews:

Semi structured interviews were conducted to gain information about benefits of the implemented projects.

- Observations during fieldwork:

A walk through to the project areas/village/ streets were made by the surveyors for the physical verification, functionality of the project.

3.5.3 Data analysis tool

Automated ZOHO analytics and MS- Excel were used as a data analysis tool to analyze the primary data collected during the survey. All the objective inputs are analyzed using this tool while subjective responses are analyzed using semantic analysis methods.

3.6 Project Management - Planning and Execution of Impact Assessment (PEIA)

This involves consultation with NHPC project site officials, implementing agencies and impact assessment team to plan the field work within stipulated time. The Impact Assessment team has developed a standard operating procedure along with checklists and forms & formats. The brief details of the PEIA SoP's is as follows:

3.6.1 Checklist for Impact Assessment study

Stage 1: Schedule, Survey preparation, and training

1. Field visit schedule.
2. Preparation of survey questionnaire and preparation of ZOHO link.
3. Training and briefing of investigators.
4. Defining role and responsibilities.
5. Preparation of format for daily report.

Stage 2: Collection of Documents and Material Needed before going to field

1. Representation letter from SR Asia.
2. ToR for investigators.
3. ID for all investigators.
4. Project details.
5. Survey Questionnaire link.
6. Feedback Form.
7. Other data collection formats.
8. Smartphone.
9. Diary and pen.

Stage 3- During Field visit

1. Meeting with Nodal officer of implementing agencies.
2. Meeting with stakeholders.
3. Verification of activities.
4. Conducting survey of beneficiaries.
5. Case Studies and success stories.
6. Geo-tagged photographs.
7. Short videos of beneficiaries.
8. Photographs and video evidences of field visits (Meetings, Streetlights, Survey participants, interviews)
9. Preparation and submission of daily progress report.

Stage 4: Data Analysis and Report Writing

1. Preparation of graphs and pie charts.
2. Preparation of success stories and case studies.
3. Drafting and proofreading of the report.
4. Review from impact assessment experts.

3.7 Ethical Considerations

Informed consent is an important principle for all research endeavours and the same was maintained during the study. The respondents and key stakeholders of the study were informed about the purpose of the study . Further an assurance about confidentiality of the interview was given to all the respondents. They were free to choose not to answer any question while conducting survey or interview.

3.8 Fieldwork Schedule

Table 3.3: Fieldwork schedule

Project Name	Planned Schedule of fieldwork		Actual Schedule of Fieldwork	
	Start Date	End Date	Start Date	End Date
Implementation of LED based (High Mast) Solar Public Lighting & Solar Street Lights in nearby areas of Kanpur District, of Uttar Pradesh	17th May 2022	25th May 2022	17th May 2022	25th May 2022

CHAPTER IV

Implementation of LED based (High Mast) Solar Public Lighting & Solar Street Lights in nearby areas of Kanpur District of Uttar Pradesh

4.1 *About the Project*

This project was supported by NHPC to provide high quality and sustainable lighting solutions in nearby areas of Kanpur. The project intends to have ground level benefits for the local communities living in the target area.

The Solar Street Lights installed in nearby areas of Kanpur District, of Uttar Pradesh contribute to the overall objective of the Street Lighting National Program (SLNP) by illuminating streets using solar energy and conserving conventional electricity. It was a contribution to the NHPC's corporate social vision, and will also promote green and energy efficient technologies thus modernizing societies in accordance with the DPE guidelines on CSR and sustainability.

There are advantages of using Solar Street Lights over the conventional street lights like wireless installation, beautification of the area, continuous supply of energy, promotion of clean and green energy sources. The wireless installation is able to provide much more aesthetics to the street lights. The day to day operations of Solar Street Lights are easy as they come with an automatic ON/OFF mechanism. In addition, as they operate with solar energy, no regular operation cost is associated with solar street lights.

The Solar Street Lights are provided with an automatic switch ON/OFF facility. The Solar Street Lights switch on automatically at dusk, with the diminishing rays of sun. These Solar Street Lights remain functional till dawn, and turn off at the first sun ray. The Solar Street Lights were functional throughout the night in the study villages. The best part with the automatic ON/OFF system is that no human resource/intervention is required to take care of the daily operation of switch them on and off. Again, the Solar Street Lights are able to adjust with the changing day and night duration due to change in season. Local community and representatives were actively supporting the CSR initiative of NHPC. The issues of reduced functioning hours of solar street lights were due to irregular maintenance of the street light.

This project provided high quality, sustainable lighting solutions for the people of Arya Nagar, Govind Nagar. It increased the beautification and aesthetics of the Kanpur Cantt. area and the Maharajpur. It provided an opportunity for the local community to continue economic activity after dusk and engage more in outdoor activities. People are of the view that this initiative successfully reduced street accidents and crime rate in the area

LED (High Mast) Solar based Light

A Solar High Mast Light with dusk to dawn operation is built with a raised source of lights, which gets lit automatically in the absence of light. High mast lighting is preferred over conventional lighting, because it can achieve very large space to height ratios. It can illuminate large areas without the need for numerous lighting columns. The luminaire is 18W with GI pole of height of 7 meters.

Solar Mast light is an ideal application for campus and street lighting. The system is provided with battery storage backups sufficient to operate the light for 10-11 hours daily. Automatic ON/OFF time switch for dusk to dawn operation and overcharge/deep discharge prevention cut-offs are provided with LED indicators. It requires low maintenance, have longer life and provides better performance.

Solar based LED Street Light

A standalone solar photovoltaic street lighting system is an outdoor lighting unit used for illuminating a street or an open space. The solar street lighting system consists of a solar voltaic module, a luminaire, storage battery and battery charge controller, control electronics, interconnecting wires/cables, module mounting pole including fixture along with the mounting arrangement and solar panel and integrated solar street light installed. The luminaire is 7W with mounting height of 4 meters with 160 Wh lithium battery.

Table 4.1 Area wise allocation of Solar Street Lights and High Mast Lights

Name of the parliamentary Constituency	Legislative Assembly Constituency	Quantity of 18W LED based Solar High Mast Lights	Quantity of 07W LED based Solar Street Lights
Kanpur	Govind Nagar	24	100
	Arya Nagar	40	100
	Kanpur Cantt	88	100
	Maharajpur	36	120

4.2 Objectives of the Project

Solar lights were installed in eminent public venues with the objective to support outdoor community activities, increase commerce, improve safety conditions especially for women and increase regional aesthetics.

Making places safe and improving the quality of living

In addition to enhancing quality of life for the residents of identified project areas. This project was developed for improving the living environment and making public spaces and roads safe to commute at night.

Promoting renewable energy and sustainability

Each solar based street light is an independent unit. The breakdown of one unit has no bearing on the performance of another unit. It even reduces chances of blackout upto large extent compared with traditional streetlights.

Improvement in Social well being

Easy movement during evening hours and rainy days, reduced elephant attacks and snake bite incidents, improved sense of security among women and children, contribution towards power for all, and savings on conventional electricity were the prominent benefits of the Solar LED Street Lights.

4.3 Project sites

This Solar LED Street Lights are installed in the following areas of Kanpur district

- Govind Nagar
- Arya Nagar
- Kanpur Cantt
- Maharajpur

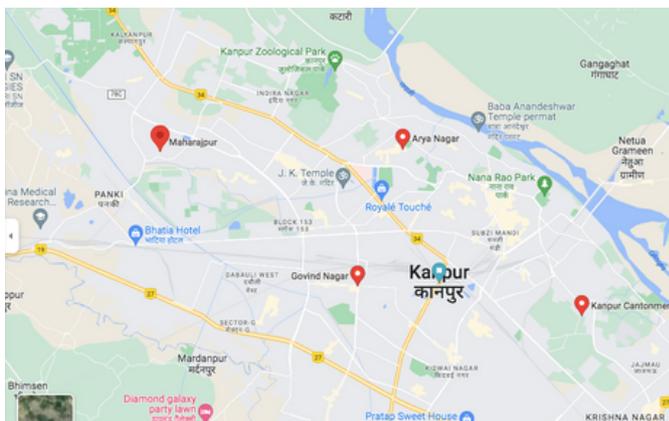


Fig 4.1 Project sites

4.4 Implementing Agency

Energy Efficiency Services Limited (EESL) has developed a CSR project for NHPC Limited for installation of LED based solar public lighting (High Mast) and solar street lights in nearby areas of Kanpur, Uttar Pradesh. Energy Efficiency Services Limited (EESL) under the aegis of Ministry of Power is a joint venture of 04 Central Public sector undertakings.

