MID-TERM REVIEW

UNDP India

"Market Transformation and Removal of Barriers for Effective Implementation of the State Level Climate Change Action Plans"

(MT Project)

PROJECT SUMMARY TABLE

Project title:	Market Transformation and Removal of Barriers for Effective Implementation of the State-Level Climate Change Action Plans			
GEF Project ID:	5361		*at endorsement (Million US$)*	*at completion (Million US$)*
UNDP Project ID:	00093346 PIMS: 4606	GEF financing:	3,744,500 USD	3,744,500 USD
Country:	India	IA/EA own:	500,000	500,000
Region:		Government:	24,500,000	24,500,000
Focal Area:	Climate Change	Other:		
FA Objectives, (OP/SP):		Total co-financing:	25,000,000	25,000,000
Executing Agency:	UNDP	Total Project Cost:	28,744,500	28,74,4500
Other Partners involved:		ProDoc Signature (date project began):		20-01-2016
		(Operational) Closing Date:	Proposed: Dec 2019	Actual:

EXECUTIVE SUMMARY

This report presents the main findings of the Mid-term Review (MTR) of the "Market Transformation and Removal of Barriers for Effective Implementation of the State-Level Climate Change Action Plans" (MT) project. The review was commissioned by UNDP India and was carried out during March-April (including a field mission on 18-22 March 2019) by a team of two independent experts. The MTR's scope encompasses all activities from the project's start date, indicated in the Project Document as September 2015, to the point of review (March/April 2019).

The project's overall goal is the reduction of GHG emissions in the states of Jharkhand and Manipur by transforming the market and removing barriers to the successful implementation of GHG reduction measures. The project is part of India's multi-pronged and long-term strategy for dealing with climate change articulated in the National Action Plan for Climate Change (NAPCC). The project's objective is to accelerate the implementation of energy efficiency and Renewable Energy related climate-change mitigation actions identified in the State-level Action Plans on Climate Change (SAPCC) in the two states of Jharkhand and Manipur.

The project was implemented in collaboration with the governments of Jharkhand and Manipur and under the aegis of India's Ministry of Environment, Forests and Climate Change (MoEFCC). A Project Management Unit (PMU) was established to supervise and co-ordinate project activities. At the state level, project activities were undertaken by state PMUs, led by assigned state agencies (ASAs) which were the Jharkhand Renewable Energy Development Agency (JREDA) and the Manipur Renewable Energy Development Agency (MREDA). UNDP provided overall management support through its New Delhi Country Office (CO) and technical guidance from its Bangkok Regional Hub (BRH). MoEFCC designated a National Project Director (NPD) responsible for overall management, including achievement of planned results and use of project funds through effective process management and well-established programme review and oversight mechanisms. MoEFCC also facilitated partnerships with state governments (Manipur and Jharkhand) and coordination with other relevant central ministries as required. At the strategic level, the Project Steering Committee (PSC) was responsible for providing guidance for the project.

As far as the design of the project is concerned, the Project Document was found to have provided a comprehensive and well-structured framework regarding expected outcomes, as well as associated risks. It provided a thorough and consistent analysis of the country context and identifies a clear set of objectives and activities for the project to pursue. The analysis of the context and the problem was quite thorough. A thorough description of India's current energy infrastructure was provided, as well as crucial information on completed work in the field of RE/EE and climate-change mitigation. This included a detailed analysis of Indian government ministries and the structure of various agencies participating in the project along with details on their respective roles. The Project Document further identified long-term barriers and solutions to achieving the project's objective. The logic of the proposed intervention was clear and discussed at length in the Situation

Analysis section of the Project Document. The project's goal was clearly defined. Outcomes (three in total), as well as outputs (fourteen in total), were well-formulated and delineated the project's goals. The project was based on the premise that existence of several technical, financial, policy, institutional and awareness and capacity building barriers have constrained the large-scale implementation of RE and EE projects in the states.

Many of the indicators and targets identified in the Results and Resources Framework (RRF) of the Project Document meet the SMART criteria prescribed by UNDP M&E guidelines. However, some indicators and targets were problematic. A number of targets in the RRF did not seem realistic, especially with hindsight after a period of time in which the project had been implemented. Another challenge with some of the targets and indicators was that they were defined in a vague way which makes it difficult to establish the level of their achievement. Some of these targets and indicators could be revised at this point in the project. The revision should also include a realistic assessment of what is and what is not possible at this point in time, including the options that are available in Manipur until the end of the project. The situation on the ground has changed since the conceptualization of the project, so further adaptation to the context will be necessary. The whole revision process will require discussions and decisions in the Steering Committee.

Sustainability and replication are crucial elements of this project that deserve more attention by project stakeholders. At the point of this MTR, it is not fully clear what the sustainability path of this project is and what replication model will be used by the authorities to take the approach tested under this project to scale. This is largely a consequence of the design of the Project Document which does not identify in clear terms the mechanism through which the MT approach will be replicated elsewhere and the role of MoEFCC in the process. The MT Project Document has a significant focus on the Jharkhand and Manipur states and seems to have neglected somehow the replication process in other states and the essential role of federal institutions, especially MoEFCC.

The greatest challenge for this project has been the delay in the kick-starting of activities. First, there has been an overall delay in getting activities started in general. Second, activities in the state of Manipur have not started fully yet. The reason for this has been the lack of clearance from DEA despite repeated attempts made by the project team, including three LPAC meetings organized on this matter in 2017 and 2018. At the time of the MTR mission (March 2019), only one project Steering Committee meeting had taken place (a second meeting took place shortly after the MTR mission). Further, certain stakeholders interviewed for this review noted that national institutions at the federal level could have played a more active role in providing for clearance for project activities in Manipur. Another challenge was the fact that project AWPs were not signed for 2016, 2017 and 2018 (only the AWP for 2019 has been signed), which has made it difficult for the project team to get the right amount of support and guidance for the implementation of project activities.

In response to these challenges, the project team was able to redefine priorities and engage in activities that were relevant in the emerging situation. The focus of activities has been the state of Jharkhand where there has been a dynamic situation with a number of partners involved in project

activities, including the state government (especially, JREDA and the Department of Environemnt, Forest and Climate Change), community and livelihood groups (especially, the cooperatives that have benefited from project initiatives such as the cold storage rooms), industry association (JSIA, ASIA etc) research institutes, NGOs, private sector entities, etc. UNDP's partnership with JREDA has resulted in agreements to pursue clean energy development (a strategic roadmap for clean energy deployment plan developed by UNDP for the State of Jahrkhand till 2022). Although there have been some delays in gaining JREDA approval on pilot initiatives, successful implementation of RE and EE projects in the state of Jharkhand have resulted in greater coordination with JREDA. The Project Management Unit in Jharkhand has been housed in JREDA and the PMU supports climate change activites of Forest Department as well, which has ensured close cooperation between the project and key partner at the state level. UNDP has provided an appropriate level of support to the project team. In particular, no delays were noted in the transfer of funds and no shortcoming were detected in the conduct of monitoring activities. Where the UNDP Country Office could have been more proactive is in working with the respective government agencies in obtaining the necessary clearances for project activities to start in the Manipur state.

Overall, the monitoring and reporting system that has been used by the project has been effective and has been implemented well by the project stakeholders. The project team has followed the common M&E template developed under the project and used standard tools such as risk logs which have been updated accordingly. The National Project Manager has been closely involved in project activities and working closely with the Jharkhand PMU. He has been providing substantive support by discussing the progress and problems, assisting with advice and monitoring project activities. The project could have tracked more effectively a number of crucial parameters, such as the uptake of outputs (studies, training, etc.) and the degree to which they have served their intended purpose, the degree to which the capacity of participants in the various training programmes improved, the experience of infrastructure initiatives, the lessons they generate and the extent to which they get scaled up, etc. The project should monitor co-financing more effectively by improving the tracking system at the infrastructure project level.

Overall, the project has focused on prioritizing suitable technology options for the Jharkhand state, developing investment-ready proposals, mapping opportunities for financing clean energy projects, budgeting for climate change concerns and faciliting the discourse on clean energy. Targeted advocacy was carried out to push for a policy on energy efficiency for public buildings (e.g. promoting energy conservation in public building through ESCOs), operationalizing net metering for solar rooftop, implementing innovative business models like RESCO for solar rooftop etc. The project team in Jharkhand has demonstrated significant achievements. In particular, the project team has been active in attempting to spur private-sector investment through initiatives with the goal of countering what can be perceived as a lack of investor interest, over-dependency on government subsidies, as well as doubts over the viability of RE and EE technology implementation. In Manipur some preparatory activities have taken place, despite the lack of approvals for the fully-fledged start of activities.

In terms of efficinecies, the project's budget execution rate for all years has been between 90 and 100%. Overall, administrative (project management) costs have been low, averaging about 5% of total project expenditure for the three years of project implementation, which is an indication of good efficiency. The main challenge with this project when it comes to delays has been the major delays getting off the ground in Manipur, as well as approval delays in Jharkhand. There have also been delays in hiring members of the project management team. Regardless, despite the approval delays in Jharkhand, the project team was successful in productively utilizing the interim period to generate investor interest in the project through a variety of interventions and activities. As far as cooperation and coordination between UNDP projects in the area of climate change mitigation and community development is concerned, interviewees for this review pointed to limited coordination of activities. One ongoing project that is particularly relevant and complementary to MT is the the "Scale-up of Access to Clean Energy for Rural Productive and Domestic Use" project, known in UNDP India as the ACE project. This project is particularly relevant to the MT project because it has a similar focus in terms of objectives and activities, but in different states.

As far as sustainability is concerned, one area of primary focus for the project should be the sustainable financing of EE/RE projects. The existing subsidy policy for energy efficiency investments in Jharkhand has created deep expectations about financing for EE/RE projects. The recent phase-out of the subsidy policy represents a challenge for these types of projects, because the expectations of the population and market players have become engrained in this policy. The key challenge for the project is moving from grants-based solutions, which has been the main financing modality, towards the establishment of more sustainable market-based mechanisms that involve the banking sector for the financing of these project initiatives. Only this will create the necessary stability and sustainability of these mechanisms. Although some concessional funding has been made available through international credit lines, no market-based loan mechanism is readily available yet for these kinds of project initiatives. In this context, the project should place greater focus on working with the banking sector (both public and private) on developing financial products for solar and energy efficiency projects. This work should involve the whole banking chain from Delhi down to the local branches at the state level.

The project's sustainability from a governance and institutional perspective is related to its replicability and scalability. The intended design of the pilot projects is to showcase how such systems could be made self-sustainable and replicable, driven largely by markets rather than the subsidy. The project has made numerous efforts to demonstrate the potential of replicability and scalability of RE and EE solutions in the state of Jharkhand. Suitable technologies and business models have been identified to impress upon JREDA, as well as relevant ministries at the national level, the feasibility of these project initiatives. The main challenge here is how to ensure that these technologies and approaches are replicated in other states. If some of the pilots will be replicated in other states, the central government has to take a more proactive role in the project.

Further, the project's logic is not based on solving specific problems in a one-off manner, but by training the necessary personnel to develop the skills necessary to provide a long-term solution. A

significant number of awareness raising and training events have been conducted by the project. The key question here is what has been the level of uptake (or absorption) among the recipients of these trainings. This is something that the project team should be able to track more effective in the remainder of the project. Also, it is important to understand the extent to which people view solar-energy and other RE/EE solutions favorably and as a feasible means of energy generation. Further, cooperation between departments is key, and communication between institutions at the national and sub-national level will need to be strengthened to ensure long-term sustainability.

With regards to gender and attention to the needs of vulnerable groups, the MT project has followed a human rights approach by targeting vulnerable groups and regions and addressing the rights of women, poor, etc. One potential improvement from the project team would be a more detailed discussion on the gender aspect of this project. For example, in the tracking of results and reports, there is potential to discuss how the project benefits women (for example in terms of beneficiaries of project initiatives, training and education in RE and EE energy implementation, hiring and training of meter-readers, etc.).

The following is the project's rating in this evaluation.

Monitoring and Evaluation	
Overall quality of M&E	MS
M&E design at project start up	S
M&E Plan Implementation	MS
IA & EA Execution	
Overall Quality of Project Implementation/Execution	MS
Implementing Agency Execution	MS
Executing Agency Execution	MS
Outcomes	
Overall Quality of Project Outcomes	MS
Relevance	HR
Effectiveness	MS
Efficiency	MS
Sustainability	
Overall likelihood of Sustainability:	ML
Financial resources	ML
Socio-economic	L
Institutional framework and governance	ML
Environmental	L
Overall Project Results	MS

This evaluation makes the following recommendations:

Recommendation 1: Reassess the Situation in Manipur and Chart the Way Forward

This MTR of the MT project has identified a number of critical issues which will require a clear decision on the way forward. This is the right point in time for project stakeholders, and in particular the Steering Committee, to chart a path for the remainder of the project's lifetime. The following are the most crucial issues on which project stakeholders should focus:

- First of all, the project team and Steering Committee should carefully assess the Manipur component of the project. Now that the necessary clearances for initiating full-scale activities in Manipur have been obtained, the question is what activities should the project team undertake there. Given the limited amount of time available, the project team should conduct an assessment of what is feasible to achieve in Manipur in terms of activities that are in line with the nature of this project and based on the experience of Jharkhand.
- Subsequently, based on the results of the Manipur assessment, the project team should develop a clear and realistic work plan for the Manipur component which needs to be approved by the Steering Committee. This plan should include both the approach that will be taken and the list of activities that will be conducted in Manipur.
- The Manipur assessment and work plan will provide a clearer picture of the timeframe that will be required for the completion of all project activities. This should be the basis for any decision on the extension of the project. As things stand out, an extension seems inevitable if a strategic decision is made by project stakeholders and the Steering Committee to proceed with the implementation of the Manipur component.[1] The timeframe for the extension should be determined on the basis of the Manipur assessment and ensuring work plan.
- The project team should start an intensive process of engagement with relevant players in Manipur (government, civil society, private sector, etc.) and the Steering Committee should be expanded to include relevant members from Manipur.
- Given the limited timeframe for the completion of a number of key activities and the need for intensifying the pace of activities in Manipur, it is recommended that the Steering Committee meets more frequently for the remainder of the project. At least a meeting every six months is highly recommended.
- Quickly mobilizing a fully-fledged team for Manipur will be crucial for the project. It might be difficult for the project to find experienced staff members in Manipur who are not only versatile with the specifics of the RE and EE sector, but also familiar with UNDP rules and procedures. If that will be the case, the project might consider shifting human resources from Jharkhand to Manipur by using financial incentives for staff to move from one state to the other.

[1] The key assumption that is made here is that the clearance provided by the authorities for the start of Manipur activities is definite and with immediate effect.

Recommendation 2: For the Remainder of the Project Focus on Key Issues

There are a number of key issues on which the project could focus in the remainder of its lifetime. This MTR has identified a few of those issues. The evaluators would recommend the following:

- It would be advisable to revise the project RRF, given the challenges that some of the targets present – especially at the outcome level, as discussed in this report. The revision of the RRF should be done in a way that takes into account what is feasible in Manipur and also what the project will aim to achieve there.
- MoEFCC needs to play a more crucial role in leading project activities through the Steering Committee. New Annual Work Plans that will include Manipur will have to be swiftly approved.
- With the help of the project team, MoEFCC should also consider different options for the scaling up of the initiatives and demonstrations promoted by the project. MoEFCC has an important role to play in this process because it is the entity that can forge cooperation across states and ensure that the models and approaches tested and promoted by the project will cross state borders and get absorbed elsewhere.

Recommendation 3: Strengthen the Sustainability of Project Initiatives

The project team should examine more closely the issue of sustainability of the various project initiatives it has been promoting for demonstration purposes. What is crucial here is to set these initiatives on market-based foundations. This will require moving away from grants and promoting financing from the banking/financial sector which is the only sustainable option in the long run. This will require a continuation and intensification of the project's engagement with the banks and financial institutions not only at the state level, but also on a national scale. MoEFCC and the UNDP CO can play a major role here by contributing through their advocacy efforts in Delhi. The project team needs to develop a clear action plan for this area, which also identifies specific tasks for MoEFCC and the UNDP CO at the national level.

Recommendation 4: Strengthen Synergies and Linkages between Projects

UNDP and MoEFCC should strengthen collaboration and linkages between the MT project and other technical assistance projects under their leadership, particularly the ACE project. Where feasible, they should establish more integrated frameworks not only for sharing lessons and good practices, but also for project planning and implementation where feasible.

In general, UNDP should explore the establishment of mechanisms for managing more closely together aspects of projects that share similar objectives, especially when the state level is concerned. Such mechanisms may involve not only integrated implementation of activities related to information sharing and data systems, but also joint implementation tools related to training, awareness raising, planning, monitoring and evaluation, etc.

Recommendation 5: Using the M&E System to Track Important Parameters

The project team should examine how the M&E system is used to track important aspects of the project with a view to improving the availability of information for management purposes. The following are a few dimensions worth considering.

- *Uptake of project outputs (studies, training, etc.) and the degree to which they serve their intended purpose* – The project should monitor more systematically the extent to which project activities related to research and training get absorbed by beneficiaries.
- *Capacity of stakeholders/beneficiaries* – The project should track the degree to which the capacity of participants taking part in the various training programmes organized by the project has improved.
- *Experience of infrastructure project initiatives, lessons they generate and the extent to which they get scaled up* – It might be a bit too early to talk about replication of infrastructure projects, but one characteristic of them is that they serve to produce lessons which when shared may lead to replication in other locations. They can be vehicles for transmitting experience and play a crucial role for upscaling and replication. However, it is not clear how their lessons are collected, analyzed, synthesized and shared by the project. This requires more systemic thinking and actions. The project should develop a tracking mechanism for pilot initiatives, including documenting results, lessons, experiences and good practices.
- *Co-financing* – The project should track more effectively co-financing by implementing partners and also co-financing by beneficiaries for infrastructure projects. The project team might consider the establishment of a monitoring database for this purpose.

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ACRONYMS AND ABBREVIATIONS

ASAs	Assigned State Agencies
AWP	Annual Work Plan
BEE	Bureau of Energy Efficiency
BRH	Bangkok Regional Hub
BTOR	Report/Back to Office Report
CDR	Combined Delivery Report
CO	Country Office
CPAP	Country Programme Action Plan
CSOs	Civil Society Organizations
DAC	Development Assistance Committee
EEFP	Energy Efficiency Financing Platform
EESL	Energy Efficiency Services Limited
FACE	Fund Authorization and Certificate of Expenditures
FEEED	Framework for Energy Efficient Economic Development
GEF	Global Environment Facility
GoI	Government of India
JREDA	Jharkhand Renewable Energy Development Agency
M & E	Monitoring and Evaluation
MANIREDA	Manipur Renewable Energy Development Agency
MNRE	Ministry of New and Renewable Energy
MoEFCC	Ministry of Environment, Forest and Climate Change
MREDA	Manipur Renewable Energy Development Agency
MSDA	The Manipur State Development Agency
MTEE	Market Transformation for Energy Efficiency
MTR	Mid-Term Review
NAPCC	National Action Plan for Climate Change
NIM	National Implementation Modality
NMEEE	National Mission on Enhanced Energy Efficiency
NMSH	National Mission on Sustainable Habitat
NPD	National Project Director
NSM	National Solar Mission
NSM	National Solar Mission
OECD	Economic Co-operation and Development
PAT	Perform, Achieve and Trade
PIR	Project Implementation Reviews
PMU	Project Management Unit
PPR	Project Progress Report
PSC	Project Steering Committee
QPR	Quarterly Project Reports
RRF	Results and Resources Framework

SAPCC	State Level Action Plans on Climate Change
SEC	Specific Energy Consumption
SECI	Solar Energy Corporation of India
SERCs	State Electricity Regulatory Commissions
TAC	Technical Advisory Committee
TE	Terminal Evaluation
UNDP	United Nations Development Programme

1. INTRODUCTION

This report presents the main findings of the Mid-term Review (MTR) of the "Market Transformation and Removal of Barriers for Effective Implementation of the State-Level Climate Change Action Plans" (MT) project. The review was commissioned by UNDP India and was carried out during March-April (including a field mission on 18-22 March 2019) by a team of two independent experts. This chapter provides an overview of the MTR's objectives and methodology employed for the collection of information and analysis of the data.

1.1. Purpose of the MTR

This MTR of the MT project was conducted at mid-point of project implementation with the goal of determining progress towards the achievement of outcomes and identifying potential corrections of project's course if needed. The MTR is focused on the relevance, effectiveness, efficiency, sustainability and timeliness of project implementation, highlights issues requiring decisions and actions, and presents initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the remainder of the project's term.

More specifically, the MTR was conceived and conducted with the following specific objectives in mind:

- To assess overall project performance against project objectives and outcomes as set out in the Project Document, the Logical Framework, and other related documents;
- To assess the extent to which results have been achieved, partnerships established, capacities built, and cross cutting issues such as gender equality addressed;
- To establish whether the project implementation strategy has been optimal and recommend areas for further improvement and learning;
- To identify gaps and weaknesses in the project design and provide recommendations as to how it may be improved for the remaining implementation period;
- To assess project strategies and tactics for achieving objectives within established timeframes;
- To critically analyze the project's implementation and management arrangements;
- To provide an appraisal of the project's relevance and efficiency of implementation;
- To review and assess the strength and sustainability of partnerships with government bodies, civil society, private sector and international organizations;
- To assess the gender aspects of implementation and results;
- To draw lessons that may help improve the selection, design and implementation of project activities in the remainder of the project's lifetime; and,
- To provide the project team and partners with feedback on issues that are recurrent and need attention, and on improvements regarding identified challenges;

The results of this MTR are intended to:

- Support the decision making of the project team and stakeholders on: i) implementation modalities of the present stage, and ii) strategic planning of activities in the remainder of the project's lifetime; and,
- Provide the project team, government counterparts, UNDP Country Office (CO) and Global Environment Facility (GEF) with lessons from this particular project on overall project implementation and delivery, including potential corrective/adaptive measures that need to be applied to project interventions to enhance their effectiveness, efficiency, relevance and sustainability prospects.

1.2. MTR's Scope and Methodology

The MTR's scope encompasses all activities from the project's start date, indicated in the Project Document as September 2015, to the point of review (March/April 2019). The Terms of Reference (ToR) where the scope and main steps of the MTR process were laid out are attached in Annex I of this report.

Key issues at the center of the MTR are:

- Project design and its effectiveness in achieving stated objectives;
- Assessment of key financial aspects, including planned and realized budgets, financing, etc.;
- The project's effectiveness in building the capacity of local institutions and strengthening policy framework to promote sustainable livelihoods and development;
- Strengths and weaknesses of project implementation, monitoring and adaptive management and sustainability of project outcomes including the project's exit strategy; and,
- Recommendations, lessons learned, best practices that may be used further in the project or in future interventions.

The MTR applied OECD DAC criteria[2] and definitions and followed norms and standards established by the United Nations Evaluation Group. It was guided by the requirements set forth in UNDP's evaluation toolkit, and in particular the "*Handbook on Monitoring and Evaluation for Development Results*"[3] and "*Guidance for Conducting Mid-Term Reviews of UNDP-supported, GEF-financed Projects*".[4]

The methodology was based on mixed methods and involved the use of commonly applied evaluation tools such as documentary review, interviews, information triangulation, analysis and synthesis. A participatory approach was taken for the collection of data, formulation of

[2] Criteria for evaluating development assistance: relevance, effectiveness, efficiency, sustainability and impact of development efforts.
[3] http://web.undp.org/evaluation/handbook/documents/english/pme-handbook.pdf
[4] http://web.undp.org/evaluation/documents/guidance/GEF/mid-term/Guidance_Midterm%20Review%20_EN_2014.pdf

recommendations and identification of lessons learned. MTR activities were organized according to the following stages: i) planning; ii) data collection; and, iii) data analysis and reporting. Figure 1 below shows the three stages and the main activities under each of them.

Figure 1: Stages of MTR

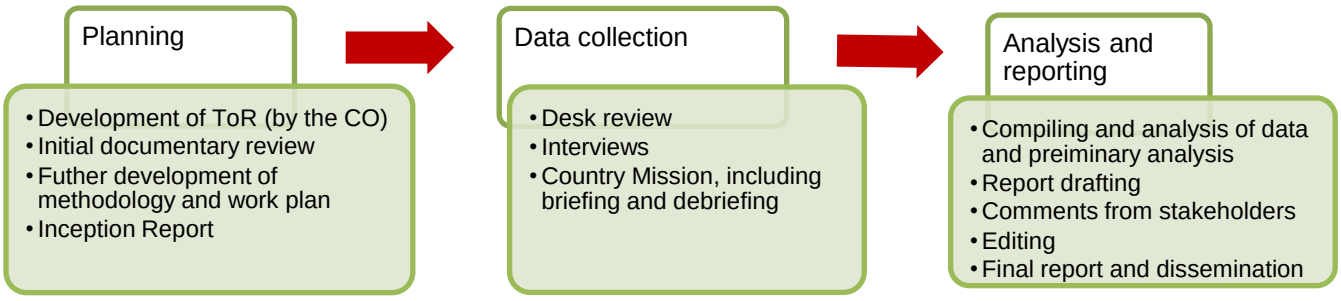


Table 1 further details the main activities that were undertaken under each stage.

Table 1: MTR Steps

I. Planning • Development of the ToR (by the project team) • Teleconference discussion and finalization of work plan • Collection and revision of project-related documents • Formulation and submission of inception report
II. Data Collection • Further collection of project related documents (home based) • Mission preparation: agenda and logistics • Country Mission • Interviews with key stakeholders • Mission debriefings & Mission report summary
III. Data analysis and reporting • In-depth analysis and interpretation of data collected • Follow-up interviews • Develop draft MTR report • Circulate draft report with project team and stakeholders • Integrate comments and submit final report

MTR Planning

The planning and preparation phase included the development of the ToR by the UNDP CO and the design of the MTR framework which was presented in an inception report. The MTR team further developed interview guides for interviews with stakeholders.

Data Collection

The data collection process involved a comprehensive desk review of project documents and semi-structured interviews with stakeholders and partners.

- ***Desk Review*** - The MTR team started by analyzing relevant documents, project documents and progress reports, as well as country development policies and strategies. Documents from similar and complementary initiatives, as well as reports on the specific context of the project will form part of the analysis.
- ***Semi-structured Interviews*** – The MTR in-country mission took place in March 2019. In the course of this mission, the evaluators held meetings with project stakeholders in Jharkhand and Delhi. Also, site visits were conducted in the state of Jharkhand. For reasons that will be discussed in more detail further in this report, a field trip to Manipur was not possible.
- ***Open-ended questions*** were used to enable interviewees to express their views freely and raise the issues they considered most important. A questionnaire was designed to guide the semi-structured interviews and ensure that questions would be investigated consistently across all interviews (the questionnaire can be found in Annex III). A full list of people that were interviewed was developed in cooperation with the CO and project team.

Data Analysis

Information obtained through the documentary review and interview process was triangulated against available documented sources, and then synthesized using analytical judgement. The method of triangulation is depicted in Figure 2 below.

Figure 2: Method of Triangulation

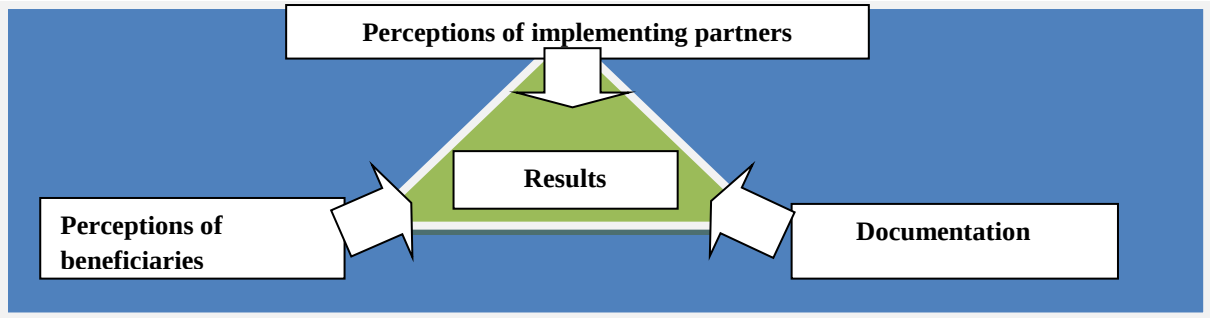
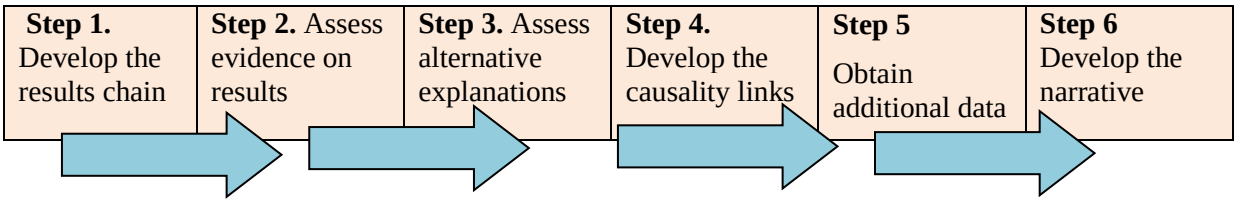


Figure 3 shows the steps taken for the analysis which was conducted on the basis of the standard criteria of relevance, effectiveness, efficiency, and sustainability (see Annex II for a more detailed list of questions used for the analysis of information).

- ***Relevance,*** covering the assessment of the extent to which outcomes are suited to local and national development priorities and organizational policies, including changes over time;

- ***Effectiveness,*** covering the assessment of the achievement of the immediate objectives (outputs) and the contribution to attaining the outcomes and the overall objective of the project; and an examination of the any significant unexpected effects of the project (either of beneficial or detrimental);
- ***Efficiency,*** covering the assessment of the quality of project implementation and adaptive management; adequacy of planning and financial management; the quality of monitoring and evaluation; the contribution of implementing and executing agencies in ensuring efficient implementation;
- ***Sustainability,*** covering likely ability of the intervention to continue to deliver benefits for an extended period of time after completion.

Figure 3: Steps in Analysis Process



The analysis starts with the construction of the results chain, which is subsequently used to assess the collected evidence. Alternative explanations are considered, on the basis of existing data, and causality links are identified. After the collection of additional information, the final evaluation narrative is developed. The analysis covers aspects of project formulation, including the extent of stakeholder participation during project formulation; replication approach; design for sustainability; linkages between the project and other interventions within the sector or in the targeted locations; adequacy of management arrangements, etc.

Table 2 shows the six-scale rating system used to rate the various dimensions of this review.

Table 2: Rating Scale

Rating for the assessment of Relevance, Effectiveness and Efficiency	
HS	Highly Satisfactory: The project has no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency
S	Satisfactory: The project has minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency
MS	Moderately Satisfactory: The project has significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency
MU	Moderately Unsatisfactory: The project has major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency
U	Unsatisfactory: major problems
HU	Highly Unsatisfactory: The project has severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency
Ratings for sustainability assessment	
LS	Likely sustainable: negligible risks to sustainability
MLS	Moderately Likely sustainable: moderate risks
MUS	Moderately Unlikely sustainable: significant risks

Additional	
N/A	Not Applicable
U/A	Unable to Assess

The following Indicator Assessment Key is used:

- Green = Achieved
- Yellow = On target to be achieved
- Red = Not on target to be achieved

1.3. MTR Limitations

All possible efforts were made to minimize any limitations of this review. Overall, the MTR team received all the necessary support from the UNDP CO and implementing partners and access to project-related data and information. The field mission in the Jharkhand state was well-organized and attended, thanks to the support of UNDP CO, the project team, and the respective authorities. A visit in the state Manipur was not possible, given that activities in this state had not started properly at time of the conduct of the evaluation (as will be explained in more detail further in this report).

1.4. Structure of the Report

The current chapter provides an overview of the MTR's objectives and methodology. The second chapter provides a description of India's development context and a description of the project. The third chapter presents the main findings of the report and consists of three parts: the first part assesses key aspects of project design and formulation; the second part focuses on implementation issues; and, the third part presents an assessment of the results achieved by the project along the standard dimensions of relevance, effectiveness, efficiency and sustainability. The fourth chapter summarizes the main conclusions and identifies key "lessons learned" drawn from the experience of this project and the last (fifth) chapter provides a set of recommendations for the consideration of project stakeholders. Additional information supporting the arguments made throughout the document is provided in the annexes attached to this report.

2. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

2.1. Project Summary

The project entitled "Market Transformation and Removal of Barriers for Effective Implementation of the State-Level Climate Change Action Plans" has as its overall goal the reduction of GHG emissions in the Indian states of Jharkhand and Manipur. As can be surmised from the title, the project is aimed at transforming the market and remove barriers to the successful implementation of GHG reduction measures.

This project is part of India's multi-pronged and long-term strategy for dealing with climate change. As the world's second largest country and fourth largest consumer of electricity, climate-change issues are at the forefront of India's concerns for the future.[5] The Government of India (GoI) launched in 2008 the National Action Plan for Climate Change (NAPCC), which represents a multi-pronged, long-term and integrated strategy for achieving key climate change goals: namely, "achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, leading to further mitigation of greenhouse gas emissions", and "devising efficient and cost-effective strategies for end-use demand-side management". NAPCC articulates eight national missions, whose goal is to devise efficient and cost-effective strategies for addressing climate change. These eight missions aim to achieve national growth objectives by focusing on end-use demand-side management and achieving ecological sustainability. The eight national missions are:

1. National Solar Mission (NSM): The NSM aims at increasing the share of solar energy in the total energy mix through the development of new solar technologies, while expanding the scope of other renewable and non-fossil options such as nuclear energy, wind energy and biomass
2. National Mission on Enhanced Energy Efficiency (NMEEE): The NMEEE comprises of four initiatives to enhance EE in the country:
    a. Perform, Achieve and Trade (PAT): a national market mechanism where each designated consumer is given a specific energy consumption (SEC) target to meet over a period of three years;
    b. Market Transformation for Energy Efficiency (MTEE): an initiative to make EE products more affordable on the market;
    c. Energy Efficiency Financing Platform (EEFP): a plan to help finance demand-side management programmes in all sectors by capturing future energy savings;

[5] India is also the fourth largest energy consumer in the world, accounting for nearly 4.7% of the world's total energy consumption in 2013. Most of this energy is thermal in nature, with coal predominating as the primary energy source (59%), followed by oil (mostly imported). However, India's per capita energy use is around 614 kgoe4 /year, roughly a third of the world average and one-eighth of the average per capita energy consumption in OECD countries. With India's rising population and growing development needs, India's energy needs are only expected to grow.

    d. Framework for Energy Efficient Economic Development (FEEED): a development plan targeting fiscal instruments to promote energy efficiency.
3. National Mission on Sustainable Habitat (NMSH): The NMSH aims to make the habitat sustainable through enhancement of EE in buildings, effective solid waste management, and modal shift to public transport.
4. National Water Mission: The mission is to ensure integrated water resource management helping to conserve water, minimize wastage and to ensure more equitable water distribution both across and within the state.
5. National Mission for Sustaining the Himalayan Ecosystem: This mission is to ensure management measures for sustaining and safeguarding the Himalayan glacier and mountain ecosystem.
6. National Mission for a Green India: This mission aims to enhance eco system services and to rehabilitate degraded forest land through the guidance of the Department of Forest in states.
7. National Mission for a Sustainable Agriculture: This mission strives to devise strategies to make Indian agriculture more resilient to climate change.
8. National Mission on Strategic Knowledge for Climate Change: The mission seeks to build a dynamic and vibrant knowledge system that informs and supports national policy and action for responding effectively to climate change challenges, while not compromising on the nation's growth goals.

NAPCC encourages planning and coordination at different levels, especially state (sub-national) level. States and Union Territories of India have prepared the State Level Action Plans on Climate Change (SAPCCs), which define state-level objectives and strategies that are aligned with the objectives of the NAPCC.

In this context, the aim of the MT project is to promote energy efficiency and Renewable energy based climate-change mitigation actions identified in the State-level Action Plans on Climate Change (SAPCC) in the two states of Jharkhand and Manipur. The development objective of the project is to stimulate implementation of climate change mitigation actions stated in the State Action Plan on Climate Change (SAPCCs); maximize the benefits through exploring inter-state cooperation; showcase the actual implementation of SAPCCs; demonstrate institutional mechanisms for inter-state networking and cross-learning, including information sharing and technology dissemination; and develop and implement a common monitoring system to assess progress on the SAPCCs in the two states.

Box 1 below presents a recap of the main aspects of the MT project, which is funded by GEF and implemented by UNDP.

Box 1: Project Summary

Implementing Agency:	UNDP
Grant Size	US$ 3,744,500
Implementing Partner:	MoEFCC
Other Key Partners:	Government of Jharkhand and Government of Manipur
Programme Period:	September 2015 – August 2019
Co-financing:	Government parallel $ 24,500,000 UNDP $ 500,000 Total Co-financing $ 25,000,000 Private Sector leveraged funds $ 5,000,000
Target areas:	States of Jharkhand and Manipur
Sector/Sub-sector:	Renewable Energy (RE) and Energy Efficiency (EE) development. Agriculture, industrial production, resource extraction.
Beneficiaries:	Public and Private entities in the states of Jharkhand and Manipur

2.2. Problems Addressed by the Project

Within the overall framework of the NAPCC, GoI is encouraging planning and coordination at different levels to most effectively meet the challenges of climate change in local socioeconomic and ecological contexts. This is been manifested in SAPCCs, whose goal is to decentralize approaches to developing and implementing state-specific solutions. While greater synergy and coordination between NAPCC and SAPCCs is required, SAPCCs hold immense potential as an important tool to integrate and mainstream climate change mitigation and adoption strategies into state development planning. Thus far, 24 states (at the time of this report's writing) have prepared and submitted SAPCC documentation to the MoEFCC, among whom the states of Jharkhand and Manipur which are the focus of this report.

JHARKHAND

Jharkhand is a new state in Eastern India and was formed in 2000. It was bifurcated from the southern part of Bihar. Jharkhand is endowed with mineral wealth as well as adequate water resources, a relatively modest climate and a very fertile land providing tremendous scope for horticulture and floriculture. Jharkhand is located in Eastern India and covers an area of 79,714 km and is the 13th most populous state in India. Jharkhand's mineral wealth makes up 40% of total mineral deposits in the country, and includes coal, iron ore, copper, uranium, mica, bauxite, granite, limestone, silver, graphite, magnetite and dolomite. Despite this mineral wealth, Jharkhand is plagued with a high rate of poverty (36% of the population lives below the poverty line, in comparison to 21% of India's total population). Jharkhand's literacy rate is 66.41% and below average for India, while access to electricity is 45.8%. The major challenge among state policy makers is to provide access to energy and eliminate energy poverty to harness the full economic and socio potential of the state. Agriculture contributes 26.33% while the service sector contributes 43.70% to the state economy.

Given the importance of electricity for industrialization and for improving the quality of life for the people of Jharkhand, the state is placing a high priority on setting up conventional and renewable power generating units in order to achieve uninterrupted power supply in the entire state while meeting its environmental objectives. Urban and rural electrification plans are a priority, with the particular problem of providing quality power with non-fluctuating voltage and frequency being a foremost issue. The state has not yet developed any concrete plan for the design and implementation of energy efficiency measures in sectors like buildings, domestic, industry, municipal and agriculture. To improve the supply of electricity, there is a need for demand-side management programs. Despite this need, the state has a long way to go to develop non-conventional sources of energy using clean technology through private participation. The development of renewable sources such as grid-connected solar and wind, roof-top solar, biomass and micro-hydro are a major focus of the SAPCC for the State of Jharkhand.

Figure 4: Map of Jharkhand

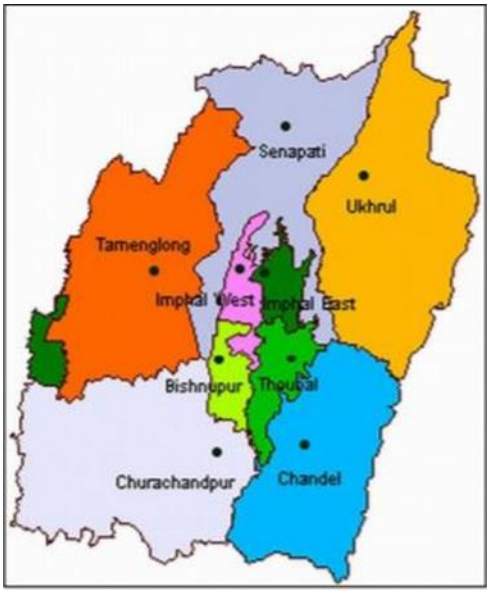
MANIPUR

Manipur is a hill state situated in the eastern-most corner of Northeast India. It covers an area of 22,327 km and shares borders with other North-eastern states (Nagaland, Mizoram and Assam) as well as the neighbouring country of Myanmar. Natural forest covers about 64% of the total area of Manipur and agricultural continues to be the backbone of the economy of the state. Almost 50% of the population is engaged in agriculture and this industry contributes 26.93% to the state's GDP and employs 60% of the working population. The industrial and manufacturing sections contribute 25,15% while services make up 47.92% of the State's GDP. Regardless, these two sectors are seen as unsustainable and non-viable due to low-capital base and there is significant focus on developing Manipur's agricultural sector due to varied agro-climatic conditions. Manipur has a

high literacy rate of 79.21% but suffers from a high poverty rate of 36.89%. Manipur also lags behind in state infrastructure development.

Manipur suffers from a lack of energy independence and is primarily dependent on energy allocations from the central government and from outside the state. Almost 99% of Manipur's energy comes from Central Sector Generating Stations, and diversification of its energy mix through independently produced renewable energy is crucial for the state. In additional, there is a need to plan and implement energy efficiency and renewable energy projects with the active participation of stakeholders like financial institutions, private sector, vendors, technology providers, Energy Service Companies and research institutions. The promotion of renewable energy initiatives and engagement by shareholders is a major focus of the SAPCC for the State of Manipur.

Figure 5: Map of Manipur



The MT project is designed to address major barriers to the implementation of SAPCCs for the States of Jharkhand and Manipur, which include:

- ***Awareness Barrier:*** Limited awareness of capacity of state-level institutions and stakeholders on issues related to climate change mitigation. The limited know-how and shortage of relevant experts and manpower is proving to be a major hindrance to the implementation of the SAPCC. The role of stakeholders in the implementation of SAPCC is not clearly defined, there is limited awareness of climate change mitigation technologies (both RE and EE) including the associated cost-benefits.
- ***Framework Barrier:*** There is no appropriate institutional and incentive policy framework for adoption of climate change mitigation technologies and strategies. This is further exacerbated by conflicting state priorities, weak cohesion between institutional and inceptive structures for

adoption of climate change mitigation strategies, and no cross-learning between centre and states or for cross-sectoral collaboration and coordination.

- ***Funding Barrier:*** There is limited participation and investment of the private sector due to the risks associated with lack of information exchange regarding RE and EE interventions. Existing ESCOs are trying different models of implementation of EE, but business operations are not sustainable without external funding support.
- ***Research Barrier:*** A lack of data and research on GHG abatement cost curves means that full implementation of the SAPCC is impossible without proper research. This process is not even foreseen in the near future, and without this analysis, cost-effective interventions in EE and RE cannot be selected and prioritized by the states and project developers.
- ***Technology Barrier:*** A lack of EE and RE technology suppliers and equipment manufacturers in the states prevents reaching the full goals of the SAPCC. This is further aggravated by the lack of any implementation framework.
- ***Institutional Barrier:*** Limited capacity of state-level institutions to integrate and link climate change considerations within their programmes and state budgets (such as creating slate clean energy funds for deployment of low-carbon technologies, soft loans routed through public banks, etc.) prevent economic planning and programmes and the sub-national level. Financial institutions, especially at the sub-national level, have limited knowledge of proven climate change mitigation technologies and strategies.
- ***Private-Sector Barriers:*** Due to high interest loan rates, private sector is quite limited in the design, implementation, monitoring, evaluation and review of interventions. Private investors are not confident about performance-based payments (preferential tariffs, for example) for EE projects.
- ***Regulatory Barriers:*** Inadequate regulatory incentives to encourage private investment through suitable and affordable financing has led the Indian government to subsidize fossil-fuels. In 2011, this amounted to 3.4% of GDP and have proven a huge burden for the government as they encourage wasteful energy consumption, deter investments in energy efficiency and infrastructure, and reduce incentives for renewable energy technologies.

2.3. Project Objective and Outcomes

The objective of the MT project is the reduction of GHG emissions through implementation of RE and EE solutions at the state level. This will be achieved by removal of the key barriers that prevent effective implementation of SAPCCs, with focus on developing RE and EE. Project benefits are expected to primarily consist of the reduction of GHG emissions in the short-term, with less tangible long-term co-benefits in the form of improved state capacities in implementing RE and EE measures and incorporation of climate change mitigation actions in state development plans. Major project outcomes and outputs are presented below:

Outcome 1: Successful and sustainable implementation of priority CCM actions on energy generation and application of EE and RE technologies in the major energy end-use sectors in selected states.

- Output 1.1: Regularly updated GHG abatement cost curves at state level
- Output 1.2: Selected prioritized RE and EE actions listed in Manipur and Jharkhand Action Plans on Climate Change for implementation
- Output 1.3: Designed and implemented common monitoring, reporting, and verification (MRV) system for the selected RE and EE actions of the Manipur and Jharkhand APCC, in a way to feedback into the SAPCC process

Outcome 2: Enhanced states capability and capacity for identifying, designing, planning, financing and implementing selected RE and EE mitigation actions from their SAPCC.

- Output 2.1: Completed evaluation of existing available loan mechanisms for projects developed as part of SAPCC targets
- Output 2.2: Implemented non-grant financing instruments such as flexible debt finance (including long tenure low-interest loans)
- Output 2.3: Mobilized public and private sector funding
- Output 2.4: Established public private partnerships (PPP) for implementations and scaling up of selected RE and EE actions in Manipur and Jharkhand
- Output 2.5: Implemented nine RE and EE investment projects in Manipur and Jharkhand
- Output 2.6: Completed implementation manual and workshops for supporting the implementation of selected public private partnership models for RE and EE actions

Outcome 3: Enhanced technical capability of state government in integrating climate change concerns within sectoral development plans and budgets and undertaking MRVs efficiently for SAPCC actions, facilitated inter-state learning and coordination for SAPCCs

- Output 3.1: Aligned state sectoral budgets for development plans to include climate change mitigation actions related expenses
- Output 3.2: Completed training and capacity building programs on the developed MRV systems for the State officials
- Output 3.3: Established institutional mechanism for interstate exchange of information and technology dissemination for Manipur and Jharkhand for implementation of SAPCC mitigation actions
- Output 3.4: Conducted inter-state study trips and stakeholder interaction workshops
- Output 3.5: Established and operational information dissemination system on lessons learnt from investment projects undertaken on priority RE and EE actions

2.4. Project Implementation Arrangements

As already mentioned, the project was designed to be implemented in the two states of Jharkhand and Manipur, under the aegis of India's Ministry of Environment, Forests and Climate Change (MoEFCC). Overall, UNDP interventions have been focused in nine Indian states with the highest proportion of people living in poverty—Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan and Uttar Pradesh. Among these, the states of Jharkhand and Manipur are the targeted states of the MT project.

Based on the Project Document, the GoI was designated as the project's implementing partner under the National Implementation Modality (NIM). UNDP was designated to provide overall management support through its New Delhi Country Office (CO) and technical guidance from its Bangkok Regional Hub (BRH). MoEFCC, as the Implementing Partner, was designated to assume full responsibility and accountability in partnership with the state governments of Manipur and Jharkhand for the effective use of UNDP and other resources and the achievement of the project outcomes and outputs at all levels as set forth in the document. Under the Project Document, MoEFCC was foreseen to designate a National Project Director (NPD) responsible for the overall management, including achievement of planned results and use of project funds through effective process management and well-established programme review and oversight mechanisms. MoEFCC was also foreseen to facilitate partnership development with state governments (Manipur and Jharkhand) and coordination with other relevant central ministries as required.

Based on the Project Document, responsibilities of the MoEFCC included:[6]

- Reporting fairly and accurately on project progress based on the agreed work plans. This will be in accordance with the reporting schedule and formats included the project document/Annual Work Plans;
- Maintaining documentation and evidence that describes the proper and prudent use of project resources in conformity to the project document and in accordance with applicable regulations and procedures;
- Meeting the targets and the outputs outlined in the approved and signed annual work plan;
- Approving and signing the Combined Delivery Report (CDR) at the end quarter and at the end of the year:
- Signing the Financial Report or the Fund Authorization and Certificate of Expenditures (FACE).

Based on the Project Document, MoEFCC in consultation with state governments (Manipur and Jharkhand) was expected to sign budgeted Annual Work Plans (AWP) with UNDP to achieve

[6] MT Project Document, page 102.

planned results. Each state government was expected to designate a nodal officer who would facilitate support to the project at state, district and sub-district levels.

The Project Document also foresaw the establishment of a Project Steering Committee (PSC) to provide guidance for the project and a Technical Advisory Committee (TAC) to provide technical support to the Central PMU (Project Management Unit) overseeing operational aspects of the project. PMU would supervise, co-ordinate and provide integrated coherence to all project activities. At the state level, project activities were to be undertaken by state PMUs, led by the assigned state agencies (ASAs) which are the Jharkhand Renewable Energy Development Agency (JREDA) and the Manipur Renewable Energy Development Agency (MREDA). The ASAs and state PMUs were to provide day-to-day practical on the ground support at the state and investment project level.

2.5. Beneficiaries and Stakeholders

While the immediate benefit of the project is the reduction of GHG and the subsequent negative externalities thereof, over the medium-and-long term, benefits were expected to accrue in the markets and industries in the states of Jharkhand and Manipur. Expected benefits included the following:

- Emergence of a stronger and more diverse market for RE/EE energy and technology
- A significantly increased proportion of successful RE/EE projects operating at higher performance levels
- A higher level of awareness of the value of well-designed and suitably specified RE/EE implementation models. This will increase public sector and private sector engagement in RE/EE projects including government agencies, entrepreneurs, suppliers, manufacturers, financing institutions, consumer associations etc.
- A more supportive policy and regulatory framework that fosters the promotion and adoption of RE/EE activities

Projects in Jharkhand and Manipur were expected to have the potential to scale-up and replicate. It was also expected that other provinces would pay heed to the benefits of increased private and public sector investment in RE/EE technologies and markets.

Major stakeholders of the MT project at the national level were foreseen as follows:

- **Ministry of Environment, Forests and Climate Change (MoEFCC)**: MoEFCC is the GEF focal point for GEF projects in India and thus will liaise with GEF and provide overall coordination of the project. It will act as the Coordination Unit for the implementation of this project.

- **Ministry of New and Renewable Energy (MNRE)**: MNRE provides inputs for the planning, design and implementation of the project activities and will assist the states in design and implementation of renewable energy programs and investment projects. MNRE support reaches the states through various national and state level schemes and the National Solar Mission (NSM). MNRE also ensures that the Solar Energy Corporation of India (SECI) takes up the investment projects in the states of Jharkhand and Manipur.
- **Solar Energy Corporation of India (SECI)**: Solar Energy Corporation of India (SECI) is a not-for-profit set up by the Government of India for the facilitation and implementation of Solar Energy programs. SECI is assisting the states in design and implementation of solar park and roof-top solar projects.
- **Bureau of Energy Efficiency (BEE)**: BEE is the nodal agency for the National Mission on Enhanced Energy Efficiency, under the aegis of the Ministry of Power. Consultations and coordination with BEE provide inputs for planning, design and implementation of the projects for achieving improved energy performances in the two selected states.
- **Energy Efficiency Services Limited (EESL)**: EESL is an ESCO created to deliver the market-related actions of the NMEEE. It works with both the selected states for the implementation of energy efficiency projects for Demand-Side Measures including municipal, agriculture, public building, lighting etc. It also assists in developing the market for other private ESCO's and companies to promote energy efficiency.

The following are the major stakeholders identified at the state level:

Department of Environment (Manipur) and Department of Forests, Environment (Jharkhand):

These departments are the nodal agencies both for preparation and implementation of the SAPCC. They are the key stakeholders in the project for coordinating project implementation. They are lead agencies for project implementation, coordination with other departments for implementation, project monitoring, oversee the accomplishment of project objectives and tasks, lead co-funding requirements, initiate policy actions on its own and through other departments, and facilitate coordination with other key stakeholders.

Manipur Renewable Energy Development Agency (MANIREDA) and Jharkhand Renewable Energy Development Agency (JREDA):

These are the state level agencies for the promotion and implementation of renewable energy and energy efficiency. They play a key role in the implementation of investment projects with support from EESL and SECI and other stakeholders (public & private sector). These agencies work closely with the state nodal agency for SAPCC during the implementation phase of the project, and ensure coordination with other stakeholders.

State Electricity Regulatory Commissions (SERCs) and State Electricity Board:

The SERCs have the responsibility for determining electricity tariffs and for regulating power purchase and procurement processes within their state. SERCs are key project partners as it is expected that tariff structures for grid electricity generation (through solar rooftop PV) would ideally be updated through project activities. The state electricity distribution companies are also involved in providing needed electricity generation and consumption data for the project sites under the project.

Other stakeholders include financial institutions (such as SIDBI, Punjab National Bank, State bank of India, NABARD etc.), international organizations (such as the UNDP, which act as the implementing agency of the proposed project), private sector enterprises (TATA BP Solar, Schneider, inverter/battery manufacturers, etc.), Civil Society Organizations and Academic Institutions (operating in an advisory capacity).

3. FINDINGS

While the amount of information generated by this review was large, the findings presented in this chapter cover only the project's most essential aspects and are to some extent focused on those issues that require improvement and the attention of project stakeholders. The MTR's findings are organized in the following sections: i) Project Design; ii) Project Implementation; and, iii) Project Results.

3.1. Project Design

This section examines the project's logic and design features by focusing on elements like the results framework, management arrangements, identification of risks and assumptions, use of lessons derived from other projects, linkages with relevant UNDP or donor projects, UNDP's comparative advantage in the area, planned stakeholder engagement, replication approach and exit strategies, etc. The main questions that drive the analysis presented in this section are shown in Box 2 below.

Box 2: Key Issues Related to Project Design

The key questions driving the analysis in this section are:

- Whether the project has a sound logic with outcomes flowing from activities and the latter driven by project objectives.
- Whether assumptions and risks were adequately identified at the outset of the project.
- Whether lessons learned from other UNDP interventions were incorporated into the project design.
- Whether the project's linkages to other relevant projects in the UNDP portfolio or by other donors were properly identified and capitalized on.
- Whether UNDP's comparative advantages were adequately exploited.
- Whether stakeholder consultation was an essential part of the project incorporated from the project design phase.
- Whether the replication approach was sound, and an exit strategy was clearly identified.
- Whether management arrangements were properly identified, with roles and responsibilities adequately determined prior to project approval.

It is important to emphasize here that the following discussion does not pertain to how the project was implemented, but only to how it was designed.

3.1.1. Analysis of the Project Document and Planning Matrix

The MT Project Document provides a comprehensive and well-structured framework regarding expected outcomes, as well as associated risks. It provides a thorough and consistent analysis of the country context and identifies a clear set of objectives and activities for the project to pursue.

The **analysis of the context and the problem** is quite thorough. A thorough description of India's current energy infrastructure is provided as well as crucial information on hitherto completed work in the field of RE/EE and climate-change mitigation. This includes a detailed analysis of Indian government ministries and the structure of various agencies participating in the project along with details on their respective roles. The importance of developing India's RE/EE infrastructure and engaging with private and public stakeholders is stressed throughout, and a comprehensive calculation of GHG emission reductions is provided. The Project Document also clearly describes the local economic context of the states of Jharkhand and Manipur and stresses the importance of climate change mitigation strategies, given high population density, as well as the vulnerability of local agriculture. Further, the energy efficiency sector is described in great detail for both states, providing a clear baseline for the activities of the project.

The Project Document further identifies **long-term barriers and solutions** to achieving the project's objective. A quick summary of barriers to the project is as follows:

- ***Framework Barrier***: Lack of an appropriate institutional and incentive policy framework for adoption of climate change mitigation strategies. Conflicting state priorities, weak cohesion between structures, and lack of cross-learning between state departments.
- ***Funding Barrier***: Limited participation and investment of the private sector due to risks associated with lack of information exchange.
- ***Research Barrier***: Lack of data and research on GHG abatement cost curves, thereby preventing any full implementation of the goals of the SAPCC.
- ***Technology Barrier***: A lack of EE and RE technology suppliers and equipment manufacturers in the states of Jharkhand and Manipur limits the full effectiveness of the project.
- ***Institutional Barrier***: Limited capacity of state-level institutions to provide soft-loans, slate clean energy funds, and other funding mechanisms to help implement climate change mitigation technologies.
- ***Private-Sector Barriers***: High interest loan rates exacerbate the ability of the private sector to invest in RE and EE projects
- ***Regulatory Barriers***: Inadequate regulatory incentives to encourage private investment.

One of the project's proposed solutions is to empower local businesses, as well as public institutions, in implementing RE and EE solutions. The development of solar energy, wind power, and other renewable sources of energy, as well as the installation of more-efficient means of transport, manufacturing, air-conditioning, cooling and refrigeration are project priorities. The

Project Document identifies key stakeholders at the national and state levels capable of aiding in the implementation of these solutions.

The **logic of the proposed intervention** is clear and discussed at length in the Situation Analysis section of the Project Document. India, with a population of over one billion and an energy supply matrix mostly thermal (coal-and-oil fueled) in nature, is a key arena in the struggle for implementing climate-change solutions. The proposed intervention concentrates on the removal of barriers—institutional, financial, and commercial among others—that are hindering the full and unimpeded development of RE and EE technology solutions among businesses and private and public sector parties in India. Market transformation is at the forefront of efforts in Jharkhand and Manipur, and with the anticipated success of the project, replicability and scalability in other interested states in India is a logical future step.

The **project's goal** is clearly defined. Outcomes (three in total), as well as outputs (fourteen in total), are well-formulated and delineate the project's goals (as shown in Box 3 below). The project is based on the premise that existence of several technical, financial, policy, institutional and awareness and capacity building barriers have constrained the large-scale implementation of RE and EE projects in the states. While project benefits are likely to be in the tangible form of reduction in GHG emissions and total energy saved from EE measures more significant albeit gradual and less tangible co-benefits will flow in terms of improved state capacities in implementing RE and EE measures and incorporation of climate change mitigation actions in state development plans and schemes.

Box 3: Outcomes and Outputs Identified in the Project's Logical Framework

The following are the three main outcomes and related outputs that the project is designed to achieve:

Outcome 1: Successful and sustainable implementation of priority CCM actions on energy generation and application of EE and RE technologies in the major energy end-use sectors in selected states.

- Output 1.1: Regularly updated GHG abatement cost curves at state level
- Output 1.2: Selected prioritized RE and EE actions listed in Manipur and Jharkhand Action Plans on Climate Change for implementation
- Output 1.3: Designed and implemented common monitoring, reporting, and verification (MRV) system for the selected RE and EE actions of the Manipur and Jharkhand APCC, in a way to feedback into the SAPCC process

Outcome 2: Enhanced states capability and capacity for identifying, designing, planning, financing and implementing selected RE and EE mitigation actions from their SAPCC.

- Output 2.1: Completed evaluation of existing available loan mechanisms for projects developed as part of SAPCC targets
- Output 2.2: Implemented non-grant financing instruments such as flexible debt finance (including long tenure low-interest loans)

- Output 2.3: Mobilized public and private sector funding
- Output 2.4: Established public private partnerships (PPP) for implementations and scaling up of selected RE and EE actions in Manipur and Jharkhand
- Output 2.5: Implemented nine RE and EE investment projects in Manipur and Jharkhand
- Output 2.6: Completed implementation manual and workshops for supporting the implementation of selected public private partnership models for RE and EE actions

Outcome 3: Enhanced technical capability of state government in integrating climate change concerns within sectoral development plans and budgets and undertaking MRVs efficiently for SAPCC actions, facilitated inter-state learning and coordination for SAPCCs

- Output 3.1: Aligned state sectoral budgets for development plans to include climate change mitigation actions related expenses
- Output 3.2: Completed training and capacity building programs on the developed MRV systems for the State officials
- Output 3.3: Established institutional mechanism for interstate exchange of information and technology dissemination for Manipur and Jharkhand for implementation of SAPCC mitigation actions
- Output 3.4: Conducted inter-state study trips and stakeholder interaction workshops
- Output 3.5: Established and operational information dissemination system on lessons learnt from investment projects undertaken on priority RE and EE actions

Many of the indicators and targets identified in the Results and Resources Framework (RRF) of the Project Document (Pro Doc) meet the SMART criteria[7] prescribed by UNDP M&E guidelines. However, there are a number of indicators and targets that seem problematic. The following are some key examples of these shortcomings.

- A number of targets in the RRF do not seem realistic, especially with hindsight after a period of time in which the project has been implemented. For example, the target for number of people who benefitted directly or indirectly with improved energy access in the two states through the project interventions is set at 17.8 million, which seems extraordinarily large for the size of this project. The project team reported an approximate number of 4,250 beneficiaries at this point in the state of Jharkhand – a figure which is realistic and quite far off the target established in the Pro Doc. Further, the target for cumulative CO2 emission reductions set at 304,250 tCo2e is way above what is possible to be achieved through this project. Also, the target of "total energy savings achieved" set at 190,452 MWh does not seem to be too realistic for the scope of this project.
- Another challenge with some of the targets and indicators is that they are defined in a vague way which makes it difficult to establish the level of their achievement. For example, the target for Output 2.5 reads "No. of demonstration investment projects based on innovative financial models developed by end of year 1". This indicator is rather vague because it does not specify

[7] Specific, Measurable, Attainable, Relevant, and Time-Bound.

in unambiguous terms what passes as "*innovative mechanism*". Also, output indicator 2.1 is quite vague. It is formulated as "*number of loan mechanisms evaluated by Year 2*", which is rather subjective because the evaluation of a mechanism does not have much practical relevance. Also, indicator 2.3 is formulated as "*amount of total funding mobilized for implementation (US$) by Year 4*", which lacks clarity because the term mobilization needs to be defined in specific terms.

Some of these targets and indicators could be revised at this point in the project. The revision should also include a realistic assessment of what is and what is not possible at this point in time, including the options that are available in Manipur until the end of the project (more on this further in this report). The situation on the ground has changed since the conceptualization of the project, so further adaptation to the context will be necessary. The whole revision process will require discussions and decisions in the Steering Committee.

Further, there are certain design aspects of the Project Document that could have been more adequately discussed and elaborated.

1. Special circumstances of Manipur and obtaining clearance from the central governmental

While providing a detailed description of the energy efficiency sector in the targeted regions, the Project Document also does not discuss in any detail the special governance circumstances of the state of Manipur. In retrospect, Manipur turned out to be a serious challenge for this project (as will be discussed in more detail later). The difficulty of obtaining clearance for the implementation of activities in Manipur caused serious delays to the project. The requirements for operation in Manipur could have been foreseen and analyzed in more detail in the Pro Doc.

2. Role of the National Ministry of Environment (MoEFCC) in the replication of project results

The main purpose of this project is to demonstrate feasible strategies (and, in particular, business models) for renewable solutions to energy challenges in India. The project is designed to pilot various initiatives that are expected to have wider application in the country. While a number of specific initiatives are identified and described in great detail in Jharkhand and Manipur, the Project Document does not outline in significant detail the mechanism through which these initiatives will be piloted and brought to scale at the national level. At a minimum, such replication will inevitably require the involvement of MoEFCC in the scaling up process. However, this role of MoEFCC is for the most part not discussed. In retrospect, this turned out to be a challenge for this project (as will be discussed further in this report).

3. Private Sector Involvement in the Project

While the Project Document stresses the importance of market transformation and the need for private-sector industries to adapt RE/EE solutions towards climate-change mitigation, it would

have benefited from a more explicit and comprehensive strategy for the involvement of the private-sector industries in the MT project. Although certain energy-solution providers (such as TATA BP Solar, Schneider, and various battery and inverter manufacturers) are mentioned in the Project Document (and companies like Ecozen/Ecofrost were eventually involved as the solar cold storage service provider), it would be been useful to have had the project develop more comprehensive case studies describing successful steps undertaken by private industry in climate-change mitigation. In particular, the banking sector and industry associations are not given a crucial place in the design of the project's strategy and activities. This is something that the project team is seeking to achieve right now, but there are no clear provisions for this in the Project Document.

