Terminal Evaluation

of the UNDP-supported, GEF-financed project

"Bhutan Sustainable Rural Biomass Energy"



Final Report

September 2016

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SYNOPSIS

Title of UNDP supported GEF financed project: Bhutan Sustainable Rural Biomass Energy (SRBE)

UNDP Project ID: 4181

GEF Project ID: 3844

Final Evaluation time frame: January 2013 – August 2016

Date of Terminal Evaluation report: 30 September 2016

Region and Countries included in the project: South Asia region, Bhutan

GEF Focal Area Objective: CC-4; Promoting sustainable energy production from biomass

Implementing partner and other strategic partners: Department of Renewable Energy, Ministry of Economic Affairs, Department of Forest and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan

Terminal Evaluation team members: Mr. Andreas Karner, International Consultant; Mr. Chhimi Dorji, National Consultant.

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Abbreviations

ADB	Asian Development Bank
APR	Annual Progress Report
BERIS	Bhutan Energy Resource Information System
BET	Biomass Energy Technology
BTFEC	Bhutan Trust Fund for Environmental Conservation
BAoWE	Bhutan Association of Women Entrepreneurs
CBO	Community Based Organisation
CFMG	Community Forestry Management Group
CO_2	Carbon dioxide
CSO	Civil Society Organization
DAHE	Department of Adult and Higher Education
DRE	Department of Renewable Energy
DT	Dzongkhag Tshogde (District Development Committee)
EE	Energy Efficiency
EOP	End of Project
GEF	Global Environment Facility
GHG	Greenhouse Gas
GNHC	Gross National Happiness Commission
GT	Gewog Tshogde (Block Development Committee)
ICS	Improved Cook Stoves
IPCC	Inter Governmental Panel on Climate Change
M&E	Monitoring and Evaluation
MoAF	Ministry of Agriculture and Forests
MoEA	Ministry of Economic Affairs
MoH	Ministry of Health
NEX	Nationally Executed Project
NGO	Non-governmental Organization
NRDCL	National Resource Development Corporation Limited
Nu	Ngultrum (Bhutanese currency)
PAC	Project Appraisal Committee
PB	Project Board
PEI	Poverty Environment Initiative
PIMS	Project Implementation Management System
PIR	Project Information Report
PMU	Project Management Unit
REAP	Rural Economic Advancement Programme
RGoB	Royal Government of Bhutan
RTA	Regional Technical Advisor
SDC	Swiss Agency for Development and Cooperation
SFED	Social Forestry and Extension Division
SRBE	Sustainable Rural Biomass Energy
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNDP-CO	UNDP Country Office
USD	United States Dollar
VTI	Vocational Training Institute

1 Executive Summary

1.1 Project Information Summary

Project Title			
UNDP Project ID (PIMS #):	3884	PIF Approval Date:	15.09.2009
GEF Project ID (PMIS #):	4181	CEO Endorsement Date:	05.07.2012
ATLAS Business Unit, Award # Proj. ID:	Award ID: 00076640, Project ID: 00087057	Project Document (ProDoc) Signature Date (date project began):	29.08.2012
Country:	Bhutan		
Region:	South Asia	Inception Workshop date:	15.01.2013
Focal Area:	Climate Change	Terminal Evaluation completion date:	30.09.2016
GEF Focal Area Strategic Objective:	CCM-4	Planned closing date:	31.12.2015
Trust Fund [indicate GEF TF, LDCF, SCCF, NPIF]:	GEF TF	Actual closing date:	31.12.2016
Executing Agency/Implementing Partner:	Department of Renewable Energy, Ministry of Economic Affairs, Royal Government of Bhutan		
Other execution partners:	BTFEC, PEI, RGoB, Private Sector		

Project Financing	at CEO endorsement (USD)	at Completion (USD) *)
[1] GEF financing:	1,703,000	1,703,000
[2] UNDP contribution:	200,000	200,000
[3] Government:	510,000	859,600
[4] Other partners:	1,816,700	1,964,889
[5] Total co-financing [2 + 3+ 4]:	2,526,700	3,354,489
PROJECT TOTAL COSTS [1 + 5]	4,229,700	5,057,489

*) status: September 2016

1.2 Objective of the Evaluation

The Terminal Evaluation (TE) is being conducted on a request of UNDP CO in Bhutan; it is a key element of standard project monitoring and evaluation procedure under the UNDP-supported, GEF-financed projects.

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a Terminal Evaluation (TE) upon completion of implementation of a project *to provide a comprehensive and systematic account of the performance of the completed project by evaluating its design, process of implementation and achievements vis-à-vis GEF project objectives and any agreed changes during project implementation*.

TE mission was fielded to Bhutan in the city of Thimphu with field trips to project sites in seven dzongkhags (districts) – namely Thimphu, Wangdue, Punakha, Paro, Tsirang, Dagana, and Sarpang – between the 17th and 28th July 2016.

Key issues addressed in this TE include:

- The appropriateness of the SRBE concept and design in the context of creating awareness and demand for efficient cook stoves in rural households and demonstration of biomass energy technologies (BET) in private industries;

- Implementation of SRBE in the context of relevance, efficiency and effectiveness of the activities;
- SRBE impacts based on current outputs and outcomes and the likelihood of sustaining project results; and
- The future potential of SRBE to further replicate efficient cook stoves and biomass energy technologies for rural development applications.

Outputs from this TE will provide guidance in charting future directions on sustaining the use of biomass for the use in rural households and industries of Bhutan.

1.3 Brief description of the Project

The Sustainable Rural Biomass Energy (SRBE) Project is a three-year programme contributing to the reduction of greenhouse emissions through the sustainable production and utilization of biomass through the promotion and dissemination of efficient cook stoves in the rural areas of Bhutan and implementation of demonstration biomass energy technologies in relevant industries. This will be achieved through supporting market mechanisms, mainstreaming sustainable biomass energy in policy formulation and building capacities in the management of community forests and production and utilization of biomass energy technologies using wood as fuel.

The SRBE has the following Project goal and objective:

- **Project Goal**: Achieve reduction of GHG emissions from rural households, select industries through sustainable biomass production, utilization, and promotion of efficient energy technologies.
- **Project Objective:** Removal of barriers to sustainable utilization of available biomass resources in the country; and application of biomass energy technologies that can support economic and social development in the country's rural sector.

The Project has been designed to implement three components that are expected to generate outcomes that, when achieved, will realize the Project Objective. Moreover, the Project is expected to deliver certain outputs that will help to achieve the desired outcomes. These outcomes and their corresponding outputs are enumerated below:

- **Outcome 1**: Implementation of strengthened support policies and regulatory frameworks and institutional capacity for adoption of sustainable practices production, conversion and use of biomass resources in Bhutan;
- **Outcome 2**: Implementation of BET applications due to improved confidence in their feasibility, performance, environmental and economic benefits through demonstration projects, market mechanisms and increased private sector participation;
- **Outcome 3**: Improved knowledge, awareness and capacities of policy makers, financiers, suppliers and end-users on benefits and market opportunities for modern biomass energy technologies;

The main problem in Bhutan regarding biomass is the unsustainable utilization of biomass resources. This is mainly due to the (a) inadequate policies and institutional set up; (b) use of in efficient biomass technologies and their applications; and (c) inadequate local knowledge and expertise to produce and utilize modern and efficient biomass systems.

The implementation of Project commenced from January 2013, after the Inception meeting that was held in October 2012. The Project duration is until December 2016, considering a year extension.

1.4 Project Evaluation Rating

The following table summarises the SRBE project performance considering the overall project design, implementation, results and outcomes achieved and comes up with an overall rating. For details on the justification of rating refer to sections 4 and 5 of the report.

RATING SRBE PROJECT PERFORMANCE		
CRITERIA	**RATING**	**COMMENT**
Monitoring and Evaluation: *Highly satisfactory (HS), Satisfactory (S), Moderately satisfactory (MS), Moderately unsatisfactory (MU), Unsatisfactory (U), Highly unsatisfactory (HU) - severe shortcomings.*		
Overall quality of M&E	S	PMU included the study results and main indicators describing energy efficiency, GHG emission reductions and performance of stoves into the regular MRV scheme. Overall, the Project's capabilities of monitoring of energy and GHG emission savings have been improved compared to the MTE.
M&E design at project start-up	S	Project was generally designed in line with UNDP/GEFs recommendation of M&E activities.
M&E Plan Implementation	S	MTR recommended to drop indicators as monitoring 44 indicators is too large to bring any desired results. Therefore, the project team considered to monitor only the selected indicators, which is considered *satisfactory*.
IA & EA Execution: *Highly satisfactory (HS), Satisfactory (S), Moderately satisfactory (MS), Moderately unsatisfactory (MU), Unsatisfactory (U), Highly unsatisfactory (HU) - severe shortcomings.*		
Overall Quality of Project Implementation/Execution/Adaptive management	HS	Overall implementation of SRBE project including adaptive management was *highly satisfactory.* PMU has achieved appropriate partnerships with relevant national stakeholders (ministries, NGOs/CSOs, private sector in regard to the briquetting project) and participation of these national stakeholders is visible throughout the whole project and beyond. Governmental stakeholders support the objectives of the project and are involved in strategic decision-making and setting directions through the Project Board.
Implementing Agency Execution (DRE)	HS	No major shortfalls of IA were observed, co-operation and communication level between with relevant stakeholders was good.
Executing Agency Execution (UNDP)	HS	No major shortfalls of EA were observed, co-operation and communication level between with relevant stakeholders was good.
Overall Project Management Arrangements		The overall structure of the project organization in execution of the "National Implementation Modality" has been found useful, since DRE was managing the Project well, ensured continuous involvement of project stakeholders (via PSC) and kept the senior beneficiaries (GNHC, MoAF) as well as UNDP in a close communication loop. The adequacy and effectiveness of the project management are therefore rated *Satisfactory*.
Reporting	S	The project implementation reports provide a summary review on the output/activity level in regard to PMU keeping track on each activity, the status of their implementation, and if the corresponding activity indicator was achieved or respectively not achieved. Additionally, quarterly progress is reported on the indicators provided.
Project Finance	HS	Considering the additionally leveraged co-financing means and the appropriate financial execution, the overall financial management is rated *Highly Satisfactory*.
Risk Management	S	The link between the risks/assumption section of the PRF and the tables dealing with the risks and risks mitigation strategies in the Project Document and Inception Report are consistent. The overall project risk management is therefore rated *Satisfactory***.**
Outcomes: *Highly satisfactory (HS), Satisfactory (S), Moderately satisfactory (MS), Moderately unsatisfactory (MU), Unsatisfactory (U), Highly unsatisfactory (HU) - severe shortcomings.*		
Overall Quality of Project Outcomes	S	There were some outcomes which did not achieve all the foreseen outputs and/or indicators. Rating of project outcomes: • Outcome 1: Satisfactory • Outcome 2: Satisfactory • Outcome 3: Moderately satisfactory Overall, the Project has improved its performance since the MTR stage and has prospects for replication. The achievement towards outcomes is rated *satisfactory*.
Relevance: Relevant (R) or Not Relevant (NR)	R	The Project is considered relevant in regard to its addressing key barriers in the field, while also contributing to the national strategic priorities in the energy and environmental field together with those of the UNDP and the GEF.