4.4.1 SOP's followed by Implementing Agency

Scoping study to understand the technology needs, identified appropriate technology; identified technology suppliers based on institute's bidding protocol, and then finally supervised the installation of technology. The technology supplier installed the Solar Street Lights with three years of warranty period. In case of observation of any fault in the systems, the village coordinators call the technology supplier.

It conducted an assessment for technical feasibility for Solar Street Lights. The duration of sunny hours and availability of space were indicative of suitability of the technology in the village locations. Based on the street length, the numbers of solar Street Lights were decided. The spacing was estimated in such a manner that no dark patch remains after the dusk hours

Implementing agency has taken following initiatives for the safety, upkeep and sustainability of street lights during and post installation.

- A unique identification (UID) number has been provided to each system. The UID will help in tracking the exact location of the system and thus the compliance resolution system will be in place.
- Grassroots partnership among NHPC, EESL and local self government institutions. It was supposed to establish a project implementation committee in order to monitor and review the project. But the impact assessment agency could not access the details regarding it.
- Awareness and sensitization campaigns to ensure continuous involvement of local communities for the safety of installed infrastructure.

4.5 Project Beneficiaries

The project beneficiaries are people living in Govind Nagar, Arya Nagar, Kanpur Cantt, Maharajpur. There will be indirect beneficiaries including people who are passing through the areas, visitors, commercial and non-commercial units/vendors. The project implementation has access to electricity for social welfare and security.

4.6 Findings and Analysis

All the observations, feedback received from the individual beneficiaries, information gathering through stakeholders consultation are recorded in true form as follows:

4.5.1 Key Observations made by Field Investigators

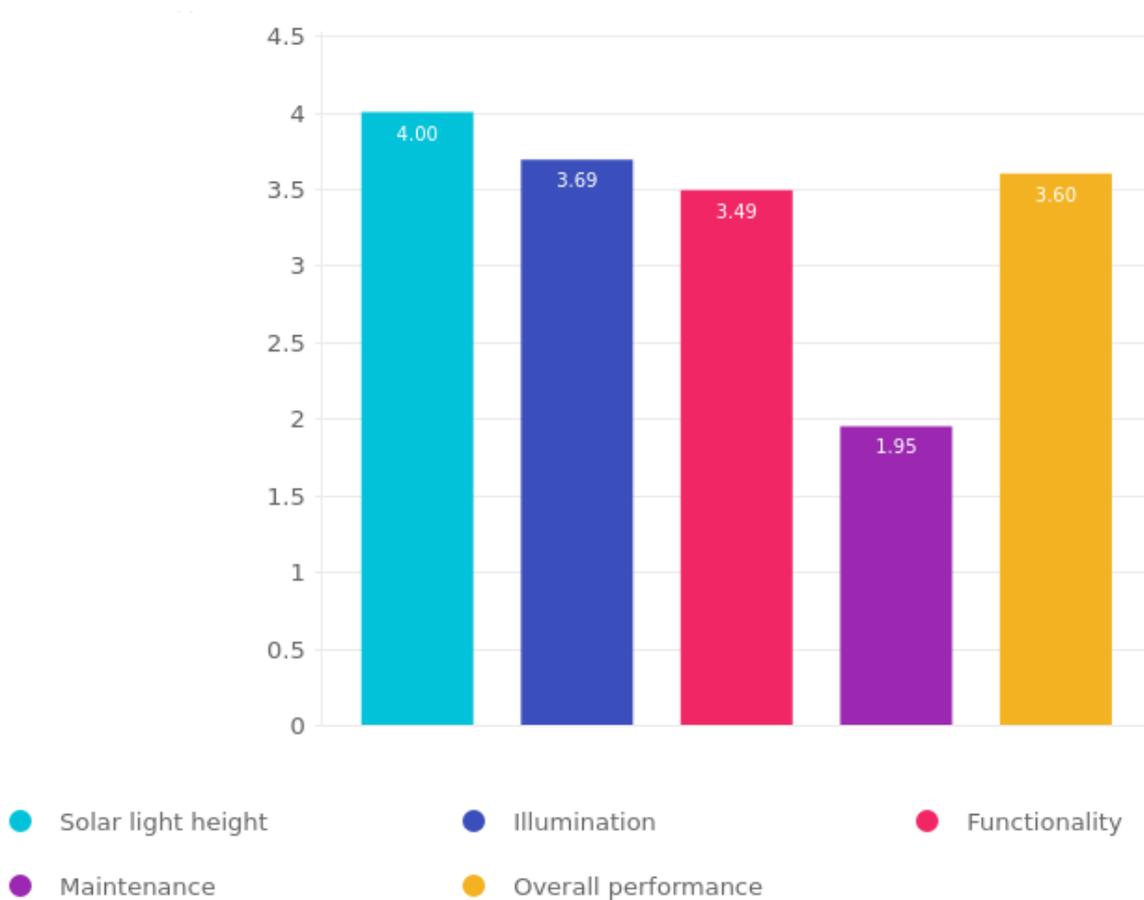
A team of trained and qualified local field investigators has visited to all project sites in Kanpur district to assess the impact created by the installation of Solar high Mast and Solar street lights. The observations by the investigators are noted in detail.

Sr. No	Constituency	Observations
1	Arya Nagar	The lights were installed in the identified and needful places. Some lights do not work for long due to lack of sunlight at that location. After the lights were installed, no maintenance was done, which affected the illumination of the light. 65% of the total solar street lights installed were fully functional. The duration of their working is only 3 to 4 hours and its illumination has also reduced over time.
2	Govind Nagar	100 solar street light have been installed in Govind Nagar assembly constituency, and they work properly. The people there have benefited a lot from the lights installed in the slums areas. Few homes still lack regular power connection, hence they do their work with the illumination of the solar lights.
3	Maharajpur	100 solar street light have been installed in Maharajpur assembly constituency. Lights were missing in some of the locations.. High mast lights need replacement of the battery. Some LED panel are broken by monkeys and some by the local miscreants. When the lights were installed it made the area beautiful and bright. Some local shop owners have tampered with the panels and use that as a power backup for their personal use.
4	Kanpur Cantt.	Some lights are very useful for locals who do their work in illumination of the solar street light. High mast light was very useful for street vendor. But now they can not take advantage of it because of the batteries of many lights were stolen.

4.5.2 Survey results

The survey was conducted using ZOHO survey online and offline survey tools to capture data on real time basis. The technologies used is embedded with AI technologies to carryout analytics and accordingly the studies are represented as follows. All the critical parameters analysed are explained through graphics.

Fig: 4.2 Rating of the overall performance of the Streetlight and High Mast Light



Analysis concludes that average rating of the project is 3.35 rated over the scale of the 5.