4. Educational Initiatives

The Project Document makes mention of the importance of educational initiatives. For example, the Jharkhand Energy Policy 2012 lays special stress on a communication campaign for consumer guidance and mass awareness about energy conservation measures. The Manipur State Development Agency (MSDA) has also made plans to discuss climate-change in state educational curriculum, publish booklets and posters as well as organize a National Energy Conservation Day every year on the 14th December. Regardless, there is no comprehensive section in the Project Document that outlines and discusses educational initiatives. It would have been helpful if the Project Document had provided a small but detailed section in the Project Document outlining educational and cultural initiatives that could have been supported by the GOI in collaboration with the state governments of Jharkhand and Manipur with the involvement of UNDP and other stakeholders.

These are some design shortcomings that did have an impact subsequently during the implementation stage, as will be discussed further in this report. Apart from these challenges, it can be noted that overall the project design and strategy has been adequate and, most importantly, appropriate and relevant for the context in which the project operated.

3.1.2. Assumptions and Risks

The Project Document identifies a set of assumptions underlying the project, as well as major possible risks in implementation.

Assumptions for the implementation of the project revolve around expectations from both the government and the market sides of RE and its use in rural livelihoods. The following assumptions undergirding the success of the project are listed below:

- Continued support and participation from co-financing institutions, MoEFCC, MNRE, state nodal agencies, state renewable energy development agencies and other stakeholders

- Selected end users and project implementers have sufficient financing and favourable regulatory and overall business environment
- Enough technical and financial capacity is available in the state for implementation of projects
- All state agencies are supportive of implementing the investment projects
- Continued interest in the selected RE and EE mitigation actions by co-financing institutions
- Freely available information on PPP based RE and EE business models
- Interest of the state agencies in the adoption of MRV system and diligent data collection
- Interested state agencies in both states for interstate exchange of information and technology
- State nodal agencies continue to cooperate with SPMUs in the clearance of investment projects without delay.

Risks related to the implementation of the project were classified in two categories: external (risks based on the political situation or policy changes in India, as well as climate change related) and internal (risks inherent to the project implementation, and which could be substantially controlled by the project's management or in the project's implementation).

Key external risks identified in the Project Document include:[8]

a. Failure to secure the necessary effective ongoing policy, management or financial support from MoEFCC and state agencies, as main project implementing agency and providers of co-financing – for example due to adverse impact changes in MoEFCC's management, or from reduced MoEFCC funding.
b. Current levels of funding available to support the development and implementation of SAPCC at the central and state government level are reduced and hence there is less funding support available to be accessed by the project for the implementation of SAPCC aspects of project activities.
c. Implementation of SAPCC does not remain an important item on the relevant central and/or state political agendas.
d. Supporting RE and EE does not remain a high central or relevant state government priority.
e. Civil, political or communal disorder or natural disasters (e.g. delayed or weak monsoon or other rains, cyclonic storms, disease outbreaks in monoculture crops, an outbreak of insect plagues like locusts, major outbreak of animal or human diseases, major forest fires, etc.) negatively impact on the project's investment project locations.
f. There is a sustained reduction in the international oil price, or large subsidies are re-introduced and sustained for diesel used for captive power generation, or funds available for LPG subsidies is significantly increased, or the price of electricity for thermal sources falls – hence significantly undermining the economics of RE and EE for the concerned states
g. Major adverse economic or political conditions significantly force up interest rates and/or curtail bank lending for a significant period in India during the project's implementation, hence

[8] MT Project Document, page 86.

reducing the affordability of the bank loans or financial instruments that may be designed for implementation of RE and EE investment projects by project developers.

Internal risks identified in the Project Document include the following:[9]

h. The project is not able to find or to motivate additional RE technology and/or service providers to enter the market and to grow their businesses in the concerned states.
i. The project is not able to get MoEFCC, MNRE, BEE, NSM, NMEEE and relevant state-based agencies efforts to remain engaged or to effectively work together to support the growth of RE and EE for SAPCC
j. The project is not able to mobilize the necessary financing from banks or microfinance institutions for the replication and scale up projects in the relevant RE and EE projects
k. Project co-financers such as EESL, SECI and state governments are unable to keep to their commitments to financially support the project.
l. Relevant RE and EE investment projects are successfully demonstrated, but then do not get replicated for a variety of internal or external factors. This could lead to a negative circular effect in terms of credibility around the project.
m. There is a significantly slow start of on-the-ground project activities.
n. There is significant RE/EE technology underperformance or failure in project activities (technical risk).
o. There is a lack of necessary leadership and/or slow or low-quality decision-making in the PMU.
p. There are significant delays in completing the recruitment process for SPMU and other consultancy assignments.

Some of the risks listed above are adequately identified, as they turned out to have been relevant. For example, the above discussion on co-financing and scaling up adequately represents challenges that this project faced (as will be discussed in more detail further in this report). However, the major risk related to the lack of clearance for the start of project activities in Manipur is not specifically identified, although there are general references to support by state entities. This particular risk turned out to be so crucial that one wonders whether it would have been possible to have anticipated it at the stage of the design of the project. Also, sustainability-related risks, which will be discussed in more detail further in this report, do not receive a lot of attention in the Pro Doc's part on risk analysis. One of these risks is institutional environment in support of the scaling up of the project results (which will be discussed in more detail further in this report).

[9] MT Project Document, page 86.

3.1.3. Lessons from Other Relevant Projects Incorporated into the Project Design

The activities of the MT project fall under UNDP's Country Programme Action Plan (CPAP) 2013-2017 and country programme document for India (CPD 2018-2022), both of which are agreed between the GoI and UNDP.[10] UNDP's objective under its country programme is to expand access to clean energy and help build the capacity of communities to manage natural resources and withstand climate change and disasters. Specifically, at the request of the government and in consultation with partners, UNDP supports initiatives that help reduce the impact of climate change.

The Project Document does not identify any other UNDP projects in the area of energy efficiency from which lessons for the MT project may be drawn. Given the detailed analysis of the context in Jharkhand and Manipur, it is not clear why this dimension was neglected. In fact, UNDP has had a number of other energy efficiency projects implemented in India which must have generated useful lessons for the MT project. Some examples of these projects identified from the UNDP India website are the following:

- Energy Efficiency Improvements in Commercial Buildings
- Market Development and Promotion of Solar Concentrators Based Process Heat Applications in India
- Energy Efficiency Improvements in the India Brick Industry
- Upscaling Energy Efficient Production in Small Scale Steel Industry in India

The "*Scale-up of Access to Clean Energy for Rural Productive and Domestic Use*" project, known in UNDP India as the ACE project, is particularly relevant to the MT project because it has a similar focus in terms of objectives and activities, but in different states. The project's aim is to demonstrate and develop the market for Renewable Energy Technology Packages for Rural Livelihoods in the states of Assam, Odisha and Madhya Pradesh. This project has identified and is promoting the relevant renewable energy technologies: solar lighting systems; solar and/or biomass waste-powered micro-grids for common facilities; solar irrigation pumps; improved commercial biomass cook-stoves; poultry-litter-based biogas plants; poultry-litter-based briquetting units; solar dryers for vegetables, spices and fish; solar-powered milk chillers; and cold rooms for storage of horticultural produce.

The Project Document could have gone further to identify not only relevant projects and lessons learned, but also synergies between the MT project and these other projects in the area of energy efficiency.

[10] UNDP has also been an active partner in the development of UNDAF (the India UN Development Action Framework) and is a lead agency for many of the thematic areas of interventions by the UN system in India under the UNDAF.

3.1.4. UNDP's Comparative Advantage

The MT Project Document identifies some of UNDP's comparative advantages in the area of climate change mitigation and the implementation of RE and EE technologies to further this end. UNDP's comparative advantage arises primarily from a strong, multi-disciplinary country presence in key climate change mitigation projects, its extensive networks and long-term track record with Indian government agencies and organizations in the public and private sectors, and institutional experience in implementing previous and ongoing projects on climate change adaptation. UNDP is recognized as a partner of choice by the government based on its timely and significant contributions to the country's development agenda.

UNDP's vast experience enables it to build on previous achievements and apply the lessons learnt to new challenges. Combined with the good image, effective financial system control, procurement systems, close links and trusted partnership with government and non-governmental partners, this experience allows UNDP to ensure continuity in the circumstances of the frequent institutional changes. The following box summarizes some key advantages of UNDP in the implementation of environmental projects.

Box 4: Key Elements of UNDP's Comparative Advantage

- UNDP has developed good partnerships with the government, civil society, private sector, research institutes, etc. National stakeholders value UNDP for its neutrality and impartiality. The trust and respect commanded by UNDP and the access it has to government officials, as well as civil society, place UNDP in a good position to play a strong advocacy role on the one hand, and, on the other, to undertake pioneering initiatives.

- UNDP has extensive experience supporting capacity development initiatives of national governments and other stakeholders through advocacy, policy advisory, and technical assistance services. Implementation of this project benefited from the experience and technical support UNDP provided as a specialist in capacity development.

- Its global experience and lessons learned in the same sectors in many countries around the world and in the region in particular, provide UNDP with a distinct advantage. When needed, UNDP is able to mobilize support from a range of UNDP and UN structures. Its access to a vast global network of experts allows it to tap into comparative experiences and technical support from other regions. UNDP's regional office in Bangkok, in particular, provides technical support to numerous projects across a number of areas. Regional technical advisors assist with project formulation and input into the development of the logical frameworks, recruitment of international experts, identification of key stakeholders, etc.

- UNDP has extensive experience and capabilities related to regional cooperation. A significant part of UNDP's work is regional (multi-country) in nature. It has great

capabilities for promoting south-south and triangular cooperation and can mobilize technical expertise to develop a suitable regional knowledge platform.

- UNDP's strong record of working with GEF on climate change adaptation and environmental projects allows it to capitalize on valuable GEF expertise in these sectors. UNDP has one of the largest portfolios of GEF-funded projects in the world. The experience and capacity that this implies is a significant comparative advantage in developing and implementing such types of projects.

- Another one of UNDP's strengths is its broad-based development approach focused on strengthening national capacities for sustainable development through the integration and mainstreaming of various development aspects. SDGs are used by UNDP as an integrating platform for all development efforts in various countries and as an instrumental for engaging with a wide spectrum of stakeholders, which has proven to be a critical factor of success in many instances.

- UNDP's extensive experience in India is one of its strongest assets and a huge comparative advantage when it comes to delivering development programmes at the sub-national level. Long established partnerships with sub-national partners are crucial for ensuring smooth implementation, sustainability and replication of various initiatives. Also, UNDP has a lot of experience helping communities develop local initiatives and bankable proposals.

3.1.5. Planned Stakeholder Participation

The Project Document outlines key stakeholders and their specific involvement in terms of roles and responsibilities as partners and beneficiaries of the project. It lists the following key stakeholders:

- Ministries and other public agencies with a mandate to support sub-national development and climate change adaptation. This includes government ministries at the national level and at the state level.
- Financial institutions, which includes public and private sector banks, as well as venture capitalists.
- Private sector enterprises involved in developing and delivering specific RE and EE solutions. This includes RE and EE equipment providers such as TATA BP Solar, Schneider, and various inverter, battery and lighting manufacturers.
- Civil society organizations (CSOs and NGOs)
- Academic institutions, which operate in a monitoring and reporting capacity as well as act to provide expert opinion for the implementation of RE and EE solutions.

Table 3 below provides a more detailed list of stakeholders engaged in the MT project, as well as their roles in project implementation.

Table 3: Key stakeholders involved in the project

Stakeholder	Role in Project Implementation
Government – Central Level	
Ministry of Environment, Forests and Climate Change (MoEFCC)	MoEFCC is the GEF focal point for GEF projects in India and thus is expected to liaise with GEF and provide overall coordination of the project. It is expected to act as the Coordination Unit for the implementation of this project.
Ministry of New and Renewable Energy (MNRE)	MNRE is expected to provide inputs for the planning, design and implementation of the project activities and will assist the states in design and implementation of renewable energy programs and investment projects. MNRE support is expected to reach the states through various national and state level schemes and the National Solar Mission (NSM). MNRE is also expected to ensure that the Solar Energy Corporation of India (SECI) takes up the investment projects in the states of Jharkhand and Manipur.
Solar Energy Corporation of India (SECI)	Solar Energy Corporation of India (SECI) has been set up as a not-for- profit company under Section-25 of the Companies Act 1956 for implementation and facilitation of Solar Energy programs. SECI is expected to assist the states in design and implementation of solar park and roof-top solar projects. It is also expected to facilitate the implementation of activities under JNNSM and achieving the targets set therein for both Manipur and Jharkhand states.
Bureau of Energy Efficiency (BEE)	BEE is the nodal agency for the National Mission on Enhanced Energy Efficiency, under the aegis of the Ministry of Power. Consultations and coordination with BEE are expected to provide inputs for planning, design and implementation of the projects for achieving improved energy performances in the two selected states.
Energy Efficiency Services Limited (EESL)	EESL is a Super ESCO and has been created to deliver the market- related actions of the NMEEE. It is expected to work with both the selected states for the implementation of energy efficiency projects for Demand Side Measures including municipal, agriculture, public building, lighting etc. It is also expected to assist in developing the market for other private ESCO's and companies to promote energy efficiency, and can act as a resource centre in the field of Energy Efficiency and take up the activities of Capacity Building Training and other related activities.
Government – State Level	
Department of Environment, Manipur and Department of Forests and Environment and Climate Change , Jharkhand	These departments are the nodal agencies both for preparation and implementation of the SAPCC. They are the key stakeholders in the project for coordinating project implementation. They will be lead agencies for project implementation, coordination with other departments for implementation, project monitoring, oversee the accomplishment of project objectives and tasks, lead co-funding requirements, initiate policy actions on its own and through other departments, and facilitate coordination with other key stakeholders.
Jharkhand Renewable Energy Development Agency (JREDA) and Manipur Renewable	These are the state level agencies for the promotion and implementation of renewable energy and energy efficiency. They are expected to play the key role in the implementation of investment projects with support from EESL and SECI and other stakeholders (public & private sector). These agencies will work very

Energy Development Agency (MANIREDA)	closely with the state nodal agency for SAPCC during the implementation phase of the project, and ensure coordination with other stakeholders.
State Electricity Regulatory Commissions (SERCs) and State electricity distribution companies	The SERCs have the responsibility for determining electricity tariffs and for regulating power purchase and procurement processes within their state. SERCs is expected to be key project partners as it is expected that tariff structures for grid electricity generation (through solar rooftop PV) would ideally be updated through project activities. The state electricity distribution companies will also be involved in providing needed electricity generation and consumption data for the project sites under the project.
Urban Local Bodies in Jharkhand and Manipur	ULBs are expected to be engaged in implementing municipal EE projects under the project and will be involved in preparing the replication and scale up plan for the state.
Financial Institutions	
Financial institutions such as IREDA, State Bank of India, Union Bank of India, NABARD, Pvt Equity Funds etc.	Financial institutions (including public and private sector banks, venture capitalists, etc.) are expected to be involved in project implementation through co- financing, and would be engaged in project progress and monitoring etc.
International Organization	
United Nations Development Programme (UNDP)	UNDP will serve as the GEF implementing agency for the proposed project and ensure that the project will deliver its objectives. It is expected to carry out monitoring & evaluation, and facilitate the budgetary provisions.
Private sector enterprises involved in developing / delivering specific renewable energy/EE solutions	
RE/EE equipment providers and manufacturers	RE and EE equipment providers like TATA BP Solar, Schneider, inverter/battery manufactures and manufacturers of EE equipment's and lights are expected to be involved in the project implementation for supplying the related equipment for the project.
CSO and NGOs	
Civil Society Organizations	CSOs are expected to be involved in the project implementation as one of the stakeholders, to generate ownership among identified stakeholders for the implementation of selected RE and EE interventions.
Academic and Research Institutes	
Academic Institutions	Their role in the project implementation is expected to be that of provision of expert opinion, design of monitoring and reporting system for the implemented RE and EE interventions. These are expected to respond to the needs of the PMU

3.1.6. Replication Approach

The main purpose of the MT project is to showcase an approach for the implementation of State Action Plan on Climate Change (SAPCC) in the states Jharkhand and Manipur. As such, sustainability and replicability are crucial aspects of the project's design. A major objective of this project is to replicate with the assistance of associated stakeholders and partners the approach

tested in the states of Jharkhand and Manipur. One unique innovation identified in the design of this project is the collaborative effort among the states in maximizing the effectiveness, and ultimately the impacts, of their respective climate change mitigation efforts. This is expected to not only lead to the achievement of individual (state) objectives (SAPCC), but also the collective (mission-level) targets at the national level (NAPCC).

The MT project has been designed in a way that conducting training and capacity building, development of frameworks, templates of data collation, websites, and training modules have been incorporated as key outputs of the project. The Project Document recognizes that currently at the state level there is dearth of well-stocked information, measuring, reporting and verification systems, and the development of robust information dissemination systems, MRV frameworks, training and capacity building modules under the current project will go a long way in overcoming the related barriers in the states.

Based on the Project Document, after the completion of the MT project, it is expected that the impetus for implementing RE and EE measures to mitigate GHG emissions will continue in India. The post project-end sustainability is expected to be ensured by:

- Emergence of a stronger and more diverse RE/EE for technology and service provider industry in State, with stronger supply chains and improved quality RE/EE technology and service offerings, implementation models that meet defined standards, and improved delivery mechanisms for RE/EE abatement of GHG.
- A significantly increased proportion of successful RE/EE for MT project working at the defined performance levels that are specified in government funding supports and that work as expected by the state level agencies and end users.
- Availability of suitably documented demonstrations and replications of key RE/EE interventions for SAPCC, applications in real-world operating environments in India.
- A higher level of awareness of the value of well-designed and suitably specified RE/EE implementation models inclusive of public private sector engagement and financing models amongst the state level government agencies enterprises, entrepreneurs, suppliers, manufacturers, financing institutions and consumer associations.
- A more supportive policy and regulatory framework that fosters the promotion and adoption of RE/EE activities for SAPCC implementation.

As will be discussed further in this report, sustainability and replication are crucial elements of this project that deserve more attention by project stakeholders. At the point of this MTR, it is not fully clear what the sustainability path of this project is and what replication model will be used by the authorities to take the approach tested under this project to scale. This is largely a consequence of the design of the Project Document which does not identify in clear terms the mechanism through which the MT approach will be replicated elsewhere and the role of MoEFCC in the process. The MT Project Document has a significant focus on the Jharkhand and Manipur

states and seems to have neglected somehow the replication process in other states and the essential role of federal institutions, especially MoEFCC.

3.1.7. Management arrangements

UNDP is the designated implementing agency, tasked to provide overall management through its New Delhi Country Office (CO) and technical guidance from its Bangkok Regional Hub (BRH). The project's implementation partner is designated to be the Ministry of Environment, Forests and Climate Change (MoEFCC), which is expected to assume full responsibility and accountability in partnership with the state government of Jharkhand and Manipur for the effective use of project resources and the achievement of the outcomes and outputs at all levels.

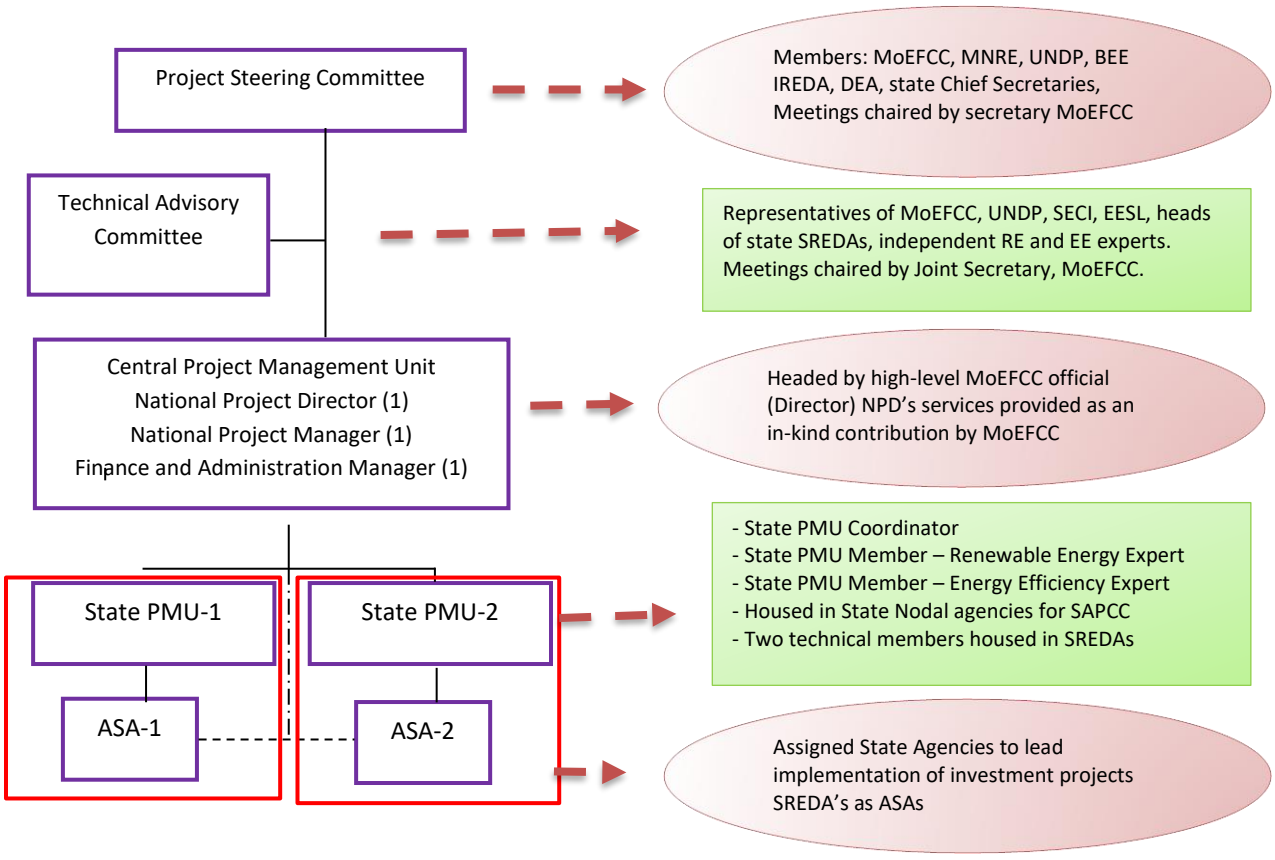
MoEFCC was given the responsibility for the overall implementation of the project at the national and state levels.[11] Also, it was in partnership with MoEFCC that UNDP initially developed and submitted the project document. Under the Project Document, MoEFCC was expected to designate a National Project Director (NPD) as head of the Central Project Management Unit (PMU), responsible for overall project management, including achievement of planned results and use of UNDP funds through effective process management and well established programme review and oversight mechanisms. MoEFCC was expected to facilitate partnership development with state governments (Manipur and Jharkhand) and coordination with other relevant central ministries as required. Major MoEFCC responsibilities included:

- Reporting on project progress against agreed work plans in accordance with the reporting schedule and formats included in the project document/Annual Work Plans;
- Maintaining documentation and evidence that describes the proper and prudent use of project resources in conformity to the project document and in accordance with applicable regulations and procedures. This documentation is expected to be available on request to project monitors (project assurance role) and designated auditors;
- Meeting the targets and the outputs outlined in the approved and signed annual work plans;
- Approving and signing the Combined Delivery Report (CDR) at the end quarter and at the end of the year;
- Signing the Financial Report or the Fund Authorization and Certificate of Expenditures.

[11] MoEFCC is the nodal agency for planning, promotion, coordination and managing the execution of India's environmental/forestry policies and programs. Its Climate Change Division is the nodal body for climate change cooperation and global negotiations. MoEFCC is also the GEF point for GEF projects in India and acts as the key Coordination Unit for the implementation of this project. Other key agencies include the Ministry of New and Renewable Energy (MNRE), the Bureau of Energy Efficiency (BEE), the Indian Renewable Energy Development Agency (IREDA), the Department of Economic Affairs (DEA), and state Chief Secretaries, all of which make up the Project Steering Committee (PSC) (included in the flow chart in the figure on Management Arrangements below).

According to the Project Document, MoEFCC, in consultation with state governments (Manipur and Jharkhand), was expected to sign budgeted annual work plans (AWPs) with UNDP for the achievement of planned results. Each state government was expected to designate a nodal officer to facilitate support to the project at state, district and sub-district levels. Also, based on the Project Document, UNDP, the Solar Corporation of India (SECI), Energy Efficiency Services Limited (EESL) and independent RE and EE experts and consultants were expected to constitute the Technical Advisory Committee. Finally, state PMU coordinators for Jharkhand and Manipur were expected to work with assigned state agencies to lead the implementation of RE and EE investment projects. The Project Document also notes as critically important the fact that all key project financial contributors and stakeholders have a strong ownership in the project design and execution at the strategic level. At the operational level, day-to-day activities were expected to be carried out by assigned state agencies (ASAs), with support from the state project management units (SPMU) for each state. All activities at the investment project and state-levels were expected to be supported and guided by a central Project Management Unit (PMU) located in MoEFCC. The project's institutional arrangements as foreseen in the Project Document are shown in the figure below.

Figure 6: Project Management Arrangements[12]



[12] Figure taken from the MT Project Document, page 103.

The project's institutional structure laid out in the Project Document was designed to provide an effective and integrated means to oversee and manage the multiple state level activities. As such, effective project management requires a combined mix of expertise in renewable energy, energy efficiency, project administration, and project management. While in the Project Document organizational arrangements are laid out as described above, in practice during the implementation stage the situation has been different to some extent, as will be described in more detail further in this report.

3.2. Project Implementation

During its lifetime, the project has gone through a number of important stages. The following is a chronology of key events that have marked the project's conceptualization and implementation phases spanning the period 2013-2018.

- Project Identification Form was submitted to GEF on 1 April 2013.
- Preparation Grant was approved by GEF on 5 February 2014.
- Project concept was approved by GEF on 3 March 2014.
- Project was approved for implementation on 17 September 2015.
- Project Document was officially signed on 20 January 2016 by UNDP and the Implementing Partner.
- Department of Economic Affairs (DEA) organized initial LPAC on 7 March 2017.[13] The Committee advised MoEFCC and UNDP to rework the proposal in view of the observations and suggestions made in consultation with MNRE/MoP and resubmit the proposal to DEA for consideration by LPAC.
- Inception Workshop and first Project Steering Committee meeting was held 16 March 2017 at MoEFCC.
- The Project Document was shared and discussed with respective Ministries. No objection from BEE, MNRE and MHA received between May-June 2017. No objection was received from MDONER.
- Second LPAC meeting was organized on 22nd Nov 2017 and the views of the relevant ministries were shared with DEA. Execution of Jharkhand component was cleared for implementation, while that of Manipur was kept on hold subject to comments from MDONER. LPAC directed the project team to get the necessary clearance from MEA for implementation of the project in Manipur. No objection and political clearance have been obtained from MEA.
- Mobilization for Project Implementation started on 22 November 2017.
- The project was initiated in November 2017
- LPAC meeting for getting clearance on implementation of Manipur component of the project was organized on 20th July 2018.

As can be seen from the chronology above, the biggest challenge for this project has been the delay in the kick-starting of activities. First, there has been an overall delay in getting activities started in general. As can be seen from the chronology above, the project was approved for implementation on 17 September 2015 and the Project Document was officially signed on 20 January 2016. Yet, the inception workshop was organized only in March 2017, more than one year later. Although a number of letters were sent from UNDP to MoEFCC on the starting up of the project, clearance procedures and the reaction of national institutions took longer than expected.

[13] Project LPAC meetings were held on 7 March 2017, 22 November 2017 and 20 July 2018.

Second, activities in the state of Manipur (an important component of the project) have not started fully yet. The reason for this has been the lack of clearance from DEA despite repeated attempts made by the project team, including three LPAC meetings organized on this matter in 2017 and 2018 (see Box 5 below for a more detailed summary of events related to Manipur).

Box 5: Chronology of Events Related to Manipur

The Project Management Unit (PMU) was established in Manipur in June 2016 and the Department of Economic Affairs (DEA) organized the first Local Project Appraisal Committee (LPAC) meeting on 7 March 2017. The Steering Committee advised MoEFCC/UNDP to rework on the proposal in view of the observations/ suggestions made in consultation with MNRE/MoP and resubmit the proposal to DEA for further consideration by LPAC. The Project document was shared and discussed with respective ministries and received no objection/project clearance from BEE, MNRE, MHA, etc. in between May-June 2017 except from Ministry of Development of North Eastern Region, North East India (MDoNER) for the Manipur component.

The second LPAC meeting was organized on 22 November 2017 and the views of the relevant Ministries were shared with DEA. Project execution plan for Jharkhand component was cleared by the ministry but for Manipur it was still kept on hold subject to clearance from MDoNER.

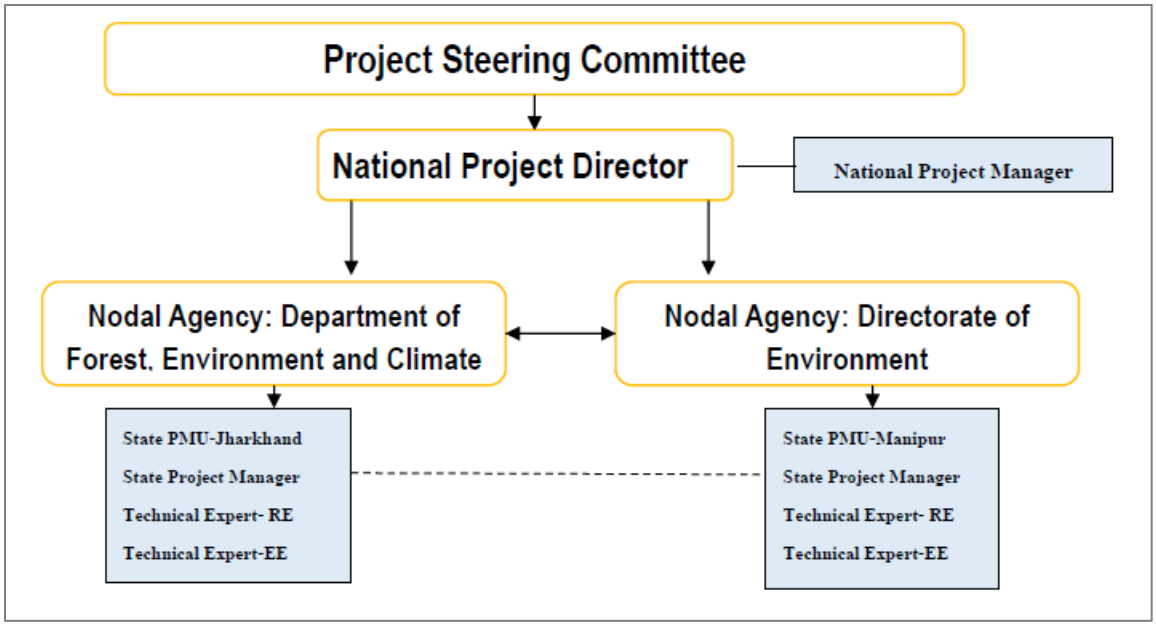
The third LPAC meeting was organized on 20 July 2018 for getting clearance on implementation of Manipur component of the project. But the committee further directed to get necessary clearance from MEA for implementation of the project in Manipur. The "no objection" and political clearance was obtained from MEA and submitted to DEA on 22 March 2019. In a follow up communication, DEA has suggested the project to obtain the required approval from NITI Aayog for the Manipur component.

The fourth LPAC meeting was organized on 15 May 2019 and DEA has given final approval for implementation of project activities in Manipur.

. At the time of the MTR mission (March 2019), only one project Steering Committee meeting had taken place (a second meeting took place shortly after the MTR mission). Further, certain stakeholders interviewed for this review noted that national institutions at the federal level could have played a more active role in providing for clearance for project activities in Manipur. Another challenge was the fact that project AWPs were not signed for 2016, 2017 and 2018 (only the AWP for 2019 has been signed), which has made it difficult for the project team to get the right amount of support and guidance for the implementation of project activities.

Project management arrangements, as they turned out in practice during the implementation stage, are shown in the figure below. They are largely along the lines of the management arrangements outlined in the Project Document described in the previous section of this report.