RATING SRBE PROJECT PERFORMANCE		
CRITERIA	**RATING**	**COMMENT**
Effectiveness	S	The development intervention's objectives were addressed and achieved to a satisfactory level. There are a few achievements to be followed-up or tentatively be achieved by EOP.
Efficiency	S	Inputs and resources (financially, time) were converted to results in a quite efficient manner. Major delays at project start-up were out of scope of the project stakeholders and were made up throughout the project execution.
Sustainability: *Likely (L), Moderately Likely (ML), Moderately Unlikely (MU), Unlikely (U)*		
Overall likelihood of risks to Sustainability	ML	The overall rating is equivalent to the lowest sustainability ranking score of the 4 dimensions.
Financial resources	ML	While the project was to develop and deploy fiscal incentives, such as smart subsidies, to enable market mechanisms to be introduced for BET applications, the resulting subsidy scheme was applied with a focus on the co-funded SRBE project, yet without a clear strategy on how financial sustainability should be achieved in the future.
Socio-economic	ML	Currently the project activities do not lead to an assumption by EOP which ensures that supply of cook stove part would continue especially in the rural areas to those who are willing to bear the cost, although fabricators of metallic parts have expressed continued interest from the market and their readiness to supply materials in the future.
Institutional & governance	ML	The Project should have used more resources to ensure that capacity building and knowledge management be better consolidated so that practitioners and professionals could be further engaged in establishing "communities of practice" and put them to work sharing their knowledge, insights and experience to address specific challenges in BETs adoption and dispersion.
Environmental	L	The Project has been successfully targeting at distribution of efficient stoves across all districts of the country and thus achieving significant environmental benefits in the long-term.
Impact: *Significant (S), Minimal (M), Negligible (N)*		
Environmental Status Improvement	S	The SRBE Project is providing significant impact on some of the main issues addressed in the design of this UNDP/GEF initiative • Reduction of fuelwood consumption for cooking and heating in rural households by approximately 161,970 t (at EOP) • Direct cumulative GHG emission reduction of 173,711 tonnes CO_{2eq} per year (at EOP), cumulative direct lifetime GHG emission mitigation about 468,400 tonnes CO_{2eq} • Reducing indoor air pollution caused by the inefficient burning of solid biomass cooking fuels
Environmental Stress Reduction	S	The impact on environmental stress in regard to fuel use and exploitation of wood resources is significant, and expects to reduce the fuel wood demand significantly in the long term.
Progress towards Stress/Status Change	S	Significant progress has been made to improve the environmental impacts by the SRBE project, leading to long-term benefits in regard to environmental susceptibility.
Overall Project Results	***S***	***Overall project results are rated satisfactory, due to significant benefits achieved at result level with only few indicators not achieved, and together with relevant impacts and likeliness of sustainability of the Project outcomes in the long-term.***

1.5 Conclusions

- **Implementation of two further improved designs of cook stoves took off during the final SRBE project period.** Namely, the *Bhutan EcoStove 2015* (BES 2015) replacing the improved cook stove and the *Bhutan Multipurpose Stove 2015* (BMS 2015) replacing the fodder stove were designed, tested and were provided for implementation. The procurement of metallic parts for about 1,122 BES was completed, and the delivery to sites was under progress. It is anticipated that the construction of these stoves will be completed by December 2016, in Samtse, Sarpang, Tsirang, Pemagatshel and Lhuentse districts. This activity is also in line with the

decision of the Project Board and the Annual Work Plan and will finally bring the total number of installed stoves to about 14,179.

- **Co-operation with NGOs/CSOs have proved to be crucial for success of SRBE project.** For the implementation of improved cook stoves programme in 4 districts, NGOs such as Bhutan Association of Women Entrepreneurs and Tarayana Foundation were involved in the rural areas. Tarayana Foundation was also engaged in implementation of Bhutan EcoStoves programme in Samtse, Sarpang, Tsirang, Pemagatshel and Lhuentse districts. The above organizations were key stakeholders in achieving the successful capacity-building and training/awareness activities as well as those properly managing the dissemination of cook stoves – by identifying the beneficiaries of the stoves and adequately provide technical support in construction of energy efficient stoves.
- **Co-operation with private sector entities to construct briquetting plant was halted for long time but finally financing agreements were reached**. The modalities for the implementation of one larger (instead 3 smaller-sized) briquetting plant to utilise sawdust from local sawmills have been delayed due to negotiations about funding from the Project and co-financing required from saw millers. Only after 7 promoters agreed to step in with additional own funds, the Bhutan Briquette Pvt. Ltd was founded, in association with the Bhutan Association of Wood Based Industries. While construction of the briquetting plant at Khasadrapchu, Thimphu was ongoing throughout the TE, putting into operation was scheduled to the end of quarter three 2016.
- **The Social Forestry and Extension Division, Department of Forests & Part Services, Ministry of Agriculture & Forests, was successfully engaged in the plantation programme across the country.** The SFED has involved Community Forest Management Groups (CFMG) in planting trees in the barren land and nurturing the planted trees to increase survival rate. Under the sustainable fuel wood plantation programme, the SFED has brought 111 hectares of degraded land area under sustainable fuel wood plantation. The project has also trained 878 community forest management group members with 36% of participants being women.
- **The project has been included by UNDP CO in the Gender Mainstreaming Initiative and has achieved significant participation of women in different activities**, education and capacity building (NFE instructors and representatives from CBOs like Tarayana and BAoWE) and participation in the construction of improved stoves.
- **Quality issues with suppliers have led to delays in the implementation phase.** A major problem in the project progress and its implementation was the failure by the supplier (M/S S Dorji Fabrication Unit) in supplying the metallic parts for Trashigang, which had led to a complex arbitration and legal case for the PMU. The supplier had failed to deliver the metallic parts on time and also had quality issues. There was a major impact on the project's work schedule as the piloting of the initial design of stoves were not possible due to that. Therefore, the PMU instead of having a pilot in Trashigang, as envisaged earlier, went ahead and rolled out the ICS implementation in all the 20 Dzongkhags.

1.6 Recommendations

Recommendations concerning design, implementation, monitoring and evaluation of the Project:

- **Appropriate MRV system** to be included in all projects of such dimension. The Project shall be continuously monitoring its main indicators, in the case of SRBE referring to fuel consumption, heat generation and related GHG reduction data from the newly installed improved stoves. Additionally, the **Project's monitoring and continuous reporting of progress** on the output/activity level (against planned versus achieved tasks provided in the logframe) shall be consistently reviewed and progress reported.
- **Calculation of GHG emission reductions related to carbon capture from lower fuel wood use and afforestation/plantation programmes**. Considering the combined effect of the community forestry for carbon sequestration and efficiency improvement, the overall post-project GHG emission reduction benefit from SRBE is envisaged to be better than originally estimated during the project design. The Project could have taken the opportunity in collaboration with relevant stakeholders (such as NEC) to factor in the contribution of the project in reducing greenhouse gas emissions from as a result of direct intervention made due to community forestry plantations, for instance by referring to the IPCC's 'The Good Practice Guidance

for Land-Use and Land Use Change and Forestry'[1], and UNFCCC's CDM 'Methodology on Afforestation and reforestation of lands except wetlands' (AR-ACM0003)[2].

- **Develop a "Lessons Learnt Report" for in-country dissemination.** As a follow-up or concluding activity, although not planned, it is recommended that the PMU is to compile and disseminate across the main project stakeholders "lessons learnt" from the Project to contribute to the project's knowledge management, learning and information dissemination strategy. Excerpts of such "Lessons learnt" review shall be considered for public dissemination.
- **Project to provide grounds for continued awareness programs on efficient stoves and their benefits.** While the project had a focus on awareness-raising and building capacity among villagers and household owners related to the benefits and use of improved cook stoves / heating stoves, the sustainability of the Project could be enhanced by developing a *"Knowledge and Learning Platform*", and foreseeing further (continuous) activities on a country-level to increase the awareness of the population and the user behaviour.

Recommendations regarding future directions underlining main objectives

- **Quality Assurance Mechanism for improved stoves required.** While different organizations outside the country are able to carry out field testing of improved stoves, there is lack of a uniform national testing methodology. Actually, there is no institution responsible for testing stoves to determine if they actually perform as claimed by those promoting them. Claims of efficiency, pollution reduction, and durability are not actually tested by objective, outside groups. This is especially relevant for the newly introduced Bhutan EcoStove 2015 (BES 2015) and the Bhutan Multipurpose Stove 2015 (BMS-2015). Once a national standard on limiting of open/ 3-stone fires are available then user would likely shift from the traditional open fires to improved stoves as fuel wood reduction is not their priority right now.
- **Indoor air pollution and other health issues being further considered in the design of stoves programmes.** The Ministry of Health (MoH) being the leading agency on the 'Multisectoral National Action Plan for the Prevention and Control of Non-Communicable Diseases' together with DRE is to establish standards for indoor air quality promotion, monitoring, and identify communities with exposure to poor indoor air quality and educate communities. In order to link the issue of associated health risks with quality of improved cooking and heating stoves, testing of stoves in regard to efficiency gains (e.g. related to fuelwood use) but also indoor air pollution effects need to be performed and incorporated into national standards for improved stoves.
- **Appropriate design facilities and national research for new BET.** Regardless of the technology of the stove, encouraging community participation in design, implementation, and monitoring of stoves will help increase ownership, ensuring sustainability. Stove designs should be based on cooking needs. As the primary users of cook stoves, women have better knowledge about their needs and should be involved more systematically within the entire market system of ICS. Women's perspectives could play a central role in product design, quality assurance, research, capacity building activities, and increasing access to finance. Thus, it is important to include household level research to assist with designs of improved stoves, making them more user friendly.
- **Enhance the support of capacity-building and skills programmes for beneficiaries.** The SRBE project has made big efforts to build the technical skills of rural villagers, also to mention especially the involvement of women, in the production of improved stoves, but it has not included or led to supporting women in establishing new ICS enterprises. Training and capacity building therefore remain essential components of any future successful BET programmes.
- **Awareness and motivation about BET benefits to be effectively communicated and maintained.** Bringing about behavioural change by increasing awareness of health issues and the benefits of improved cook stoves could help create a demand approach to improved stoves. Villagers and rural households should be made aware of other benefits, such as time savings due to faster cooking, and the development of the rural economy and improvement in the living conditions of the villages. If people are aware of all benefits, the willingness-to-pay for and the acceptance level of improved cook stoves is likely to improve considerably.
- **Maintenance of stoves**: there does not seem to be a common contact point for the beneficiaries to seek help or complain on technical issues or maintenance-related questions. It might be necessary for future stove

[1] Report is available on http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf
[2] Methodology is available on https://cdm.unfccc.int/methodologies/DB/C9QS5G3CS8FW04MYYXDFOQDPXWM4OE

suppliers to have a contact number of the concerned office so that people can ask for help. Similar to a help line, but not dedicated and specialized.

- **Financial aspects: ensuring that the promotion of BET in Bhutan is not totally dependent on grant financing and financially sound business models are introduced.** Properly targeted subsidies are fundamental to the sustainability of cook stove programs. The continuation of national programmes with some limited level of subsidies provided could help to promote market development while taking into consideration the needs of various income groups. Therefore, in the case of Bhutan, it will be important in future to think about a proper subsidy scheme to promote improved cook stoves and combine market development with specific types of subsidies that would promote equity and access to private financing means (e.g. through specific schemes providing guarantees or collateral for private entrepreneurs, introducing micro-financing schemes for women and rural technicians, etc.).
- **Expedite the implementation of briquetting project with private sector saw mills to better understand the future demands of the market for briquettes.** Since the briquetting project has only lately picked up and expected the pilot plant to be operational towards the last 2-3 months of the project only, the benefits achieved on the local market need to be documented before EOP and a strategy be put in place on how private sector, which faces constraints on account of restrictions imposed by RGoB and the banks can be further supported and seek for business models which will be easy to replicate in the future. In addition, as expressed by the AWBI, it is also necessary for existing national environmental standards and procedures to be monitored in the saw mill industry to ensure environmentally unsafe dumping of wood waste.

2 Introduction

2.1 Scope & Methodology

The Monitoring and Evaluation (M&E) policy at the project level in UNDP-GEF has generally four objectives:

- to monitor and evaluate results and impacts;
- to provide a basis for decision making on necessary amendments and improvements;
- to promote accountability for resource use; and
- to document, provide feedback on, and disseminate lessons learned.