Fig: 4.3 Public opinion about the biggest impact of the project

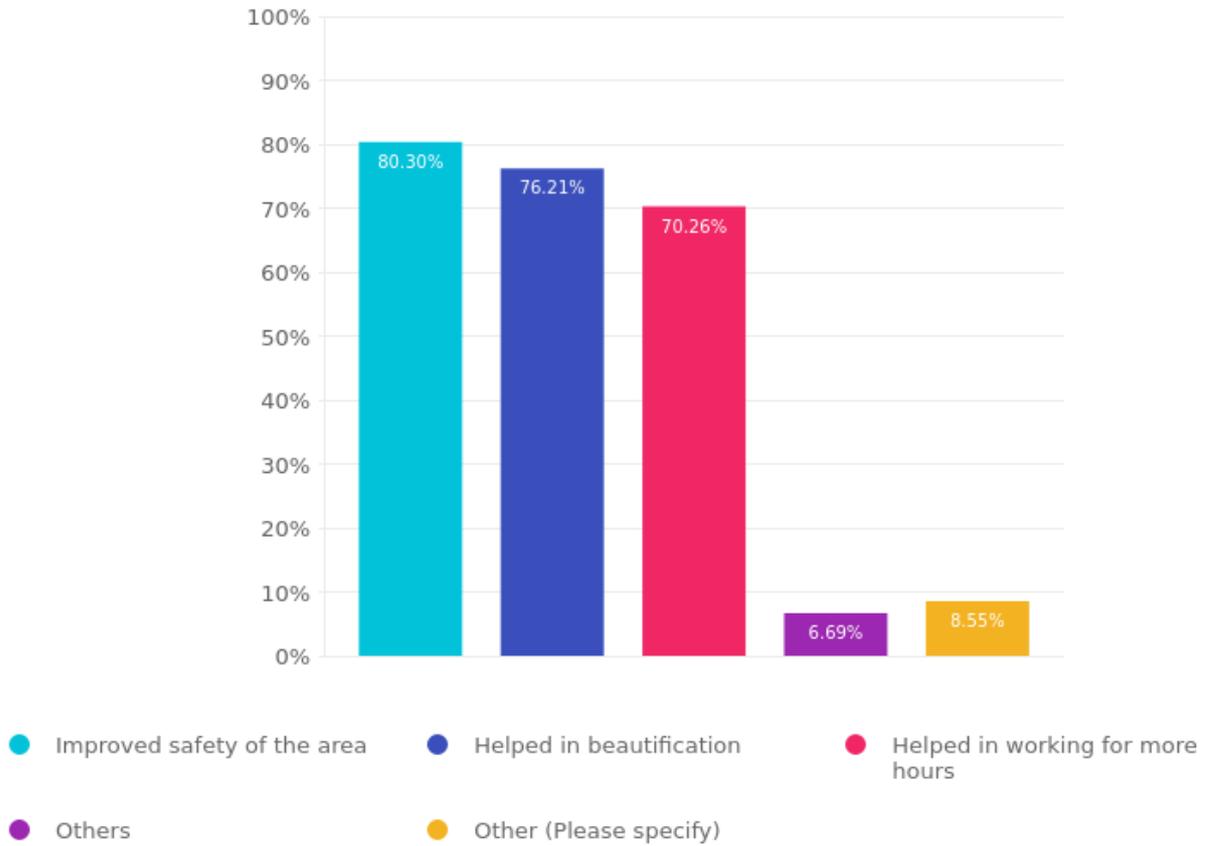


Fig: 4.4 Frequency of maintenance of solar street lights and High Mast light

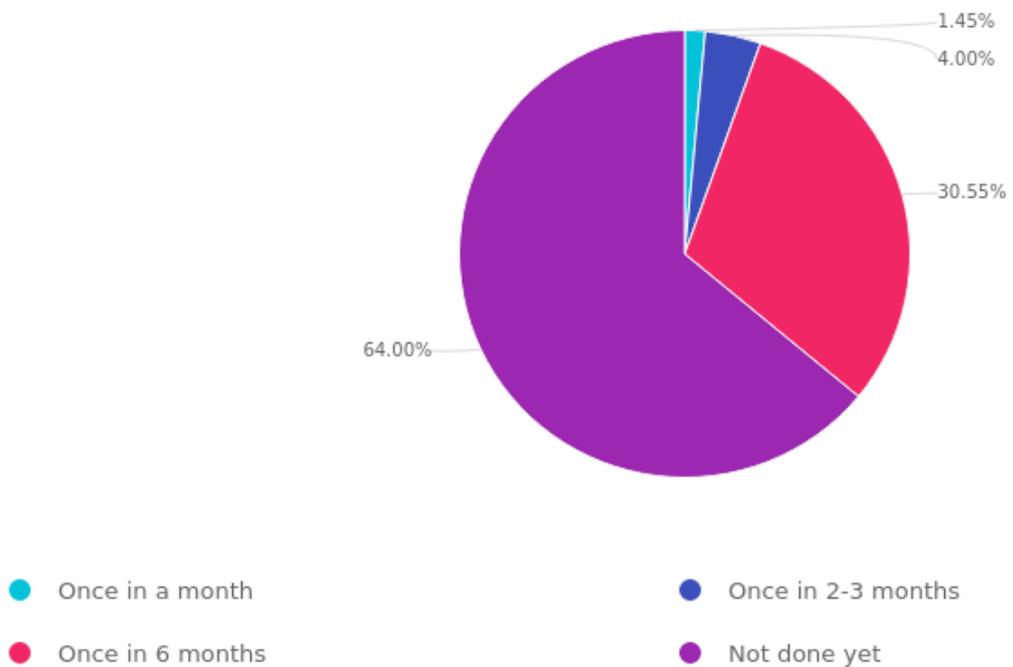


Fig: 4.5 Project benefits and its impact on society

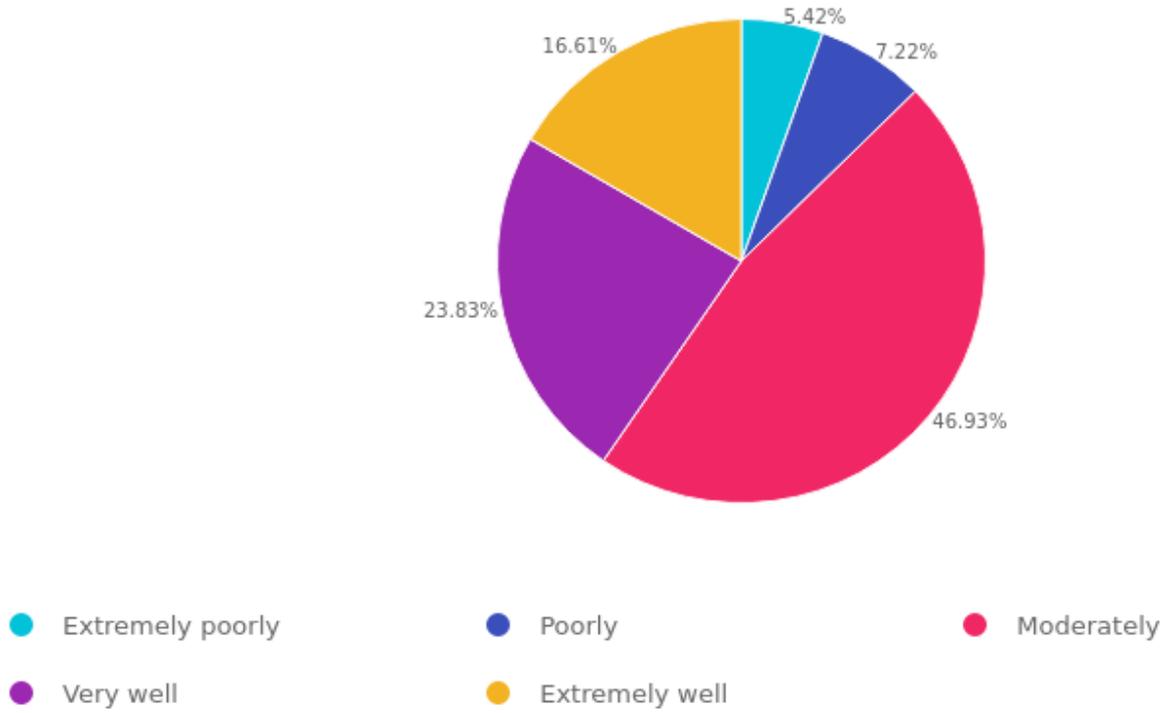
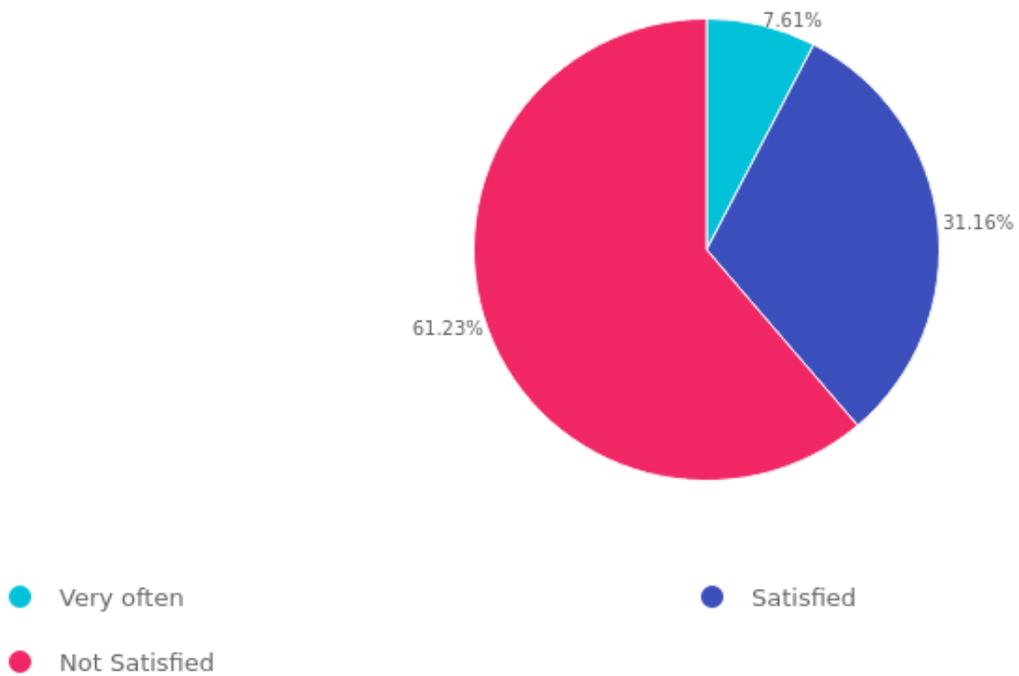