Figure 7: Project Management Arrangements



The Technical Advisory Committee, foreseen in the Project Document with the involvement of the Solar Corporation of India (SECI), Energy Efficiency Services Limited (EESL) and independent RE and EE experts and consultants was not convened and did not play a role in providing the project with guidance and advice. Further, the central Project Management Unit (PMU) which was outlined in the Project Document and which was foreseen to be located in MoEFCC was not established within MoEFCC, but consisted primarily of a National Project Manager located within the UNDP office. State Project Managers were based in Ranchi (Jharkhand) and Imphal (Manipur) and worked under the guidance and supervision of the National Project Manager in New Delhi. From UNDP's side, overall supervision of the project was provided by the Head of Climate Change and Resilience Unit.

3.2.1. Adaptive Management

While a number of adaptive strategies and actions employed by the project team were observed during the review, this section focuses on those adaptations that played a bigger role in the delivery of activities.

A major challenge faced by the project has been the lack of clearance by the Ministry of External Affairs for starting operations in Manipur. There was also a significant delay in rolling out activities at the start of the project, due to unforeseen circumstances like project clearances from the Department of Economic Affairs in the Ministry of Finance. Given the complications entailed by these delays, the project team was left with little resources during the interim waiting period but to work around delays while waiting for ministerial approval. For example, although project activities had not officially started at the point of this MTR in Manipur, the project team had done

preparatory work to lay out foundations for quick implementation in the state once government clearance was obtained. Also, in the state of Jharkhand, progress has been steady and a lot of ground has been covered after project activities were brought to full speed (especially during 2018).

Another important feature of the project that should be highlighted here is the ability of the project team to redefine priorities in cooperation with partners. One key feature of the MT Project Document is that it is too detailed in terms of what project activities, and in particular investment initiatives, would be undertaken in the two states. The analysis of these activities/initiatives is quite thorough. While this is good in that it provides the team with a very clear action plan, the downside is that it requires highly adaptive capabilities when the situation/context changes. Given the delays in kickstarting activities in Jharkhand, this turned out to be the case – certain priorities changed while the project was receiving its clearances and approvals. Yet, the project team was able to redefine priorities and engage in activities that were relevant in the new situation.

- One such example of adaptive action taken by the project team was in shifting activities towards initiatives such as village-level solutions involving solar-powered micro-cold storage, rooftop solar installations with batteries and meter reading (AMR) units to demonstrate Real-Time Energy Generation. Part of the reason for using the model-village approach to generate interest was JREDA's lack of interest in designing building energy conservation policies or implementing EE in public buildings through ESCOs like EESL. Despite the positive case studies and examples of similar projects in Maharashtra where EESL has been active in implementing energy efficiency measures, there has been no interest in Jharkhand. Regardless, it is the hope of the management team that these projects will demonstrate significant cost and energy savings, and will encourage the Government to implement policy measures through ESCOs.
- Another example is related to the LED street lighting initiative in the state of Jharkhand (described in the Project Document). The project (in Chas Municipality in the Bokaro district), aimed to replace inefficient streetlights with 90 W efficient LED lights, for a combined energy savings of 995,720 kWh. However, by the time the project obtained all clearances and was fully launched in the state of Jharkhand, local authorities (JREDA) had already taken up this initiative within their jurisdiction. So, the project team had to exclude this priority from their action plans and focus on other areas where there was a real need for support.
- Also, municipal pumping Detailed Project Reports or Investment Grade Energy Audits prepared in Jan 2017 were made redundant as EESL signed up an MoU with the Jharkhand Government (in Dec 2016) for implementing energy conservation measures across all municipal/ sewarage pumping stations in 8 cities under the AMRUT scheme. The project team rightly chose to focus on other relevant priorities.

Such deviations from what was foreseen in the Project Document are normal when the list of projects is defined in such granular detail in the Project Document, as was the case of the MT

project. Perhaps, on a going-forward basis, there is no need for such specificity and a set of criteria for the selection of initiatives would be a lot more appropriate than very detailed lists.

3.2.2. Partnership Arrangements

At the national level, project partnerships have primarily taken place between UNDP and MoEFCC. Given that Project Steering Committee meetings have not been organized regularly, relations between the project team and MoEFCC have not been formalized to the extent that they could have been had the Steering Committee meetings taken place regularly. At the central level, key national-level ministries identified in the Project Document (such as the Ministry of New and Renewable Energy, Ministry of Power and BEE) have not been yet actively involved in the implementation process. The same applies to civil society organizations and academic institutions at the national level (in Delhi) – they have not played yet a key role in contributing to the development and implementation of strategies or the conduct of scientific assessments and provision of technical inputs on forming baselines and building evidences.

So far, strong partnerships have been forged at the state level. The project's partnership arrangements have included stakeholders related to the Jharkhand component. Based on interviews conducted for this MTR in Jharkhand, project activities at the state level have overall been participatory. In Jharkhand, there has been a much more dynamic situation with a number of partners involved in project activities, including the state government (especially, JREDA and the Department of Environment, Forest and Climate Change), community and livelihood groups (especially, the cooperatives that have benefited from project initiatives such as the cold storage rooms), research institutes, NGOs, private sector entities, etc. UNDP's partnership with JREDA has resulted in agreements to pursue clean energy development (a strategic roadmap for clean energy deployment developed by UNDP for 2022). Although there have been some delays in gaining JREDA approval on pilot initiatives, successful implementation of RE and EE projects in the state of Jharkhand have resulted in greater coordination with JREDA (detailed examples will be provided in the following sections of this report). The Project Management Unit in Jharkhand has been housed in JREDA, which has ensured close cooperation between the project and key partner at the state level. The Jharkhand PMU has included a renewable energy expert and energy efficiency expert, as well as other technical members.

3.2.3. Feedback from M&E Activities Used for Adaptive Management

As noted in the previous sections, adaptive management was used for the project team's response to changing circumstances. This adaptive reaction resulted from the monitoring system that was put in place by the project team to identify problems and seek solutions. The design of the Monitoring and Evaluation (M&E) system provided in the Project Document has been generally adequate. It has comprised standard tools used in similar projects, in accordance with established UNDP and GEF procedures. The primary tools that have been employed are the Inception Workshop, Quarterly Reviews, Annual Reviews, periodic monitoring through site visits, mid-term review (who findings are presented in this report), and an expected Terminal Evaluation.

3.2.4. Project Finance

This section of the report provides a brief overview of the project's financing and expenditures, based on information provided by the project team.

Project Financing

The table below shows the amount of co-financing expected by the three main project partners (GEF, UNDP and MOEFCC), as per the MT Project Document. The Project Document indicates in particular that co-financing amounting to US$ 12.58 m was expected from MOEFCC and US$ 500,000 was expected from UNDP.

Table 4: Allocation of MOEFCC's Co-Financing Contribution (US$)

Donor	Year 1 (USD)	Year 2 (USD)	Year 3 (USD)	Year 4 (USD)	Total (USD)
GEF	1,022,850	985,603	887,950	848,097	3,744,500
MOEFCC	3,147,186	3,147,186	3,147,186	3,147,187	12,588,745
UNDP	125,000	125,000	125,000	125,000	500,000

A more detailed allocation of MOEFCC's co-financing contribution by project component is described in the table below.

Table 5: Allocation of MOEFCC's Co-Financing Contribution (US$)

Expenditure head	Amount (US $)
Component 1: Framework for the implementation of climate change mitigation options in the selected states SAPCCs	3,147,187
Component 2: Catalysing investments for implementation of selected RE and EE mitigation action	3,249,599
Component 3: Capacity development of concerned state level officials for implementation of respective SAPCCs	3,044,772
Project Management Component	3,147,187
Total	**12,588,745**

The evaluation team tried to quantify some of the information available, however it was not possible to estimate the co-financing by MOEFCC and UNDP that has materialized in the course

of the project thus far. In the remainder of the project, the project team should focus on this matter and have a clear and evidence-based estimation of the amount of financing provided by these partners.

Co-financing has been provided in the framework of the MT project at the local level (in Jharkhand), in support of the infrastructure projects that have been undertaken under the project. The co-financing that has materialized up to the point of the MTR and that is expected to be mobilized until the end of the 2019 year is shown in the table below.[14] The project team has been tracking this information, which has also been confirmed by JREDA in writing.

Table 6: Mobilization of Co-financing for Investment Projects

	Project Title	Investment Mobilized in INR (as of MTR)	Expected to be mobilized by Dec 2019	Cumulative funds mobilised (INR)	Cumulative funds in USD
1	Rooftop solar in institutional sector	51,331,500.00	25,500,000.00	INR 76,831,500.00	$1,097,592.86
2	Rooftop solar in health care facilities (HCF)	79,200,000.00		INR 79,200,000.00	$1,131,428.57
3	Rooftop solar in CNI	4,437,000.00	15,300,000.00	INR 19,737,000.00	$281,957.14
4	Rooftop solar in residential sector			INR 0.00	$0.00
5	Rooftop solar in public buildings			INR 0.00	$0.00
6	Rural mini/microgrid			INR 0.00	$0.00
7	Solar cold storage	9,000,000.00	45000000	INR 54,000,000.00	$771,428.57
8	Solar pump			INR 0.00	$0.00
9	*Canal Top Project*		160000000	INR 160,000,000.00	$2,285,714.29
	Total	**143,968,500.00**	**245,800,000.00**	**INR 389,768,500.00**	**$5,568,121.43**

Project Expenditure

The table below shows the project's expenditures by outcome area for the three years of its operation. As can be seen from the table, by the end of 2018 the project had spent a total of about US$ 2 million, which represents a bit more than half of the funds provided by GEF for this project (which excludes co-financing expected by UNDP and MOEFCC). Also, as can be seen from the table, the execution rate for all years have been between 90 and100%. Within project components (outcomes) there is a lot of diversity in terms of execution rates. Outcome 3 has seen weak execution rates averaging about 50% in the three years of project implementation. The other two components have had execution rates of more than 100%. Overall, administrative (project management) costs have been low, averaging about 5% of total project expenditure for the three years of project implementation.

Table 7: Budget Execution by Outcome Area

[14] this information has been provided by the project team and is not verified independently by the MTR team.

No.	Outcome Area	Budgeted (as per Pro Doc)	Spent	Execution Rate
Year 2016				
1	Outcome 1	380,000	210,466	55%
2	Outcome 2	90,000	212,886	237%
3	Outcome 3	70,000	66,217	95%
	Project Management	27,823	34,578	124%
4	**Total**	**567,823**	**524,147**	**92%**
Year 2017				
1	Outcome 1	275,000	220,723	80%
2	Outcome 2	305,000	436,487	143%
3	Outcome 3	88,576	22,783	26%
	Project Management	34,924	76,893	220%
4	**Total**	**703,500**	**756,886**	**108%**
Year 2018				
1	Outcome 1	247,500	548,161	221%
2	Outcome 2	330,000	220,992	67%
3	Outcome 3	25,000	6,487	26%
	Project Management	30,194	17,621	58%
4	**Total**	**632,694**	**793,261**	**125%**
ALL YEARS				
1	Outcome 1	902,500	979,349	109%
2	Outcome 2	725,000	870,365	120%
3	Outcome 3	183,576	95,488	52%
	Project Management	92,941	129,091	139%
4	**Total**	**1,904,017**	**2,074,293**	**109%**

The table below shows the project's expenditure by category of expenditure. As can be seen from the table, one of the largest categories of expenditure is contractual services with companies which have implemented the infrastructure projects pursued by the MT project. Spending under this category amounts to 41% of total expenditure. 2018 has been the year in which expenditures for contractual service have increased considerably. Another large category of spending is the Project Management Unit costs, with 47% of total expenditure.

Table 8: Expenditure by Category

Expenditure Categories	2016	2017	2018	All Years	% of Total
1. - Contractual Services-Companies	103,320	7,596	292,298	403,214	41%
2. - Local Consultants	5,705	134	34,467	40,306	4%
3. - Events, conferences, travel	4,296	5,742	12,369	22,407	2%
4. - Admin expenses	670	1,268	4,835	6,773	1%
5. - PMU Cost	85,177	183,163	192,646	460,986	47%
6. - Others	11,297	22,849	11,545	45,691	5%
TOTAL	**210,465**	**220,752**	**548,160**	**979,377**	**100%**

3.2.5. Monitoring and Evaluation

Design at entry

The Project Document contains an entire section on the Monitoring and Evaluation Framework which details the approaches and mechanisms to be used by the project team and stakeholders. The following are key M&E instruments identified at the project's design stage (in the Project Document):

- ***Inception Workshop***: Based on the Project Document, a formal Project Inception Workshop was expected to be held within 2 months of the project's start (in reality, the inception meeting was held on 16 March 2017, more than one year from the Project Document was officially signed on 20 January 2016).

- ***Quarterly Review***: Quarterly Reviews based on an enhanced results-based management platform were foreseen in the Project Document. The Project Document foresaw an initial risk analysis, followed by a regular project log to be regularly updated in ATLAS. Based on the information gathered, a Project Progress Report (PPR) would be generated.

- ***Annual Review***: Annual Reviews, which combine both UNDP and GEF reporting requirements, are outlined in the Project Document with the aim of monitoring progress since project inception. Among some of the key components of the annual review are progress made towards objectives and outcomes (along with indicators, baseline data and end-of-project targets), lessons learned and good practices, AWP and expenditure reports, risk and adaptive management as well as an ATLAS Project Progress Report (PPR) and portfolio level indicators.

- ***Periodic Monitoring through site visits***: UNDP CO and the UNDP Bangkok Regional Hub (BRH) are designated in the Project Document to conduct visits to project sites based on an agreed schedule. The project team was also expected to produce a Field Visit Report/Back to Office Report (BTOR) within one month of each visit.

- ***Mid-Term Review (MTR)***: An MTR (which is this current report) was foreseen in the Project Document as an instrument for determining the project's progress and identifying important mid-project corrections. The MTR was expected to assess the effectiveness, efficiency, relevance, timeliness and impact of the project implementation and provide recommendations for enhanced implementation during the final half of the project.

- ***Terminal Evaluation (TE)***: An independent TE is foreseen by the Project Document to take place three months prior to the final PSC meeting and is expected to be undertaken in accordance with UNDP and GEF guidance policies. It is expected to focus on the delivery of the project's results as initially planned (and as corrected after the MTR if any such correction took place). The TE is expected to look at the impact and sustainability of the project's results, including the contribution to capacity development and the achievement of global environmental benefits and goals.

The monitoring and evaluation mechanisms laid out in the Project Document were adequate in maintaining quality control, although certain adaptations needed to be made as the project progressed. What is missing in the design of the M&E framework is a clear division of labour among project partners and stakeholders on respective roles in the monitoring and evaluation process. Overall, the rating of the Monitoring and Evaluation design at entry point is "Satisfactory".

Implementation

For the assessment of the M&E framework, the evaluation team had access to some of the project documentation related to monitoring and reporting. The following documents were reviewed in the course of this MTR:

- Annual Project Implementation Reviews
- Quarterly Progress Report
- Combined Delivery Report

These reports provide a reasonable picture of project progress, as well as the issues requiring the attention of the PMU and Project Steering Committee. Overall, the quality of these documents seems to have been adequate. The most important instrument in the monitoring process appears to have been the Quarterly Project Reports (QPR) and Project Implementation Reviews (PIR). QPRs have provided the project team with an effective platform for engagement with other stakeholders on the discussion of the project's progress. Furthermore, PIRs were produced by the project team for years 2017 and 2018 and have provided a review of the project outcomes and outputs and indications whether objectives have been met or are still pending. Further, the Progress Report (titled "Commentary on Project Implementation in Jharkhand"—dated June 2016-Dec 2017), a comprehensive and satisfactory description of project successes has been provided. A detailed table of Project Log Frame Indicators for Jharkhand was also provided in the appendix, and details

baselines and targets as well as expected energy savings. In addition, the project developed a Monitoring, Reporting and Verification (MRV) system to measure, monitor and report prioritized actions and their impact.

Overall, the monitoring and reporting system that has been used by the project has been effective and has been implemented well by the project stakeholders. The project team has followed the common M&E template and used standard tools such as risk logs which have been updated accordingly. The National Project Manager has been closely involved in project activities and working closely with the Jharkhand PMU. He has been providing substantive support by discussing the progress and problems, assisting with advice and monitoring project activities.

The project could have tracked more effectively a number of crucial parameters. The following are the most important:

- Inception Workshop: The Inception Workshop was held on 16 March 2017 at MoEFCC. Overall, it was adequate in assisting all project partners to fully understand and take ownership of the project. It brought the relevant stakeholders of the project on to a common platform and share a better understanding of the project including project goals and outcomes, objectives, focus sectors, key activities, state priorities & work plan which would be implemented in the two states. It detailed the support services and complementary responsibilities of UNDP staff along with MoEFCC, the PSC, the project team, and the project's ASAs. The Inception Workshop could have provided a more detailed overview of reporting, monitoring and evaluation (M&E) requirements, financial reporting procedures and obligations, annual project audits and finalization of Annual Work Plans (AWPs).

- As has already been mentioned, Project Steering Committee meetings have not been organized regularly. Only one meeting had taken place at the point of the MTR mission, and one additional meeting was held while this report was being written. Challenges encountered by the project could have been discussed more effectively in Project Steering Committee meetings and solutions could have been pursued jointly in this forum. Board members, particularly MoEFCC, could have been more fully engaged in discussing implementation issues and the project's status, reviewing previous board meeting recommendations and planning implementation of outstanding issues in the work plan. As discussed already, AWPs were not approved in the course of the implementation of this project.

- The project would have benefitted from a Monitoring and Evaluation Plan, approved by the Project Steering Committee at the inception phase, which would have provided the project team with proper guidance on oversight of project activities to ensure that project objectives are realized and expected results achieved, implementation progress appropriately tracked, feedback from stakeholders taken into account and incorporated, as well as learning and knowledge sharing documented.

- The project could have benefited from the establishment of a clearer baseline at the start of the project. While the DPRs conducted by the project (in areas such as energy efficiency in buildings, solar rooftop for selected public buildings on the basis of the ESCO/RESCO model, energy audits of over public buildings, etc.) established a baseline on energy consumption and resulting emissions, the creation of a more formal baseline on the basis of some sort of survey could have included additional things like existing technologies, financing schemes, business models, RE investments, etc., for the state of Jharkhand. Such a baseline would have made it much easier to assess the value-added of this project along of the above-mentioned dimensions.

- The project team could have also established an audit system to monitor the quality of implementation of implemented initiatives. This would have strengthened the quality and cost-effectiveness of funded projects. The quality assurance system could have included spot-checks of projects by contracted technical support consultants during and after the construction. The capacity of Technical Support Consultants and relevant sub-national administration representatives could have been strengthened to effectively monitor and manage small-scale rural infrastructure projects. The project team could have organized training sessions on the monitoring and implementation of small-scale projects.

- The project could have tracked more effectively a number of crucial parameters. The following are the most important:
  - One element that the project team could have tracked better is the uptake of outputs (studies, training, etc.) and the degree to which they have served their intended purpose. For example, the project could have monitored more closely the extent to which research and analytical documents produced by the project were incorporated into the authorities' policies and programmes. While some evidence was generated during the interviews for this MTR (see the sustainability section for a brief discussion of this), it would have been useful if the project had kept track of this in a more systematic way.
  - Also, the project team could have tracked the degree to which the capacity of participants in the various training programmes improved. This was an important activity of the project which could not be assessed by the MTR team because of the lack of data.
  - The project team could have tracked more effectively the experience of infrastructure initiatives, the lessons they generate and the extent to which they get scaled up. It is too early to talk about the scale of replication of infrastructure projects, but one characteristic of them is that they serve to produce lessons which when shared may lead to replication. They can be vehicles for transmitting experience and play a crucial role for upscaling and replication. However, it is not clear how their lessons are collected, analyzed, synthesized and shared. The project should develop a tracking mechanism for pilot initiatives, including documenting results, lessons, experiences and good practices.

- The project should monitor co-financing more effectively by improving the tracking system at the infrastructure project level.

Overall, the project team has made good use of the available tools for monitoring and has done an adequate job in monitoring issues that have arisen in the project. The use of annual work plans and budgets, as a tool for monitoring and planning, has been effective throughout the period in question. The M&E system has overall been adequate for tracking progress and assessing the achievement of project objectives. Some improvements are still necessary, especially with regards to tracking parameters such as co-financing and others listed above. The rating of the Monitoring and Evaluation at implementation is "Moderately Satisfactory".

3.2.6. Execution and Implementation

Performance of the Executing Agency (MoEFCC)

As the Implementing Partner of this project, MoEFCC was foreseen in the Project Document to be directly responsible for the oversight of the Central Project Management Unit, under which the Project Management Units (PMUs) for Jharkhand and Manipur were to be subordinated.[15] MoEFCC was supposed to exercise this role primarily through the Project Steering Committee, as well as through a Technical Advisory Committee (shown in the chart on Management Arrangements). However, given that the Steering Committee has not met regularly and the Technical Advisory Committee has not been convened yet, MoEFCC's role in providing strategic guidance for the project has been more limited than expected. Furthermore, the central PMU which was foreseen in the Project Document to be located in MoEFCC was not established within MoEFCC, but has consisted primarily of a National Project Manager located within the UNDP office. A State Project Manager has been based in Ranchi (Jharkhand) and has worked under the guidance and supervision of the National Project Manager in New Delhi. From UNDP's side, overall supervision of the project has been provided by the Head of Energy & Environment (E&E) Unit. In this situation, the National Project Manager hired by UNDP has played a key role in guiding and monitoring project activities in Jharkhand, under the oversight of the UNDP E&E analyst. The National Project Manager has kept MoEFCC abreast of progress by the project through informal meetings or formal channels such as the provision of QPRs and IPRs.

In Jharkhand, project activities have been undertaken by the state PMUs, led by the State Project Manager. In this case, operations have been closely overseen by the Jharkhand Renewable Energy Development Agency (JREDA). Good cooperation has also been established with the Ministry of Environment in the Government of Jharkhand. As has already been mentioned, the Project Management Unit in Jharkhand has been housed in the JREDA office, which has ensured close

[15] In practice this description applies only to Jharkhand, because in Manipur the State Project Management Unit has not been established yet.

cooperation between the project and key partner at the state level. Overall, JREDA has played a significant role in the execution and implementation of projects.

Given the above challenges, and delays in the start of the project, in particular in Manipur, the rating for the Executing Agency in this project is "Moderately Satisfactory".

Performance of Implementing Agency (UNDP)

UNDP has provided the necessary support throughout the entire cycle of the project, including in its identification, preparation of concept, appraisal, preparation of detailed proposal, approval and start-up, oversight, supervision, completion and evaluation. UNDP has also played a key role in the monitoring and evaluation of the project, working closely with project partners to ensure that the outputs of the project were on track through field visits, consultations and reviews with stakeholders. Beyond that, UNDP has also provided technical advice and advisory support to the project.

Overall, the performance of UNDP (the Implementing Agency) has been adequate. UNDP has provided an appropriate level of support to the project team. During the MTR field work and interviews with project stakeholders, no concerns were noted with regards to UNDP's performance and its role in the project. In particular, no delays were noted in the transfer of funds and no shortcoming were detected in the conduct of monitoring activities. Where the UNDP Country Office could have been more proactive is in working with the respective government agencies in obtaining the necessary clearances for project activities to start in the Manipur state. For these reasons, the rating of Implementing Agency's performance in the project is "Moderately Satisfactory".

3.3. Project Results

This section of the report is organized along the standard dimensions of UNDP evaluations: i) relevance - the extent to which the project has been relevant to the country's priorities and needs; ii) effectiveness - whether the project has been effective towards the achievement of desired and planned results; iii) efficiency - whether the process of achieving results has been efficient; iv) sustainability - the extent to which the benefits of the project are likely to be sustained; and, v) mainstreaming – the extent to which considerations related to gender, human rights and SDGs have been incorporated into project activities.

3.3.1. Progress Towards Results

Although it is difficult to talk about ultimate results because the project is still underway, and even when completed full effects of many activities will take time to play out, it is possible to provide an overview of the project's more immediate contributions, which are summarized in Table 9.

As already noted, the project started with a significant delay—most notably, difficulties getting off the ground in Manipur, as well as delays in acquiring permits in Jharkhand—but has since picked up pace. In spite of these delays in obtaining clearances, the project has been successful in implementing many of its stated objectives in the state of Jharkhand. The interim period between applying for permits and their processing by the relevant agency was effectively utilized for the purposes of implementing pilot projects and demonstrations to showcase tangible gains in RE and EE implementation to the State Government. Also, quite recently (at the time of e writing of this report), the project has received the clearance for the initiatiation of fully-fledged activities in Manipur.

The project team's approach was to start by identifying a list of prioritized technologies based on their mitigation potential, cost, benefits, usefulness and relevance to the state. These technologies included building energy efficiency, replacement of agricultural/municipal pumps with EE pumps, solar rooftop, ground-mounted solar, replacement of streetlights with LEDs and solar water heater. The project team updated Marginal Abatement Cost Curves (MACC)[16] and used tham to shortlist potential investment.[17] In addition, the project developed a Monitoring, Reporting and Verification (MRV) system to measure, monitor and report prioritized actions and their impact. Subsequently, the team prepared a number of Detailed Project Reports (DPRs) on building energy efficiency and solar rooftop on selected public buildings on the basis of the ESCO/RESCO model, along with the

[16] The MACC analysis gives a visual breakdown of the low carbon development pathway, along with corresponding costs and impacts. MACCs were essential for identifying effective EE & RE investment opportunities for Jharkhand and Manipur to reduce GHG emissions. The MACCs analyzed the available mitigation options, emission reduction potential, and marginal cost associated with implementation.

[17] Prioritized technologies as per MACC: 1. Solar pumps; 2. Solar rooftop; 3. Utility scale solar; 4. Inefficient Street light replacement by LEDs; 5. Building EE; 6. Municipal Pumping EE; 7. AG DSM 8. Solar water heater. New selections: 1. MSME EE; 2. Distributed Renewable Energy in rural segment (Mini Grid and Micro Cold Storage).

municipal drinking water pumping segment.[18] The project also developed energy audits for public buildings to demonstrate opportunities for energy savings in the public building segment. The project also supported the State Government to develop a policy on energy conservation in public buildings through implementation of ESCO strategies.[19] The project also sought to catalyze investment for climate change mitigation by identifying innovative sources of funding for RE and EE, evaluating loan mechanisms and other debt instruments, and researching PPP options for scaling up projects. A report on integrating climate change related concerns in states' budgetary allocations was prepared to map how much public investment had gone towards climate change mitigation priorities.

To explore off grid market development and emissions mitigation opportunities in the rural segment, the project conducted an assessment of the feasibility of a self-sustainable solar-based mini-grid in 17 villages across Gumla, Lohardaga and Palamu districts. The study helped improve understanding of how the deployment of solar micro-grid may cater to access to energy efficiency in Jharkhand's unelectrified areas. Based on estimated demand, a solar power generation and distribution system was designed for all villages. In addition, based on the assessment of villagers paying capacity for the usage of energy, a tariff structure was proposed and annual revenues calculated. The project also drafted a report with recommendations on improving the energy status in Jharkhand through various power-sector reforms. This report set clear annual targets across different technology segments and supported the implementation of successful business models like RESCO/ESCO. An effort was also made to drive multi-stakeholder discussion, and various training and thematic events including a focus on scaling-up solar and promoting clean energy were organized through consultations with big and small industries and local developers. At the time of the conduct of the study, all identified villages were unelectrified and dependent on kerosene for their lighting needs. However, the project team has reported that in due course some villages have been covered under the rural electrification programme.

The following key pilot initiatives had been awarded by the project at the point of the writing of the MTR report (April 2019):

1. Rooftop Solar in institutions/schools[20]
2. 60 KW rooftop solar installation (with battery) across 9 healthcare facilities in Jharkhand [JREDA developers]
3. Rooftop solar in CNI[21]
4. Rooftop solar in residential sector

[18] DPRs on Building EE: for 2 buildings namely Project Building and Nepal House. DPRs for solar rooftop on OPEX/RESCO mode carried out for 2 public buildings namely Van Bhavan and BIT Sindri. DPRs for 12 pumping stations/20 pumping units across Ranchi and Dhanbad on ESCO mode.

[19] The project submitted to JREDA a policy note on energy conservation of public buildings through ESCO.

[20] Financial support for up to 20% (Phase 1) over the CFA for setting up rooftop solar in private schools (in coordination with JREDA).

[21] Rooftop solar in commercial and industrial consumer segment (plus enabling financing across all consumer categories).

5. Rooftop solar in public buildings
6. 17 KW Mini Grid at Garo village, Chatra [Suncraft]
7. Solar powered micro-cold-storage [Ecofrost]
8. Solar pump
9. Canal top project (support has been provided and implementation will be carried out by JREDA)
10. EE in public buildings

Annex VI of this report provides a detailed description of these pilot projects, based on information provided by the project team.

The main results of the project for the Renewable Energy component as of April 2019 are shown in Table 9 below. These results are confirmed by JREDA in an endorsement letter attached in Annex VII of this report.

Table 9: Results of the Renewable Energy Component (as of April 2019)

Activities (for Jharkhand only)	Capacity addition achieved through direct project funding (MW)	Capacity addition achieved through indirect project funding (MW)	Cumulative capacity addition as of Apr 2019 (MW)	Annual Emissions Reduction (tCO2)	Investment Mobilized in INR	Investment Mobilized in USD (1 USD = 70 INR)
	A	B	C=A+B			
Rooftop solar in institutional sector	1.361	0.326	1.687	2265.978	72,154,800	1,030,782.86
Rooftop solar in health care facilities (HCF)	0.06	0.65	0.71	953.672	78,000,000	1,114,285.71
Rooftop solar in Commercial and Industry		0.087	0.087	116.8584	3,915,000	55,928.57
Rooftop solar in residential sector		0.112	0.112	150.4384	6,048,000	86,400.00
Rooftop solar in public buildings (other than CHCs)		2.39	2.39	3210.248		0.00
Rural mini/micro grid[22]	0.017		0.017	22.8344		0.00
Solar cold storage	0.004	0.096	0.1	134.32	36,000,000	514,285.71
TOTAL	**1.442**	**3.661**	**5.103**	**6,854.35**	**196,117,800**	**2,801,682.86**

Furthermore, Table 10 below presents the main results of the project for the Energy Efficiency component as of April 2019. As in the case of Renewable Energy, these results are confirmed by JREDA in the endorsement letter attached in Annex VII of this report.

[22] Grid emissions factor (TCO2/MWh) = 0.92.

Table 10: Results of the Energy Efficiency Component (as of April 2019)

Project title	Annual Energy Savings through direct project funding (MWh)	Expected Annual Energy Savings through indirect project funding (MWh)	Expected Annual Energy Savings from potential/pipeline interventions, after EoP (MWh)	Cumulative energy savings (MWh)	Annual emission reduction potential for cumulative emission (tCO2)	Investment (INR)	USD (1 USD = 70 INR)
EE in Public Buildings	152	1,459	10,729	1,611	1,482.12	14,000,000	200,000
EE in Municipal pump + rural drinking water pumping		200	200	0	0	10,300,000	147,143
EE in cold storage		48	505	48	44.16		0
EE in pvt schools (40% private school + 97 Government school)		500	1,156	0	0	13,400,000	191,429
EE-AG-DSM (20% of the pilot 100 pumps)			378	0	0		0
EE in MSME sector (assumed 10% and 20% of the 120 audited units will implement EE measures in current and next year		1,404	2,807	0	0		0
TOTAL	**152**	**1,507**	**15,775**	**1,659**	**1,404.17**	**37,700,000**	**538,571**

The following is a summary of the main Renewable and Energy Efficiency results of the MT project:[23]

[23] Cumulative emission abated is calculated from total renewable energy installed and energy savings done through direct and indirect project intervention. Values are calculated on an annual basis. Financial mobilization for solar rooftop installations under market mode has been calculated on the basis of total cost of the system (including CFA) minus the financial support offered under the project, in both the phases. For other solar projects, a benchmark cost of Rs 51000/KW (without battery) has been considered. Similarly, JREDA's cost for the EE implementation work in government schools and rural drinking water systems has been considered.