The methodology used for the project terminal evaluation is based on the *UNDP-GEF Monitoring & Evaluation Policies* and includes following key parts:

I. Project documents review prior to the evaluation mission
II. Evaluation Criteria Matrix formulated, providing a set of questions to evaluate the relevance, effectiveness, efficiency, sustainability and impact of the SRBE project. The questions provided in Annex 2 were used for guidance during the stakeholder interviews.
III. Evaluation mission and on-site visit (conducted in July 2016), interviews with project management, UNDP CO, project partners and stakeholders, as well as with beneficiaries and independent experts.
IV. Drafting the TE report and ad-hoc clarification of collected information/collection of additional information
V. Circulation of the draft TE report for comments
VI. Finalizing the report, incorporation of comments

Achievements of project objectives have been rated in terms of the criteria above at a six level scale as follows:

- Highly satisfactory (HS) - the project has no shortcomings
- Satisfactory (S) - minor shortcomings
- Moderately satisfactory (MS) - moderate shortcomings
- Moderately unsatisfactory (MU) - significant shortcomings
- Unsatisfactory (U) - major shortcomings
- Highly unsatisfactory (HU) - severe shortcomings.

2.2 Structure of the Evaluation

This evaluation report is presented as follows:

- An overview of project achievements from the commencement of operations in January 2013;
- An assessment of project results based on project objectives and outcomes through relevance, effectiveness and efficiency criteria;
- Assessment of sustainability of Project outcomes;
- Assessment of monitoring and evaluation systems;
- Assessment of progress that affected Project outcomes and sustainability; and
- Lessons learned and recommendations.

This evaluation report is designed to meet GEF's "Guidelines for GEF Agencies in Conducting Terminal Evaluations, Evaluation Document No. 3" of 2008:

http://www.thegef.org/gef/sites/thegef.org/files/documents/Policies-TEguidelines7-31.pdf

The Evaluation also meets conditions set by the UNDP Document entitled "Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects":

http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf.

3 Project Description and Development Context

3.1 Project start and duration

The project was initially submitted as a full-size proposal for GEF approval in March 2007. The final approval for a GEF grant of USD 1,703,000 was received in July 2012. The project document was signed in August 2012. The inception report was finalized in October 2012 following the project Inception Workshop and First Project Board Meeting. The project duration was set to 3 years, with an extension to the initially planned terminal date of December 31, 2015 granted and the current revised closing date being December 31, 2016.

3.2 Problems that the project sought to address

Bhutan is known to have one of the highest per capita domestic fuel wood consumption in the world, with the latest studies[3] assuming that almost 1.17 tonnes are consumed per person per year. With 70 percent of its population living in rural areas, and fuel wood being one of the main sources of energy for cooking, heating and lighting in rural households, there is constant and increasing pressure on the forests of Bhutan. The inefficient fuel wood consumption is contributing to deforestation/forest degradation, indoor air pollution and greenhouse gas (GHG) emissions.

Though the constitution requires 60% of the total geographical area to remain under forest cover, Bhutan faces the problem of unsustainable utilization of biomass resources. This situation is caused mainly due to (a) inadequate policies and weak institutional set up; (b) use of traditional inefficient cook stoves; and (c) low level of local knowledge and capability to produce and utilize modern and efficient biomass systems.

In order to attain a sustainable utilization of biomass resources, the long-term solution consists of approaching the problem through policy measures, enhancement of local capability on all aspects of biomass energy technology (BET) applications and the use of market mechanisms to implement efficient BET applications.

The goal that the Project sought to address was the reduction of GHG emissions in the rural household and industrial sectors of Bhutan through sustainable production and utilization of biomass-based energy in the country, and the promotion of sustainable biomass energy technologies, using market approaches. It also aimed at the promotion of sustainable production practices of biomass in community forests, and the reduction of the amount of biomass energy utilised through the adoption of efficient processes and technologies, which is mainly used for cooking and heating purposes in rural households and local enterprises.

Some of the main barriers to sustainable biomass energy development and utilization that the SRBE Project initially meant to address are:

- Absence of a coherent and comprehensive renewable energy policy
- Absence of incentives from the government that would facilitate the acceleration of the development and wider scale application of sustainable biomass energy resources
- No comprehensive information on renewable energy resources and utilization options in the country
- Lack of enterprises that supply biomass energy system equipment and services
- Lack of technical expertise and financial resources for appropriate assessments and packaging of BET applications for productive and social uses
- Low level of awareness and capacity on sustainable biomass energy technologies
- Lack of examples of efficient technologies that are successfully operating in the country

3.3 Immediate and development objectives of the project

The Project's **development goal** is to "*reduce GHG emissions in the rural household and industrial sectors of Bhutan through integrated and sustainable biomass resource production and utilization, and promotion of sustainable biomass energy technologies in Bhutan using market based approaches."*

[3] Assessment of Fuelwood consumption and baseline health impact study in Bhutan, SRBE Project (2014)

The Project's **immediate objective** is to *"remove barriers to sustainable utilization of available biomass resources in the country and application of biomass energy technologies that can support economic and social development in the country's rural sector, in order to reduce GHG emissions."*

The Project aimed initially to accomplish this through three outcomes and 15 outputs foreseen and associated to the outcomes:

- **Outcome 1**: Implementation of strengthened support policies and regulatory frameworks and institutional capacity for adoption of sustainable practices production, conversion and use of biomass resources in Bhutan;
- **Outcome 2**: Implementation of BET applications due to improved confidence in their feasibility, performance, environmental and economic benefits through demonstration projects, market mechanisms and increased private sector participation;
- **Outcome 3**: Improved knowledge, awareness and capacities of policy makers, financiers, suppliers and end-users on benefits and market opportunities for modern biomass energy technologies;

3.4 Main stakeholders

The main Project stakeholders include:

- United Nations Development Programme (UNDP),
- Department of Renewable Energy (DRE), Ministry of Economic Affairs (MoEA),
- Gross National Happiness Commission (GNHC),
- Non-Formal Education Division (NFED), Department of Adult Higher Education (DAHE), Ministry of Education (MoE),
- Bhutan Trust Fund for Environment Conservation (BTFEC),
- Social Forestry and Extension Division (SFED), Department of Forests & Park Services (DoFPS), Ministry of Agriculture and Forests (MoAF),
- Bhutan Association of Women Entrepreneurs (BAoWE),
- Tarayana Foundation and
- all twenty Dzongkhags.

UNDP is the Implementing Agency for Global Environment Facility (GEF) and also through the country office Poverty Environment Initiative (PEI). The PEI contribution is supplemented by the Joint Sector Support Programme (JSP). GNHC is the main executing agency on behalf of the Royal Government of Bhutan. DRE is the project coordinating agency on behalf of the Government and the executing agency, GNHC. NFED is the implementing agency in 16 Dzongkhags involving Non-Formal Education Instructors as the focal project officials in the field. SFED is the implementing agency for the forest plantation component of the project for biomass sustainability plantation, study and establishment of briquette plant and capacity building of CFMGs. BAoWE a Civil Society Organization for promotion of national women capacity is the implementing agency on pilot phase in Zhemgang Dzongkhag. BAoWE also has been approved by the Project Board to implement project in Tsirang and Dagana Dzongkhags. Tarayana Foundation, another CSO has been approved by the Project Board to implement the project in Sarpang Dzongkhag. BTFEC is a co-financer for the project as designed in the ProDoc. Swiss Development Cooperation (SDC) and Asian Development Bank are engaged as a co-financier of the project, financing parallel projects to achieve similar goals. All twenty Dzongkhags, are the project beneficiary.

4 Key Findings

4.1 Project Design / Formulation

4.1.1 Project design and implementation approach, including the project results framework

The SRBE Project was designed to promote market-based mechanisms to create demand for efficient technologies using fuel wood and support from the government in the form of incentives and policy measures. Thus the

objective of the project to reduce the pressure on local forest due to inefficient consumption of fuel-wood, reduce the rate of deforestation and improve the air indoor air quality and an overall reduction in the GHG emissions through a wide spread use of use biomass energy technologies should be met.

Based on the barriers identified and mentioned above (see chapter 3.2) and through its specific approach, the ***project design*** seeks to enhance the impact leading to the reduction of GHG emissions from the improved production and efficient use of biomass throughout the country which will be achieved through awareness creation, training, building the capacity of governmental and non-governmental organizations and private sector participation.

The project's focus on introduction of improved biomass energy technologies (BET) and dissemination of improved cook stoves/heating stoves was rationalized by a number of factors, including: (i) energy supply situation and heavy dependence on fuel wood in spite of impressive electrification; (ii) growth in the energy demand and biomass supply potential; (iii) dependence on conventional cook stoves by a high percentage of rural population with low level of household income; (iv) air quality issues in the household leading to high prevalence of health issues (mainly respiratory disorder among women and children); and (v) reduced wastage of biomass residue in private industries especially sawmills, from alternate BET which convert the residue into feedstock or for use in space heating or other alternatives than fuel wood.

The **project results framework** for SRBE is included in Table 5. The project design was developed in 2010-11 and from the beginning has foreseen 3 components, which respond to the general barriers that SRBE was trying to overcome. It is, however, noticeable that the PMU used the same initial version of project logframe throughout the whole project period, although targets have been revised throughout project implementation.

Altogether, the project planning logframe has established overall 44 indicators to track and report progress under the three components, which seems too high. While it is positive that there is a rationale to the indicators provided in the logframe towards the achievement of an outcome, the number of indicators is excessive with most outputs burdened with more than one indicator. This fact has been already raised by the Mid-Term Review (MTR) and recommendation was placed to revise the project logframe. Moreover, there are few indicators that have become redundant due to reasons outside the control of the project, which could have been removed from the logframe.

A description of indicators that have been revised or have become redundant over the project period is provided below:

- The Project Objective "Removal of barriers to sustainable utilization of available biomass resources in the country and application of BET" has been revised as per the 2nd PSC meeting, the number of energy-efficient stoves by end of project was reduced from 20,000 to 13,522.
- "Number of enterprises supplying clean and efficient biomass energy systems and services by end of project" was reduced from 3 to 2 as per the mid-term of the project.
- "Fiscal incentives such as smart subsidies to enable market mechanisms introduced" from Output 2.2. Due to the financial restrictions imposed by the RGoB and absence of lending by the banks to the private sector, it became obvious that the project will be unlikely to influence markets in the remaining time and the financial resources available to it, which will not contribute to the sustainability of the project.
- "Implemented and operational BET Full Scale model on biomass gasification for electricity services and thermal applications" from Output 2.5. As the Project Board had suggested dropping the demonstration of this technology as it was economically unviable, Output 2.5 had to be revised and the corresponding indicator on biomass gasification be dropped.
- "Project developers and micro-entrepreneurs trained on different aspects of BETs" from Output 3.3. The project has faced severe challenge in getting the attention of private sector players and fabricators to respond to the tenders. It was suggested at the MTR stage that unless the market has a steady demand for improved cook stoves and other BET, it is unlikely the entrepreneurs will come forward and invest their resources – and therefore the indicator to be dropped.

With the exception of the oversights and defaults regarding the project logframe, the project scope, design and implementation approach otherwise, including the overall structure of the project results framework, can be considered as *satisfactory* for a full-size project addressing the critical elements of sustainable biomass energy policy making, awareness raising and capacity building, supporting the implementation of innovative practices and ascertaining market mechanisms for local BET to develop and evolve.

Project design is rated Satisfactory.

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
	S				

4.1.2 Assumptions and Risks

The projects risk and the mitigation strategies to address those risks were summarized in the Project Document (Risks 1-8).