Fig: 4.6 Maintenance of the street lights and its components



4.5.3 Stakeholder's Feedback

The assessment and feedback in true and as is with the integrity aspects of public consultation and feedback received and pass the same to the NHPC for all necessary actions as may be found useful on implementation of LED based (High Mast) Solar Public Lighting & Solar Street Lights in nearby areas of Kanpur District, of Uttar Pradesh.

यह प्रोजेक्ट बहुत अच्छा है। जिससे लोगो को लाभ पहुंचा है। कुछ ऐसे क्षेत्र जहां पर अंधेरा रहता था वहां पर इस प्रोजेक्ट के माध्यम से लगी लाइट से उस अंधेरा से निजात प्राप्त हुई। और संधिक्त गतिविधियों में भी कमी आई है। लेकिन इसका समयानुसार मेंटीनेस्स न होने के कारण इस प्रोजेक्ट से जितना लाभ होना चाहिए उतना लाभ प्राप्त नहीं हो सका 2-3 बार शिकायत की परंतु उन्होंने उस पर कोई भी कारवाई नहीं की गई। **Pradeep Shrivastava (Kanpur Cantt.)**

सोलर लाइट लगने से क्राइम में कामी या एक्सीडेंट में काम आई
चौकी इंचार्ज - **प्रमोद कुमार (जनता नगर)**

Initially the newly installed lights made the area nice and improved visibility at nights. Sadly, the lights have stopped working after 6 months. **Vijay Shrivastav (Govindnagar)**

Great initiative by NHPC and it is successful too. It is of great help at night and during rains as well. Thank you NHPC. **Arun Dubey (Shastrinagar)**

In this area the lights were installed in 2018. In initial stage it was in good condition and the illumination was good, even during power cuts. But even before they completed one year they are malfunctioning. **Kamlesh Gupta (Char khambha kunwa fazalganj)**

After installation of lights there has been reduction in loitering by anti-social people and has made the area safer. **Laxmi Kant (Dadanagar)**

4.5.4 Case Studies

Case study- 1

It is observed that more than 60% of the street lights were functional in Kanpur Cantt. Remaining were not working to capacity due to poor maintenance and damage suffered by the components over the period. Those found working were functional for 3-4 hours on a daily basis. Project beneficiaries are satisfied with the installation of solar street lights and high mast lights in their area. But due to lack of maintenance over a period of time, the quality of illumination has decreased significantly.

Case study- 2

It was found that about 25% of the lights were not working in the Maharajpur area because most of lights do not have battery. Batteries of the lights were stolen, because their batteries were installed too low.

Information received from the feedback of the beneficiaries reveals that they had got a lot of benefit from this High Mast lights, but due to lack of maintenance over time, the period of benefit could not be extended. Neither EESL nor Gautam Solar, fulfilled their responsibility of maintenance. Some of the lights were broken by miscreants. Some lights are not working over night because their batteries have no backup. Furthermore, it was discovered that the beneficiaries of the community were not aware that these lights have been installed by NHPC.

Case study- 3

During the study of this project team observed that about 60% of the lights were operational and functioning well in Arya Nagar. In around 40% cases batteries were installed too low, and hence they were stolen. Information was received from the feedback of the beneficiaries that they had got a lot of benefit from this high mast lights, but due to lack of maintenance many weren't performing up to the mark. Both EESL and Gautam Solar failed to fulfil their responsibility of maintenance. But overall people found the initiative very helpful and advantageous.

Case study- 4

It was observed that around 28% of the lights were not working in the Govind Nagar because most lights do not have a battery as they were stolen by the locals. It was also noticed that in some solar lights, batteries were dysfunctional and needed replacement. There has been a significant reduction in crime and accidents when the lights were working but due to lack of maintenance for a longer period the area is witnessing dark patches. But, overall, beneficiaries are in agreement that the project had created a positive impact so far.

4.5.5 Verification of installation and functioning of solar street light and High Mast Light

The impact assessment team has approached to all the following beneficiaries (Direct and Indirect) to collect their response on various quality aspects (Qualitative and quantitative) and the responses are recorded as follows.

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Krishna gopal	Mishra	Arya Nagar	IMG-20220519-WA0000.jpg	Solar Street Light	Very well
Shyam kishor	Diwedi	Arya Nagar	TimePhoto_20220519_095412.jpg	Solar Street Light	Extremely well
Gopal	Gaur	Arya Nagar	TimePhoto_20220519_095038.jpg	Solar Street Light	Moderate
Anoop		Arya Nagar	TimePhoto_20220519_101124.jpg	Solar Street Light	Extremely well
Antu	Mishra	Arya Nagar	TimePhoto_20220519_102256.jpg	Solar Street Light	Extremely poor
Suneel kumar	Sarogi	Arya Nagar	TimePhoto_20220519_111051.jpg	Solar Street Light	Extremely poor
Ram ji	Gupta	Govind Nagar	TimePhoto_20220519_104315.jpg	Solar Street Light	Very well
Seshnath	Sahu	Govind Nagar	TimePhoto_20220519_121144.jpg	Solar Street Light	Very well
Gopal	Sharma	Arya Nagar	TimePhoto_20220519_131706.jpg	Solar Street Light	Moderate
Himanshu	Saini	Arya Nagar	TimePhoto_20220519_131714.jpg	Solar Street Light	Very well
Himanshu	Saini	Arya Nagar	TimePhoto_20220519_131612.jpg	Solar Street Light	Moderate
Saurabh	Dixit	Arya Nagar	TimePhoto_20220519_132628.jpg	Solar Street Light	Very well
Abhishek	Sharma	Arya Nagar	TimePhoto_20220519_150352.jpg	Solar Street Light	Extremely well
Suresh	Panda	Arya Nagar	TimePhoto_20220519_152712.jpg	Solar Street Light	Poorly
Bablu	Sharma	Arya Nagar	16529567216722852987123859091548.jpg	Solar Street Light	Poor
Sheshnath	Kushwaha	Arya Nagar	5797255F-4FBA-4E98-90AA-FB33419B9844.jpeg	Solar Street Light	Moderate