- A cumulative capacity of approx. 1.361 MW has been installed in institutional/social consumers under the market mode scheme in two phases.
- Project has contributed in 326 KWp installations at XLRI, as the first RESCO project in Jharkhand. 2 MW of Capacity is also expected to be installed in IIT (ISM) by the end of the year, whose facility was visited by the project team for solar feasibility and mapping interest.
- In Commercial and Industrial segment, project contributed in installation of 87 KW in 2019 and it is expected that approx. 300 KW of additional capacity would be installed by the end of the year.
- 60 KW in 9 CHCs have been installed through project funding and JREDA added almost 650 KW in the segment during 2019.
- A micro cold-storage system with 4 KW solar capacities has been installed through project intervention, and approximately 24 such systems are expected to be installed by JREDA in 2019.
- Energy efficiency improvement measures have been implemented in Van Bhavan and energy savings have been estimated through direct intervention in Van Bhavan complex. Indirect support to JREDA and Electrical Works Dept. for retrofitting in 3 buildings, including project building, Nepal House and Raj Bhavan, is also being provided.
- EE implementation in selected rural drinking water systems and 97 government schools is being undertaken by JREDA. It is assumed that 20% of potential energy savings in MSMEs would be realized by the end of the year, through a mix of energy audits and financial handholding support to be provided by the project.

On the basis of the above results, the project team has made an estimation of the added capacity, reduced emissions and investment funds for renewable energy projects by the end of the project, which is estimated to be the end of December 2019. The overall estimations are shown in Table 11 below.

Table 11: Capacity Addition and Emissions Reduction by the Project

Sl	Project Title	Renewable Energy Interventions							
		Capacity addition achieved through direct project funding (MW)	Capacity addition achieved through indirect project funding (MW)	Potential Capacity addition by Dec 2019 (MW)	Cumulative capacity addition by EoP (MW)	Expected Emissions Reduction by End Of Project through direct project funding (tCO2)	Expected ER by EOP through indirect project funding (tCO2)	Expected ER by EOP from potential capacity addition (tCO2)	Cumulative ER by EoP(tCO2)
		A	B	C	D=A+B+C				
1	Rooftop solar in institutional sector	1.361	0.326	0.5	2.187	1845	928	86	2859
2	Rooftop solar in health care facilities (HCF)	0.06	0.66		0.720	128	1413		1542
3	Rooftop solar in CNI		0.087	0.3	0.387		86	214	301
4	Rooftop solar in residential sector		0.112		0.112		176		176
5	Rooftop solar in public buildings		13.184		13.184		25140		25140
6	Rural mini/microgrid	0.017		0.2	0.217	36.40		143	179
7	Solar cold storage	0.004	0.096		0.100	8.57	69		77
8	Solar pump				0.000		741		741
9	*Canal Top Project*			2	2.000		712		712
		1.442	**14.465**	**3.000**	**18.907**	**2019**	**29265**	**443**	**31726**

In addition to the investment projects which are discussed above, the project has undertaken a number of other initiatives, which include:

- Installation of 50 Automated Meter Reading (AMR) units along with dashboard for displaying Real Time Energy Generation from selected rooftop plants in Jharkhand [Suncraft][24]
- Development of database of potential consumers across eight cities of Jharkhand for setting-up rooftop solar PV in market mode [GERMI]
- Comprehensive energy performance study and solar roof top feasibility assessment for 180 private institutions/schools in Jharkhand [PGS; TUV-SUD and TERI]
- Identifying the key determinants, barriers and strategy for promotion of solar water pumping (including micro pumping application for irrigation in the state of Jharkhand and Manipur along with feasibility for grid integrated solar pumping model [PGS]
- Market assessment for the viability of solar powered micro-grid based business models [PWC][25]
- Barrier analysis towards implementing renewable energy and energy efficiency initiatives in the state [TERI]
- Training on net metering for utility staff [GERMI]
- Mapping of Energy Conservation potential for agriculture sector (agriculture irrigation pump set) in Jharkhand [PGS][26]
- Energy Audits of cold storage units in Jharkhand [TERI]
- Assessment of opportunities for integration of energy efficiency and renewable energy technology in cold storage operation.

Annex VI of this report provides a detailed description of these additional initiatives, based on information provided by the project team. It also provides a list of additional support provided by the project to authorities in Jharkhand.

The following is a list of activities currently underway. Annex VI of this report provides a quite detailed description of them.

1. Accelerating adoption of solar powered micro cold storage
2. Investment Grade Energy Audit and bankable DPR of 120 MSME units
3. Promote RE access and leverage innovative financing for RE based rural enterprises.
4. Van Bhavan Pilot on BMIS and EE retrofitting
5. Facilitating solar rooftop financing

[24] As of March 2019, 50 AMRs have been set up at 32 sites across Jharkhand.
[25] An example of this is the mini-grid in the Garo village in Chatra district.
[26] This was an initiative to map energy conservation potential across the agricultural irrigation sector in Jharkhand and designing an appropriate framework for promoting market-based interventions in the agricultural pumping sector. There has been no baseline assessment carried out in recent years and there is significant room for UNDP to engage concerned stakeholders such as BEE Discom, JREDA, etc.

6. SAPCC Revision

In Manipur some preparatory activities have taken place, despite the lack of approvals for the fully-fledged start of activities. The main activities conducted in the state have been:

- Preparation of detailed project report for 1 & 5 MW standalone solar power project for MANIREDA.
- Preparation of draft State Solar Policy (amended) 2019.
- Post implementation monitoring & data collection support to the state CC cell for the NAFCC project activity at village Phayeng.
- Review meeting & organizing workshop with state nodal departments.
- Support to the CC cell for data collection & preparation of SAPCC ver-2, etc.

The following are activities planed for the period June 2019 onwards:

- Energy performance and solar roof top feasibility assessment for private education institution/school in Manipur.
- Implementation support to MANIREDA to incentivize rooftop SPV installation in selected education institute.
- E-mobility & sustainable transport solution for Manipur.
- Market transformation & promotion of E-rickshaw through gap funding mode as demonstration activity, etc.

Overall, the project has focused on prioritizing suitable technology options for the Jharkhand state, developing investment-ready proposals, mapping opportunities for financing clean energy projects, budgeting for climate change concerns and faciliting the discourse on clean energy. Targeted advocacy was carried out to push for a policy on energy efficiency for public buildings (e.g. promoting energy conservation in public building through ESCOs), operationalizing net metering for solar rooftop, implementing innovative business models like RESCO for solar rooftop etc.

Table 9 presents the project's achievement at the point of the MTR at the level of project objectives and outcomes.

Table 12: Status of Outcome and Output Indicators at MTR Point

Assessment of Project Log Frame Indicators (*as of 7th March 2019*)

It should be noted here that the results presented in the table below are the results that the CO has estimated at the End of Project date, which in this case is estimated to be December 2019. Data at the point of evaluation – March 2019 – were no available for this report. Further, assigned targets in the Project Document are for both Jharkhand and Manipur. However, expected achievements/results here are captured for Jharkhand only, given that activities in Manipur have not properly started yet.

In the table below, Green is used for targets achieved (expected to be achieved by end of 2019, as assessed by the project team), orange is used for undetermined achievement and red is used for unachieved targets (based on estimates by the project team for the end of 2019).

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
Project goal: Reduced GHG emissions achieved through implementation of RE and EE solutions at the state level as identified in the SAPCCs	Cumulative CO_2 emission reduced from start of project to End-Of-Project (EOP), (M tCO_2e)	0	304,250 tCo2e	39,522 tCO2e	The target for this defined in the Pro Doc does not seem realistic.
Project Objective: To support the effective implementation of specific energy efficiency and renewable energy climate change mitigation actions identified in the SAPCCs for Manipur and Jharkhand	Total energy savings achieved from implemented RE and EE mitigation actions by EOP, MWh	0	190,452 MWh	45,417 MWh	Also, the target for this defined in the Pro Doc does not seem realistic.
	Total installed capacity of RE systems (MW) by EOP	0	28 MW	18.91 MW	This target as well does not seem realistic.
	Number of people that benefitted directly or indirectly with improved energy access in the two states through the project interventions by the EOP (million). (This includes, improved job opportunity, quality of life and education.)	0	17.8	Preliminary estimates suggest that the number of people expected to have benefitted both directly and indirectly through DRE in rural areas is approximately 4,250+ [*Mini Grids: 400 people in each village x10; Solar cold storage: 10 people x25 sites*]. With solar rooftop applications across all	The 4,250+ number for beneficiaries reported by the CO here seems a lot more realistic than the millions estimated in the original RRF.

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
				consumer segment, the number of beneficiaries in both peri urban and urban segment will be much larger. Final estimation will be undertaken by December 2019 when all the RE/EE applications are installed and being used by communities.	
Component 1: Framework for the implementation of climate change mitigation options in the selected states SAPCCs					
Outcome 1: Successful and sustainable implementation of priority Climate Change and Mitigation (CCM) actions on energy generation and application of Energy Efficiency (EE) & Renewable Energy (RE) technologies in the major energy end-use sectors in selected states	Number of CCM actions implemented by the project in the states by EOP.	0	9	Mitigation actions finalized are listed below: 1. Rooftop Solar in institutions/schools 2. 60 KW rooftop solar installation (with battery) across 9 healthcare facilities in Jharkhand [JREDA developers] 3. Rooftop solar in CNI 4. Rooftop solar in residential sector 5. Rooftop solar in public buildings 6. 17 KW Mini Grid at Garo village, Chatra [Suncraft] 7. Solar powered micro-cold-storage [Ecofrost] 8. Solar pump 9. Canal top project	For the canal top project support has been provided and implementation will be carried out by JREDA. Technical assessment has been completed for the additional actions and they are expected to be completed by EoP.

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
				The following are to be completed by EoP: 1. MSME EE 2. Energy Efficiency in conventional cold storage segment 3. Energy Efficiency in municipal pumps 4. AgDSM (EE in irrigation pumping)	
Output 1.1: Regularly updated GHG abatement cost curves at state level	Number of abatement cost curves prepared by Year 1	0	4	Initially in the first year, the following 8 technologies were prioritized through MACC 1. Solar rooftop 2. Utility scale solar 3. Municipal Demand Side Management (MuDSM) – replacement of inefficient pumps 4. Agriculture Demand Side Management (AgDSM) – replacement of inefficient pumps 5. Solar pumps 6. Building EE 7. Replacement of inefficient street lights with LEDs 8. Solar water heater Cost curves were also updated	

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
O**utput 1.2:** Selected prioritized RE and EE actions listed in Manipur and Jharkhand Action Plans on Climate Change for implementation	Number of prioritized RE and EE mitigation actions selected for implementation in the states by end of year 1	0	4	Five prioritized RE and EE mitigation actions selected for implementation in Jharkhand after the first year are listed below: 1. Rooftop Solar in schools/institutions 2. Rooftop solar in CHCs (with storage) 3. Solar Cold Room 4. Solar based mini grid in remote villages 5. Energy Efficiency in public buildings	These are specific list of activities which have been demonstrated and expected to be upscaled in Jharkhand.
Output 1.3: Designed and implemented common monitoring, reporting, and verification (MRV) system for the selected RE and EE actions of the Manipur and Jharkhand SAPCC, in a way to feedback into the SAPCC process	No. of monitoring, reporting, and verification (MRV) systems designed and implemented in the states by Year 3	0	5	Investment demonstrations as listed above have been implemented. MRV system for Marginal Abatement Cost Curves (MACC) has been developed. Meanwhile Automatic Meter Reading (AMR) system for monitoring solar rooftop generation data has also been installed and is being corrected to address any mismatch from inverter data.	5 demonstrations as mentioned above. 50 AMRs have been installed in Jharkhand.

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
Component 2: Catalyzing investments for implementation of selected RE and EE mitigation action					
Outcome 2: Enhanced states capability and capacity for identifying, designing, planning, financing and implementing selected RE and EE actions from their SAPCC	Number of locally designed, planned and financed RE and EE projects implemented in the states by EOP	0	4	Mitigation actions finalized are listed below: 1. Rooftop Solar in institutions/schools 2. 60 KW rooftop solar installation (with battery) across 9 healthcare facilities in Jharkhand [JREDA developers] 3. Rooftop solar in CNI 4. Rooftop solar in residential sector 5. Rooftop solar in public buildings 6. 17 KW Mini Grid at Garo village, Chatra [Suncraft] 7. Solar powered micro-cold-storage [Ecofrost] 8. Solar pump 9. Canal top project	This is the same list as above.
Output 2.1: Completed evaluation of existing available loan mechanisms for projects developed as part of SAPCC targets	Number of loan mechanisms evaluated by Year 2	0	5	5 loan mechanisms evaluated in financing landscape report prepared in the first year are as listed below: 1. National Clean Energy Fund 2. MNRE- Solar Pumping Programme 3. BEE-Partial Risk Guarantee Fund for Energy Efficiency	12 is the longlist of the activities. Fund mobilization actually achieved for these seven interventions

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
				4. Public Financial Institutions: PFC, RECL, SIDBI& IREDA 5. Commercial banks: Public and Private sector banks In addition, active engagement with financing institutions is being carried out to facilitate financing with a focus on solar rooftop for all consumer segments and solar cold storage for FPOs/farmers. Facilitating Micro, Small and Medium Enterprises (MSME) financing for energy efficiency and technology upgradation measures and required handholding is also planned out as an extension of energy audit activity.	
Output 2.2: Implemented non-grant financing instruments such as flexible debt finance (including long tenure low-interest loans)	Number of non-grants based financial instruments developed by Year 3	0	1	1. Solar rooftop installation across private consumers, through market mode (capex, with or without subsidy support). 2. ESCO for building EE. 3. RESCO for solar rooftop projects especially for large institutions and C&I. 4. Revolving fund for building EE project (for	The project reported these financial instruments, although they were not established exclusively by the MT project.

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
				repaying back to JREDA through savings). 5. Capex for DRE solution like solar cold storage by FPOs.	
Output 2.3: Mobilized public and private sector funding	Amount of total funding mobilized for implementation (US$) by Year 4	0	USD 12,000,000	USD 5,568,121.43 (only for RE, excluding subsidy component)	
Output 2.4: Established public private partnerships (PPP) for implementation and scaling up of selected RE and EE actions in Manipur and Jharkhand	Number of replication projects on the selected RE and EE mitigation actions implemented by EOP	0	21	1. Solar rooftop in 40+ private institutions 10 in CHCs/healthcare segment; 10+ in commercial/ industrial segment and domestic segment. 2. 18 and 6 cold storage system by JREDA and Forest Dept respectively as planned in their budget; at least 10 proposals from various FPOs 3. Building EE	6 demos done based on Market project experience. Total 24 cold storage system are planned and file put for approval. 10 farmer producer organizations have shown interest. Project supporting with fund mobilization.
	No. of PPP business models developed by Year 3	0	9	1. Building energy efficiency through ESCO 2. Solar rooftop through RESCO/OPEX 3. Solar rooftop: Aggregated consumer segment 4. MSME EE: financial convergence and/or debt syndication	

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
Output 2.5: Implemented nine RE and EE investment projects in Manipur and Jharkhand	No. of demonstration investment projects based on innovative financial models developed by end of year 1	0	9	9	The project reported 9 such projects, but what needs to be clarified further is whether the financial models used were "innovative".
	No. of demo investment projects implemented by EOP	0	5	6 as listed above	
Output 2.6: Completed implementation manual and workshops for supporting the implementation of selected public private partnership models for RE and EE actions	No. of implementation manuals developed by Year 3 (one manual for each state)	0	2	0	
	No. of workshops conducted on sensitizing the state agencies on proposed models by Year 4	0	2		No information provided on this.
Component 3: Capacity development of concerned state level officials for implementation of respective SAPCC					
Outcome 3: Enhanced technical capability of state government in integrating climate change concerns within state sectoral development plans and budgets and undertaking MRVs efficiently for SAPCC actions, facilitated inter-state learning and coordination for SAPCCs	No. of sectoral state budgets for RE and EE activities that are aligned with the budgets proposed under SAPCCs by Year 2	0	2	Report on aligning climate change actions in departmental budget has been prepared for both JREDA and Dept of Forest, Env and CC, GoJ.	The actual target itself has not been reached, but the project has provided its assessment and recommendations to the state of Jharkhand. The project team believes that beyond this the government has to take action, which

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
					is beyond project control.
Output 3.1: Aligned state sectoral budgets for development plans to include climate change mitigation actions related expenses	Allotment of budget for climate change actions in departmental budgets by year 2	0	2	0	
Output 3.2: Completed training and capacity building programs on the developed MRV systems for the State officials	No. of handbooks and guidelines prepared for MRV system by year 3	0	2	0	
	No. of training undertaken on the new MRV system by EOP	0	5	0	
Output 3.3: Established institutional mechanism for inter-state exchange of information and technology dissemination for Manipur and Jharkhand for implementation of SAPCC mitigation actions	No. of joint CCM actions discussed and planned for implementation between states by EOP	0	4	Following 5 CCM actions have been shortlisted 1.Solar rooftop for all private consumer segments under market mode 2. Performance assessment of existing solar rooftop installations to identify learning opportunities and assess generation data and overall status of all plants above 10KWp 3. Scaling up solar cold storage system 4. Energy efficiency in buildings 5. EE adoption and financing in MSMEs	There is ambiguity in the achievement of this target, as the target talks about inter-state (joint) CCM actions, and what is reported by the CO relates only to Jharkhand.
Output 3.4: Conducted inter-state study trips and stakeholder interaction workshops	No. of study trips undertaken by EOP	0	4	JREDA officials have not shown any interest in visiting states like Gujarat or Karnataka which have made significant progress in climate action despite	

Strategy	Description	Baseline	Target	Expected EoP (i.e. Dec 2019 achievement)	Note by Evaluators
				proposing twice in 2017-18 (on file)	
	No of workshops undertaken by EOP	0	4	Following 5 Workshop/events have been conducted namely 1.Project inception event in June 2016, 2. Exploring and catalyzing financing opportunities for implementation of climate change mitigation activities in Jharkhand in Dec 2016; 3. Business opportunities for scaling up solar in Jharkhand, June 2017 4. Business opportunities for adoption of RE and EE in MSMEs in Jharkhand; Sep 2017; 5. Climate change opportunities and challenges in Jharkhand in Sep 2018	
Output 3.5: Established and operational information dissemination system on lessons learnt from investment projects undertaken on priority RE and EE actions.	No. of brochures, case study reports and other printed material published and disseminated by year 4	0	10	Various content including briefs and brochures (8) have been developed on all pilot projects namely mini grid, solar on CHCs, Institutions, solar cold storage, solar for C&I, plus project factsheets and general climate change opportunities for the state	
	No of users of the system/year starting Year 4	0	2,500	10,000	

3.3.2. Relevance

This section provides an assessment of the relevance of the project. While there may be many criteria for assessing relevance, here it will be assessed along the following dimensions: i) relevance to the country's needs and priorities; ii) relevance to UN Country Priorities and UNDP's Country Mandate and Strategy; and, iii) relevance to GEF objectives.

Relevance to the country's needs and priorities

The feedback received from national stakeholders, including government representatives in Delhi and Ranchi, community members and other partners participating in project activities was unambiguously positive. The project is fulfilling an important role in the country and is relevant to the national processes on mitigation of and adaptation to climate change. This project is well-aligned with the following national strategic plans regarding climate change mitigation:

- National Action Plan on Climate Change (NAPCC): On 30 June 2008, the Prime Minister's Council on Climate Change released India's NAPCC, which represents a multi-pronged, long-term and integrated strategy for achieving key climate change goals. This includes achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability leading to further mitigation of greenhouse gas emissions, and devising efficient and cost-effective strategies for end-use demand-side management. The NAPCC consists of 8 national missions, among which, the National Solar Mission (NSM) and the National Mission on Enhanced Energy Efficiency (NMEEE) co-inside most strongly with the gains made regarding RE and EE interventions in the state of Jharkhand.

- National Solar Mission (NSM): The NSM aims at increasing the share of solar energy in the total energy mix through development of new solar technologies. The hope is to deliver 20,000 MW of solar power by 2022. Since the financial scale of the project is enormous (in the order of 90 billion USD), mobilizing private investments through banks and financial institutions will have a crucial role to play in achieving this target.

- National Mission on Enhanced Energy Efficiency (NMEEE): Launched in June 2008, the NMEEE promotes innovative policy and regulatory-regimes, market-based financing mechanisms and business models to enhance cost-effective efficiency investments in energy-intensive large industries. Demand-side management, especially in municipalities, is one of the priority areas of intervention. Municipalities account for 10% of the total electricity consumed in cities in India and they spend about 60% of their budget on electricity bills. Several studies conducted in India indicate that it is possible to improve the energy efficiency of municipalities by at least 20-25%. The Bureau of energy Efficiency (BEE), designated as the legal entity for executing initiatives under NMEEE, has been engaging in public-private partnerships to implement various EE programs.

Relevance to UN Country Priorities and UNDP's Country Mandate and Strategy

The project is in line with the key planning document of the UN and UNDP in the country—UNDAF/ UNSDF, UNDP's Country Programme Document (CPD) and Country Programme Action Plan (CPAP).

The project supports the United Nations Sustainable Development Framework (UNSDF), 2018-2022. UNSDF's outcome 6 states that "by 2022, environmental and natural resource management is strengthened and communities have increased access to clean energy and are more resilient to climate change and disaster risks". In particular, the project contributes to two sub-outcomes:

- 6.1 Annual reduction in tons of CO2 (tCO2/year) in line with the nationally determined contribution and commitments under UNFCCC.
- 6.6 Enhanced energy access within vulnerable communities.

The project is also in line with the country programme document for India (CPD 2018-2022) which focused on the goal of building exemplary projects funded through GEF and other sources in order to develop EE technology with the opportunity to scale-up. In particular, the goal is to meet the clean energy requirements of underserved, poor communities. This outcome also focuses on UNDP's commitment to reinforce integration of internationally adopted frameworks and policies for climate change within national and state-level institutions, systems and processes, including the energy, transportation, water, agriculture and forestry sectors.

The MT project contributes to CPD Outcome 3 (energy, environment and resilience) and in particular to the following two outputs:

- Output 3.3. Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal clean energy access.
- Output 3.4: Blended finance mechanisms developed to strengthen sustainable energy and environment solutions.

Relevance to GEF Objectives

The project is also in line with GEF's climate change mitigation strategy which aims "*to support developing countries to make transformational shifts towards low-emission development pathways compatible with the objectives of the UNFCCC and the Paris Agreement*".[27] In particular, it contributes to GEF's goal of promoting innovation and technology transfer for sustainable energy breakthroughs.

Based on the examination of project activities and the opinions of stakeholders interviewed in the course of the MTR mission, the project is rated as "Highly Relevant".

[27] https://www.thegef.org/topics/climate-change-mitigation

3.3.3. Effectiveness

This section provides a brief overview of the project's effectiveness, which in this case implies the extent to which the project has achieved what it set out to achieve.

As has been shown in the previous sections of this report, due to a lack of clearance the Ministry of External Affairs, the project has gotten to a rocky start in Manipur and there has been little activity in RE and EE interventions thus far. In Jharkhand, delays also resulted in a late kickstart of activities. However, once things got off the ground in Jharkhand, there has been significant and steady progress in the implementation of projects initiatives. This is evident in the results' section of this report, which provides a detailed assessment of progress made in the implementation of solar and other RE/EE solutions (see color code in the Table above for an assessment of the achievement of project targets).

The project team in Jharkhand has demonstrated significant achievements (provided in more detail elsewhere in this report). In particular, the project team has been active in attempting to spur private-sector investment through initiatives with the goal of countering what can be perceived as a lack of investor interest, over-dependency on government subsidies, as well as doubts over the viability of RE and EE technology implementation.

The main achievements of the project are outlined in detail in the previous section of this report focused on "progress towards results". Overall, the outcomes identified in the Project Document have not been achieved, but the main problem is with the way the outcomes have been defined – as discussed in the design section of this report, the outcome indicators used in this project's RRF are way too ambitious. The output indicators are on the way to achievement for most outputs identified in the RRF. There are though a number of indicators will require further clarity in terms of their meaning, especially under Component 2. This is something that should be discussed and settled in the project's Steering Committee.

Given the lack of fully-fledged activities for the Manipur component, the rating of the project's effectiveness is "Moderately Satisfactory". It should be noted that this score is not a reflection of the project team's performance, but applies more broadly to the stakeholders and the Project Committee responsible for obtaining the necessary clerances.

3.3.4. Efficiency

This section provides an assessment of the project's efficiency. To assess efficiency, the report focuses on a number of parameters which are closely associated with efficient project management. These parameters are categorized into the following categories: i) budget execution rates; ii) timeliness of project activities; and iii) synergies with other projects.

Budget Execution Rates

Budget execution rates can be an adequate indicator of efficiency because inefficient projects usually have delays in expenditure which results in more spending occurring at accelerated rates closer to project end dates. This typically leads to hurried decisions and hastened implementation which is rarely efficient. Table 13 shows execution rates, provided by the project team.

Table 13: Budget Execution

No.	Outcome Area	Budgeted (as per Pro Doc)	Spent	Execution Rate
Year 2016				
1	Outcome 1	380,000	210,466	55%
2	Outcome 2	90,000	212,886	237%
3	Outcome 3	70,000	66,217	95%
	Project Management	27,823	34,578	124%
4	**Total**	**567,823**	**524,147**	**92%**
Year 2017				
1	Outcome 1	275,000	220,723	80%
2	Outcome 2	305,000	436,487	143%
3	Outcome 3	88,576	22,783	26%
	Project Management	34,924	76,893	220%
4	**Total**	**703,500**	**756,886**	**108%**
Year 2018				
1	Outcome 1	247,500	548,161	221%
2	Outcome 2	330,000	220,992	67%
3	Outcome 3	25,000	6,487	26%
	Project Management	30,194	17,621	58%
4	**Total**	**632,694**	**793,261**	**125%**
ALL YEARS				
1	Outcome 1	902,500	979,349	109%
2	Outcome 2	725,000	870,365	120%
3	Outcome 3	183,576	95,488	52%
	Project Management	92,941	129,091	139%
4	**Total**	**1,904,017**	**2,074,293**	**109%**

As can be seen from the table, the budget execution rate for all years has been between 90 and 100%. Within project components (outcomes) there is a lot of diversity in terms of execution rates. Outcome 3 has seen weak execution rates averaging about 50% in the three years of project implementation. The other two components have had execution rates of more than 100%. Overall, administrative (project management) costs have been low, averaging about 5% of total project expenditure for the three years of project implementation, which is an indication of good efficiency.

Timeliness of Activities

Another indicator of project efficiencies is the extent to which implementation falls behind established timelines. The main challenge with this project when it comes to delays has been the major delays getting off the ground in Manipur, as well as approval delays in Jharkhand. These matters have been discussed in detail in the previous sections of this report. There have also been delays in hiring members of the project management team. Regardless, despite the approval delays in Jharkhand, the project team was successful in productively utilizing the interim period to generate investor interest in the project through a variety of interventions and activities, which are enumerated in the "results" section of this report.

Synergies and Linkages with Other Projects

Another angle from which to assess the project's efficiency is by examining the extent to which its activities have been coordinated and synergetic with the activities of other UNDP projects. From an efficiency perspective, it is important to understand how various project activities have reinforced each other and the degree to which similar UNDP interventions have functioned as one.

As far as cooperation and coordination between UNDP projects in the area of climate change mitigation and community development is concerned, interviewees for this review pointed to limited coordination of activities.

One ongoing project that is particularly relevant and complementary to MT is the "*Scale-up of Access to Clean Energy for Rural Productive and Domestic Use*" project, known in UNDP India as the ACE project. This project is particularly relevant to the MT project because it has a similar focus in terms of objectives and activities, but in different states. The project's aim is to demonstrate and develop the market for Renewable Energy Technology Packages for Rural Livelihoods in the states of Assam, Odisha and Madhya Pradesh. This project is promoting the relevant renewable energy technologies: solar lighting systems; solar and/or biomass waste-powered micro-grids for common facilities; solar irrigation pumps; improved commercial biomass cook-stoves; poultry-litter-based biogas plants; poultry-litter-based briquetting units; solar dryers for vegetables, spices and fish; solar-powered milk chillers; and cold rooms for storage of horticultural produce.

Other projects with potential for synergies with MT are the following:

- Energy Efficiency Improvements in Commercial Buildings
- Market Development and Promotion of Solar Concentrators Based Process Heat Applications in India
- Energy Efficiency Improvements in the India Brick Industry
- Upscaling Energy Efficient Production in Small Scale Steel Industry in India

UNDP should further strengthen project linkages as much as possible within existing constraints presented by the fact that projects are subject to different funding sources and windows. The CO could in particular aim for further coordination of its operations at the state level where some of its projects are currently operating and have grant components. This strategy could include frameworks for project planning and implementation at the state level matched with CO's plans at the national level.

Overall, on the efficiency front, there have been good achievements, but also some crucial challenges such as the delays in implementation. The efficiency rating of the project is "Moderately Satisfactory".

3.3.5. Sustainability

While the sustainability of project outcomes is shaped by a number of factors, the focus of this section is on risks related to financial, sociopolitical, institutional, and environmental sustainability of project outcomes. These are standard dimensions in the evaluation of GEF-funded projects.

Financial resources

Financing is quite relevant for the continuity of the results of pilot initiatives undertaken by the MT project in Jharkhand with the involvement of the state government, public and private sector investors and industry. Continued financing is important because it is an indication of commitment and ownership from the partners, and as such an important aspect of sustainability.

The existing subsidy policy for energy efficiency investments in Jharkhand has created deep expectations about financing for EE/RE projects. The recent phase-out of the subsidy policy represents a challenge for these types of projects, because the expectations of the population and market players have become engrained in this policy. The key challenge for the project is moving from grants-based solutions, which has been the main financing modality, towards the establishment of more sustainable market-based mechanisms that involve the banking sector for the financing of these project initiatives. Only this will create the necessary stability and sustainability of these mechanisms.

So far, project activities in this area have remained at the level of studies and assessments. For example, the project has developed a proof-of-concept for financial returns on investment aimed at loan products for debt financing of cold storage units. The project has also developed a model DPR for accessing debt finance in line with the requirement of financing institutions. In mid-March 2019, the project started an assessment of various financing instruments and options such as debt equity and Convertible/Non-Convertible Debenture available from financial institutions (public and private banks) with regards to financing roof-top solar installation.

Given importance of financing for the investment projects, it is important that communication between stakeholders and financial institutions continue long after the UNDP role in this project has ceased. In particular, stakeholders must have confidence that financial institutions are aware of the benefits of RE/EE projects and are willing to supply the necessary capital. Will local stakeholders maintain and strengthen these relations with financial institutions without the intervening role of the UNDP? Financial models such as DPRs in assessing debt-finance have been developed to demonstrate the feasibility of funding. Who will be in charge of providing accurate energy-savings data to financial institutions in order to demonstrate the feasibility of further funding?

Although some concessional funding has been made available through international credit lines (such as ADB-CTF financing for PNB, as well as the World Bank), no market-based loan mechanism is readily available yet for these kinds of project initiatives. Access to low-cost financing is a key barrier in accelerating the adoption of solar rooftop across all consumers. Financing for solar PV rooftop has not yet taken off largely due to the limited knowledge, understanding and awareness of the opportunities and risks for lending in this market segment. The lender's cost for project due diligence also increases due to the small project size and scattered locations. Another challenge is the credit rating of customers, which limits the amount of debt funding available for rooftop projects. Finally, higher interest rates for debt-funding of rooftop-projects through domestic sources make certain projects financially unviable.

In this context, the project should place greater focus on working with the banking sector (both public and private) on developing financial products for solar and energy efficiency projects. This work should involve the whole banking chain from Delhi down to the local branches at the state level. The project team has already met with officials of some financial institutions (DGM, PNB, AGM, RBI, SIDBI) and discovered that while officials at higher levels (regional office and higher) may have experience with financing solar and energy efficiency projects, employees at the branch level may not be as aware. The project team should work on developing an awareness and training programme for banking sector employees.

Given these positive examples, but also challenges, the likelihood of sustainability of the project's outcomes from a financial perspective is rated as "Moderately Likely".

Socio-economic

Although there are always socio-economic risks to the sustainability of project outcomes emanating from the country's political stability and security situation, the area of climate change mitigation and adaptation is less political in nature and a clear priority of India's leadership. This is evident in the NAPCC, which clearly details India's commitment to climate-change mitigation.

Given this, the likelihood of sustainability from the socio-economic perspective is rated as "Likely".