Risk	Level	Mitigation Measure
1) Lack of availability of adequate skilled personnel in the field	Moderate	• Availability of TAs to provide required expertise • Capacity building program for local technicians and micro-entrepreneurs
2) Trained personnel leave the country as part of the 'Brain Drain' phenomenon	Moderate to High	• Business and work opportunities for trained personnel are expected to provide some incentives for these personnel to stay on
3) Low level of support and cooperation of national and local stakeholders	Low	• Commitment from government through endorsement letters • Individual discussions with many stakeholders during the project preparations phase • Stakeholders' meetings to discuss needs and requirements of beneficiaries • Well-designed services and activities that cater to the needs of the stakeholders
4) Insufficient economic and technical evidence of BETs to compete on a level playing field with other types of energy such as diesel oil or hydropower based electricity, etc.	Moderate	• Techno-financial analysis conducted during PPG stage • BETs to be introduced are proven and are successfully operated in other regions • Availability of suppliers of BETs in the global market well established
5) Lack of cooperation of energy consumers and biomass energy suppliers and local government agencies, on the provision and monitoring of energy data	Low	• Discussions conducted with many stakeholders during the project preparation phase • Creation of the Biomass Energy Resource Information System to gather and document data
6) Lack of cooperation and interest of the financing institutions in supporting BET's in support of rural development initiatives	Low	• Commitment letters from relevant financing institutions • Indications of interest and support during discussions and stakeholders' meetings
7) Lack of willingness of the private sector and the NGOs to participate in the project.	Low	• Commitment letters from potential project developers/owners • Participation of private sector and the NGOs is • expected to provide some incentives • Continuous dialogue and coordination with the private sector, especially the local businesses and other project stakeholders
8) Technology to be introduced not being able to attain social acceptability	Moderate	• Assurance of initial social acceptability determined through a national survey conducted during the PPG stage • Design of furnace/stove to be introduced has been initially demonstrated in a few areas and feedback from end users received and being incorporated in the final design

Table 1: Project risks and their mitigation (at CEO endorsement stage)

In addition to the above, the Project Results Framework is listing a number of assumptions for successfully reaching:

The project objective:

- Recognition of the government on importance of reducing GHG emission and continuing commitment towards it.
- Recognition of demonstration value of improved stoves by end-users; thus, resulting in widespread replacement of older more polluting stoves.
- Rural households adopt the new technology which comes at higher costs

Outcome 1:

- Government continues to see biomass as a priority

Outcome 2:

- Existing knowledge, experience, skills and sources are adequate to source and access technologies
- Availability of credit facility from financial institutions
- Viability of demonstrated new BETs are resulting in decisions to further replicate BETs

Outcome 3:

- Target groups are willing to participate and are receptive to awareness campaigns and capacity building activities
- Continued interest of participants to receive trainings
- Widespread interest among potential replicators of BETs to join site visits and continued interest and willingness of project owners to host site visits

While many assumptions listed above are largely within the scope of the project trying to influence, some other assumptions/risks should have been addressed in the project's risk analysis and risk mitigation strategies, and whereas some risks have evolved throughout the project implementation and are considered to be relevant to be considered for further up-scaling activities and long-term sustainability of the Project. One assumption that has not been properly reflected in the risk analysis is referring to the financing risk and the question, how replication of BETs will be provided with appropriate financial means (as suggested during project design with e.g. a credit facility being available). Moreover, the involvement of private sector entities being among the potential replicators and service-providers for in rural areas is of utmost relevance and should have been addressed in the risk analysis, especially in order to achieve the expected results of outcome 3.

However, in general, the link between the risks/assumption section of the PRF and the tables dealing with the risks and risks mitigation strategies in the Project Document and Inception Report are consistent.

The overall project risk management is therefore rated Satisfactory.

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
	S				

4.1.3 Lessons from other relevant projects incorporated into project design

The Project Document does not include a specific chapter to highlight the lessons from other projects that have been incorporated into project design, but the Project Document refers in some places indirectly to lessons learned from other project activities that the SRBE project wanted to pursue:

- In the description of the components (chapter 2.3.1 of Project Document) under *component 2,* the development of technical standards, certification and guidelines for the design and manufacturing of efficient cook stoves is referred to build upon "*experiences and lessons learnt from an earlier attempt to establish a smokeless stoves programme, which had suffered from a lack of adequate ownership and M&E, as well as poor perception of its effectiveness and value".*
- Furthermore, within the same chapter, reference is made to experiences from GEF-Small Grants Programme (SGP), which through UNDP-Bhutan has in the past supported activities related to sustainable energy production through efficient use of biomass resources, particularly targeting schools, religious institutions and health centres. However, due to a lack of policy and institutional support, this work has

not expanded beyond the project sites. The project was supposed to *"build on the experience and lessons learnt from the SGP program to upscale and mainstream BETs into the wider rural economy, through wider understanding and accelerated market growth".*

- On other place, activity 3.6.3 (Conduct of international forums/symposia/solutions exchange in Bhutan to meet and/or dialogue with counterparts in countries with more developed RE Policies) refers to exchange of experience and organization of dialogues between stakeholders from Bhutan *"to ask questions related to experiences, problems encountered, lessons learned, and recommendations that the countries have in the formulation and implementation of renewable energy policies."* As part of these events and dialogues, an establishment of South-South partnerships & collaboration as well as the exchange of knowledge & experiences was foreseen to be pursued.

What remains astonishing is the fact that the design of the project did not envisage any further linkage or provide at least reference to experiences and lessons-learned gathered from other likely projects in other countries. Since there are similar activities ongoing in countries of the region e.g. Bangladesh, Nepal, or India addressing the issues of efficient fuelwood use, or avoidance of indoor air pollution, linking similar projects or at least exchange of experience should have been intended/foreseen.

Also, reference to international donor programs, NGOs' activities or public-private partnerships such as the *Global Alliance for Clean Cookstoves (GACC)* cannot be found in the Project Document. Although the project design of SRBE started about 7-8 years ago where some of international initiatives where still in their infancy stage, and considering the specific geographical situation of Bhutan, linking up with other programmes (especially in the region) might have been found useful, since almost no experience and knowledge of efficient BET existed with the relevant stakeholders from the central government to district administration level, Community Based Organizations and private sector players.

4.1.4 Planned stakeholder participation

During the PIF and PPG stages, stakeholders consisting of relevant agencies, non-government organizations (NGOs) and private sector groups who could participate in the formulation and contribute to the successful implementation of the Project have been identified. Several workshops and individual face- to-face consultations were conducted to assess their needs, clearly define their role/involvement both during the project preparation and project implementation and ascertain their commitment to the objectives of the Project.

As some stakeholders are also beneficiaries of the Project outcomes, their participation and commitment were ensured from the beginning, which adds assurance to the success of the Project. A table showing the different stakeholder groups and their involvement in the Project as well as the benefits they were supposed to expect to receive where included in the Project Document. Furthermore, a detailed capacity assessment of the DRE, which was nominated to be the Lead Executing Agency of the Project was provided.

One of the main stakeholders and beneficiary of this project are women and children. The project design has given sufficient emphasis for inclusion of women in certain outputs.

4.1.5 Replication approach

The SRBE was initially designed to target a dissemination of 20,000 efficient stoves by the end of the 3-year period of the Project. This would have constituted about 17% of Bhutan's total households of around 120,000. The potential for replication was therefore considered high. Even with the government's planned electrification efforts, it was still expected that a significant number of households would use firewood as fuel for cooking and home heating, and therefore there are sufficient potential targets of the replication efforts.

In line with the emphasis of the Project on capacity-building and training activities among users and beneficiaries, the role of *community-based organizations (CBOs)* acting as catalysts and facilitators in the dissemination of efficient stoves was very useful and provides a successful model for replication and dissemination of improved stoves in the future.

In addition, the Project Document has foreseen potential biomass gasification and briquetting plants to be piloted under the SRBE project and thus targeting the huge potential for use of biomass wastes from 105 sawmills in the country. However, the gasification component was omitted from the Project due to unfeasible economics. Nevertheless, one (larger, instead of several smaller) briquetting pilot plant remained as a pilot activity in the

Project, providing in the long-term a practical solution that combines increased economic activity of local sawmills with environmental mitigation.

At the government level, the DRE was supposed to become the host of the "Knowledge and Learning Platform" which aimed to consolidate, preserve and ensure continuing use of information and knowledge that were obtained and accumulated during the capacity building and other activities in this Project. However, the Platform as such was not implemented, only individual training and capacity-building activities were conducted in the scope of the Project. Special provision of trainings to the Social Forestry Department and its Community Forest Management Groups in order to strengthen capacity in the field of sustainable tree plantation for energy purposes where such elements of the sustainability and replication strategy that the Project followed in its initial design and were implemented as planned.

In terms of sharing the results and providing a basis for replicating the project activities in a broader sense (if successful), the Knowledge and Learning platform was meant to also consolidate all the information, experiences and lesson learnt and for determining the channels, by which these could be brought to broader audience, including also further (continuous) awareness and educational activities (e.g. national TV, radio, social media campaigns, educational programs for schools and school children, etc.). While the Project did not specifically provide awareness for the general public, the activity 3.6.3 (Conduct of international forums/symposia/solutions exchange in Bhutan to meet and/or dialogue with counterparts in countries with more developed RE Policies) was targeted more towards an expert community (governmental stakeholders, scientific community). A 3-day International Symposium was organized between 3-5 June 2015 in Thimphu to strengthen the institutional and technical capacities of the organizations involved in developing and implementing Renewable Energy programmes and strategies for sustainable development. The symposium discussed the various energy efficiency initiatives undertaken at national and international level, with 99 participants from 9 different countries.

Given the importance of the effort for all UNDP/GEF projects to benefit from similar activities implemented in the country (but also referring from the lessons-learned for other countries), to facilitate educational and cross-border information exchange and to learn from the experiences of the project already concluded (not least from the cost-efficiency point of view and by considering the effective use of GEF resources globally), such events are very important for networking among scientific partners and practitioners.

4.1.6 UNDP comparative advantage

The strength of UNDPs involvement to implement SRBE is its long-term involvement in providing technical assistance for renewable energy development to developing countries with a focus on poverty alleviation and energy security. With UNDP having implemented more than 2,000 rural energy development projects for more than 20 years in a number of developing countries, it has developed strength from an excellent track record of developing local capacity, effectively working with multiple stakeholders from public and private sectors, technical experts, civil society, and grassroots level organizations. In the context of rural development, UNDP has a multi-dimensional development perspective, and an ability to address cross-sectoral issues and inclusiveness in constituency building. Therefore, the Project uses the UNDP's experiences and comparative advantage in promoting sustainability, inclusive growth and poverty reduction, by supporting policies, capacity-building and innovative actions with regard to resource efficiency, climate-change mitigation, and access to renewable energy.

4.1.7 Linkages between project and other interventions within the sector

From an institutional and political framework point of view, the Project was designed in a consistent manner with Bhutan's policies reflected in the 10th and 11th Five Year Plan, the National Poverty Reduction Strategy Program, the Renewable Energy Master Plan and the Alternative Renewable Energy Policy (2013). These policies included: (1) linking new and renewable energy to sustainable development policies and to actions consistent with relevant international agreements; and, (2) attracting investments supporting national development objectives.

SRBE was also developed in line with the agreed strategic area of support under the United Nations Development Assistance Framework (UNDAF) from 2008-2012 for Bhutan, namely: (1) Capacity of relevant agencies and communities to implement Renewable Energy Program improved; and, (2) Effective and affordable renewable/alternative energy technologies for remote *Gewogs* (a group of villages) supported.