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Divyanshu	Sharma	Arya Nagar	0283597E-E449-490D-AC22-FE4E1300E966.jpeg	Solar Street Light	Moderate
Kalu	Sharma	Arya Nagar	TimePhoto_20220519_111137.jpg	Solar Street Light	Very well
Kalu	Sharma	Arya Nagar	TimePhoto_20220519_111208.jpg	Solar Street Light	Moderate
Kalu	Sharma	Arya Nagar	TimePhoto_20220519_111217.jpg	Solar Street Light	Very well
Divyanshu	Sharma	Arya Nagar	7BEAC8EF-DFFA-4668-8C64-F87F59FEF8F1.jpeg	Solar Street Light	Moderate
Sheshnath	Kushwaha	Arya Nagar	A5163995-328D-4993-ABB8-3C8CF35BD48F.jpeg	Solar Street Light	Moderate
Pappu		Arya Nagar	TimePhoto_20220519_162014.jpg	Solar Street Light	Moderate
Vikash	Saxena	Arya Nagar	B9103A99-4DDE-4E4F-B512-A5091CCBD542.jpeg	Solar Street Light	Moderate
Shri gopal	Gupta	Arya Nagar	IMG-20220519-WA0001.jpg	Solar Street Light	Moderate
Seshnath	Kushwaha	Arya Nagar	TimePhoto_20220519_123141.jpg	Solar Street Light	Very well
Sheshnath	Kushwaha	Arya Nagar	0143E6DC-8C20-46A9-8FD5-9FA27B902C71.jpeg	Solar Street Light	Very well
Annata		Arya Nagar	TimePhoto_20220519_164448.jpg	Solar Street Light	Moderate
Ajay		Arya Nagar	TimePhoto_20220519_170257.jpg	High Mast Light	Extremely well
Shiva	Tiwari	Arya Nagar	TimePhoto_20220519_144304.jpg	Solar Street Light	Poorly
Naresh	Gupta	Arya Nagar	TimePhoto_20220520_092944.jpg	Solar Street Light	Extremely well
Manoj	Shukla	Govind Nagar	TimePhoto_20220520_100657.jpg	Solar Street Light	Extremely well
Chaya	Devi	Govind Nagar	73F5874B-9161-4193-97A6-2005AAFCBD5D.jpeg	Solar Street Light	Moderate

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Manoj	Katiya	Govind Nagar	E66BFCD5-228C-47C1-8671-C06383869C0B.jpeg	Solar Street Light	Very well
Lakshmi	Kant	Govind Nagar	TimePhoto_20220520_121224.jpg	High Mast Light	Moderate
Lakshmi	Kant	Govind Nagar	TimePhoto_20220520_121359.jpg	Solar Street Light	Moderate
Sandeep	Agnihotri	Govind Nagar	TimePhoto_20220520_121152.jpg	Solar Street Light	Moderate
Ajay	Pandey	Govind Nagar	TimePhoto_20220520_124220.jpg	Solar Street Light	Moderate
Satydev	Singh	Govind Nagar	TimePhoto_20220520_123836.jpg	Solar Street Light	Moderate
Deepak	Vishkarma	Govind Nagar	TimePhoto_20220520_132728.jpg	Solar Street Light	Moderate
Surendra	Mishra	Govind Nagar	73B1F949-6265-4E36-86E4-40335833B808.jpeg	Solar Street Light	Very well
Surendra	Mishra	Govind Nagar	67687071-AEAB-491E-A851-2F5B48C719DE.jpeg	High Mast Light	Poor
Lalit	Upadhayay	Govind Nagar	09BE99E8-EEA0-4D0B-A040-018BCA0BC9E7.jpeg	Solar Street Light	Poor
Om Prakash	Sharma	Govind Nagar	FA0E829D-8F0C-4F95-91D1-8EC6AFFC4975.jpeg	High Mast Light	Poor
Vidit	Kakkar	Govind Nagar	TimePhoto_20220520_133923.jpg	Solar Street Light	Extremely well
Dr. V.k.	Omer	Govind Nagar	TimePhoto_20220520_140606.jpg	Solar Street Light	Moderate
Omprakash	Sharma	Govind Nagar	34AA6ECC-F09D-48CA-BE77-4D2528F3FA81.jpeg	High Mast Light	Poor

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Sanjeev	Arora	Govind Nagar	TimePhoto_20220520_143707.jpg	Solar Street Light	Extremely well
Evaai	Singh	Govind Nagar	0C8A1FE9-76F1-4DC3-85B0-E803D99CC4A6.jpeg	Solar Street Light	Poor
Atul	Singh	Govind Nagar	6C7F2E2D-1C08-4FF8-B064-F19CC3F91B9C.jpeg	Solar Street Light	Very well
Rajeev	Jain	Govind Nagar	TimePhoto_20220520_145451.jpg	Solar Street Light	Extremely well
Pradeep	Dube	Govind Nagar	TimePhoto_20220520_145957.jpg	Solar Street Light	Extremely well
Pramod	Kumar (choki prabhari)	Govind Nagar	TimePhoto_20220520_151043.jpg	Solar Street Light	Very well
Arvind	Gupta	Govind Nagar	EB10F049-D5ED-445C-947C-CA9969AB77C7.jpeg	Solar Street Light	Very well
Kuldeep	Singh	Govind Nagar	3A4737A2-E945-4EEB-A762-B6BDF504023F.jpeg	Solar Street Light	Very well
Anand	Pandey	Govind Nagar	D19199C9-2804-4BBE-8ABA-ACBD67DD242C.jpeg	Solar Street Light	Very well
Pradeep	Shrivastava	Govind Nagar	TimePhoto_20220520_161421.jpg	Solar Street Light	Extremely well
Vijay	Shrivastav	Govind Nagar	TimePhoto_20220520_163910.jpg	Solar Street Light	Extremely well
Kuldeep	Singh	Govind Nagar	4160DF5C-C826-44A8-84B7-CB35FE588D08.jpeg	Solar Street Light	Very well
Arun	Dubey	Govind Nagar	TimePhoto_20220520_165042.jpg	Solar Street Light	Moderate
Pradeep	Bhatiya	Govind Nagar	TimePhoto_20220520_170943.jpg	Solar Street Light	Extremely well

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Kamal	Gupta	Govind Nagar	TimePhoto_20220520_172521.jpg	Solar Street Light	Moderate
Santosh	Sahu	Govind Nagar	TimePhoto_20220520_175910.jpg	Solar Street Light	Moderate
Kamlesh	Gupta	Govind Nagar	TimePhoto_20220520_172521.jpg	Solar Street Light	Moderate
Ramesh	Chandra	Arya Nagar	TimePhoto_20220520_195145.jpg	High Mast Light	Moderate
Dileep kumar	Gupta	Arya Nagar	TimePhoto_20220520_200431.jpg	High Mast Light	Moderate
Umesh	Saini	Arya Nagar	TimePhoto_20220520_202214.jpg	High Mast Light	Very well
Ajay Kumar	Gupta	Arya Nagar	TimePhoto_20220520_203313.jpg	High Mast Light	Moderate
Lori	Radio	Arya Nagar	TimePhoto_20220520_204340.jpg	High Mast Light	Moderate
Lori	Radio	Arya Nagar	TimePhoto_20220520_204721.jpg	High Mast Light	Poorly
Virendra	Pal	Arya Nagar	TimePhoto_20220520_205723.jpg	High Mast Light	Moderate
Leather	Land	Arya Nagar	TimePhoto_20220520_211707.jpg	High Mast Light	Very well
Himratan	Krapa shankar	Arya Nagar	TimePhoto_20220520_212559.jpg	High Mast Light	Very well
Rajan	Das	Arya Nagar	TimePhoto_20220520_213711.jpg	High Mast Light	Very well
Mukesh	Shukla	Arya Nagar	TimePhoto_20220520_214831.jpg	High Mast Light	Very well
Mohmad	Salman	Kanpur Cantt	TimePhoto_20220521_101711.jpg	Solar Street Light	Moderate
Raghunandan	Singh		TimePhoto_20220521_101652.jpg	Solar Street Light	Moderate
Indal	Sachan	Kanpur Cantt	TimePhoto_20220521_130144.jpg	High Mast Light	Moderate
Mahesh	Rajpoot	Kanpur Cantt	TimePhoto_20220521_130004.jpg	Solar Street Light	Moderate