Institutional framework and governance

The project's sustainability from a governance and institutional perspective is related to the likelihood that project outcomes will be sustained beyond the project's completion. As can be surmised from the discussion in the previous sections, replicability and scalability are at the forefront of the project team's efforts to strengthen the sustainability of the project. The intended design of the pilot projects is to showcase how such systems could be made self-sustainable and replicable, driven largely by markets rather than the subsidy, which is usually the case.

The project has made numerous efforts to demonstrate the potential of replicability and scalability of RE and EE solutions in the state of Jharkhand. Indeed, the project initiatives listed under the previous sections of this report have been implemented to address challenges such as the lack of investor interest, over-dependence on government subsidy, as well as doubts over the viability of RE and EE implementation. Projects, such as the mini-grid in Garo (Chatra district), showcase the benefits of implementing RE and EE solutions as livelihood options as diverse as rice hulling, oil expelling, flour milling, and other commercial activities at the village level. In this way, suitable technologies and business models have been identified to impress upon JREDA, as well as relevant ministries at the national level, the feasibility of these project initiatives. The main challenge here is how to ensure that these technologies and approaches are replicated in other states. If some of the pilots will be replicated in other states, the central government, and especially MoEFCC, has to take a more proactive role in the project.

Further, the project's logic is not based on solving specific problems in a one-off manner, but by training the necessary personnel to develop the skills necessary to provide a long-term solution. A significant number of awareness raising and training events have been conducted by the project. For example, the training of solar meter readers is an example of this kind of training, which aims at long-term sustainability and replicability. Another example is the training of engineers in the installation of a cloud-based AMR system for displaying real-time solar energy generation, as well as the training in net-metering for utility staff. The key question here is what has been the level of uptake (or absorption) among the recipients of these trainings. This is something that the project team should be able to track more effective in the remainder of the project. Uptake and absorption of knowledge among the local populace is also of the foremost importance. Also, it is important to understand the extent to which local people view solar-energy and other RE/EE solutions favorably and as a feasible means of energy generation. While training and other educational endeavors have already been attempted, more needs to be done to train meter-readers, and especially engineers on the ground. Further, cooperation between departments is key, and communication between institutions at the national and sub-national level will need to be strengthened to ensure long-term sustainability.

Another challenge is the absence of large and renowned developers from the state. Developers tend to be locally-based or from nearby states, and as small players have limited capacity to target the market (through customer acquisition, bringing scale and investment and so forth). These smaller companies are largely content with carrying out 100% subsidy driven programs such as solarizing government buildings and rural electrification, and have not necessarily been interested in scaling-up. What can be done to encourage larger market-players to invest in solar energy in the state of Jharkhand?

Given these remaining challenges, the likelihood of sustainability from the governance perspective is rated as "Moderately Likely".

Environmental

The project has made significant contributions to the national objectives of ensuring demand-side market-based solutions for the development of RE/EE technologies in India.

The activities involved in this project do not involve any direct environmental risk. Therefore, this dimension of sustainability is rated as "Likely".

The following table summarizes the sustainability of the project's achievements according to the four dimensions.

Table 14: Sustainability Rating

Sustainability Dimension	Risk Assessment
Financial risk	ML
Socio-Economic risk	L
Governance risks	ML
Environmental risks	L

3.3.6. Mainstreaming

The MTR found that the project has mainstreamed reasonably well cross-cutting programming principles such as capacity gender equality, human rights, and especially the rights of vulnerable groups, Sustainable Development Goals (SDGs), etc.

Gender

This project aims to implement more efficient energy usage through the implementation of solar and other RE/EE technologies. While the reporting documents provided by the project team do not expressly mention gender concerns, it is clear that the scalability and replicability potential of the

solar and other interventions in Jharkhand (and if possible, in Manipur) have the potential to positively benefit everyone.

One potential improvement from the project team would be a more detailed discussion on the gender aspect of this project. For example, in the tracking of results and reports, there is potential to discuss how the project benefits women (for example in terms of beneficiaries of project initiatives, training and education in RE and EE energy implementation, hiring and training of meter-readers, etc.).

Human Rights Approach

Overall, the MT project has followed a human rights approach by targeting vulnerable groups and regions and addressing the rights of women, poor, etc. The following is a brief summary of the main dimensions.

- It has encouraged the adoption of resilient livelihoods through the implementation of solar and other environmentally sustainable technology. The project has also contributed to the basic right to a clean, safe and ecologically-balanced environment.
- It has promoted participation of local stakeholders in developing renewable energy generation, which has led to a greater level of community involvement in implementing RE/EE solutions.
- Through the installation of solar-panels, cold storage and so forth, the project has contributed to job creation, poverty reduction and reduced vulnerabilities, which are crucial aspects of human rights.
- The project has created solar meter-reading employment, which is particularly attractive for women.
- The project has generally contributed to reducing the number of people seeking jobs outside the province and country.

Sustainable Development Goals

Sustainable development lies at the core of India's National Action Plan on Climate Change (NAPCC), State Action Plans on Climate Change (SAPCCs), as well as the multiple government ministries, agencies and programs aimed at implementing climate-change mitigation strategies. SAPCCs hold great potential as tools for integrating and mainstreaming climate-change mitigation and adaption strategies into state development priorities. In the process of supporting Jharkhand (and possibly Manipur in the future) to update its SAPCC, the MT project could engage more actively is the promotion of SDGs. The MT project is well-positioned to contribute to this process at the state level. The project could also assist with raising awareness on the mainstreaming of climate change mitigation and adaptation concerns into sub-national policy frameworks and assist state government departments in gradually becoming more engaged with SDGs in their activities.

However, as of now, the role of the project in SDG activities has been limited. The project document does not provide any references or links to the SDGs and no such references to SDG-

related activities during the implementation phase were encountered in interviews with stakeholders in the MTR mission. This is something that project stakeholders and UNDP could examine more closely for the rest of the project's duration. This does not imply that the MT project should change its nature and allocate resources to SDG-related activities – the MT project has a clear focus and it should remain committed to this focus. What is suggested here is that the project could use its activities and events to contribute more to the raising of awareness around the mainstreaming of SDGs at the state level. However, it may be noted that in general the project contributes to SDG Goal 1, 5, 7, 9 and 13

4. CONCLUSIONS AND LESSONS LEARNED

The MT project is a relevant intervention to India's needs and priorities. Its focus on business models for RE and EE is important because it contributes to economic development using climate change as an entry point. The project's logic is not based on solving specific problems in a one-off manner, but by helping local institutions take care of these problems in the long run. This is crucial for sustainability. Stakeholders interviewed for this MTR, including beneficiaries in Jharkhand state, highly valued the objectives and activities of this project. The project team both in Delhi and Jharkhand involves highly committed and enthusiastic people striving to tackle the problems identified within the project's scope.

By seeking to demonstrate feasible technologies through pilots, the project has focused on durable institutionalized solutions, as opposed to one-off activities. The initiatives have practical relevance and benefits for local communities, especially the poorest. Some of the pilots supported by the project have already shown demonstration effects (for example, rooftop solar in schools).

The project has produced a number of achievements, such as:

- Updating of the Marginal Abatement Cost Curve (MACC) for Jharkhand and its use to identify potential investment projects
- Identification of feasible technologies such as building energy efficiency, replacement of agriculture and municipal pumps with energy efficient pumps, solar rooftop ground mounted solar, replacement of streetlights with LEDs, and solar water heater.
- A number of demonstrative pilot initiatives have been already commissioned by the project and have been discussed in detail in this report.
- Development of MRV framework to measure, monitor and report prioritized actions and their impact.
- Development of database of potential consumers across eight cities of Jharkhand for setting-up rooftop solar PV in market mode.
- Preparation of DPRs on building energy efficiency and solar rooftop on selected public buildings on ESCO/RESCO mode along with municipal drinking water pumping segment.
- Conduct of energy audits for public buildings to demonstrate opportunities for energy savings in the public building segment and cold storage units in Jharkhand.

Further, a number of assessments/studies have been conducted in the framework of the project:

- Clean Energy Action Plan for JREDA
- Policy note on energy conservation of public buildings through ESCO
- Identified innovative funding sources for RE and EE at sub-national and national levels, evaluated loan mechanisms and other debt instruments, established the need for PPP for scaling up projects

- Prepared a report on integrating climate change related concerns in State's budgetary allocations to map how much of public investment has occurred and identify opportunities for the state
- Undertaken a study on viability of a self-sustainable mini grid and conducted feasibility assessments in 17 villages across districts
- Conceptualized a mini grid pilot project and designed a multi-stakeholder survey for successful operations of solar based mini/micro grid
- Prepared a report on outlining a strategic roadmap for clean energy deployment by 2022 for the SNA
- Carried out assessment of the feasibility of 17 villages across Gumla, Lohardaga and Palamu districts for operations of a self- sustainable solar based mini grid
- Comprehensive energy performance study and solar roof top feasibility assessment for 180 private institutions/schools in Jharkhand [PGS; TUV-SUD and TERI]
- Market assessment for the viability of solar powered micro grid-based business models [PWC]
- Barrier analysis towards implementing renewable energy and energy efficiency initiatives in the state [TERI]
- Trainings have been organized on scaling-up solar, promoting clean energy adoption in MSME, net metering for utility staff, etc.
- Conducted consultations with both small and big industries and local developers.

However, the MT project has also faced challenges. The most important ones identified in this report are:

- Delays in implementation, especially inability to start full-scale operations in Manipur
- Use of market-based financing mechanisms
- Sustainability of structures and practices promoted by the project

As described in this report, the project has been able to adapt to evolving circumstances and respond to emerging challenges. The effective use of adaptive management by the project team and board has been critical for dealing with unexpected circumstances.

As outlined in this report, there are three crucial areas where there is a need for further progress and greater attention in the coming months:

- Start up of activities in Manipur. A number of crucial questions will need to be discussed in the Steering Committee about this. How can the project deploy the necessary human resources to accelerate implementation in Manipur? Can human resources be shifted from Jharkhand to Manipur? The Steering Committee should also discussed the issue of extension, which is unavoidable if project activities are kicked off in the next few weeks in Manipur. The decision about the length of expension should be based on a discussion and informed consensus in the Steering Committee.

- Design, approval and construction of remaining investment projects. In this area the project has acquired a lot of good experience, so bringing all planned initiatives to completion in Jharkhand should not be a major challenge any more. The challenge will be on how to create the infrastructure for the speey implrmrntation of project initiatives in Manipur, and the experience of Jharkhand provides a lot of experience and lessons already.
- Focsing on creating market-based mechanisms for the financing og RE/EE projects which involve the banking sector. Market-based mechanisms, in particular, will play a crucial role in the continued sustainability of projects on the ground. Access to finance plays a key role on the sustainability and replicability of these projects.

In the remainder of this project, stakeholders should prioritize these areas to ensure that activities are accelerated.

Table 16 (below) provides the summary of the project's performance rating, using the standard scale for GEF-funded projects.

Table 15: Overall Project Performance Rating

Monitoring and Evaluation	
Overall quality of M&E	MS
M&E design at project start up	S
M&E Plan Implementation	MS
IA & EA Execution	
Overall Quality of Project Implementation/Execution	MS
Implementing Agency Execution	MS
Executing Agency Execution	MS
Outcomes	
Overall Quality of Project Outcomes	MS
Relevance	HR
Effectiveness	MS
Efficiency	MS
Sustainability	
Overall likelihood of Sustainability:	ML
Financial resources	ML
Socio-economic	L
Institutional framework and governance	ML
Environmental	L
Overall Project Results	MS

There are many lessons that can be drawn from the experience of this project reviewed in this report, but the following are worth highlighting:

Lesson 1: Swift Kick-starting of a Project Requires Clarity on Approvals

One lesson that can be learned from this project is related to its late start due to the lack of clearances and approvals, especially for activities in Manipur. Given the specificity of the situation in Manipur, the Project Document could have laid out in clearer terms the challenges of getting the project started in Manipur. The key lesson here is that to get the project started on time, it is important to identify all the approvals that are needed and assess realistically the amount of time that will be needed to obtain those clearances.

Lesson 2: Importance of Project Design

This MTR has highlighted a number of challenges related to the design of the Project Document. In particular, some of the outcome targets seem to have been determined quite unrealistically and will require a revision. The main point here is that the setting of the project targets should be based on a better analysis of what is feasible and what is not. Targets that are far off from the real capabilities of the project indicate that the expectations from this project at the design stage must have been quite removed from the actual situation.

Lesson 3: Importance of Adaptive Management

Given the project's delayed start, the use of adaptive management by the project team was essential for addressing unexpected contingencies and taking advantage of emerging opportunities. A key example of the project team's ability to respond to evolving needs and emerging opportunities were the modification of the list of project initiatives, which in the Project Document had been defined in great detail. Another lesson that can be drawn from this work is that detailed lists of project initiatives identified at the conceptual stage are not very useful because the situation changes rapidly. More flexibility is required in how the project responds to the defined priorities.

5. RECOMMENDATIONS

Recommendation 1: Reassess the Situation in Manipur and Chart the Way Forward

This MTR of the MT project has identified a number of critical issues which will require a clear decision on the way forward. This is the right point in time for project stakeholders, and in particular the Steering Committee, to chart a path for the remainder of the project's lifetime. The following are the most crucial issues on which project stakeholders should focus:

- First of all, the project team and Steering Committee should carefully assess the Manipur component of the project. Now that the necessary clearances for initiating full-scale activities in Manipur have been obtained, the question is what activities should the project team undertake there. Given the limited amount of time available, the project team should conduct an assessment of what is feasible to achieve in Manipur in terms of activities that are in line with the nature of this project and based on the experience of Jharkhand.
- Subsequently, based on the results of the Manipur assessment, the project team should develop a clear and realistic work plan for the Manipur component which needs to be approved by the Steering Committee. This plan should include both the approach that will be taken and the list of activities that will be conducted in Manipur.
- The Manipur assessment and work plan will provide a clearer picture of the timeframe that will be required for the completion of all project activities. This should be the basis for any decision on the extension of the project. As things stand out, an extension seems inevitable if a strategic decision is made by project stakeholders and the Steering Committee to proceed with the implementation of the Manipur component.[28] The timeframe for the extension should be determined on the basis of the Manipur assessment and ensuring work plan.
- The project team should start an intensive process of engagement with relevant players in Manipur (government, civil society, private sector, etc.) and the Steering Committee should be expanded to include relevant members from Manipur.
- Given the limited timeframe for the completion of a number of key activities and the need for intensifying the pace of activities in Manipur, it is recommended that the Steering Committee meets more frequently for the remainder of the project. At least a meeting every six months is highly recommended.
- Quickly mobilizing a fully-fledged team for Manipur will be crucial for the project. It might be difficult for the project to find experienced staff members in Manipur who are not only versatile with the specifics of the RE and EE sector, but also familiar with UNDP rules and procedures. If that will be the case, the project might consider shifting human resources

[28] The key assumption that is made here is that the clearance provided by the authorities for the start of Manipur activities is definite and with immediate effect.

from Jharkhand to Manipur by using financial incentives for staff to move from one state to the other.

Recommendation 2: For the Remainder of the Project Focus on Key Issues

There are a number of key issues on which the project could focus in the remainder of its lifetime. This MTR has identified a few of those issues. The evaluators would recommend the following:

- It would be advisable to revise the project RRF, given the challenges that some of the targets present – especially at the outcome level, as discussed in this report. The revision of the RRF should be done in a way that takes into account what is feasible in Manipur and also what the project will aim to achieve there.
- MoEFCC needs to play a more crucial role in leading project activities through the Steering Committee. New Annual Work Plans that will include Manipur will have to be swiftly approved.
- With the help of the project team, MoEFCC should also consider different options for the scaling up of the initiatives and demonstrations promoted by the project. MoEFCC has an important role to play in this process because it is the entity that can forge cooperation across states and ensure that the models and approaches tested and promoted by the project will cross state borders and get absorbed elsewhere.

Recommendation 3: Strengthen the Sustainability of Project Initiatives

The project team should examine more closely the issue of sustainability of the various project initiatives it has been promoting for demonstration purposes. What is crucial here is to set these initiatives on market-based foundations. This will require moving away from grants and promoting financing from the banking/financial sector which is the only sustainable option in the long run. This will require a continuation and intensification of the project's engagement with the banks and financial institutions not only at the state level, but also on a national scale. MoEFCC and the UNDP CO can play a major role here by contributing through their advocacy efforts in Delhi. The project team needs to develop a clear action plan for this area, which also identifies specific tasks for MoEFCC and the UNDP CO at the national level.

Recommendation 4: Strengthen Synergies and Linkages between Projects

UNDP and MoEFCC should strengthen collaboration and linkages between the MT project and other technical assistance projects under their leadership, particularly the ACE project. Where

feasible, they should establish more integrated frameworks not only for sharing lessons and good practices, but also for project planning and implementation where feasible.

In general, UNDP should explore the establishment of mechanisms for managing more closely together aspects of projects that share similar objectives, especially when the state level is concerned. Such mechanisms may involve not only integrated implementation of activities related to information sharing and data systems, but also joint implementation tools related to training, awareness raising, planning, monitoring and evaluation, etc.

Recommendation 5: Using the M&E System to Track Important Parameters

The project team should examine how the M&E system is used to track important aspects of the project with a view to improving the availability of information for management purposes. The following are a few dimensions worth considering.

- *Uptake of project outputs (studies, training, etc.) and the degree to which they serve their intended purpose* – The project should monitor more systematically the extent to which project activities related to research and training get absorbed by beneficiaries.
- *Capacity of stakeholders/beneficiaries* – The project should track the degree to which the capacity of participants taking part in the various training programmes organized by the project has improved.
- *Experience of infrastructure project initiatives, lessons they generate and the extent to which they get scaled up* – It might be a bit too early to talk about replication of infrastructure projects, but one characteristic of them is that they serve to produce lessons which when shared may lead to replication in other locations. They can be vehicles for transmitting experience and play a crucial role for upscaling and replication. However, it is not clear how their lessons are collected, analyzed, synthesized and shared by the project. This requires more systemic thinking and actions. The project should develop a tracking mechanism for pilot initiatives, including documenting results, lessons, experiences and good practices.
- *Co-financing* – The project should track more effectively co-financing by implementing partners and also co-financing by beneficiaries for infrastructure projects. The project team might consider the establishment of a monitoring database for this purpose.

ANNEX I: MTR'S TERMS OF REFERENCE

UNDP-GEF Midterm Review (International Consultant) Terms of Reference

1. INTRODUCTION

This is the Terms of Reference (ToR) for the UNDP-GEF Midterm Review (MTR) of the full sized project titled Market Transformation and Removal of Barriers for Effective Implementation of the State-Level Climate Change Action Plans (PIMS# 4606) implemented through the Ministry of Environment Forest and Climate Change, which is to be undertaken in 2018. The project started in January 2016 and is in its third year of implementation. In line with the UNDP-GEF Guidance on MTRs, this MTR process was initiated before the submission of the second Project Implementation Report (PIR). This ToR sets out the expectations for this MTR. The MTR process must follow the guidance outlined in the document Guidance For Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects

2. PROJECT BACKGROUND INFORMATION

The project was designed to showcase the implementation of State Action Plan on Climate Change (SAPCC) in two selected Indian states Jharkhand and Manipur, with a potential scope to extend its activities to other states if there is a strong interest. The state governments are responsible for developing state- specific action programmes for the power, transport, industry, buildings, and municipal energy efficiency and forestry sectors in line with the National Action Plan on Climate Change NAPCC. There is a need to have greater synergy between national priorities and state-specific strategies, as it requires actions in several sectors that are State subjects and have to be implemented in the States. In the preparation of SAPCCs, the required inventory for these sectors is sourced from the national inventory management system (NIMS)

that was established as part of the National Communication process; inventory estimation and management are not part of the SAPCC preparation process. The Government of India will provide some financial support to state governments for the implementation of their SAPCCs.

With the objective of addressing the barriers to implementation of SAPCC, the project will revisit the existing regulatory and policy frameworks at the national and state levels, including the directives under the national Missions, to overcome any regulatory and policy relates hurdles for implementation of SAPCC. In consultation with MOEFCC, UNDP and State Governments Jharkhand and Manipur have been selected to demonstrate that how the mitigations measures can be implemented effectively in partnership with private sector, financing institutions, research institutions, international agencies, SERCs, ESCOs and local EE and RE experts. For both Jharkhand and Manipur state governments a number of barriers like (a) limited awareness and capacities across institutions at various levels, (b) absence of framework for the implementation

of SAPCCs at state level, and (c) lack of conducive environment for investments in the implementation of RE and EE projects is evident.

The project is supporting the implementation of SAPCC strategies in Jharkhand and Manipur. These two states are among the most vulnerable states in India. They have been selected as pilot states in the project so as to (a) build on their approved SAPCCs, which are now ready for implementation, (b) achieve geographical balance in project coverage, and (c) cover diverse climatic conditions, so as to link diverse aspects and cross-learning between neighboring states. The two states also represent different techno- economic profiles in terms of technology cost, availability and energy mix. The indicative SAPCC budget for Jharkhand is US$ 477 Million (INR 3,179 Crores) over the period of 2013-2018 and that for Manipur is US$ 588 Million (INR 3,915 Corers) over the period of 2012-2017.

Objective of the project

The India SAPCC project aims at reduction of GHG emissions achieved through implementation of RE and EE solutions at the state level as identified in the SAPCCs. This will be achieved by removal of the key barriers that prevent effective implementation of SAPCC, with focus on RE and EE actions.

The project focus is on removal of barriers for effective implementation of RE and EE actions at the state level. The project is based on the premise that existence of several technical, financial, policy, institutional and awareness and capacity building barriers have constrained the large-scale implementation of RE and EE projects in the states. While project benefits are likely to be in the tangible form of reduction in GHG emissions and total energy saved from EE measures more significant albeit gradual and less tangible co- benefits will flow in terms of improved state capacities in implementing RE and EE measures and incorporation of climate change mitigation actions in state development plans and schemes.

The development objective of the project is to stimulate implementation of climate change mitigation actions stated in the State Action Plan on Climate Change (SAPCCs); maximize the benefits through exploring inter-state cooperation; showcase the actual implementation of SAPCCs; demonstrate institutional mechanisms for inter-state networking and cross learning, including information sharing and technology dissemination; and develop and implement a common monitoring system to assess progress on the SAPCCs in the selected states.

The project aims to:

- Identify priority strategies specifically relating to the energy sector with a focus on renewable energy; and energy efficiency;

- Design and implement common monitoring, reporting and verification (MRV) system for climate change mitigation actions;

- Demonstrate implementation of specific climate change mitigation actions;
- Establish public-private partnerships and mobilization of public and private sector investments; and
- Scale-up and replication of the mitigation actions.

a) Implementation Strategy

Component 1 of the project deals with the development of framework for effective implementation of climate change mitigation actions. The project aims at developing Marginal Abatement Cost Curves (MACC), Monitoring Reporting and Verification (MRV) framework and Detail Project Reports.

Component 2 focuses on catalyzing investments for the implementation of the mitigation actions in the energy sector. Under this component, the project also aims at strengthening capacity of stakeholders for catalyzing investments from both public and private sector.

Component 3 deals with the capacity development of State Government officials helping them integrate climate change concerns within sectoral development plans and budgets, undertaking MRVs efficiently for SAPCC actions and promoting inter-state learning and coordination for SAPCCs.

b) Key Outcomes of The Project

- Successful and sustainable implementation of priority Climate Change Mitigation Actions on energy generation and demand side management and application of RE and EE technologies in major energy end use sectors in the chosen states;
- Enhanced capability of states and capacity for identifying, designing, planning and implementing RE and EE mitigation actions from SAPCCs; and
- Enhanced technical capability of State Government in integrating climate change concerns within sectoral development plans and budgets and undertaking MRVs efficiently for SAPCC actions.

c) Benefits of The Project

- Accelerate implementation of SAPCC strategies in Jharkhand and Manipur;
- Enhance energy security in the state through upscaling renewable energy and energy efficiency initiatives in the chosen states;
- Prepare ground for design and implementation of large scale energy efficiency and renewable energy projects at the state level with by demonstrating their effectiveness in municipalities and other sectors;

- Engage different state level stakeholders (public/private) in project implementation and align states climate change mitigation ambitions with other developmental efforts; and
- Building institutional capacities across state government departments for designing and implementing climate change mitigation actions

Budget and Planned Co- financing

Expenditure head (GEF component) Amount (US $)

Component 1: Framework for the implementation of climate change mitigation options in the selected states SAPCCs

1,213,500

Component 2: Catalysing investments for implementation of selected RE and EE mitigation action

1,234,753

Component 3: Capacity development of concerned state level officials for implementation of respective SAPCCs

1,118,000

Project Management Cost 178,247

Total 3,744,500

Summary of total fund

Donor	Year 1 (USD)	Year 2 (USD)	Year 3 (USD)	Year 4 (USD)	Total (USD)
GEF	1,022,850	985,603	887,950	848,097	3,744,500
MOEFCC	3,147,186	3,147,186	3,147,186	3,147,187	12,588,745
UNDP	125,000	125,000	125,000	125,000	500,000
Jharkhand	1,310,575	1,310,575	1,310,575	1,310,575	5,242,300
Manipur	1,667,238	1,667,239	1,667,238	1,667,240	6,668,955
Total	7,272,849	7,235,603	7,137,949	7,098,099	28,744,500

Institutional Arrangement and relevant partners

This UNDP-GEF project is to be implemented by the Ministry of Environment Forests and Climate Change (MoEFCC), Government of India as the Implementing Partner of UNDP under National

Implementation Modality (NIM), agreed by UNDP and the Government of India. As the implementing agency (on behalf of the GEF), the UNDP will provide overall management through its New Delhi Country Office (CO) and technical guidance from its Bangkok Regional Hub (BRH) in Bangkok. MoEFCC, as the Implementing Partner, will assume full responsibility and accountability in partnership with the state government of Manipur and Jharkhand for the effective use of UNDP and other resources and the achievement of the project outcomes and outputs at all levels as set forth in the document. The MoEFCC will be responsible for the overall implementation of the project at national and state levels. The MoEFCC will designate a National Project Director (NPD), who will be responsible for overall management, including achievement of planned results, and for the use of UNDP funds through effective process management and well established programme review and oversight mechanisms. MoEFCC will facilitate partnership development with state governments (Manipur and Jharkhand) and coordination with other relevant central ministries as required.

Project Management Structure

3. OBJECTIVES OF THE MTR

The MTR will assess progress towards the achievement of the project objectives and outcomes as specified in the Project Document and assess early signs of project success or failure with the goal of identifying the

necessary changes to be made in order to set the project on-track to achieve its intended results. The MTR will also review the project's strategy, its risks to sustainability.

4. MTR APPROACH & METHODOLOGY

The MTR must provide evidence-based information that is credible, reliable and useful. The MTR team will review all relevant sources of information including documents prepared during the preparation phase

(i.e. PIF, UNDP Initiation Plan, UNDP Environmental & Social Safeguard Policy, the Project Document, project reports including Annual Project Review/PIRs, project budget revisions, lesson learned reports, national strategic and legal documents, and any other materials that the team considers useful for this evidence-based review). The MTR team will review the baseline GEF focal area Tracking Tool submitted to the GEF at CEO endorsement, and the midterm GEF focal area Tracking Tool that must be completed before the MTR field mission begins.

The MTR team is expected to follow a collaborative and participatory approach1 ensuring close engagement with the Project Team, government counterparts (the GEF Operational Focal Point), the UNDP Country Office(s), UNDP-GEF Regional Technical Advisers, and other key stakeholders.

Engagement of stakeholders is vital to a successful MTR.2 Stakeholder involvement should include interviews with stakeholders who have project responsibilities; executing agencies (Jharkhand Renewable Energy Development Agency and Forest department in Jharkhand and Directorate of Environment and Manipur Renewable Energy Development Agency in Manipur, senior officials and task team/ component leaders, key experts and consultants in the subject area, Project Board, project stakeholders, academia, local government and CSOs, etc. Additionally, the MTR team is expected to conduct field missions to Ranchi, Jharkhand and Imphal, Manipur.

The final MTR report should describe the full MTR approach taken and the rationale for the approach making explicit the underlying assumptions, challenges, strengths and weaknesses about the methods and approach of the review.

5. DETAILED SCOPE OF THE MTR

The MTR team will assess the following four categories of project progress. See the Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for extended descriptions.

i. Project Strategy

Project design:

- Review the problem addressed by the project and the underlying assumptions. Review the effect of any incorrect assumptions or changes to the context to achieving the project results as outlined in the Project Document.

- Review the relevance of the project strategy and assess whether it provides the most effective route towards expected/intended results. Were lessons from other relevant projects properly incorporated into the project design?

- Review how the project addresses country priorities. Review country ownership. Was the project concept in line with the national sector development priorities and plans of the country (or of participating countries in the case of multi-country projects)?

1 For ideas on innovative and participatory Monitoring and Evaluation strategies and techniques, see UNDP Discussion Paper: Innovations in Monitoring & Evaluating Results, 05 Nov 2013.

2 For more stakeholder engagement in the M&E process, see the UNDP Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 3, pg. 93.

- Review decision-making processes: were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process, taken into account during project design processes?

- Review the extent to which relevant gender issues were raised in the project design. See Annex 9 of

Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for further guidelines.

- If there are major areas of concern, recommend areas for improvement.

Results Framework/Logframe:

- Undertake a critical analysis of the project's logframe indicators and targets, assess how "SMART" the midterm and end-of-project targets are (Specific, Measurable, Attainable, Relevant, Time-bound), and suggest specific amendments/revisions to the targets and indicators as necessary.

- Are the project's objectives and outcomes or components clear, practical, and feasible within its time frame?

- Examine if progress so far has led to or could in the future catalyse beneficial development effects (i.e. income generation, gender equality and women's empowerment, improved governance etc...) that should be included in the project results framework and monitored on an annual basis.

- Ensure broader development and gender aspects of the project are being monitored effectively.

Develop and recommend SMART 'development' indicators, including sex-disaggregated indicators and indicators that capture development benefits.

ii. Progress Towards Results

Progress Towards Outcomes Analysis:

- Review the logframe indicators against progress made towards the end-of-project targets using the Progress Towards Results Matrix and following the Guidance For Conducting Midterm Reviews of UNDP- Supported, GEF-Financed Projects; colour code progress in a "traffic light system" based on the level of progress achieved; assign a rating on progress for each outcome; make recommendations from the areas marked as "Not on target to be achieved" (red).

- Compare and analyse the GEF Tracking Tool at the Baseline with the one completed right before the Midterm Review.

- Identify remaining barriers to achieving the project objective in the remainder of the project.

- By reviewing the aspects of the project that have already been successful, identify ways in which the project can further expand these benefits.

iii. Project Implementation and Adaptive Management

Management Arrangements:

- Review overall effectiveness of project management as outlined in the Project Document. Have changes been made and are they effective? Are responsibilities and reporting lines clear? Is decision- making transparent and undertaken in a timely manner? Recommend areas for improvement.

- Review the quality of execution of the Executing Agency/Implementing Partner(s) and recommend areas for improvement.

- Review the quality of support provided by the GEF Partner Agency (UNDP) and recommend areas for improvement.

Work Planning:

- Review any delays in project start-up and implementation, identify the causes and examine if they have been resolved.

- Are work-planning processes results-based? If not, suggest ways to re-orientate work planning to focus on results?

- Examine the use of the project's results framework/ logframe as a management tool and review any changes made to it since project start.

Finance and co-finance:

- Consider the financial management of the project, with specific reference to the cost-effectiveness of interventions.

- Review the changes to fund allocations as a result of budget revisions and assess the appropriateness and relevance of such revisions.

- Does the project have the appropriate financial controls, including reporting and planning, that allow management to make informed decisions regarding the budget and allow for timely flow of funds?

- Informed by the co-financing monitoring table to be filled out, provide commentary on co-financing: is co-financing being used strategically to help the objectives of the project? Is the Project Team meeting with all co-financing partners regularly in order to align financing priorities and annual work plans?

Project-level Monitoring and Evaluation Systems:

- Review the monitoring tools currently being used: Do they provide the necessary information? Do they involve key partners? Are they aligned or mainstreamed with national systems? Do they use existing information? Are they efficient? Are they cost-effective? Are additional tools required? How could they be made more participatory and inclusive?