Otherwise, the Project Document doesn't mention specific linkages with other previous project activities or interventions within the sector, mainly because they did not exist at a national level at that time. The only references made in the Project Document are:

- TERI[4] conducted in 2005 an extensive survey in Bhutan to develop an Integrated Energy Management Masterplan (IEMMP) for the Royal Government of Bhutan. The survey covered a total of 5,396 households (about 5% of total) spread over urban and rural areas and covering all Dzongkhags in the country, to assess the energy consumption in the residential sector. It was the only detailed energy demand assessment available at the time when the project was designed. Nevertheless, it is assumed that the consumption trend identified at that time hasn't changed much since then.
- A small project initiative was the *Biomass Fuel Efficiency project* implemented in Tsirang district (by Tsirang Women Group between 1999 and 2002, supported by the GEF Small Grants Fund). The project sought to address some of the environmental and health related problems faced by the rural communities, the unsustainable extraction of fuelwood leading to destruction of natural forests and smoke related diseases particularly on women and children.
- The cook stoves that were initially implemented in the SRBE project were designed under the scope of the project "Increasing wood efficiency – rural stoves for Bhutan, Phase 2," Project No 2249 funded by the Austrian Development Agency. Interdisciplinary Research Institute for Development Co-operation (IEZ), Austria; RSPN and Department of Energy, Bhutan implemented the project from 2005- 2006. The design was later improved by a local consultant in Thimphu through the SRBE project.
- Otherwise, large-scale initiatives on the national level have not existed before SRBE. It was therefore concluded, that a widespread dissemination of the efficient cook stoves in the country wouldn't have happened without the Project intervention.
- Regarding the use of sawdust from sawmills, there are no well-documented initiatives. The Natural Resource Development Corporation Ltd. (NRDCL) currently operates the briquetting plant installed at Ramtokto in peri-urban Thimphu. The machine has a capacity of 500 kg/hour. The machine was bought from India. Owing to the poor quality of the machinery, it is often prone to breakdown. It has been reported in the national newspaper that the demand for Briquette has actually increased. In 2015, the briquette factory in Ramtokto, Thimphu sold 270.91 tonnes of briquette. There was a slight drop in supply last year than 2014 when 316.15 tonnes were sold. However, the demand for briquette was higher in 2013. From the total 404.34 tonnes produced 400.41 tonnes were sold. This was 56.16 tonnes more than the sale in 2012.[5]
- There is another Briquette Plant in Bumthang - Norden Pine. But it is not functional due to certain technical issues. The evaluators were informed that Norden Pine's briquetting plant was installed under subsidy from foreign donor and RGoB.
- On the global level, since there is a growing sector focused on creating awareness about the clean cooking issue, on enhancing the performance and availability of technologies and fuels and on strengthening enterprises so they can scale production and distribution, efforts are being led by the *Global Alliance on Clean Cookstoves* and the organization's more than 1,000 partner organizations across six continents. A public-private partnership hosted by the UN Foundation, the Alliance is taking a market-based approach to ensure culturally-appropriate cook stoves and fuels are available and accessible to those who need them.

As a result, the SRBE Project was developed with the major focus to support the improvement of the living conditions of people in the rural areas allowing them to contribute more productively to the economy, and also contribute to environmental protection. The project was designed in a manner to integrate a top-down approach of providing support through policy measures and incentives, and a bottom-top approach of promoting market mechanisms to create demand for the sustainable development and utilization of stoves and biomass energy technologies (BETs) using wood as fuel.

4.1.8 Management arrangements

The SRBE project is being implemented by UNDP and executed by the Department of Renewable Energy (Ministry of Economic Affairs) and Social Forestry and Extension Division (SFED) of Ministry of Agriculture and Forests under guidelines for nationally implemented modality (NIM).

Under this arrangement, UNDP assumes the overall management of the project under the direction of the NPD from DRE. The day-to-day management of the project has been carried out by a Project Management Unit (PMU) under the overall guidance of the Project Board (PB) consisting of DRE, Social Forestry and Extension Division, Non-

[4] TERI – Integrated Energy Management Master Plan. The Energy and Resource Institute, New Delhi, India (2005)
[5] http://www.kuenselonline.com/demand-for-briquette-not-dropped/

Formal Education Division, and UNDP. The PMU is established within the premises of DRE, MoEA and reports to the DRE, the Executing Agency and the PSC. The Project management structure is provided in the figure below.

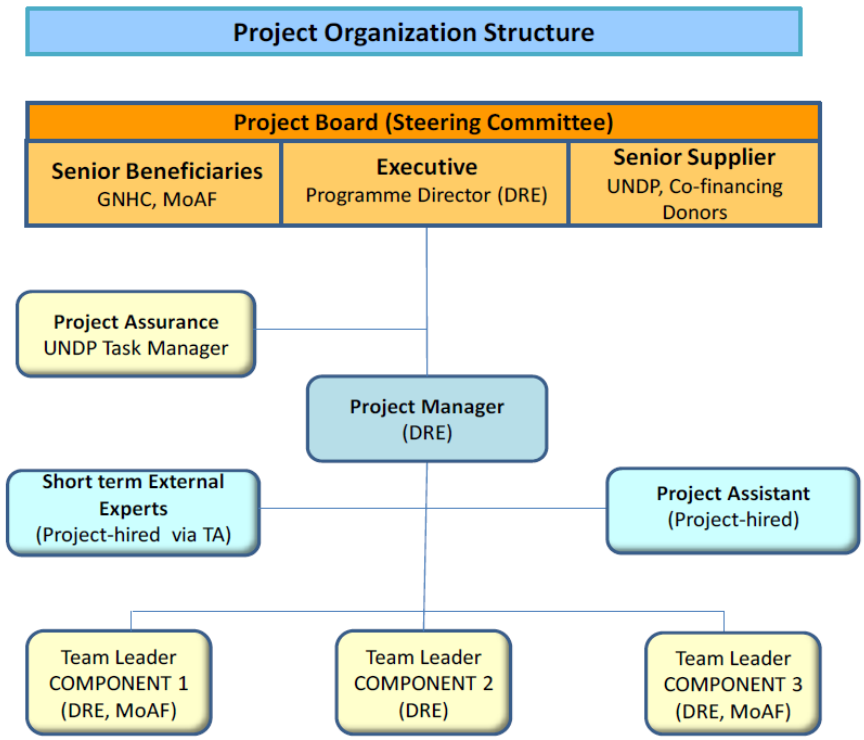

Figure 1: Project Management Structure

The overall structure of the project organization in execution of the "National Implementation Modality" has been found useful, since DRE was managing the Project well, ensured continuous involvement of project stakeholders (via PSC) and kept the senior beneficiaries (GNHC, MoAF) as well as UNDP in a close communication loop. The adequacy and effectiveness of the project management are therefore rated *Satisfactory*.

The overall project management arrangements are rated Satisfactory.

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
	S				

4.2 Project Implementation

4.2.1 Adaptive management

SRBE experienced delay in its initiation phase from January 2013, and implementation was slow until September 2013. The project start-up coincided with the 2nd parliamentary elections, during which the Election Commission of Bhutan banned public meetings and gatherings all over the country. The project implementation was designed to start with workshops, awareness raising and training components, but since this was in conflict with the order of the Election Commission, the project had to wait for the elections to be over in July 2013. Thereafter, three months of peak monsoon period coupled with farming season delayed the field work, as beneficiaries could not participate in the consultation process. Monsoon season also restricts the movement of vehicles in the hills and to the villages, which are away from main road. During this period, the project carried out redesign of stoves.

Due to long delays in getting the original project activities started, the PMU needed to adaptively change the planned activities from the beginning to achieve the objectives set by the Project. In this regard, much of what has finally been accomplished by the Project, with notable progress achieved in 2015 and 2016, has been a result of adaptive management, which has helped the Project to achieve progress.

The main issues that required adaptive management include:

- **Selection of appropriate cook stove design:** The initial Austrian experts provided cook stove design was finally too costly, and thus the major challenge was to convince/attract it to beneficiaries due to their low affordability. A re-design of the cook stove provided through a local Bhutanese consultant resulted in a cost reduction by almost 50%; the new design used local materials in construction and helped to reduce the metallic components, which in turn had brought down the costs significantly. The cost effective solution helped the project to design the financial support mechanism, which allowed for supplying metallic parts cook stove from Project funds, while the beneficiary households were supposed to provide locally made mud bricks and their work force for free.
- **Reduction of the amount of stoves installed.** Due to the delays experienced throughout the project start-up and organizational issued faced by the PMU in procurement of works and engagement of CBOs, it became obvious that the initial target – distribution of 20,000 energy efficient stoves – had to be revised (final EOP target set to 13,522). The decision was reached within the 2nd Project Board (PB) meeting in July 2013. Despite the revision of EOP targets, the Project was successful in achieving about 85% of its initial targets regarding fuelwood and GHG reductions. This demonstrates that although the stoves target needed to be revised down as an adaptive management, the project did not fundamentally compromise the overall goal and objective level targets.
- **Engagement of NGOs/CBOs** and procurement of works, goods and consultancy services through tendering processes proved to be a lengthy process. The PMU was initially not allowed to directly engage NGOs and CBOs due to restrictions in the government procurement rules and regulations. The PMU was instructed to invite a tender for *Zhemgang* Dzongkhag, which was at that time the second pilot Dzongkhag after *Trashigang* selected for implementing pilot cook stoves. The tender for the Expression of Interest was invited but the response was very poor. BAoWE was the only NGO that participated in the bidding process for *Zhemgang* Dzongkhag. It was also evident that the costs of dissemination of cook stoves through NGOs/CBOs were significantly higher than the project's initial estimate. In line with the project's objective to engage CBOs/NGOs in the dissemination of cook stoves, contract agreements were finally signed with local NGOs – Bhutan Association of Women Entrepreneurs (BAoWE) and Tarayana Foundation, for the implementation of stoves in 4 districts in South and Central Bhutan (completed by July 2015).
- In other cases, the PMU had to resort to conducting multiple tendering processes due to non-responsive bids. The participation of private sector has been very poor, since the RGoB has frozen loans from financial institutions for business entities due to the shortage of Indian Rupee in the market. Remoteness of the project sites, illiterate end users, monsoon season in summer and snowy months in winter hindered the project progress in various ways.
- As a result of the delays encountered in the procurement of metallic parts and lessons learnt thereof, the PMU has initiated and completed bulk procurement of metallic parts for all 20 districts.
- **Decision to drop gasification technology** demonstration in the private industry and re-allocate resources to cook stoves. A feasibility study on gasification and briquetting was conducted in 2013 and 2014 respectively. The result of the study indicated that gasification was not a financially viable option for Bhutan due to low electricity tariff. Therefore, during the 3rd PSC meeting held on 30th January, 2014, the PSC decided to drop the construction of gasification plant. Instead, the study indicated that briquetting was considered a viable option for Bhutan, and as a result of lengthy negotiations between the PMU, the RGoB and the Association of Wood-based Industries, the construction of one larger (instead of several smaller) pilot briquetting plant was initiated in 2015.
- **Decision to engage DAHE to support project implementation in 16 districts**. In 2013, *Trashigang* Dzongkhag was identified as the pilot site for the dissemination of cook stoves. The project signed a Memorandum of Understanding (MoU) with the Department of Adult and Higher Education (DAHE), Ministry of Education, to engage the Non-Formal Education (NFE) instructors in creating awareness and construction of cook stoves in Trashigang Dzongkhag. This option was chosen mainly due to the widespread presence of NFE instructors at the village level. In August 2013, the first batch of 46 (26 female and 20 male) NFE instructors were trained in Trashigang on the construction and maintenance of improved stoves. In continuation to Trashigang pilot project, DAHE also consented to implement cook stoves in 15 other districts. MoU to this effect was extended and by the time DAHE has supported the construction of around 8,900 improved cook stoves and fodder stoves
- **Financial constraints:** the lack or availability of financial means were not the most critical issue why initial targets could not be achieved. The reason was rather the time gap, inflation and other economic factors occurring between project inception and implementation, which resulted in the cost of metallic parts had

gone up. Therefore, in order remain in line with the available budget for stoves implementation, there was a need to reduce the original target from 20,000 to 13,522.