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Rajendra	Mishra	Kanpur Cantt	TimePhoto_20220521_131301.jpg	High Mast Light	Moderate
Arpit	Ojha	Kanpur Cantt	TimePhoto_20220521_132253.jpg	Solar Street Light	Moderate
Avneesh	Ojha	Kanpur Cantt	TimePhoto_20220521_132640.jpg	High Mast Light	Moderate
Pappu		Kanpur Cantt	TimePhoto_20220521_142554.jpg	Solar Street Light	Very well
Atul	Kumar	Kanpur Cantt	TimePhoto_20220521_140130.jpg	High Mast Light	Poorly
Atul	Pandit	Kanpur Cantt	TimePhoto_20220521_141405.jpg	High Mast Light	Very well
Dr sourav	Roy	Kanpur Cantt	TimePhoto_20220521_142218.jpg	High Mast Light	Extremely poorl
Ashok	Pal	Kanpur Cantt	TimePhoto_20220521_142218.jpg	High Mast Light	Poorly
Babblu		Kanpur Cantt	TimePhoto_20220521_143413.jpg	Solar Street Light	Moderate
Sanjay	Kumar	Kanpur Cantt	TimePhoto_20220521_143627.jpg	High Mast Light	Poorly
Ankit	Rathore	Kanpur Cantt	TimePhoto_20220521_144307.jpg	Solar Street Light	Poor
Hareeshchand		Kanpur Cantt	TimePhoto_20220521_150332.jpg	Solar Street Light	Poor
Aisan		Kanpur Cantt	TimePhoto_20220521_145213.jpg	Solar Street Light	Moderate
Roshan	Agrawal	Kanpur Cantt	TimePhoto_20220521_150038.jpg	High Mast Light	Moderate
Geeta	Yadav	Kanpur Cantt	1653126165901739404181098589940.jpg	Solar Street Light	Extremely well
Veerendra	Yadav	Kanpur Cantt	TimePhoto_20220521_151240.jpg	Solar Street Light	Moderate

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Rameshchand	Yadav	Kanpur Cantt	TimePhoto_20220521_151524.jpg	Solar Street Light	Extremely well
Veerendra	Yadav	Kanpur Cantt	TimePhoto_20220521_151326.jpg	Solar Street Light	Very well
Jeetu	Yadav	Kanpur Cantt	TimePhoto_20220521_152043.jpg	Solar Street Light	Extremely well
Anil	Kumar verma	Kanpur Cantt	TimePhoto_20220521_152602.jpg	Solar Street Light	Extremely well
Sureshchand	Sahu	Kanpur Cantt	TimePhoto_20220521_153244.jpg	High Mast Light	Moderate
Vishal	Sharma	Kanpur Cantt	TimePhoto_20220521_153009.jpg	Solar Street Light	Very well
Nagendra	Singh	Kanpur Cantt	TimePhoto_20220521_153417.jpg	High Mast Light	Moderate
Pankaj	Gautam	Kanpur Cantt	TimePhoto_20220521_154433.jpg	Solar Street Light	Moderate
Abhishek	Kumar	Kanpur Cantt	TimePhoto_20220521_154326.jpg	High Mast Light	Moderate
Sarda	Sharma	Kanpur Cantt	TimePhoto_20220521_155103.jpg	Solar Street Light	Moderate
Irfan	Warshi	Kanpur Cantt	TimePhoto_20220521_155122.jpg	Solar Street Light	Moderate
Sandeep		Kanpur Cantt	TimePhoto_20220521_155749.jpg	Solar Street Light	Moderate
Anas	Ansari	Kanpur Cantt	TimePhoto_20220521_155919.jpg	High Mast Light	Moderate
Munna	Babu	Kanpur Cantt	TimePhoto_20220521_160456.jpg	High Mast Light	Moderate
Shekhar	Saini	Kanpur Cantt	TimePhoto_20220521_160518.jpg	Solar Street Light	Extremely well
Ansh	Saini	Kanpur Cantt	TimePhoto_20220521_161122.jpg	Solar Street Light	Moderate
Rinku	Sahu	Kanpur Cantt	TimePhoto_20220521_161815.jpg	Solar Street Light	Moderate
Arvind	Sharma	Kanpur Cantt	TimePhoto_20220521_161611.jpg	High Mast Light	Moderate
Amarcahnd	Sonkar	Kanpur Cantt	TimePhoto_20220521_162848.jpg	Solar Street Light	Moderate
Ved	Prakash	Kanpur Cantt	TimePhoto_20220521_162127.jpg	High Mast Light	Moderate
Kailash	Kumar	Kanpur Cantt	TimePhoto_20220521_163019.jpg	High Mast Light	Moderate
Kartik		Kanpur Cantt	TimePhoto_20220521_163655.jpg	Solar Street Light	Poor
Nitya	Dsahu	Kanpur Cantt	TimePhoto_20220521_163534.jpg	High Mast Light	Poorly

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Vipin	Awasthi	Kanpur Cantt	TimePhoto_2022 0521_163428.jpg	High Mast Light	Very well
Shyam	Lal	Kanpur Cantt	TimePhoto_2022 0521_164922.jpg	Solar Street Light	Moderate
Faizan	Ahmed	Kanpur Cantt	TimePhoto_2022 0521_164539.jpg	Solar Street Light	Very well
Suneel kumar	Verma	Kanpur Cantt	TimePhoto_2022 0521_165019.jpg	Solar Street Light	Moderate
Gouri	Shankar	Kanpur Cantt	TimePhoto_2022 0521_165718.jpg	Solar Street Light	Extremely well
Ashu kirana store	Ashu	Kanpur Cantt	TimePhoto_2022 0521_165501.jpg	High Mast Light	Very well
Arman		Kanpur Cantt	TimePhoto_2022 0521_170140.jpg	Solar Street Light	Poor
S k	Pandey	Kanpur Cantt	TimePhoto_2022 0521_170818.jpg	High Mast Light	Moderate
Ashok	Soni	Kanpur Cantt	TimePhoto_2022 0521_172559.jpg	High Mast Light	Very well
Shivam tea stall	Shivam	Kanpur Cantt	TimePhoto_2022 0521_173427.jpg	High Mast Light	Very well
Ramesh	Rana	Kanpur Cantt	TimePhoto_2022 0521_180115.jpg	High Mast Light	Poorly
Bhupesh	Singh	Kanpur Cantt	TimePhoto_2022 0521_181314.jpg	High Mast Light	Moderate
Kanihiya	Tiwari	Kanpur Cantt	TimePhoto_2022 0521_184108.jpg	High Mast Light	Poorly
Pankaj	Mishra	Maharajpur	TimePhoto_2022 0521_195508.jpg	High Mast Light	Very well
Sharda prashad	Tiwari	Maharajpur	TimePhoto_2022 0521_200507.jpg	High Mast Light	Very well
Ram	Aasre	Maharajpur	TimePhoto_2022 0521_202349.jpg	High Mast Light	Extremely well
Rohit	Singh	Maharajpur	TimePhoto_2022 0521_203050.jpg	High Mast Light	Extremely well
Hariom	Gupta	Maharajpur	TimePhoto_2022 0521_204329.jpg	High Mast Light	Poorly

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Chotu	Tiwari	Maharajpur	TimePhoto_20220521_204743.jpg	High Mast Light	Moderate
Madhu	Tripathi	Maharajpur	TimePhoto_20220521_205151.jpg	High Mast Light	Moderate
Gh Nabi	Malik			Solar Street Light	Very well
Munna	Lal	Kanpur Cantt	TimePhoto_20220521_145925.jpg	Solar Street Light	Extremely well
Chunna	Lal	Kanpur Cantt	TimePhoto_20220521_121235.jpg	Solar Street Light	Moderate
Lakshmi	Traders	Kanpur Cantt	TimePhoto_20220521_121012.jpg	Solar Street Light	Extremely well
Ram	Singh	Maharajpur	TimePhoto_20220522_105605.jpg	Solar Street Light	Moderate
Satyam		Maharajpur	TimePhoto_20220522_111528.jpg	Solar Street Light	Moderate
Shailendra	Diwedi	Maharajpur	TimePhoto_20220522_113716.jpg	Solar Street Light	Extremely well
Shiv	Kumar	Maharajpur	TimePhoto_20220522_121106.jpg	Solar Street Light	Extremely well
Sandeep	Kumar	Maharajpur	TimePhoto_20220522_114559.jpg	Solar Street Light	Very well
Rajeev	Sahu	Maharajpur	TimePhoto_20220522_115718.jpg	Solar Street Light	Poorly
Ranu	Shukla	Maharajpur	TimePhoto_20220522_120146.jpg	Solar Street Light	Moderate
Parvesh	Bajpai	Maharajpur	TimePhoto_20220522_120801.jpg	Solar Street Light	Extremely well
Surendra prakash	Shukla	Maharajpur	TimePhoto_20220522_122116.jpg	Solar Street Light	Very well
Gaurav	Kushwaha	Maharajpur	TimePhoto_20220522_121623.jpg	Solar Street Light	Extremely well
Ankit	Shukla	Maharajpur	TimePhoto_20220522_122009.jpg	Solar Street Light	Moderate
Shubhash	Dwivedi	Maharajpur	TimePhoto_20220522_122537.jpg	Solar Street Light	Very well
Shiva	Singh	Maharajpur	TimePhoto_20220522_122845.jpg	Solar Street Light	Extremely well
Guru	Prashad	Maharajpur	TimePhoto_20220522_124055.jpg	Solar Street Light	Extremely well