- Examine the financial management of the project monitoring and evaluation budget. Are sufficient resources being allocated to monitoring and evaluation? Are these resources being allocated effectively?

Stakeholder Engagement:

- Project management: Has the project developed and leveraged the necessary and appropriate partnerships with direct and tangential stakeholders?

- Participation and country-driven processes: Do local and national government stakeholders support the objectives of the project? Do they continue to have an active role in project decision-making that supports efficient and effective project implementation?

- Participation and public awareness: To what extent has stakeholder involvement and public awareness contributed to the progress towards achievement of project objectives?

Reporting:

- Assess how adaptive management changes have been reported by the project management and shared with the Project Board.

- Assess how well the Project Team and partners undertake and fulfil GEF reporting requirements (i.e. how have they addressed poorly-rated PIRs, if applicable?)

- Assess how lessons derived from the adaptive management process have been documented, shared with key partners and internalized by partners.

Communications:

- Review internal project communication with stakeholders: Is communication regular and effective?

Are there key stakeholders left out of communication? Are there feedback mechanisms when communication is received? Does this communication with stakeholders contribute to their awareness of project outcomes and activities and investment in the sustainability of project results?

- Review external project communication: Are proper means of communication established or being established to express the project progress and intended impact to the public (is there a web presence, for example? Or did the project implement appropriate outreach and public awareness campaigns?)

- For reporting purposes, write one half-page paragraph that summarizes the project's progress towards results in terms of contribution to sustainable development benefits, as well as global environmental benefits.

iv. Sustainability

- Validate whether the risks identified in the Project Document, Annual Project Review/PIRs and the ATLAS Risk Management Module are the most important and whether the risk ratings applied are appropriate and up to date. If not, explain why.

- In addition, assess the following risks to sustainability:

Financial risks to sustainability:

- What is the likelihood of financial and economic resources not being available once the GEF assistance ends (consider potential resources can be from multiple sources, such as the public and private sectors, income generating activities, and other funding that will be adequate financial resources for sustaining project's outcomes)?

Socio-economic risks to sustainability:

- Are there any social or political risks that may jeopardize sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that the project benefits continue to flow? Is there sufficient public / stakeholder awareness in support of the long term objectives of the project? Are lessons learned being documented by the

Project Team on a continual basis and shared/ transferred to appropriate parties who could learn from the project and potentially replicate and/or scale it in the future?

Institutional Framework and Governance risks to sustainability:

- Do the legal frameworks, policies, governance structures and processes pose risks that may jeopardize sustenance of project benefits? While assessing this parameter, also consider if the required systems/ mechanisms for accountability, transparency, and technical knowledge transfer are in place.

Environmental risks to sustainability:

- Are there any environmental risks that may jeopardize sustenance of project outcomes?

Conclusions & Recommendations

The MTR team will include a section of the report setting out the MTR's evidence-based conclusions, in light of the findings.8

Recommendations should be succinct suggestions for critical intervention that are specific, measurable, achievable, and relevant. A recommendation table should be put in the report's executive summary. See the Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for guidance on a recommendation table.

The MTR team should make no more than 15 recommendations total.

ANNEX II: KEY QUESTIONS DRIVING THE ANALYSIS OF DATA

Dimension	Key Questions
Relevance	Were project activities relevant to national priorities? Were project activities relevant for the main beneficiaries? Were project activities aligned to UNDP goals and strategies? Has the project tackled key challenges and problems? Were cross-cutting issues, principles and quality criteria duly considered/mainstreamed in the project implementation and how well is this reflected in the project reports? How could they have been better integrated? How did the project link and contribute to the Sustainable Development Goals? To what extent was the project relevant to the strategic considerations of the governments involved? To what extent was the project implementation strategy appropriate to achieve the objectives?
Effectiveness	To what level has the project reached the project purpose and the expected results as stated in the project document (logical framework matrix)? What challenges have been faced? What has been done to address the potential challenges/problems? What has been done to mitigate risks?
Sustainability	How is the project ensuring sustainability of its results and impacts (i.e. strengthened capacities, continuity of use of knowledge, improved practices, etc.)? Did the project have a concrete and realistic exit strategy to ensure sustainability? Were there any jeopardizing aspects that have not been considered or abated by the project actions? In case of sustainability risks, were sufficient mitigation measures proposed? Is ownership of the actions and impact on track to being transferred to the corresponding stakeholders? Do the stakeholders / beneficiaries have the capacity to take over the ownership of the actions and results of the project and maintain and further develop the results?
Efficiency	Have the resources been used efficiently? How well have the various activities transformed the available resources into the intended results in terms of quantity, quality and timeliness? (in comparison to the plan) Were the management and administrative arrangements sufficient to ensure efficient implementation of the project?
Stakeholders and Partnership Strategy	How has the project implemented the commitments to promote local ownership, alignment, harmonization, management for development results and mutual accountability?
Theory of Change or Results/Outcome Map	Is the Theory of Change or project logic feasible and was it realistic? Were assumptions, factors and risks sufficiently taken into consideration?

ANNEX III: INTERVIEW PROTOCOL

For each interview obtain the following information of all the people who were part of the meeting

Name of Interviewee	Title, Department	Institution
Date of Interview	Time	Location
Other Persons present/title	Team members present	

Below is the list of indicative questions which we need to answer for the MTR. Depending on who we interview, we need to choose among the questions below the suitable ones to ask (particularly given that we have normally just around 1 hour for each interview). For example, with implementation partners of specific projects, we may want to focus on part A and some additional questions in other parts as appropriate. For donors and other development partners we may want to focus on part B.

1. EFFECTIVENESS:

1.1. To what extent has the project **achieved its expected objectives**? Were all the planned project outputs and outcomes achieved? What were the **key results achieved** (Please describe, in particular, what **"changes"** have been brought about by the project)?

1.2. Were there any key results not achieved and why? Were there any positive or negative unintended results?

1.3. What was the quality of the deliverables?

1.4. Do you think that all the strategies and plans that were supported will be implemented?

1.5. What were the major **factors contributing** to the achievements of this project? What were the **impeding factors**?

1.6. **Partnerships**: Who were the partners in implementing the project? In your view, how effective has UNDP been in using its partnerships?

1.7. To what extent were government counterparts engaged and interested in the project activities? What roles did they play? Can you mention specific government actors and specific roles they played?

1.8. UNDP's role in **policy guidance**: What was the quality of upstream policy advisory services provided through this project? To what extent was this project able to affect policy

change? If yes, can you mentioned some specific examples? What is the implication of such policy change to the country?

1.9. In what ways can UNDP strengthen its policy advisory role (what worked and what didn't work; why)?

2. RELEVANCE:

2.1. To what extent do you think the project objectives were **aligned with country needs and national priorities, policies or strategies**?

2.2. How was the work conducted under this project connected to the broader reform agenda under way in the transport sector? Was it integrated with the existing reform architecture in the area of transportation? Please provide specific examples.

2.3. To what extent were the **approaches taken by the project** appropriate in terms of the project **design and 'focus**'?

2.4. How coherent was the project in terms of how it fit with the policies, programmes and projects undertaken **by other government counterparts**?

3. EFFICIENCY:

3.1. **Managerial and operational efficiency**:

a) Has the project been implemented **within expected dates, costs estimates**? Explain **'factors'** influencing the level of efficiency.

b) Has the project management taken prompt actions to solve implementation and other operational issues? What was **project management structure** (incl. reporting structure; **oversight** responsibility)?

c) How adequate were the Project Management arrangements put in place at the start of the project? Did the project display effective adaptive management?

d) What were the implications of the project's organizational structure for its results and delivery?

3.2. **Progammatic efficiency:**

a) Were the financial resources and approaches envisaged appropriate to achieving planned objectives? Was there a 'good' mix of upstream and downstream efforts to maximize the results?

b) Were the resources focused on a set of activities that were expected to produce significant results (**prioritization**)? Has the project achieved 'value for money'?

c) Has the project followed any known 'best practices'?

d) Were there any efforts to ensure 'synergies' with other donor initiatives in the target countries? Explain results, and contributing factors.

3.3. What could have been done to improve the overall efficiency of the project?

4. SUSTAINABILITY:

4.1. To what extent are **project benefits likely to be sustained** after the completion of the project? What are the supporting/ impeding factors?

4.2. What are the risks that are likely to affect the persistence of project outcomes?

4.3. What plans were put in place to ensure the continuity of the efforts (e.g., funding, technical capacity)? Has there been an **exit strategy** that describes these plans?

4.4. Do you think that the various key stakeholders see that it is in their interest that the project benefits continue to flow?

4.5. Would you want to see this project extended in its current form or some other form?

4.6. Do you think a project like this would be useful in promoting the achievement of SDGs in targeted countries?

B. ASSESSMENT OF THE PROJECT'S STRATEGIC POSITIONING

5.1. To what extent has the project been **responsive** to meeting the needs of the country?

a) How responsive was the project to changes in development priorities in the sector?

b) To what extent has the project been able to adapt its ongoing programme to take into account the changing realities and sensitivities in the sector?

c) To what extent has UNDP been able to adjust its implementation approach specifically to respond to the challenges created by political and institutional changes?

5.2. To what extent has the project been able to **integrate the concept of sustainable development** in the transportation sector (design, allocation of resources and implementation)? Examples?

5.3. What **was the comparative advantage of** UNDP, when compared to other actors in the same area?

- To what extent has UNDP been able to provide **technical guidance**, and knowledge?
- What are UNDP's **comparative strengths**, vis-à-vis other partners, if any?
- To what extent do UNDP have the skills and expertise needed to support this area?

5.4. To what extent has the project been able to establish **partnerships and networks** with relevant partners and build strategic alliances in supporting key national priorities in the transportation area?

5.5. What do you think would be the **role of UNDP in helping planning for, implementing strategies to achieve and/or monitor progress towards the Sustainable Development Goals?**

C. OTHER ISSUES

Are there any issues that you would like to raise about the project's performance that have not been covered in this interview?

ANNEX IV: LIST OF STAKEHOLDERS INTERVIEWED FOR THIS MTR

ANNEX V: PROJECT'S RESULTS FRAMEWORK

Assigned targets in the Project Document are for both Jharkhand and Manipur. However, the expected achievements/results are captured for Jharkhand only.

Strategy	Description	Baseline	Target	Expected EoP i.e. Dec 2019 achievement
Project goal: Reduced GHG emissions achieved through implementation of RE and EE solutions at the state level as identified in the SAPCCs	Cumulative CO_2 emission reduced from start of project to End-Of-Project (EOP), (MILLION tCO_2e)	0	304,250 tCo2e	39,522 tCO2e
Project Objective: To support the effective implementation of specific energy efficiency and renewable energy climate change mitigation actions identified in the SAPCCs for Manipur and Jharkhand	Total energy savings achieved from implemented RE and EE mitigation actions by EOP, MWh	0	190,452 MWh	45,417 MWh
	Total installed capacity of RE systems (MW) by EOP	0	28 MW	18.91 MW
	Number of people that benefitted directly or indirectly with improved energy access in the two states through the project interventions by the EOP (million). (This includes, improved job opportunity, quality of life and education.)	0	17.8	Preliminary estimation suggests no of people that are expected to have been benefitted both directly and indirectly through DRE in rural areas is approx. 4,250+ [*Mini Grids: 400 people in each village x10*; *Solar cold storage: 10 people x25 sites*]. With solar rooftop applications across all consumer segment, the beneficiaries in both peri urban and urban segment will be much larger. Final estimation will be undertaken by December 2019 when all the RE/EE applications are installed and being used by communities.
Component 1: Framework for the implementation of climate change mitigation options in the selected states SAPCCs				

Strategy	Description	Baseline	Target	Expected EoP i.e. Dec 2019 achievement
Outcome 1: Successful and sustainable implementation of priority Climate Change and Mitigation (CCM) actions on energy generation and application of Energy Efficiency (EE) & Renewable Energy (RE) technologies in the major energy end-use sectors in selected states	Number of CCM actions implemented by the project in the states by EOP.	0	9	11 Mitigation actions finalized are listed below: 1. Rooftop Solar in institutions/ schools 2. Rooftop solar in CHCs/Public buildings 3. Rooftop solar in commercial and industrial consumer segment (plus enabling financing across all consumer categories) 4. Solar Cold Room 5. Solar mini grid 6. Energy Efficiency in public building 7. MSME EE 8. Energy Efficiency in conventional cold storage segment 9. Energy Efficiency in municipal pumps 10 AgDSM (EE in irrigation pumping) 11. Solar pumps
Output 1.1: Regularly updated GHG abatement cost curves at state level	Number of abatement cost curves prepared by Year 1	0	4	9. Initially in the first year the following 8 technologies were prioritized through MACC 10. Solar rooftop 11. Utility scale solar 12. MuDSM 13. AgDSM 14. Solar pumps 15. Building EE 16. Replacement of inefficient street lights with LEDs 17. Solar water heater Cost curves were also updated
O**utput 1.2:** Selected prioritized RE and EE actions listed in Manipur and Jharkhand Action Plans on Climate Change for implementation	Number of prioritized RE and EE mitigation actions selected for implementation in the states by end of year 1	0	4	5 prioritized RE and EE mitigation actions selected for implementation in Jharkhand after the first year are listed below: 1. Rooftop Solar in schools/institutions 2. Rooftop solar in CHCs (with storage) 3. Solar Cold Room 4. Solar based mini grid in remote villages 5. Energy Efficiency in public building

Strategy	Description	Baseline	Target	Expected EoP i.e. Dec 2019 achievement
Output 1.3: Designed and implemented common monitoring, reporting, and verification (MRV) system for the selected RE and EE actions of the Manipur and Jharkhand SAPCC, in a way to feedback into the SAPCC process	No. of monitoring, reporting, and verification (MRV) systems designed and implemented in the states by Year 3	0	5	Investment demonstrations as listed above have been implemented. MRV system for MACC has been developed. Meanwhile AMR system for monitoring solar rooftop generation data has also been installed and is being corrected to address any mismatch from inverter data.
Component 2: Catalyzing investments for implementation of selected RE and EE mitigation action				
Outcome 2: Enhanced states capability and capacity for identifying, designing, planning, financing and implementing selected RE and EE actions from their SAPCC	Number of locally designed, planned and financed RE and EE projects implemented in the states by EOP	0	4	6 locally designed, planned and financed RE and EE projects implemented - Solar cold room - solar rooftop on schools/institutions/social segment - RTS on CHCs - Solar micro grid - EE in public buildings -MSME EE -EE in conventional cold storage units
Output 2.1: Completed evaluation of existing available loan mechanisms for projects developed as part of SAPCC targets	Number of loan mechanisms evaluated by Year 2	0	5	5 loan mechanisms evaluated in financing landscape report prepared in the first year are as listed below: - National Clean Energy Fund - MNRE- Solar Pumping Programme - BEE-Partial Risk Guarantee Fund for Energy Efficiency -Public Financial Institutions: PFC, RECL, SIDBI& IREDA -Commercial banks: Public and Private sector banks In addition, active engagement with financing institutions is being carried out to facilitate financing with a focus on solar rooftop for all consumer segments and solar cold storage for FPOs/farmers. Facilitating MSME financing for energy efficiency and technology upgradation measures and required

Strategy	Description	Baseline	Target	Expected EoP i.e. Dec 2019 achievement
				handholding is also planned out as an extension of energy audit activity.
Output 2.2: Implemented non-grant financing instruments such as flexible debt finance (including long tenure low-interest loans)	Number of non-grants based financial instruments developed by Year 3	0	1	1.Solar rooftop installation across private consumers, through market mode (capex, with or without subsidy support).2. ESCO for building EE 3. RESCO for solar rooftop projects especially for large institutions and C&I 4. Revolving fund for building EE project (for repaying back to JREDA through savings) 5. Capex for DRE solution like solar cold storage by FPOs
Output 2.3: Mobilized public and private sector funding	Amount of total funding mobilized for implementation (US$) by Year 4	0	USD 12000,000	USD 55,68,121.43 (only for RE, excluding subsidy component)
Output 2.4: Established public private partnerships (PPP) for implementation and scaling up of selected RE and EE actions in Manipur and Jharkhand	Number of replication projects on the selected RE and EE mitigation actions implemented by EOP	0	21	1.Solar rooftop in 40+ private institutions 10 in CHCs/healthcare segment; 10+ in commercial/ industrial segment and domestic segment. 2. 6 solar cold storage in other focus states of ACE project, 18 and 6 cold storage system by JREDA and Forest Deptt respectively as planned in their budget; at least 10 proposals from various FPOs 3. Building EE
	No. of PPP business models developed by Year 3	0	9	1.building energy efficiency through ESCO 2.Solar rooftop through RESCO/OPEX

Strategy	Description	Baseline	Target	Expected EoP i.e. Dec 2019 achievement
				3. solar rooftop: Aggregated consumer segment 4. MSME EE: financial convergence and/or debt syndication
Output 2.5: Implemented nine RE and EE investment projects in Manipur and Jharkhand	No. of demonstration investment projects based on innovative financial models developed by end of year 1	0	9	9
	No. of demo investment projects implemented by EOP	0	5	6 as listed above
Output 2.6: Completed implementation manual and workshops for supporting the implementation of selected public private partnership models for RE and EE actions	No. of implementation manuals developed by Year 3 (one manual for each state)	0	2	0
	No. of workshops conducted on sensitizing the state agencies on proposed models by Year 4	0	2	
Component 3: Capacity development of concerned state level officials for implementation of respective SAPCC				
Outcome 3: Enhanced technical capability of state government in integrating climate change concerns within state sectoral development plans and budgets and undertaking MRVs efficiently for SAPCC actions, facilitated inter-state learning and coordination for SAPCCs	No. of sectoral state budgets for RE and EE activities that are aligned with the budgets proposed under SAPCCs by Year 2	0	2	Report on aligning climate change actions in departmental budget has been prepared for both JREDA and Deptt of Forest, Env and CC, GoJ.
Output 3.1: Aligned state sectoral budgets for development plans to include climate change mitigation actions related expenses	Allotment of budget for climate change actions in departmental budgets by year 2	0	2	0
Output 3.2: Completed training and capacity building	No. of handbooks and guidelines prepared for MRV system by year 3	0	2	0

Strategy	Description	Baseline	Target	Expected EoP i.e. Dec 2019 achievement
programs on the developed MRV systems for the State officials	No. of training undertaken on the new MRV system by EOP	0	5	0
Output 3.3: Established institutional mechanism for inter-state exchange of information and technology dissemination for Manipur and Jharkhand for implementation of SAPCC mitigation actions	No. of joint CCM actions discussed and planned for implementation between states by EOP	0	4	Following 5 CCM actions have been shortlisted 1.Solar rooftop for all private consumer segments under market mode 2. Performance assessment of existing solar rooftop installations to identify learning opportunities and assess generation data and overall status of all plants above 10KWp 3. Scaling up solar cold storage system 4. Energy efficiency in buildings 5. EE adoption and financing in MSMEs
Output 3.4: Conducted inter-state study trips and stakeholder interaction workshops	No. of study trips undertaken by EOP	0	4	JREDA officials have not shown any interest in visiting states like Gujarat or Karnataka which have made significant progress in climate action despite proposing twice in 2017-18 (on file)
	No of workshops undertaken by EOP	0	4	Following 5 Workshop/events have been conducted namely 1.Project inception event in June 2016, 2. Exploring and catalyzing financing opportunities for implementation of climate change mitigation activities in Jharkhand in Dec 2016; 3. Business opportunities for scaling up solar in Jharkhand, June 2017 4. Business opportunities for adoption of RE and EE in MSMEs in Jharkhand; Sep 2017; 5. Climate change opportunities and challenges in Jharkhand in Sep 2018
Output 3.5: Established and operational information dissemination system on lessons learnt from investment projects undertaken on priority RE and EE actions.	No. of brochures, case study reports and other printed material published and disseminated by year 4	0	10	Various content including briefs and brochures (8) have been developed on all pilot projects namely mini grid, solar on CHCs, Institutions, solar cold storage, solar for C&I, plus project factsheets and general climate change opportunities for the state
	No of users of the system/year starting Year 4	0	2500	10000

ANNEX VI: SUPPORT PROVIDED BY THE PROJECT

Detailed Description of Project Initiatives Awarded by the Project

Mini Grid at Garo, Chatra District

Setting up 17 KWp Solar based Mini Grid was unique as it aimed to demonstrate installation and operation of a successful, sustainable and replicable business model for rural electrification in Jharkhand. A successful mini grid operation also paves way for creating various rural enterprises, supported with business models leading to a strengthening livelihood opportunity for that segment.

The State Government perceives solar as an intermediate technology for rural electrification as there is a big focus by the state on enhancing the grid outreach to all the rural areas (under both DGGVY/GARV and Saubhagya scheme for rural electrification). By the end of 2018, Jharkhand installed over 2.5 MW of mini/micro-grid projects and over 600 KW of solar home lighting systems across the state.

Rural mini/micro grids commissioned by JREDA so far lack the potential for implementation of a sustainable model which ensures tariff recovery for meeting the O&M expenses across the lifetime of the system. This shows that the state government considers solar as an intermediate solution for rural electrification.

It is certain that grid cannot reach to all the household and villages due to the topographical and other techno-economic barriers and thus mainstreaming grid access to rural consumers will always be an issue. Considering the operational and financial performance of the discom, the quality/reliability of grid availability in rural areas for both existing and new rural consumers (with growing demand) will be quite challenging, yet the focus on operation of self- sustainable solar based community led model is missing and the pilot project in a partially electrified village in intended to showcase that opportunity to the State Government. This assignment will also pitch for an off grid or mini grid policy for the state as recently implemented in UP and Bihar. Though off- grid or rural electrification segment in Jharkhand presents tremendous opportunity for private Mini Grid operators yet the conventional grid outreach, lack of clarity on grid integration and overall a mixed experience of both successful and unsuccessful mini grid projects have posed major challenges for the segment. Mini Grid unit has been commissioned in Feb 2019. Subsequently 8 Watt LEDs have also been distributed to almost all 70-80 households and basic training on plant operations and maintenance has been provided to youth. Further to commissioning of the plant, the project team aims to demonstrate how livelihood options of the villagers can be strengthened through suitable interventions like utilization of renewable energy in applications like rice hulling, oil expeller, flour mill or any other commercial activity at the village level. In that context, suitable technologies and potential for RE driven enterprises/business models are being identified in coordination with an ongoing assignment on rural energy enterprises. The broader objective of such an activity is to showcase Garo as an energy independent smart village. To achieve that, the project team plans to develop a feasibility report for the village while linking with the market assessment study carried out by PWC along with findings on increased economic enterprise viability study for rural segment.

Solarizing selected CHCs

Similarly, solar rooftop installations on CHCs highlights how clean, cost effective and reliable supply of electricity is critical to deliver quality health care services` in peri urban/rural areas in the state. JREDA will solarize over 1,400 public buildings across the state, a majority of the CHCs (along with other public buildings) have been included under the state scheme. Some CHCs have already been solarized and almost all the remaining are expected to be done under the ongoing scheme of JREDA. Grid interactive 60 KW cumulative capacity was planned to be installed across 9 selected CHCs under the UNDP project assignment, out of which by June 2018 47 KWp capacity was installed across 7 CHCs and work order for the remaining 2 CHCs (to be commissioned by Apr 2019) have been issued in Jan 2019. The novel aspect of this assignment is that in addition to ensuring quality of module and other systems along with monitoring continuous system operation, the overall healthcare improvement benefits will also be mapped. This successful experience will also be shared with private hospitals/ and other healthcare facilities in peri urban/urban area along with other areas to motivate them to go for solar. With the annual tariff revision for JBVNL and all other consumers of different discoms , there is a business case for solar rooftop and that case along with supporting the health benefits will be strategically pitched to both the Government and other stakeholders in health sector through advocacy, events, etc., to tap the potential.

Solar rooftop in private institutions

Though JREDA has focused on adoption of solar rooftop across private schools, commercial and industrial consumers through initiatives like the market mode program, until early 2018 there was no uptake (i.e. almost no capacity installed) in any of these consumer segments across the state. Two key reasons for the lack of adoption is the perceived cost of solar (upfront capex) & lack of low- cost financing and lack of awareness. Both these challenges were significantly addressed with the additional 20% financial assistance (over CFA) provided by the project for the private schools/institutional segment. The activity was designed and subsequently anchored through signing a letter of agreement (LoA) between UNDP and JREDA for supporting solar rooftop installations in healthcare and private institutional segment. The project team actively engaged with solar developers and consumers regarding the ease and benefits of installing solar rooftop, which resulted in receiving an interest of approx. 605 KWp by March 2018 under the market mode program. Later many consumers dropped out due to various reasons including financing issues and subsequently by June 2018, approx. 371 KWp of capacity was installed in 14 schools. Benefits including significant reduction in monthly electricity cost accrued by those schools led to some positive response in the segment and so approx 990 KWp of applications were received by Dec 31. 2018, when the second round of applications were invited under the market mode program. Work Order for more than 800 KWp of capacity was issued by JREDA by Mid Jan 2019, with a commissioning timeline of 3 months. An important point to note here is that majority of the targeted consumers in Jharkhand were neither aware of solar and its overall benefit but also there were significant challenges in creating even a niche market, as most of the solar developers had a focus on implementing 100% subsidy backed projects like installations on public building only. An absence of a growing market ecosystem was demonstrated through the capacity installed in the state until that time (almost nil under the market mode).

This demand and supply gap in the entire solar value chain was addressed in 2018 through the project intervention, which resulted in KW scale capacity installation initially and subsequently translated into MW scale (interest) by the end of the year. Earlier a detailed feasibility assessment for rooftop solar (along with mapping energy conservation potential) was carried out across 180 schools in 3 major cities in the state and an interest has been received from many of them. This activity certainly enabled the institutional consumers to know about the cost and benefits of solar power, which resulted in rising interest in the segment. UNDP facilitation in form of additional financial assistance (20% of the benchmark cost) broke the status quo in this market segment and delivered the much-needed capacity addition across institutional consumers. Schools survey/ feasibility has also presented an opportunity for aggregated consumers clusters for the take up of RESCO projects and since JREDA has already prepared a draft solar rooftop policy with a focus on innovative models like RESCO and net metering arrangements like virtual and group net- metering , it will be a good opportunity for them to implement that. Further some targeted events will also need be carried out with many schools to demonstrate the viability and opportunities for solar rooftop adoption.

Detailed Description of Additonal Activities Supported by the Project

Development of database of potential consumers across eight cities of Jharkhand for setting-up rooftop solar PV in market mode [GERMI]

Broad objective of this assignment was to collate and prepare a comprehensive list/database of potential consumers (across commercial, institutional and industrial segments) for installation of grid interactive roof-top solar system across all the major cities in Jharkhand. Such a database will be useful to facilitate the overall engagement with all the concerned stakeholders including consumers, empaneled solar developers/investors, EPC vendors and the Government to scale up rooftop solar in market mode. Scope of work included Identification of potential commercial, institutional and industrial consumers for installation of roof-top solar system in CAPEX/ OPEX model. It broadly included collection of required data for preparation of feasibility report and its validation through site visits/meetings with consumers, analysis of information/data and preparation of a comprehensive database and feasibility report of 80 consumers in 8 cities. The assignment resulted in developing a database for over 14 MW of rooftop projects largely across the targeted consumer segments all over the state, which was shared with JREDA. As a result of this exercise and with continuous engagement of the project team with the interested parties, 2 MSME promoters (namely Raj Ceramics and Tajna Shellac) in Ranchi installed a cumulative capacity of 70 KWp (35 KWp each) in their units. Both these units were surveyed earlier under this assignment and their actual feasibility was much higher than what was installed. Nonetheless as the first industry consumers for solar rooftop in the state, the concerned MSME promoters also wanted to test the experience with solar without investing for a higher capacity installation. It is expected that more MSME units (along with commercial consumers) will set up solar, as the actual benefits are demonstrated, and success stories are communicated within the MSME community/peer group.

This survey has played a vital role in spreading awareness among the consumers and explaining the basic technical points to the consumers. There is high potential to scale up the roof top solar installation particularly in C&I segment in Jharkhand. A few consumers have shown some interest after the survey however they have not translated that into actual action. Although there were some barriers, such as net metering approval process and limited presence of OPEX model investor in the state however, recently the Energy Deptt has streamlined the net metering approval system along with the entire application process through AHA solar app/online system. As an extension to this assignment, targeted engagement are being made (e.g. through JSIA platform) and will continued to be made with the selected consumers to pitch for solar adoption. Financial assistance strategy in line with institutional consumers for limited window could also be planned (subject to project modality) in case there are no actual interest from the consumers for solar rooftop.

Installation of Cloud based AMR system for displaying real time solar energy generation in Jharkhand. (Suncraft)

The objective of this assignment was to design and implement a cloud based automatic meter reading system in existing roof top solar systems on selected Govt Buildings and other rooftop sites across the state to display both cumulative and real time generation. AMR system with a web dashboard will log, fetch, consolidate and analyse generation data from roof top installations in the state. System will capture and display real time solar generation data and will help JREDA and state utilities to track the performance of the installed system. This will also help to calculate GHG emission reduction which would be proportional to generation. JREDA has already installed more than 14.5 MW on over 500 public buildings (until Jan 2019) and is mandated to solarize approximately 1400 Government buildings across the state. However, generation data from most of the sites are not available due to some reason or another and so it is not possible to ensure how the plants are performing. In that respect, this assignment on AMR is intended to consolidate the system of fetching data from a range of existing (and future metering points, if JREDA scales that up through their routine tender) and pull the data to the cloud server to be displayed both on a web based and standalone dashboard (to be set up in a strategic location post completion of the assignment). Showcasing real-time generation data along with other parameters like CO2 abatement etc will not only promote wider awareness of such technology in the state but also demonstrate the accomplishment of the Government. Real time generation data at scale will also help state utilities to understand the real time generation pattern of the roof top solar in the state and will further help state load dispatch center to schedule and dispatch the conventional power. Further will help to understand the load on a distribution transformer and will bring awareness among utilities engineers and will help to scale up the roof top installation in the state.

Update as on March 2019: 50 AMRs have been set up at 32 sites across the state however in many cases data is not getting uploaded due to issues including network and hardware/software related challenges. These issues are actively being addressed through direct mirroring the AMR with inverters and replacing the systems where network problem is consistent.

Training on net metering for utility staff (GERMI)

Without proper processes and training and education of utility engineers and concerned stakeholder at the last mile, even well intended net metering policy and regulations will not work. The training program undertaken by GERMI On July 20 2018 built the capacity of JBVNL engineers on net metering system to facilitate the smooth implementation of solar rooftop projects in the state. Based on the experience, similar training programs can be undertaken for JBVNL discom in other circles and for other discoms including JUSCO, BSL, DVC to train their engineers on various aspects of solar PV rooftop technology, its grid interconnection procedure, safety aspects, etc. Depending upon the approval, either such trainings could be planned under the project or can be separately conducted by the State Government and concerned discoms. In any case, such trainings are critical to scale up solar rooftop technology as the understanding of net metering system and its approval process at the level of circle engineers is not very promising and that must be significantly improved. All these trainings and related events are an essential part of component 3 of the project with a broader focus on building the skills and capacity of concerned officials and other stakeholders at various levels.

AgDSM assignment (PGS)

The overall objective of the assignment was to map the energy conservation potential across the agricultural irrigation sector in Jharkhand and designing of an appropriate framework for promoting market based interventions in agricultural pumping sector. Though not an agriculture predominant state like its neighbors UP/Bihar, and the lack of network of irrigation canals due to topography and other issues farming in Jharkhand in most of the parts is traditionally dependent on rains. The sector has many opportunities to improve the yield, rural livelihood and energy performance, however like many other segments there has been no baseline assessment carried out in recent years for energy performance improvement in the state. NPC carried out a comprehensive study on electricity consumption and conservation potential in irrigation across many states including Jharkhand almost a decade ago however besides that no other work has been carried out to reduce energy consumption in this segment. So, UNDP-GEF assignment which will also audit 100 pumps is certainly a timely activity to explore the untapped potential in times when Government focus on addressing farm and rural livelihood issues have significantly increased. Framework development for AgDSM intervention on PPP mode and identification of pilot for up to 50KW cumulative capacity of 50KW would pave way for the discom along with BEE to design an appropriate market for EE pumps manufacturers and suppliers. On successful completion of this assignment, project team will focus on developing and structuring that framework along with the concerned stakeholders like BEE, Discom, JREDA etc and simultaneously propose the implementation of DPRs of both electric and diesel run pumps by discom/agriculture deptt.