- A **Roadmap for policy implementation and promotion of sustainable biomass production** and utilization was supposed to be prepared within SRBE. However, while the Project commenced late, the development of Biomass Roadmap was covered under the Renewable Energy Master Plan studies undertaken by the DRE under Energy Plus Fund Project. Under this project, one component was to develop a Renewable Energy Master Plan for the RGoB. It was a one-year project, the studies have been completed and the DRE was finalising the works during this TE. UNDP and DRE have contributed in the development of the ToRs, while providing results from the biomass policy analysis done under SRBE to be formulated as further requirements to be considered under the Biomass Roadmap. However, DRE felt that it would have been a duplication of works, as under the RE Master Plan, development of Roadmap for all renewable energy resources was being considered anyway. Therefore, as a conclusion the Roadmap was dropped under SRBE.

With regard to the numerous requirements to adapt to changes in the environmental and development objectives the adaptive management is rated **highly satisfactory.**

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
HS					

4.2.2 Partnership arrangements

During the initial period of SRBE from 2013 to 2014, a number of activities related to community awareness, mobilisation and livelihood improvement activities were implemented.

Partnerships that were established and strengthened during this time and included:

Civil Society Organizations /NGOs:

The project has been successful in engaging and signing partnership agreements with the Bhutan Association of Women Entrepreneur (BAoWE) and Tarayana Foundation, both experienced NGOs working for the empowerment of women and improving lives of rural women and improving the lives of disadvantaged people living in abject poverty in rural Bhutan. It was a strategic partnership as one of the goals of this project is to mainstream gender and provide equal opportunities to men and women. While fulfilling the project mandates on the dissemination of fuel-efficient cook stoves, BAoWE and Tarayana Foundation have the necessary capacity/expertise to effectively mobilize and engage women in particular in the project sites. These two NGOs are supporting in implementing project activities in four remote districts.

Private Sector:

The project has concluded supply agreements based on tenders with the local fabricators of metallic parts for fuel-efficient cook stoves. The partnership has provided a platform for local fabricators to enhance their existing capacity, as well as ensured a steady income, youth employment and sustainable business for the future.

The study on briquetting plant was useful to gauge the feasibility and interest of the private sector. In the ensuing discussions, some private sector representatives indicated that they would be interested in briquetting plants even without incentives.

GEF Small Grants Program

Useful lessons are shared between the project and GEF Small Grants Programme. The UNDP CO and project personnel are represented in the national sub-committee and national steering committee of the Small Grants Programme.

Other Partnerships:

There was a MoU signed with Department of Adult and Higher Education (DAHE) in implementing this project in 16 out of 20 Dzongkhags. Selection was made due to the fact that the Non Formal Education (NFE) instructors are widely present at the village level.

The Gup (community headman), and district administrations from all 20 districts were involved, including NFE and forestry departments who were involved in building capacity of concerned agencies and stakeholders in the

country. The project benefited from active involvement of national and district government stakeholders in various project activities such as training, and demonstration of cook stoves in the field.

In addition, members of the PSC were drawn from GNHC and MoAF as well as MOE to provide wide but important perspectives in the decision making process to support the project. With the exception of private industries, all relevant governmental agencies and departments participated in the PSC meetings.

International and local consultants were involved in the baseline and technology assessments.

Hence, one of the major issues with the stakeholder engagement efforts of the project has been the lack of experience and successful engagement of private sawmill industries for utilization of biomass. However, the effectiveness of this engagement is somewhat complex, given that the demonstration of biomass energy technology in industries in Bhutan , which were hitherto non-existent, and is linked to the demand of briquette in the market and initial financial incentives provided by the project for pilot. The spread of BET among private sawmills is contingent upon the market demand for briquette and its price. Further, the lending restrictions imposed by the local banks make investment in new technologies challenging unless industry decide to use balance sheet financing. In the current operating environment, the owners of private sawmills have no clear incentive to add a new stream in the existing business due to uncertainty in the demand of briquettes as source of fuel and due to availability of other cheaper sources of energy such as electricity.

4.2.3 UNDP and Implementing Partner Performance

The project was implemented based on the UNDP National Implementation Modality (NIM). During the inception phase the **Project Management Unit (PMU)** was nominated based on the proposed organization structure foreseen in the Project Document. It consists of a project director, associate engineers and project assistant who manage in co-operation with UNDP's CC portfolio manager the Project on a daily basis.

The project received high level guidance and oversight from the **Project Board (PB),** which is chaired by the Secretary, Ministry of Economic Affairs, as the home ministry for the Lead Executing Agency, DRE. The PB is responsible for making management decisions on a consensus basis for the Project when guidance is required by the Project Manager, including approval of project revisions. Project assurance reviews are made by the PB at designated decision points during the running of a project, or as necessary when raised by the Project Manager. In this sense, the PB provided important input to the PMU in adaptive project management, and in general very positive feedback was provided throughout the evaluation mission regarding the level of cooperation between DRE and UNDP.

Members of the PB were interviewed during the evaluation mission they also expressed their full satisfaction on the project implementation arrangements and the Board's role there, especially on receiving relevant and timely information throughout the project implementation, to perform their expected duties and to express their views in the Board meetings, which have been well documented.

Overall conclusion is that the project management has achieved appropriate partnerships with relevant national stakeholders (ministries, NGOs/CSOs, private sector in regard to the briquetting project) and participation of these national stakeholders is visible throughout the whole project and beyond. Governmental stakeholders support the objectives of the project and are involved in strategic decision-making and setting directions through the Project Board.

Implementing and Executing partners' performance is rated **Highly Satisfactory.**

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
HS					

4.2.4 Project finance

SRBE is financed with USD 1,703,000 through a GEF grant, USD 200,000 from UNDP (also grant), USD 300,00 from BTFEC and USD 30,000 from PEI, and RGOB . In addition to, the project has received co-financing contributions from different donors. Both, ADB and Swiss Development Cooperation/Helvetas have provided support for parallel ongoing program activities. ADB is for instance providing a grant and a loan for construction of 2,800 family biogas units under its "Rural Renewable Energy Development" project, and Helvetas is supporting 550 community

forestry activities under its “Participatory Forest Management” project. The Bhutan Trust Fund for Environmental Conservation (BTFEC) is providing USD 300,000 for distribution of approximately 1,500 cook stoves and 1,600 heating stoves, UNDP/UNEP Poverty - Environment Initiative (PEI) USD 50,000 for capacity building and training activities, and the remainder of USD 500,000 through the RGoB (support for baseline activities and involvement of national institutions – DRE, DAHE, SFD).

For the establishment of the Briquette Plant in Thimphu by the Association of Bhutanese Wood Based Industries a private company called Bhutan Briquette Private Limited was set up. The SRBE project had contributed to only 50% of the cost for a set of machines. The rest 50% of equipment, construction of shed, land lease, transportation and other establishment costs are all borne by the private company.

For the activities that have been funded by the project, financial management of project funds has been overall satisfactory. Moreover, the project has appropriate financial controls which include regular reporting, which has allowed the PMU and the PSC to make informed budgetary decisions. Various interventions supported with project resources consisted mostly of workshops, studies and feasibility studies that have been carried out. The excess funds from some of the activities that have been found to be unviable (e.g. gasification project) have been reallocated for dissemination of improved stoves.

By mid-July 2016, the disbursement of the GEF resources stood at USD 1,583,600 which is approximately 93 % of the total GEF resources. The remaining USD 119,376 will be spent during the rest of the year for the outstanding awareness activities (component 3) and finalisation of pilot stoves distribution (under component 2). Expenditures within component 2 have been increased deliberately to increase the funds available for the dissemination of new stoves in the communities. In this context, the Project has been able to utilise the limited resources at utmost with a focus to maximise promotion of improved cook stoves (and provision of metal parts used for the construction), in particular by using extra funds allocated throughout the Project (as mentioned through BTFEC) and utilising financial savings from other components that have been diverted to component 2.

The available budget has been allocated and is expected to be fully utilised. The unallocated funds provided in the table are mainly used for compensation of currency exchange losses during the course of implementation.

A summary of the SRBE expenditures (status end September 2016) is provided in the table below.

Project Component	Budget approved/Expenditure (in USD)								Remaining budget	Total (USD)	Changes in allocation
	from ProDoc	2012	2013	2014	2015	2016	Budget spent	% of budget spent	2016		Total (USD)
Component 1	**143,340**	2,444.02	35,904.91	60,626.35	38,243.30		137,218.58	**95.73**	-	**137,218.58**	**6,121.42**
Component 2	**1,145,510**	-	40,673.39	435,530.68	759,945.18	44,872.38	1,281,021.62	**111.83**	11,973.20	**1,292,994.82**	**-147.484.82**
Component 3	**261,150**	-	9,185.58	27,263.77	83,674.45	14,854.56	134,978.36	**51.69**	15,000.00	**149,978.36**	**111.171.64**
Project Management Costs	**153,000**	3,969.33	16,825.00	30,686.49	7,335.10	15,620.77	74,436.69	**49.96**	17,572.37	**92,009.06**	**47,807.43**
Exchange Loss/Gain	**0**	-258.31	8,348.66	9,638.70	13,070.13	-	30,799.18	**-**	-	**30,799.18**	**-30,799.18**
TOTAL GEF	**1,703,000**	**6,413.35**	**110,937.54**	**563,745.99**	**902,268.16**	**75,347.71**	**1,658,454.43**	**97.38**	**44,545.57**	**1,703,000.00**	**0**

Table 2: Project Budget and Expenditures (in USD)

Co-financing and in-kind contributions

The Project has benefited from additionally leveraged in-kind cash resources of about USD 350,000 from RGoB and in-kind contributions of USD 550,000 from ADB through the biogas project. Significant amount of private sector was contributed from stoves users (rural households) in the form of in-kind contributions and cash contributed from shareholders (sawmills) of the Bhutan Briquettes Private Ltd., in total about USD 350,000 more than initially committed in the Project Document

Confirmed Project co-financing to date has amounted to an estimated USD 5.06 million or 120% compared to the contributions sourced at project design stage, with details provided in the Table 3 below.

Sources & type of co-financing	Name of co-financer	Amount confirmed at CEO Endorsement	Actual amount Contributed at stage of Terminal Evaluation	Actual % of expected amount
		USD	USD	
Cash Contribution	Global Environment Facility (GEF)	1,703,000	1,703,000	100%
	Bhutan Trust Fund for Environment Conservation (BTFEC)	300,000	300,000	100%
	United Nations Development Programme (UNDP Bhutan)	200,000	200,000	100%
	Poverty Environment Initiatives (PEI)	50,000	30,000	60%
Grant and in-kind Contribution	Royal Government of Bhutan (RGoB)	510,000	859,600	169%
	Asian Development Bank (ADB-Biogas Project)	950,000	1,500,000	158%
	SDC/Helvetas	400,000	0	0%
Funding leveraged through Private Sectors	Stove Users ($ 397,765.23)	116,700	464,889	398%
	Bhutan Briquettes Private Limited ($ 67, 124.11)			
	TOTAL	**4,229,700**	**5,057,489**	**120%**

Table 3: Co-financing of Project Partners (in USD)

Considering the additionally leveraged co-financing means and the appropriate financial execution, **the overall financial** management is rated **Highly Satisfactory**.

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
HS					

4.2.5 Monitoring and evaluation

The design of the Project's Monitoring and Evaluation (M&E) system at the entry has relied on the standard UNDP requirements, including annual *Project Implementation Reviews (PIRs)* and the project *Mid-Term Evaluation* completed on time. In addition, the progress of the project has been monitored on an ongoing basis by regular Project Board meetings. The PSC meetings appear as the main forum on which major Project decisions were made. Information from the PMU and stakeholders was provided for discussion at the PSC meetings.