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Gopal	Gupta	Maharajpur	TimePhoto_20220522_123431.jpg	Solar Street Light	Very well
Arjun	Gupta	Maharajpur	TimePhoto_20220522_124110.jpg	Solar Street Light	Extremely well
Chotu	Tiwari	Maharajpur	TimePhoto_20220522_124113.jpg	Solar Street Light	Extremely well
Radheshyam	Maurya	Maharajpur	TimePhoto_20220522_130344.jpg	Solar Street Light	Extremely well
Tej	Narayan	Maharajpur	TimePhoto_20220522_130650.jpg	Solar Street Light	Very well
Vinay mishra	Mishra	Maharajpur	TimePhoto_20220522_130301.jpg	Solar Street Light	Extremely well
Raj Kumar	Singh	Maharajpur	TimePhoto_20220522_131745.jpg	High Mast Light	Poorly
Bablu	Singh	Maharajpur	TimePhoto_20220522_135347.jpg	Solar Street Light	Moderate
Bablu	Arya	Maharajpur	TimePhoto_20220522_145249.jpg	Solar Street Light	Moderate
Harshit	Vishwakarma	Maharajpur	TimePhoto_20220522_150613.jpg	Solar Street Light	Extremely well
Neeraj	Gupta	Maharajpur	TimePhoto_20220522_151738.jpg	Solar Street Light	Extremely well
Shivran	Singh	Maharajpur	TimePhoto_20220522_130301.jpg	Solar Street Light	Extremely well
Chotu		Maharajpur	TimePhoto_20220522_152753.jpg	High Mast Light	Extremely well
Ramesh	Nishad	Maharajpur	TimePhoto_20220522_151055.jpg	Solar Street Light	Moderate
Surendra	Nishad	Maharajpur	TimePhoto_20220522_145550.jpg	Solar Street Light	Very well
Anil	Nishad	Maharajpur	TimePhoto_20220522_144855.jpg	Solar Street Light	Moderate
Gaya	Deen	Maharajpur	TimePhoto_20220522_154611.jpg	High Mast Light	Very well
Santosh	Kumar	Maharajpur	TimePhoto_20220522_155244.jpg	High Mast Light	Moderate
Soni	Singh	Maharajpur	TimePhoto_20220522_130014.jpg	Solar Street Light	Poor
Seema	Bajpai	Maharajpur	TimePhoto_20220522_141250.jpg	Solar Street Light	Moderate
Suru		Maharajpur	TimePhoto_20220522_125943.jpg	Solar Street Light	Extremely well
Himanshu	Mishra	Maharajpur	TimePhoto_20220522_125904.jpg	Solar Street Light	Extremely well

First Name of the respondent	Last Name of the respondent	Name of the Area where solar and high mast lights are installed	Please Take Geo Tagged Photo of solar light along with respondent	Whether Solar street or High Mast light	Performance Level
Atul	Tiwari	Maharajpur	TimePhoto_20220522_125817.jpg	Solar Street Light	Extremely well
Hemraj	Gupta	Maharajpur	TimePhoto_20220522_124110.jpg	Solar Street Light	Extremely well
Ramesh	Gupta	Arya Nagar	TimePhoto_20220522_093655.jpg	High Mast Light	Moderate
Pappu	Singh	Kanpur Cantt	IMG-20220523-WA0001.jpg	High Mast Light	Moderate
Mradul		Govind Nagar	TimePhoto_20220523_120421.jpg	High Mast Light	Moderate
Ansh		Govind Nagar	TimePhoto_20220523_123816.jpg	High Mast Light	Moderate
Abhimanyu	Yadav	Govind Nagar	TimePhoto_20220523_134600.jpg	High Mast Light	Moderate

4.5.6 Success Stories

Story-1

Name of the respondent: Naresh Gupta

Location: Rajapurwa J.K. Mandir, Govind Nagar, Kanpur.

My name is Naresh Gupta. I have been living here since birth. I work as a daily wage labour. There was no street light anywhere in my area. Due to the absence of the street light, there are many problems like theft and accidents. Solar light were installed about 3 or 4 years ago. Solar lights were installed in our area by NHPC. The security of the area has become very good due to the installation of lights. When the light is turned on, the entire area is illuminated by the solar light.

Story-2

Name of the respondent: Shyam Kishor Dwivedi

Location: Maheshwari Mohan, Arya Nagar, Kanpur.

My name is Shyam Kishor Dwivedi. I am a teacher of the geography in Inter college. I have been living here since birth. In temple there was no adequate arrangement of light. Solar light were installed in the temple premises about 4 years ago. This provided illumination in the temple premises as well as in the street. The security of the area has become better after the installation of the solar street light in the street. The occasional suspicious activities in the street have also come down. I want to thank the company that installed this solar light. Light has helped a lot.

My small suggestion is that if a toll-free number is given so that I can complain if there is a problem in the light and the light can be rectified.

Story-3

Name of the respondent: Bablu

Location: Faithful Ganj, Kanpur Cantt., Kanpur.

My name is Bablu. I am small scale business trader, and work from home. Before the installation of solar light, there was no light in the streets. There is power crisis in our area. Hence, power outages are frequent. Solar light proves beneficial as it automatically turns on as soon as it gets dark and lights up through out the night. I can also do my work for a long period of time which proves fruitful.

Story-4

Name of the respondent: Raghunandan Singh Bhadauria

Location : Kanpur Cantt.

My name is Raghunandan Singh Bhadauria. I am a former MLA of Kanpur Cantt. During my tenure, NHPC funded the project for installed solar lights in our constituency. For about a year, it was working very well. But slowly all the solar lights have gotten worse. I complained many times to the EESL about the failure of the light. But none of the complaints were heard. The intensity of the lights have decreased. But overall I am happy with this initiative and I also want to request NHPC that they should also support projects in health and education sector in my area.

Story-5

Name of respondent: Pramod Kumar

Location: Janta nagar chowki ,Govind nagar Kanpur.

My name is Pramod Kumar. I am a sub inspector in Uttar Pradesh police. For the last 5 years I am in-charge of Janta nagar chowki. Solar street light was installed in my presence. Light was needed in this area. The number of accident and other incidents in this area was vey high, due to the absence of the light, no pictures were visible in the CCTV cameras, due to which there was a lot of problem in catching the criminals. Since the installation of solar street light, crime incidents have decreased. There has also been a significant reduction in road accidents. If said in brief, it would be fair to say that the purpose for which the solar street light were installed was successful and proved to be very beneficial.

Story- 6

Name of respondent: Shyam Lal

Location: Kanpur Cantt.

My name is Shyam Lal. I am a resident of Kanpur Cantt. We benefited a lot from this light. In the absence of light we used to trip and fall, many a times I had fallen during night walks. The shops in our locality used to close before 9 o'clock every night, but now they remain opened till 10 o'clock and area remains bustling. The brightness of these lights is very good, so much so that children play under it at night. The only problem is their battery which needs to be changed now because the intensity of lights have decreased.

Story-7

Name of respondent: Arvind Sharma

Location: Shanti Nagar, Kanpur.

My name is Arvind Sharma. I am a resident of Shanti Nagar, Kanpur. This high mast LED Street light is installed in the park near my house. Earlier no one wanted to come to this park, because it remained dark from the evening. But now, after the installation of this street light, people come to this park in the evening time, as well as for night walk with the children. These lights have lit the entire park and the neighboring area. I wish that more such lights to be installed. This has created an atmosphere of happiness. Light battery need to be replaced because battery are getting old and have less backup. If these batteries get replaced it would help increase their life.