Solar Pumps [PGS]

The study had an aim to assess the potential for solarisation of agriculture pumps including its penetration, identify the key challenges and determinant preventing solarisation of agricultural pumping sector and design an enabling strategy for large scale adoption of solar irrigation pump to phase out subsidy across Jharkhand (5 districts). The study also intended to identify the feasibility of grid connected solar irrigation pumping unit as an alternative business model for

popularizing the technology followed by possible demonstration. Solar pumping for irrigation has not been a successful story in Jharkhand unlike many other neighboring states. One of the key challenges for the adoption of solar pumps in state is that the subsidy is being offered only to 6 tribal districts. Apparently the demand for solar pumps are largely outside these districts and it is expected that the required modifications will be carried out by the Government to effectively target the systems where they are actually needed.

This was the first study to be carried out in solar pumping for irrigation in the state and so attempted to capture the various lessons to be learnt from Jharkhand and other state's experience with the technology and its wider scale up. With the renewed focus of the Central Government on solar pumping through KUSUM program (as outlined during Union Budget 2018-19 and approved by CCEA in Feb 2019), this marginalized technology has again gained some traction in the state. This assignment will build on to that interest and will enable the wider uptake of both standalone and grid -connected systems. Subsequently advocacy will also aim to demonstrate a grid interactive pumping system by JREDA/Discom and accordingly carry out capacity building and related engagement with FIs (including rural banks).

Market Assessment for the viability of mini grid business models [PWC]

Even after considerable grid outreach, large swathes of rural areas in the state are still un-electrified. Though GARV resulted in 100% electrification at village level (by 2018 end) and Saubhagya is expected to achieve the same at household level (by April 2019), reliability/quality of electricity supply will always be a challenge. In the above context, a survey-based study in 15 villages has been awarded to PWC towards understanding the demand, operational and financial challenges of adopting mini/micro-grids in the rural areas of Jharkhand. This assignment had a focus on all the technical, social and financial prospects in framing the customised, sustainable and scalable business plans for the selected villages in Jharkhand.

Outcome:

1. Market assessment: To understand the potential of micro grids adoption and the sustainability of their operation in terms of sufficing rural households needs and promoting micro-enterprises. The market assessment framework is being designed, not only to identify the electricity demand, requirements and pattern, but also the ability and willingness to pay in households, productive users, businesses and institutions.
2. Identify the level of financial inclusion: Since solar powered micro grids are predominantly on tariff based models or pay as you use concept the study also focus to capture the level of financial inclusion.
3. Developing business plan for micro grid promotion: the study will lead to identification of different business models suitable for promotion of micro grid based electrification and rural enterprise promotion

The business model designed through the study will be tested during the mini grid pilot at Garo Village, Chatra and lessons learned from the pilot will be used to mainstream the technology option supported business model across other villages (including both electrified and unelectrified) in the state.

Assessing opportunities for integration of energy efficiency and renewable energy technology in cold storage operation: (TERI)

As per Ministry of Food Processing Industries the number of cold storage units in Jharkhand is around 58 with cumulative storage capacity of 2.36 Lakhs MT. Electricity accounts for 50-60% of the operating expenditure of these unit with the typical energy consumption in range of 0.5 - 0.8 kWh/MT/day. The cold storage units being constructed without optimizing the energy consumption consideration has a typical potential of saving of over 20% based on low investment and high return measures. The unreliability of electricity supply in the state also forces the cold storage operators to operate the unit on diesel generator for considerable time during the peak summer season to sustain the perishability of the agriculture produce stored. With this background, an assignment with a focus on reducing energy consumption in cold storage operations was designed, encompassing the following tasks (i) Potential Assessment: Mapping/inventorisation of the cold storage units in the state, accessing the technology in use and establishing the existing baseline specific energy consumption towards benchmarking energy consumption and identifying technology solution towards its optimization (ii) Creating an enabling ecosystem (a) Detailed energy audit of 10 sample units were undertaken to identify the areas of energy conservation and potential/possibility of renewable energy integration (b) Handholding at least 2 cold storage units in implementing energy conservation measures and adoption of renewable energy technology and (c) Assessment of the enabling policy and financing scheme to support adoption of technology measures (RE and EE) across the cold storage units.

Key Outcomes from the Assignment

- Sectoral energy conservation potential mapped along with technology measures/solutions (both EE and RE) that can be adopted by the units for better profitability in operation.
- Proof of concept vide successful demonstration of the benefit from implementation of energy efficiency measures as well as from adoption of renewable energy technology options. BEE agreed to fund INR 10 lakhs for the proposed interventions in 2 cold storage units to demonstrate energy savings and utilize some of their funds with JREDA. JREDA is expected to issue a tender by March/April 2019 to invite bids from ESCOs/Suppliers/Manufacturers etc.
- Key policy and financing scopes that could motivate the units in adopting technology solutions

Market Creation/Scaling Up Opportunities

- Existing units: The energy audit at 10 units followed by implementation at 2 units (Through BEE and JREDA support) can be used as mobilization tools for persuading other units in adopting technology options provided an enabling market environment can be created in terms of right policy, easy access to technology and supplier and access to finance. As a baseline, No efforts on energy conservation were made in the cold storage segment at all inspite of a poor supply position and incurring high cost of running DG.
- Upcoming units: Once the energy efficient technology options (and renewable energy technology model) can be successfully demonstrated, it will create a benchmark for the upcoming units for adopting the improved technology solution.

- Supply chain strengthening: Adoption of energy efficient technology and renewable energy technology will create a market for the supply chain stakeholders and will improvise in creation of local supply side and maintenance side infrastructure. It will likely to create new job opportunities. Moreover the project is likely to strengthen the ESCO network in the state.
- Creating of an Enabling Environment: Active engagement with financial institutions for bridging the gap between the agencies and institution towards easing of debt financing.

New activities planned based on outcome of the current study

- Development of IEC material on success stories of implementation/proof of concept and organizing workshop to persuade other units in adopting/implementing RE and EE technology measures
- The proof of concept in terms of financial return on investment form the implemented project will be used for consultation with the financial institution for developing a loan product for debt financing of cold storage units for adoption of RE and EE measures

Identification of barriers and potential for market transformation for large scale renewable and energy efficiency activities [TERI]

This multi-stakeholder survey based assignment was conceptualized to re-evaluate the relevance of the prevailing barriers identified at the project design stage and new set of market challenges that have evolved during project execution stage that are forbidding the widescale adoption of renewable energy technology and energy efficiency/DSM measures across both states (Jharkhand and Manipur). Broadly the objectives of the survey based study were (a) to undertake an assessment of status of implementation/adoption of renewable energy and energy efficiency activities (including DSM) (b) identify key policy, regulatory, technical, institutional and financial barriers preventing large scale adoption of renewable energy and energy efficiency measures, and (c) identify measures/strategies towards addressing of the persistent barrier.
Key Outcomes from the Assignment: The situational analysis accessed the current level of adoption of renewable energy and energy efficiency measures across the states with focus on (a) current level of adoption of the technology measures as against the clean energy (including energy efficiency) target including the public and private sector investment for adoption (b) enabling factors/ecosystem that has helped/resulted in adoption of the technology options (c) institution/agency that have catalyzed deployment including the role of the agency in mainstreaming adoption. It will also identify barriers currently forbidding and jeopardizing the adoption of the clean energy technology options across industrial, commercial, institutional, residential and agricultural sector across the states. It framed customized short-term solution towards addressing the identified barriers in line and within the project purview.

Market Creation and scaling up opportunities

The customized solution/strategy identified from the study will help in framing tailormade sub-activity under the existing project purview (policy framing or advocacy, institutionalizing regulatory measures, institutional development and capacity building) which will capture key aspects within the shorter time frame in line with the project log-frame. Further, the study will

guide the strategy that needs to be adopted for scaling up of technology measures planned to be promoted through the project.

New activities planned based on outcome of the current study: Capacity building of the Government officials and other stakeholders in line with the outcome and midterm re-strategizing of the current approach adopted under the project towards removal of market barrier for facilitating private sector investment and participation in adoption of renewable energy technology and energy efficiency measures.

Detailed Description of Activities Currently UNderway

Accelerating adoption of solar powered micro cold storage (Meghraj)

The objective of this assignment is to accelerate and promote installation of solar based micro cold storage units across Jharkhand through the existing FPOs network. This scale-up activity is a follow-up to the successful installation of standalone solar powered micro cold storage under the project at Village Sardarodih, Dist Koderma in collaboration with a local FPO and JREDA. As part of this Engagement, 24 willing FPOs will also be identified who would like to install a mini cold storage. The assignment also includes an analysis of existing solar cold storage systems installed across the country including the lesson learned in implementing these interventions and challenges faced in making such a system operationally feasible; Subsequently, it will also carry out a detailed analysis of the favorable state level policies and financial benefit offered by other States for implementation of solar micro cold storage along with recommendations for Jharkhand Government. A model DPR for accessing debt finance in line with the requirements of the financing institutions in the space will also be prepared. The assignment will also result in generation of interest from atleast 24 FPOs/FPCs/Mandi co-operatives for the technology options and accordingly, detailed written consent from the FPOs/FPCs/Mandi co-operatives will have to be provided along with the demand report to substantiate. The project team will ensure that those genuine interest are translated into installations, through mobilising both private and subsidy component from the concerned department. Communication material including briefs/brochures and a short film are also being developed in addition to organizing multiple sensitizing events and visits under the assignment. The larger objective of the assignment is to devise a plan for scaling up adoption of such systems by engaging with concerned stakeholders including FPOs, farmers, FIs and Government and thus create an enabling market ecosystem for solar powered cold storage systems in the state. The assignment must be completed by the end of March 2019.

Investment Grade Energy Audit and bankable DPR of 120 MSME units (TERI, TUV-SUD, PGS)

IGEA across 120 MSME units (including refractory, automotive, foundry sector etc) is being performed with an objective of sensitizing and appraising the MSME units on the potential of energy conservation and the possible impact on the unit's profitability and competitiveness from its adoption. Preparation of bankable DPR is aimed at helping the units in accessing debt finance from financial institutions for implementation of energy conservation and technology

upgradation measures on opting for an ESCO based implementation model. The DPRs shall comply to the requirement of application for subsidy/financial benefit programmes of MSME. The agency will have to ensure that the owner/concerned authorities of the MSME are made to understand the proposed energy conservation measures or recommendations, which will eventually help them in taking decisions. The format of the DPR will be provided by UNDP to each of the agencies to have an overarching uniformity of the reports from all the agencies. The agency needs to obtain approval/acceptance of the report from the units.

For the first time such a study is being carried out in Jharkhand MSME segment. So far no other organization including BEE, multilateral institutions or even FIs like SIDBI have carried out any energy auditing in Jharkhand MSMEs. Thus this assignment will not only establish energy consumption baseline for the segment but also define an outline for reducing that along with energy cost and enable the industries in adopting measures through availing requisite finance from banks/FIs.

Promote RE access and leverage innovative financing for RE based rural enterprises (ICCSPL)

The objective of this assignment is to to promote renewable energy access and to leverage innovative financing for RE based enterprises/ livelihood development in Jharkhand through technical and financial handholding of identified beneficiaries. The study will initially identify 10 RE based enterprises/ livelihood activities in each of the 24 districts of Jharkhand. Out of these 10 opportunities identified at least 30% i.e. three should be for supporting women entrepreneurs / women shelf help groups. Each of these identified activities should have a minimum fund requirement of INR 5 Lakhs and the agency should ensure equal representation from peri urban and rural areas. Subsequently 5 RE based enterprises/livelihood activities plan from each districts will be shortlisted through assigned criteria and business plan and financial feasibility report for the selected enterprises from each of the 24 districts would be prepared. Post finalization of business plans in a district the agency shall facilitate funding for all the finalized business plans. through government livelihood/ enterprise schemes or loan from financial institutions and provide handholding support to all the beneficiaries in execution of their business plan.

Study for designing of BMIS system (IBI Consultancy India Pvt Ltd)

With the objective of scaling up adoption of energy efficiency measures across existing commercial building sector, a pilot demonstration is planned across one of the public building (Van Bhawan Complex) where IGEA was carried out during 2016-17. Given the overarching objective of the pilot a separate study was commissioned through IBI to revalidate the findings of IGEA, re-assess the techno commercial viability of incorporation of the energy efficient options proposed under IGEA and design a Building Management Intelligent System (BMIS) to control, automate and manage the existing functioning of the energy system, continuously monitor energy consumption, energy savings and associated GHG abatement via centralized and integrated platform.
Based on the detailed revalidation exercise and techno-commercial assessment of the suggested ENCON measures, the study recommended for retrofitting/replacement of the existing

inefficient lighting fixtures with efficient LED based lighting fixtures, replace exiting fans with energy efficient BLDC fans, existing inefficient non-star rated window ACs with energy efficient five star rated split ACs in addition to integrated occupancy sensor to control the lighting and fans across the rooms and gallery. The BMIS system designed comprises of installation of Multi-Functional Digital Electricity Meters (MFM) in parallel to existing meters along with installation of the same at DGs along with Demand Controllers, and integration of the same to achieve centralized control and monitoring of the electricity usage across various utilities / sections of the Van Bhawan Complex. The recommendations of the study were used as the basis for designing of the RPF for implementation of the pilot interventions at Van Bhawan.

Pilot Interventions at Van Bhawan

The pilot interventions at Van Bhawan Complex encompasses retrofitting of exiting inefficient electrical fixtures with efficient and star rated appliances with similar and in some case with better output performance, implementation of automatic control system for controlling the function of lighting and ventilation system and installation of Multifunction Electricity Meter and Demand Controllers via an integrated and centralised platform towards monitoring and controlling the function of energy systems of the buildings through a direct budgetary support of around forty two lakhs INR.

The retrofitting involves replacement of 207 numbers of old and inefficient ceiling fans (between 75-125 W) with super-efficient BLDC fans (35 W), replacement of 129 numbers of exiting fluorescent tube light with copper ballast (45 W and above) with 4FT-18 W LED tube light, replacement of 174 numbers of incandescent and CFL with equal lumen LED fixtures and replacement of 10 numbers of inefficient window ACs with five star rated split ACs. The retrofitting is expected to result in an annual energy savings of 34,459 units and associated GHG abatement of 31 tCO2e/annum. Installation of 186 numbers of automated and integrated (with lighting and ventilation systems) occupancy sensors are expected to result in an annual energy savings of 13,556 units post retrofitting and associated GHG abatement of 12 tCO2e/annum. The implemented BMIS system comprises of installation of 13 numbers of Multi-function Electricity Meters in parallel with existing DISCOM meters and DGs, four numbers of Demand Controllers along with existing DGs and specific software and hardware systems to monitor, analyze and regulate the functioning of electrical appliances in the buildings.

Facilitating financing for solar rooftop consumers

A new assignment expected to be implemented from Mid-March 2019, is aimed at helping solar rooftop consumers access low cost financing from the financing institutions including commercial banks thus addressing a major barrier of availing affordable finance in the segment. Deployment of solar rooftop projects in the state can be expedited by establishing an enabling financial environment that addresses the requirements of financiers, solar developers, third-party service providers, and consumers. In that context, the assignment will not only assess the developing solar roof top financing ecosystem but also facilitate to bridge existing financing gaps/current barriers with catering to specific market needs in the solar rooftop sector in the state. The assignment will also include an assessment of various financing instruments/options

such as Debt, Equity and Convertible/Non Convertible Debenture etc available with the financial institutions including private and public banks and non-banking financial institutions along with outlining their criteria/pre-requisite and process for providing loan to private consumers for roof top solar system installation. The specific focus of the assignment is to support private sector entities/consumers (Industrial, Commercial, Institutional, Residential) in accessing affordable loan/debt from various banks and financial institutions for installation of roof top solar system. The handholding and facilitation support provided by the assignment to various categories of consumers will enable significant growth in solar roof top capacities and accordingly render rooftop solar PV a viable alternative for their energy needs. The highly-visible installations will further have a cascading effect in terms of sensitization and awareness of the population will broadly encourage both public and private participants to invest in renewable energy sources

The below note outlines a brief description of solar rooftop financing and the activities which have been implemented by the project team.

Financing solar rooftop in the state

Access to low cost financing is a key barrier in accelerating the adoption of solar rooftop across all consumers. Financing for solar PV rooftop development in the state has not taken off in a big way, largely due to the limited knowledge, understanding and awareness of the opportunities and risks for lending in this market segment. Rooftop segment being smaller in compared to utility scale also face significant challenges, one of which is collateral security from small enterprises/residential consumers. The lender's cost for project due diligence also increases largely due to small project size and scattered locations. Another challenge for the limited interest FIs take for rooftop financing is the Credit rating of the customers. Debt funding available for rooftop projects through domestic sources is at a higher rate, which makes projects financially unviable. Concessional funding has been made available through international credit lines (e.g. ADB-CTF financing for PNB; World Bank -SBI and GCF-Tata Capital), which has helped in bringing down the interest rate to 1.5-2%, however there are many reasons the local branches of these banks are not able to avail the concessional financing and pass on that benefit to the consumers.

Other Key impediments in the state, which impacts financing.

Technical challenges:

1. Limited technical strengths of the lender in carrying out timely due diligence activities and appraisal of rooftop projects (especially with grid integration aspects)

Policy and regulatory challenges:

1. The subsidy provided by both Central and State Government sometimes poses a challenge for as subsidized projects are not eligible for concessional financing (e.g. as in case with ADB- PNB credit)
2. Delays in subsidy disbursal has an impact on project's cash flow and overall viability
3. Though Competitive bidding (discovery of L1) has considerably reduced the cost of solar, often unviable and low- cost bidding by non- serious players simply distorts the market, which impacts the entire market.
4. No focus on RESCO model or any other aggregated market linked models (beyond the existing subsidy linked CAPEX) by the State Government so far. Though the soon to be released

new solar rooftop policy highlights the opportunities with RESCO along with innovative net metering arrangements.

Market challenges

1. Nascent market, so not all project processes including customer acquisition to project commissioning supported with financial closure have clearly evolved in the state. Absence of big and renowned developers from the state is also a big challenge as targeting large capacity (especially in aggregated mode/RESCO, etc) and mobilsing required funding are beyond the reach of state empaneled developers. Mostly the developers (either locally based or from nearby states) are quite small players and have limited capacity to target the market (through customer acquisition, bringing scale and investment etc) and so they are mostly content with carrying out 100% subsidy driven programs like solarizing Government buildings, and/or rural electrification works. One may say that Jharkhand is not on solar landscape of the country and the Government must do a lot to create confidence in the sector and so to attract big solar developers.

In view of all these key challenges (and many other barriers including offtaker's risks) the project team has tried to engage with concerned stakeholders including representatives of concerned FIs (including SBI, PNB, SIDBI etc) along with Government, customers including JSIA members, developers and consultants (e.g. EY, as they are managing WB-SBI program) to figure out what tailormade support could be offered to create credit worthy and demand at scale (i.e. submission of bankable loan applications) and how concerned FIs could sanction loans at a quicker pace and on concessional rate.

With reference to the financing institutions; project team has met the following officials

1. DGM, PNB (along with his team) at their main branch, Ranchi
2. AGM, RBI (to explore how RBI' support could also be taken to better engage with local FIs)
3. AGM, SIDBI (to tap financing opportunities for both solar rooftop and MSME EE)
4. AGM, SBI
5. AGM (NABARD, the focus has largely been decentralized technologies for rural or CC related financing)

Further, there are immediate plans to meet with the DGM, Bank of India who leads the State Level Bankers Committee to get their views on how solar rooftop financing could be eased out in Jharkhand.

A common aspect which resulted from these discussions highlighted on the disconnect between the regional office(s) and the branch level for an internal approval and due diligence part. From the bank's perspective, that challenge gets further compounded if credit worthiness of some of the customers are considered. It was also felt that concerned bank officials at the branch levels are not aware of many aspects related to solar loan and many customers/developers both have been asked to contact main branch for any query. Due to this information asymmetry, in some cases customers also lose interest as financing is often linked with project award and commissioning timeline, in case with subsidy.

Many of the industrial/commercial and institutional consumers have long and trust worthy relationships with their banks and those are also being leveraged in many cases. However for solar financing to ease out to focus on required additional capacity, more structured efforts have to be made from both banks and consumers. In this context, an RfP has been floated which will be instrumental in bridging the gaps between customers and FIs by facilitating in preparing

bankable applications from credit worthy consumers and assist FIs in performing due diligence to reduce their project cost and turnaround time. Basically, the larger objective of this assignment is to mainstream solar loan as a financial product of concerned public sector banks, in Ranchi assuming the entire streamlined process will automatically be replicated at branch levels across the state once it is successfully executed in selected banks in the city.

SAPCC Revision

Jharkhand SAPCC was formulated in 2014, endorsed by the MoEFCC in 2015 and is due to expire in 2019-20. The project team planned to develop a revised version of State Action Plan on Climate Change for 4 States (including Jharkhand) in the context of present and future vulnerabilities and to effectively integrate and mainstream Climate Change into the development planning. Accordingly, required approvals from the Department of Forest, Environment and Climate Change, GoJ was sought. The assignment is to revise the earlier version of SAPCCs, with detailed sectoral plans (as identified and prioritized by the State governments). Along with this, a template for recording and presenting the interlinkages and contributions of the SAPCCs to the NDC targets will be prepared in consultation with the respective State and District level departments. The methodology would comprise series of meetings/workshops/discussions, key informant interviews and technical consultations at various levels (State/District/Block) to make the whole process a participatory one and crosscutting at all levels, besides conducting desk research. The assignment is expected to be awarded by end of March 2019 and completed by July 2019.

Additional support offered by the SPMU to JREDA and Forest Department

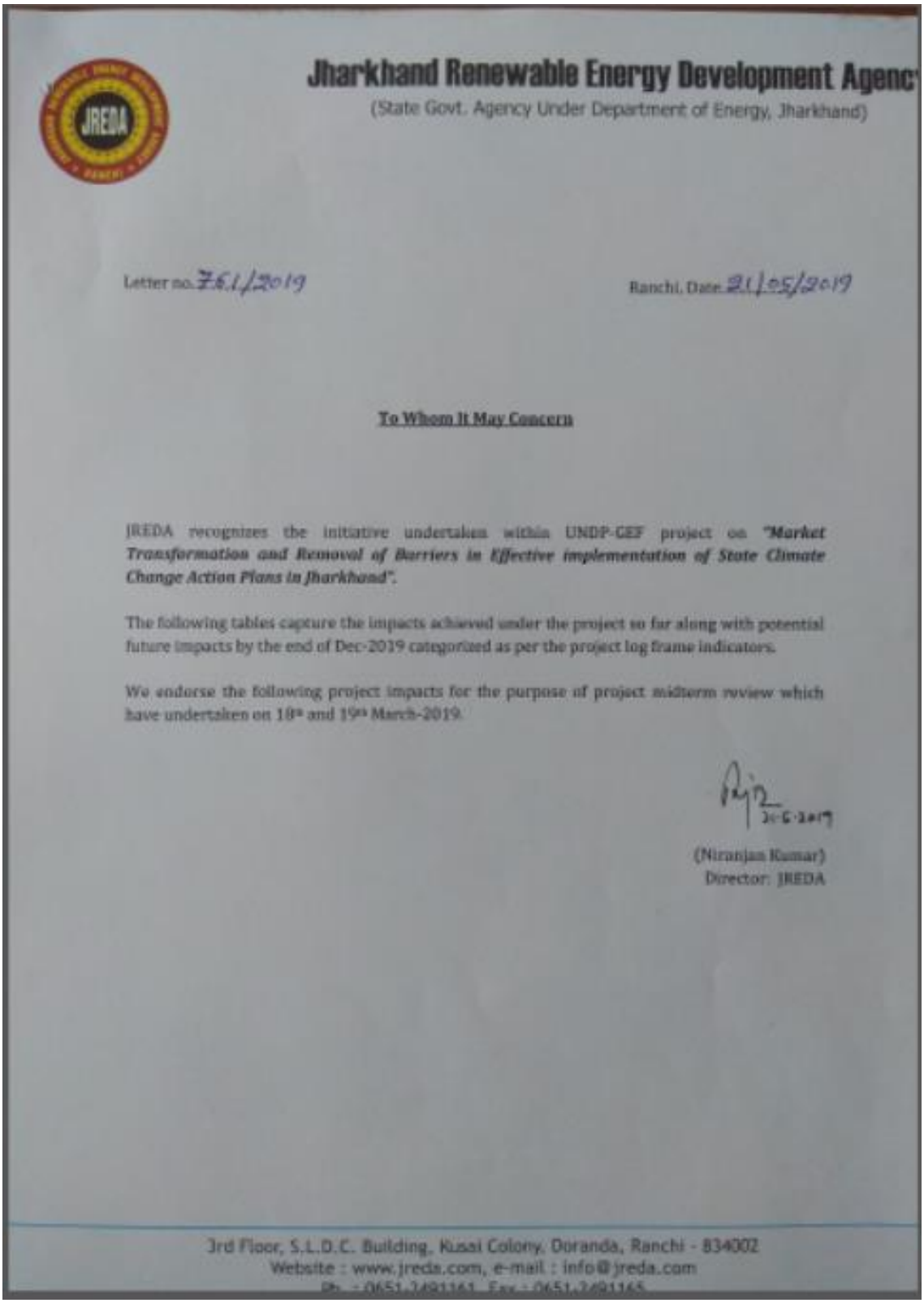
Support to JREDA

Sl.	Title of support
1	Assisted JREDA in preparation and finalization of RPO responses from time to time.
2	Assisted JREDA in development of concept paper for first canal top solar in the state
3	Provided technical input to JREDA in finalizing tender for selection of agency for implementation of canal top solar
4	Prepared concept paper for utilization of state energy conservation fund.
5	Supported JREDA framing of the institutional structure for implementation of ECBC measures in the state
6	Prepared concept notes for development of model solar village in the state
7	Supported in preparation of tender doc for hiring of agency for implementation of EC measures across selected cold storage units
8	Supported JREDA in assessing the impact of solar rooftop (with net metering) on selected institutional consumers bills
10	Supported in preparing an RFP for comprehensive state plan for energy efficiency and conservation

Support to State Forest Department

Sl.	Title of support
1	Developed concept note for incorporation of improved cook stoves as strategy for preventions of deforestation in the state and provided technical input in finalization of JICA proposal
2	Developed concept paper for state forest department for implementation of micro cold storage towards preservation of NTFP
3	Developed feasibility for biomass-based gasifier in the state
4	Potential assessment for solarization of offices in the state
5	Support dept in organizing and documentation of meeting of steering committee on climate change for discussion on the way forward strategy for implementation of NAFCC project and matters related to SAPCC
6	Preparation of six-monthly work plan and budget requirement note for mobilizing instalment payment from NABARD for NAFCC project executions
7	Preparation of RFP for selection of project management unit for implementation facilitation of the NAFCC project
8	Preparation of RFP for selection of project facilitating agency for execution of the NAFCC project
9	Supporting bid management functions (including pre bid meeting, purchase committee meeting etc.)
10	Supporting bid evaluation (for project facilitating agency and project management unit)
11	Preparation of TOR for hiring of manpower for climate change cell
12	Supported in re-constitution of project advisory committee for climate change for revising of the SAPCC

ANNEX VII: JREDA CONFIRMATION EVIDENCE



Jharkhand Renewable Energy Development Agenc

(State Govt. Agency Under Department of Energy, Jharkhand)

Letter no. 761/2019 Ranchi, Date 21/05/2019

To Whom It May Concern

JREDA recognizes the initiative undertaken within UNDP-GEF project on ***"Market Transformation and Removal of Barriers in Effective implementation of State Climate Change Action Plans in Jharkhand"***.

The following tables capture the impacts achieved under the project so far along with potential future impacts by the end of Dec-2019 categorized as per the project log frame indicators.

We endorse the following project impacts for the purpose of project midterm review which have undertaken on 18th and 19th March-2019.

21-5-2019

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Table-1

Potential for cumulative reduction.

Renewable Energy						
Activities	Capacity addition achieved through direct project funding (MW)	Capacity addition achieved through indirect project funding (MW)	Cumulative capacity addition as of Apr 2019 (MW)	Annual Emissions Reduction (tCO2)	Investment Mobilized in INR	Investment Mobilized in USD
	A	B	C=A+B			
Rooftop solar in institutional sector	1.361	0.326	1.687	2265.978	7,21,54,800.00	10,30,782.86
Rooftop solar in health care facilities (HCF)	0.06	0.65	0.71	953.672	7,80,00,000.00	11,14,285.71
Rooftop solar in Commercial and Industry		0.087	0.087	116.8584	39,15,000.00	55,928.57
Rooftop solar in residential sector		0.112	0.112	150.4384	60,48,000.00	86,400.00
Rooftop solar in public buildings (other than CHCs)		2.39	2.39	3210.248		0.00
Rural mini/micro grid	0.017		0.017	22.8344		0.00
Solar cold storage	0.004	0.096	0.1	134.32	3,60,00,000.00	5,14,285.71
	1.442	**3.661**	**5.103**	**6854.35**	19,61,17,800.00	28,01,682.86

Table-2

Energy Efficiency							
Project Title	Annual Energy Savings through direct project funding(MWh)	Expected Annual Energy Savings through indirect project funding(MWh)	Expected Annual Energy Savings from potential/pipeline interventions, after EoP (MWh)	Cumulative energy savings (MWh)	Annual emission reduction potential for cumulative emission (tCO2)	Investment (INR)	USD
EE in Public Building	152	1459	10729	1611	1482.12	1,40,00,000	2,00,000
EE in Municipal pump + rural drinking water pumping		200	200	0	0	1,03,00,000	1,47,143
EE in cold storage		48	505	48	44.16		0
EE in pvt schools (40% private school+ 97 Government school)		500	1156	0	0	1,34,00,000	1,91,429
EE-AG-DSM (20% of the pilot 100 pumps)			378	0	0		0
EE in MSME sector (assumed 10% and 20% of the 120 audited units will implement EE measures in current and next year)		1404	2807	0	0		0
	152	**1507**	**15775**	1659	**1404.17**	3,77,00,000	5,38,571

Grid emissions factor (TCO2/MWh)= 0.92
USD conversion to INR: 1 USD= 70 INR

Endorsed
Nilesh Kumar
JREDA PMU

Capacity Additions through direct project funding of UNDP are up to the mark and has been shown exact

Main Renewable Energy and Energy Efficiency activities implanted under the project.

- *A cumulative capacity of approx. 1.361 MW has been installed in institutional/social sector consumers under the market mode scheme in two phases.*
- *Project team also contributed in 326 KWp installations at XLRI, as the first RESCO project in Jharkhand. 2 MW of Capacity is also expected to be installed in IIT (ISM) by the end of the year, whose facility was visited by the project team for solar feasibility and mapping interest.*
- *In Commercial and Industrial segment, project contributed in installation of 87 KW in 2019 and it is expected that approx. 300 KW of additional capacity would be installed by the end of the year.*
- *60 KW in 9 CHCs have been installed through project funding and JREDA added almost 650 KW in the segment during 2019.*
- *A micro cold storage system with 4 KW solar capacities has been installed through project intervention, and approx. 24 such system is expected to be installed by JREDA in 2019.*
- *Energy efficiency improvement measures have been implemented Van Bhavan and energy savings have been estimated through direct intervention in Van Bhavan complex. Indirect support to JREDA and Electrical Works Dept. for retrofitting in 3 buildings including Project building, Nepal House and Raj Bhavan is also being provided.*
- *EE Implementation in selected rural drinking water systems and 97 Government schools is being undertaken by JREDA. It is assumed that 20% of potential energy savings in MSMEs would be realized by the end of the year, through a mix of energy audit and financial handholding support to be provided under the project.*

Note: *Cumulative emission abated is calculated from total renewable energy installed and energy savings done through direct and indirect project intervention. Values are calculated on an annual basis. Financial mobilization for solar rooftop installations under market mode has been calculated on the basis of total cost of the system (including CFA) minus the financial support offered under the project, in both the phases. For other solar projects, a benchmark cost of Rs 51000/KW (without battery) has been considered. For energy efficiency, the cost identified through the IGEA/DPR of buildings has been considered. Similarly JREDA's cost for the EE implementation work in Government schools and rural drinking water systems has been considered.*

Endorsed

Alok

Alok Ranjan

JREDA PMU