M&E consists basically of logging of indicators and outputs of the Project Results Framework (logframe). The indicators (43 in total) used in the logframe, however, are considered too numerous for the PMU to be all tracked, therefore the PMU concentrated on reviewing the project progress by its 15 outputs. Some of the indicators, as mentioned in chapter 4.1.1, were considered no longer relevant and could have been eliminated throughout the time, to reduce monitoring efforts and keeping the project focused on result oriented activities in the limited time available.

Despite manpower challenges within the PMU, the Project had been sending technicians to project sites on regular basis to monitor the performance of Non-Formal Education Instructors and NGO technicians and it is expected that this will continue throughout the remainder months of the Project.

Initially, monitoring data based on operational performance of improved stoves, like actual fuel use, amounts of heat generated, thermal efficiency and related GHG reduction, was not possible, due to the lack of appropriate measurement devices and accredited laboratories in the country. However, as part of the Project contribution, in 2014, the Asian Institute of Technology based in Bangkok/Thailand prepared a "Testing Report on Improved Cook stoves in Bhutan", where two types of improved cook stoves, one fodder stove and one 2-pot stove, were assessed concerning their efficiency and cooking performance. In the meantime, the PMU included the study results and main indicators describing energy efficiency, GHG emission reductions and performance of stoves into the regular MRV scheme. Unfortunately, the efforts were made only towards the end of the project and its terminal evaluation, but can be considered an asset for further replication activities.

Considering the latest efforts made, the Project's capabilities of monitoring of energy and GHG emission savings has been improved compared to the MTE.

In addition, the monitoring of progress on the output/activity level (e.g. reporting of planned versus achieved tasks) in regard to PMU keeping track on each activity, the status of their implementation (in principal "yes" or "no"), and if the corresponding activity indicator was achieved or respectively not achieved could be improved. The Project progress reports do only provide limited information in this respect.

The Project's overall achievement in regard to M&E is considered **satisfactory**

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
	S				

4.3 Project Results

Assessment of SRBE achievements and shortcomings are provided in this section against the initial Project log-frame (from ProDoc). Each outcome was evaluated against the individual criterion of:

- Relevance – the extent to which the outcome is suited to local and national development priorities and organizational policies, including changes over time;
- Effectiveness – the extent to which an objective was achieved or how likely it is to be achieved;
- Efficiency – the extent to which results were delivered with the least costly resources possible.

The Project outcomes were rated in regard to each criteria above, based on the following scale:

- 6: Highly Satisfactory (HS): The project has no shortcomings in the achievement of its objectives;
- 5: Satisfactory (S): The project has minor shortcomings in the achievement of its objectives;
- 4: Moderately Satisfactory (MS): The project has moderate shortcomings in the achievement of its objectives;

- 3: Moderately Unsatisfactory (MU): The project has significant shortcomings in the achievement of its objectives;
- 2: Unsatisfactory (U) The project has major shortcomings in the achievement of its objectives;
- 1: Highly Unsatisfactory (HU): The project has severe shortcomings in the achievement of its objectives.

The attainment of objectives and corresponding rating (including explanations to the ratings) are provided in the following section.

4.3.1 Overall results (attainment of objectives)

Development Objective: To reduce GHG emissions in the rural household and industrial sectors of Bhutan through integrated and sustainable biomass resource production and utilization, and promotion of sustainable biomass energy technologies in Bhutan using market based approaches.

Immediate objective: To remove barriers to sustainable utilization of available biomass resources in the country and application of biomass energy technologies that can support economic and social development in the country's rural sector, in order to reduce GHG emissions."

Intended EOP Outputs/targets:

- Up to 107,600 tCO2e GHG emissions mitigated annually by End of Project (EOP),
- Up to 196,700 tCO2e cumulative quantity of GHG emissions mitigated by EOP,
- Up to 183,200 t of fuel wood consumption reduced in households and industries by EOP
- At least 3 enterprises supplying clean and efficient biomass energy systems and services by EOP
- Up to 20,000 households and industries benefitting from the energy efficient furnaces/stoves & other BET applications & services by EOP.

Actual EOP Output/target:

- ☑ 88,356 tCO2e GHG emissions mitigated annually by End of Project (EOP), (about 82% of the EOP target)
- ☑ 173,041 tCO2e cumulative quantity of GHG emissions mitigated by EOP (about 88% of the EOP target)
- ☑ Approximately 161,343 t of fuel wood consumption reduced in households and industries by EOP (about 88% of the EOP target)
- ☑ Actually 6 enterprises are supplying clean and efficient biomass energy systems and services
- ☑ 13,210 households and industries benefitting from the energy efficient furnaces/stoves & other BET applications & services, with another 1,434 expected to be benefitting by EOP (about 80% of initial EOP target).

At **outcome level**, the following intended versus actual EOP outputs/targets have been considered:

Intended EOP Outputs/targets:

Outcome 1: ***Implementation of strengthened support policies and regulatory frameworks and institutional capacity for adoption of sustainable practices production, conversion and use of biomass resources in Bhutan***

- Integrated RE Policy that includes sustainable biomass energy production and utilization completed by beginning Year 2;
- 50 community-based fuel wood plantations being utilized by communities & households for use in BET applications by EOP;

Outcome 2: ***Implementation of BET applications due to improved confidence in their feasibility, performance, environmental and economic benefits through demonstration projects, market mechanisms and increased private sector participation***

- 80% of end users satisfied with degree of BETs & furnaces/stoves implemented;
- Up to 183,214 t of fuel wood saved through efficient stoves by EOP;

- Up to 921 tonnes of sawdust utilized and prevented from decaying through BET applications by EOP;
- At least 3 Full-Scale Model BETs that show good viability, improved performance, & environmental & economic benefits by EOP.

Outcome 3: ***Improved knowledge, awareness and capacities of policy makers, financiers, suppliers and end-users on benefits and market opportunities for modern biomass energy technologies***

- At least 200 participants trained in different aspects of biomass energy such as policy, financing, technology & market mechanisms by EOP.
- At least 20 relevant stakeholders whose skills and knowledge have been increased in assessing, implementing & operating BETs by EOP.

Actual EOP Output/target:

Outcome 1: ***Implementation of strengthened support policies and regulatory frameworks and institutional capacity for adoption of sustainable practices production, conversion and use of biomass resources in Bhutan***

- ☑ A Policy review of biomass energy related policies in Bhutan completed by Emergent Ventures Ltd, Consultancy firm based in India. The Roadmap development for the promotion/utilization of biomass technologies has been skipped under SRBE; however, DRE has been guiding the development of a "Renewable Energy Master Plan" under the E+ Project. It was a one-year project, the studies have been completed and the Department is working in the finalisation of the final report. UNDP and the PIU have provided inputs to the TOR development while reviewing the proposed recommendations of the RE Roadmap with specific focus on the chapter of biomass energy development.
- ☑ A total of 50 sites in 7 districts (in 45 community forests) spanning an area of 111.47 hectares were covered under sustainable fuel wood plantation programme.

In consideration of the relevance of the Roadmap, recommendations and further action would need to be developed and incorporate the provisions from the RE Master Plan being recently developed.

The overall rating of outcome 1 is considered satisfactory.

Outcome 2: ***Implementation of BET applications due to improved confidence in their feasibility, performance, environmental and economic benefits through demonstration projects, market mechanisms and increased private sector participation***

- ☑ An evaluation of the SRBE cook stoves is already underway by the DRE. An assignment "*to carry out the regionally representative survey and comprehensive analysis (from East, West, North, South and Central parts of the country) on fuelwood consumption 2. Health benefits and, 3. Overall customer satisfaction.*" had been awarded by DRE to a local Consultancy Firm. The scope of the work includes survey of customer satisfaction of the SRBE stoves, validate fuelwood consumption and health benefits. All the field work had been completed as of July 2016. A draft reported had been submitted and the final report was still under preparation. DRE had been informed in a presentation of the Draft Report that the customer satisfaction was around 90%.
- ☑ Cumulative 161,343 t of fuel wood saved through efficient stoves by EOP (about 88% of initial target)
- ☒ The briquetting plant is expected to be in operation by December 2016; while no sawdust has been utilised by the time the TE was conducted, it is expected that sawdust is starting to be utilised once the plant is commissioned.
- ☒ As a result of above, 2 (out of 3) full-scale model BET have been developed, which results in a gap compared to the assumptions of the ProDoc (gasification project annulled due to economic reasons).

All in all, the project Outputs 2.2, 2.3, 2.5 (and 3.3) are meant to stimulate the local market through a combination of market demand and financial incentives for local entrepreneurs to offer biomass energy technologies. However, in the absence of financial sector support for local businesses, achieving these outputs was from the beginning ambitious and in the current situation seems not to be achieved.

The overall rating of outcome 2 is therefore satisfactory.

Outcome 3: ***Improved knowledge, awareness and capacities of policy makers, financiers, suppliers and end-users on benefits and market opportunities for modern biomass energy technologies***

- ☒ Several individual awareness activities conducted for BET users in all 20 districts, but no comprehensive Knowledge building and learning platform has been developed.
- ☑ International Symposium on Renewable Energy and Energy Efficient Initiative, Policies, Technologies and Sustainability convened from 3-5th June 2015. About 100 participants from various international organizations and relevant national agencies/institutions participated at the event.
- ☑ A Special Stakeholder Meeting with District SRBE Focal Officers was held on 6th June 2015 to discuss on the progress, challenges and way forward on the on-going SRBE Project (Construction of improved stoves). 25 participants attended the 1 day workshop in Hotel Le Meridien, Thimphu.

The Project was supposed to develop a *Knowledge & Learning Platform*, which has been lacking. In respect to output 3.3 "Project developers and micro-entrepreneurs trained on different aspects of BETs" the project has faced severe challenge in getting the attention of private sector players and fabricators to respond to the tenders. Unless the market will be able in the future to create a steady demand for improved cook stoves and other BET, it is unlikely that entrepreneurs will come forward and invest their resources.

The overall rating of outcome 3 is therefore moderately satisfactory.

4.3.1.1 Global Environmental Benefits

Tables below summarize the GHG reduction estimates (using GEF guidelines) that were generated during SRBE (to its estimated terminal date of December 31, 2016).

The Project has introduced efficient stoves in three categories, namely: cook stoves, fodder stoves and heating stoves. These stoves replace traditional less efficient stoves that used to be installed in many households in Bhutan. Due to the much higher efficiency of the new stoves, less fuel wood is being used up for the same cooking and heating benefits derived by the end-users of the stoves.

The GHG annual emission reductions from efficient stoves are calculated as follows:

GHG emission mitigation = amount of fuel wood saved annually by the efficient stove x the emission factor of fuel wood x the number of stoves introduced

The GHG mitigation calculations provided below are referring to CDM Methodology AMS-II.G "Energy efficiency measures in thermal applications of non-renewable biomass"[6]. Number of installed stoves were provided by DRE.

Project Direct GHG Emission Mitigation

At the end of the four-year period of the Project (extended by 1 year), the summary of the expected annual and cumulative fuel wood savings and GHG mitigation as a result of using the efficient stoves is shown below[7].

The achievement of the direct cumulative GHG emission reduction of 173,711 tonnes CO_{2eq} per year at EOP against the target of 196,500 tonnes per year at EOP is due to the lower amount of improved stoves being implemented through the project (14,179 versus 20,000 planned).