Story-8

Name of respondent: Divyansh Sharma

Location: Arya Nagar, Kanpur.

My name is Divyanshu Sharma I am a resident of Arya Nagar, Kanpur. This solar high mast LED Street light proved very beneficial for me. Earlier my area used to be quite dark, me and my family members were very afraid to go out of the house after 9 P.M. There was also high risk of accident. Now, with the installation of this high mast light, everyone's worries have gone away. I want these lights to be installed in every area that remained dark at night. Now some street vendors set up their shops under that light which help them increase their business hours. People can go to their work even at night, no one is afraid on the road. But these need to be monitored from time to time in order prevent its theft and its maintenance should be given priority.

4.5.6 OECD-DAC Framework Scoring

Overall performance and rating by the beneficiary are satisfactory. The project was successfully implemented in selected nearby villages locations as per the list.

Table 4.2: OECD-DAC framework Scoring of the project

OECD Parameters	Score
Relevance	Satisfactory
Coherence	Extremely Satisfactory
Effectiveness	Extremely Satisfactory
Efficiency	Extremely Satisfactory
Impact	Marginally Satisfactory
Sustainability	Marginally Satisfactory

4.6 Impact of the project

- Overall performance and rating by the beneficiary is more than 80%.
- Project successfully installed 420 LED Street Lighting and 188 High Mast light systems in four areas in Kanpur district
- The study calculated the annual reduction in CO2 emissions due to project intervention to be around 33.4 tons approximately.
- Impact assessment report also indicated positive change on social, safety, education, health, and environmental aspects for the community.
- Maintenance of solar LED lights for 5 years was part of the project to help sustain the impact.

4.7 SDG and Sustainability of the project

In 2015 the world saw great momentum for climate action, culminating in a historic agreement in December to cut carbon emissions and contain global warming. It was also a year of continued transformation for the energy sector. For the first time in history, a global sustainable development goal was adopted solely for energy, aiming at access to affordable, reliable, sustainable and modern energy for all. To turn this objective into reality while mitigating climate change impacts, more countries are upping their game and going further with solar, wind, geothermal and other sources of renewable energy. These stories from around the world present a flavour of how they are leading the charge toward a climate-friendly future.

This project is contributing to achieve Sustainable Development Goal 7 (SDG 7) for ensuring access to affordable, reliable, sustainable and modern energy for all – with its targets on energy efficiency and renewable energy. The project had a sustainability mechanism which included maintenance support of solar LED lights for 5 years as part of the project to help sustain the impact.

NHPC and implementing agencies should engage with local government and non government agencies (NGO's) and other institutions for greater co-ordination and sustainability of the project. Participation of local people and organizations is essential for making this project a success.

4.8 Conclusion and Way forward

Some of the key benefits based on the feedback and interactions with the beneficiaries noted are as follows:

Fearless walking and ease during the night and dark

The beneficiaries have reported that they find it easy to walk during the evening and night hours in the street. The ease and preference of walking during evening and night hours is the right choice due to better illumination.

Females have reported a sense of security and empowerment

A gender strengthening dimension is observed as an impact of the Solar Street Lights. 85% of the respondents said that women feel safe while walking in the evening and night. Prior to the installation of Solar Street Lights, women were hesitant to walk alone in the streets. Now, the women are able to go by themselves to the nearby grocery shops alone after dusk. 86% of the respondents mention that women now walk in the streets without being accompanied by any male member during the evening hours. Solar street lights have helped the young girl students as they can now go for their tuition classes alone in the evening without any fear.

Reduction in incident of theft and robbery

The installation of Solar Street Lights has directly resulted in the reduction of theft and robbery cases in the areas because of proper illumination now. However, in many areas the installed lights have themselves become the target of theft with their batteries being stolen by miscreants.

Opportunity to earn more and work more

Many respondents mentioned that after the installation of Solar Street Lights at least they have a choice to work extra hours (particularly street vendors). Many respondents mentioned that the frequency of informal social gatherings outside the household premises has increased after installation of Solar Street Lights. Informal social gatherings enhance the liveliness of the villages.

Relief and safety during power cuts

The Solar Street Lights are now the source of alternative illumination in the area during power cuts on nights in particular. This has boosted the morale and safety of women and people working the night shifts.

Promotion of local social and cultural activities

Some respondents say that due to illuminations on the streets, people, as they happen to come across and meet each other, create an opportunity to discuss local issues, and gossip and this creates more social harmony.

Improved security for children and elderly

Some respondents mentioned that they feel safe about their children and elderly family members safe now if they remain in street for a little longer than usual. The respondents elaborated that earlier they would not allow their kids and elderly family members to remain outside during evening hours for playing and socializing. However, after the installation of Solar Street Lights, they allow their kids to play outside during evening hours as there is reduced fear now.

EESL was responsible for maintenance and monitoring of the street lights and High Mast solar lights as per MOU. Accordingly, the warranty and guarantee clauses of the replaceable parts or battery etc. should be checked and verified for proper functioning and may be replaced, whenever and wherever required, for the proper functioning of the solar lights and high mast lights.

The infrastructure may be handed over to the local bodies, municipalities, etc. for further maintenance by establishing a standard operating procedure (SOP). The solar lights and high mast lights should be geo-tagged for monitoring and evaluation through technology such as GIS in the future. It is suggested that maintenance services need to be reviewed by NHPC to ensure the full functionality of lights.

Following approaches can be implemented through a memorandum of understanding (MOU) and by applying standard operating procedures (SOPs) acceptable to the partners.

- The proper institutionalization and networking with the local self-government and line departments are required for the effective implementation and sustainability of the project.
- A sustainability plan by implementing agency should be a major area of focus since it can act as a reflection of the plan for creating continued impact through the intervention.
- It would be a good practice to ensure that baseline is conducted for all projects so that their outcomes are tangible, and impact can be measured and articulated clearly.
- The use of technology such as GIS, and geo-tagging is advisable for the infrastructure created to assess any change easily and in a cost-effective manner.
- Convergences with government schemes are also recommended for greater impact and maintenance of assets/infrastructure created.

Photo Gallery





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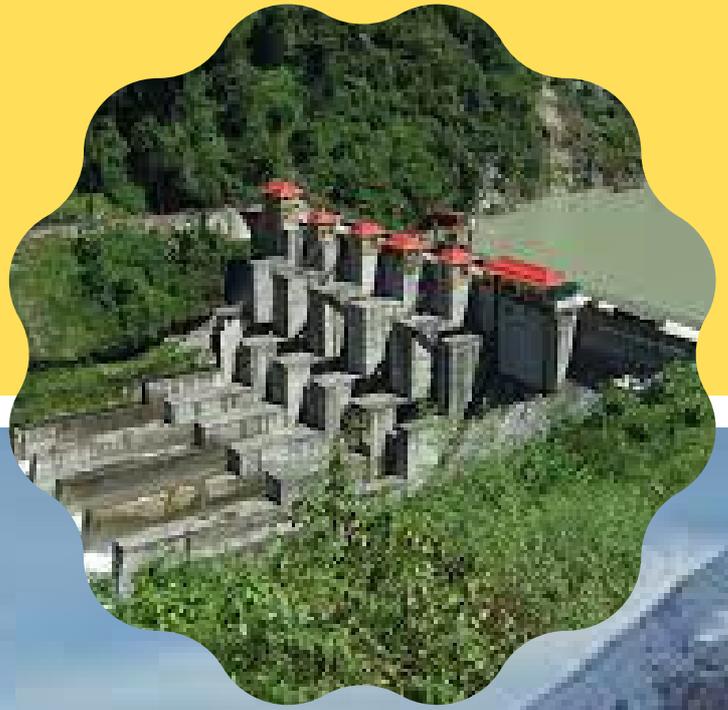
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Annexures

Annexure 1	:	Survey Questionnaire
Annexure 2	:	Format for Case study
Annexure 3	:	Format for Field Observations
Annexure 4	:	Format for daily fieldwork scheduling
Annexure 5	:	Format for collecting feedback about the project

Note: Please find all the Annexure, Geotagged Photographs and Videos through following link

<https://drive.google.com/drive/folders/1LWQ28FXihwTZoUUeu9iV5fnhLBJQoUgN?usp=sharing>



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