[6] See https://cdm.unfccc.int/methodologies/DB/DCO8WRRQVTGLH1GHQBCL035F5M13R8
[7] It is assumed that by end 2016 (extension year), another 1,222 Bhutan Eco Stoves (BES 2015) will be installed

Year	2013	2014	2015	2016
Cook stoves				
No. of installed stoves	-	600	7,844	7,844
Wood fuel saved annually (tonnes)	-	3,199	41,815	41,815
GHG emissions mitigated annually (tCO2e)	-	3,430	44,847	44,847
Bhutan EcoStove (BES 2015)				
No. of installed stoves	-	-	-	1122
Wood fuel saved annually (tonnes)	-	-	-	7009
GHG emissions mitigated annually (tCO2e)	-	-	-	7517
Fodder stoves				
No. of installed stoves	-	64	3,756	3,756
Wood fuel saved annually (tonnes)	-	387	22,700	22,700
GHG emissions mitigated annually (tCO2e)	-	415	24,346	24,346
Heating stoves				
No. of installed stoves	-	-	1,610	1,610
Wood fuel saved annually (tonnes)	-	-	10,860	10,860
GHG emissions mitigated annually (tCO2e)	-	-	11,647	11,647
Total				
No. of installed stoves	-	***664***	***13,210***	***14,332***
Wood fuel saved annually (tonnes)	-	***3,585***	***75,375***	***82,384***
Cumulative wood fuel saved (tonnes)	-	***3,585***	***78,960***	***161,343***
GHG emissions mitigated annually (tCO2e)	-	***3,845***	**80,839**	**88,356**
Cumulative tCO2e mitigated	-	***3,845***	**84,685**	**173,041**

Table 4: Project Direct GHG Emission Mitigation

Direct GHG Lifetime Emission Mitigation

The life of the stoves supported in this Project is expected to be about five years for cook/fodder stoves and 7 years for heating stoves due to their metal structure. Thus, considering the individual lifetime of different stoves beyond the last ones implemented in 2016, the cumulated direct lifetime GHG emission mitigation has been calculated with about **465,076 tonnes CO_{2eq}**.

Indirect GHG Emission Reductions – Bottom-up:

The design of the Project emphasizes on sustainability of its activities, including the dissemination of more stoves through market mechanisms and where, appropriate, continuation of subsidy from the RGoB. The bottom-up approach considers the direct lifetime GHG emission reductions achieved by the Project and extended by a replication factor (RF) reflecting how many times the investments achieved during the project period might be repeated during the "influence period" of 10 years after the project closure. In a bottom-up assumption, about 51,400 stoves would have been installed by 2026 (RF =3.5), an increment of about 37,000 compared to year 2016.

Cumulative GHG emission reduction by end of Project:	465,076 tonnes CO_{2eq}
RF:	3.4
Indirect Bottom-up GHG emission reductions:	**1,581,258 tonnes CO_{2eq}**

Indirect GHG Emission Reductions – Top-down:

In the top-down approach, it is assumed that 50% of the total households of the current 120,000 (i.e. 60,000) will benefit from improved cook stoves (BES 2015 type) after 10 years of the Project closure; whereas about 10,000 households will have a heating stove installed by that time. The corresponding GHG emission potential for the "market potential" is equivalent to about 2,516,300 tonnes CO_{2eq}. The expected Causality Factor (CF) in line with the GEF Methodology is assumed to be 80% - since the GEF contribution has been a dominant intervention resulting to the introduction of the improved cook stove and heating technology, however, some of the fuelwood and GHG emission reductions are to be attributed to a baseline development.

Total market potential of GHG emission savings:	2,516,300 tonnes CO_{2eq}
CF:	80%
Indirect Top-down GHG emission reductions:	**2,013,029 tonnes CO_{2eq}**

GHG emission mitigation from other sources

- GHG emission mitigation from the briquetting plant has not been realised so far. The briquetting plant will, after its establishment and operation use the sawdust that would have otherwise been left to decay in the dumpsite without the installation of the briquetting plant. The production of methane, a GHG that has a global warming potential of 21 times more than carbon dioxide, will be therefore avoided. By substituting fuel wood with briquettes in the household heating systems, the use of fuel wood will be reduced.
- The use of energy efficient stoves to replace the traditional ones is leading to a reduction of the consumption of fuel wood. Thus, the cutting of trees for fuel use is also reduced, which in turn increases the carbon capture from these trees.

4.3.1.2 Overall Evaluation of the Project

In conclusion and by taking into account the observed shortcomings compared to the initial, and in some cases overly ambitious, goals, it is evident that the project has had a critical role in boosting the biomass energy technology development within the market conditions of Bhutan, which growth is likely to continue also after the project closure. With some critical issues, such as availability of a clear roadmap being in line with the RE Policy and to support BET development, availability of appropriate financing mechanisms to support private sector engagement, or continuous awareness and capacity building support, remaining at the project end the relevance of the Project remains at high level, but requires a clear commitment and strategy for follow-up respectively defining further replication activities.

All in all, its results and contribution to the Project objective and its stated targets can be considered as satisfactory and have overall improved compared to the Mid-term Report.

Highly Satisfactory	Satisfactory	Moderately Satisfactory	Moderately Unsatisfactory	Unsatisfactory	Highly Unsatisfactory
	S				

Table 5 below summarizes the progress towards the **end-of-project targets** for the project objective and each outcome.

Indicator Assessment Key

Green= Achieved	Yellow= On target to be achieved by EOP	Red= Not or unlikely to be achieved by EOP

Table 5: Progress Towards Results Matrix (Achievement of outcomes against End-of-project Targets)

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
Goal: Reduction of GHG emissions in rural households and industrial sectors	Quantity of GHG emissions mitigated annually by EOP (tCO2e)	0	107,600	88,356	**S**	About 82% of the initial target have been achieved
	Total quantity of GHG emissions mitigated by EOP (tCO2e)		196,700	173,041	**S**	About 88% of the initial target have been achieved
Project Objective: Removal of barriers to sustainable utilization of available biomass resources in the country and application of biomass energy technologies that can support economic and social development in rural sector to reduce GHG emissions	Reduction of fuel wood consumption for energy use in households and industries by EOP, tonnes.	0	183,200	161,343	**S**	About 88% of the initial target have been achieved
	Number of enterprises supplying clean and efficient biomass energy systems and services by EOP	0	3	6	**HS**	Actually 6 enterprises are supplying BET systems and services
	Number of households and industries benefiting from the energy-efficient furnaces/stoves & other BET applications & services by EOP.	0	13,522	13,510	**HS**	The (revised) target of improved stoves to be implemented has been almost reached. With another 1,200 BES/BEMS planned to be implemented by EOP, the target will be very likely achieved.
Component 1: Mainstreaming sustainable biomass energy production, conversion and utilization						
Outcome 1: Implementation of strengthened support policies and regulatory frameworks and institutional capacity for adoption of sustainable practices production, conversion and use of biomass resources in Bhutan	Integrated RE Policy that includes sustainable biomass energy production and utilization completed by beginning of Year 2.	0	1	1	**S**	Policy review was completed and in line with the policy achievement, the development of Biomass Roadmap was covered under the Renewable Energy Master Plan studies undertaken by the DRE under Energy Plus Fund Project.
	Number of community-based fuel wood plantations being utilized by communities & households for use in BET applications by EOP.	0	50	50	**HS**	The number of community-based plantations has been achieved, with a total of 111 ha covered under the plantation programme.
Output 1.1: *Developed and implemented Roadmap for the promotion of sustainable biomass production and*	Existence of policies and standards on the provision and use of fuel wood for energy purposes put in place by end of Year 2, month.	1	Month 25	1	**HS**	A review of existing policies related to biomass energy production, conversion and utilization in Bhutan has been prepared ad submitted to DRE in 2015

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
utilization, using both community-based woodlots and non-fuel wood energy resources	Existence and implementation of the Roadmap for the promotion & implementation of sustainable biomass production & utilization by end of Year 1.	0	1 roadmap	1	**MU**	Biomass Roadmap covered under the Renewable Energy Master Plan (under finalisation)
Output 1.2: *Established Biomass Energy Resource Information System (BERIS) for facilitating systematic collection, analysis and dissemination*	Number of relevant agencies and institutions involved in production and use of BETs and are linked with each other via a working mechanism for coordination by EOP.	0	5	4	**S**	4 agencies (DAHE, DRE, BAoWE, Tarayana) have been working together on cook stove distribution,
	Existence of Biomass Energy Resource Information System (BERIS), which contains and disseminates information on biomass resources within Year 1, month.	0	Month 9	1	**S**	BERIS is operating and integrated into the project website http://www.bioenergy.gov.bt/main/index However, it seems that the database is not 100% up to date and has only limited functionality.
Output 1.3: *Modalities and details of participation of community-based organizations and grassroots institutions finalized and agreed*	Number of representatives from community-based organizations & grassroots institutions trained and actively involved in promoting and disseminating BETs by EOP.	0	20	19	**HS**	19 focal persons were trained in 16 Dzongkhags for awareness creation and promoting BET; Two MoUs were signed between DRE and DAHE to implement improved stoves project in 16 districts through NFEI Network; Contract agreements were signed with BAoWE for Zhemgang, Tsirang and Dagana; Contract agreement were signed with Tarayana Foundation for Sarpang district; Plantations completed through the engagement of Community Forest Management Group; Agreement with the Association of Wood Based Industries to implement Briquette project.
Output 1.4: *Earmarked areas for sustainable forest wood energy production*	Existence of an action plan & implementation procedures for allocation, utilization and management of fuel wood plantation within Year 1, month.	0	1	1	**HS**	Plan for the implementation of fuel wood plantation incl. allocation, utilization and management of fuel wood plantations was prepared.

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
	Number of earmarked areas & supporting measures for fuel wood plantation activities from beginning of Year 2.	0	50	50	**HS**	186.77 hectares of barren land identified by SFED for plantation; 111.47 hectares of plantation completed under SRBE funding; 50 earmarked areas & supporting measures for fuel wood plantation activities from beginning of Year 2.
	Participation of women in CFMG Committees.	1 woman, 4 men	20% increase in no. of women	36% of trained were women	**HS**	Total 878 CFMG members trained (557 male and 321 female); the initial expectation (20% of total trained are women) was reached without problem, total share of trained women was 36%;
Component 2: Supporting innovative practices and market mechanisms for local sustainable biomass energy technology development and promotion						
Outcome 2: Implementation of BET applications due to improved confidence in their feasibility, performance, environmental and economic benefits through demonstration projects, market mechanisms and increased private sector participation	• Degree of satisfaction by end-users of BETs & furnaces/stoves implemented, % • Fuel wood saved through efficient stoves by EOP, tonnes • Quantity of sawdust utilized and prevented from decaying through BET applications by EOP, tonnes (by EOP) • Number of operating Full-Scale Model BETs that show good viability, improved performance, & environmental & economic benefits (by EOP).	0 0 0 0	80 183,214 921 At least 3	90 154,335 progressing 1	**S**	Achievement rating is based on the findings from the field visit of the reviewers. At the time of TE 13,510 cook stoves have been installed and a survey to capture the satisfaction level of end-user was ongoing, with preliminary result showing 90% satisfaction Although the no. of the BET has been reduced from originally targeted 3 to 1 the capacity remains the same. As a result of adaptive management by the project, owing to economic feasibility, a single but bigger BET was installed rather than 3 smaller ones. Briquetting project was still under implementation, that's why the sawdust utilization indicator was not available yet.
Output 2.1: *Menu of appropriate & efficient technologies made available*	Availability of technology fact sheets and menu of appropriate & efficient BETs within Year 1, month.	0	1	1	**S**	Completed

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
Output 2.2: *Fiscal incentives such as smart subsidies to enable market mechanisms introduced*	• Existence of comparative assessments of financing schemes for BET applications and BE-supported projects by Month 7, date. • Financing support and incentives provided to end-users of BET applications & services starting from Year 2, month.	0 0	1 1	1 1	**S**	Fiscal incentives were introduced and subsidy schemes adopted for the provision of metallic components (50% for ICS, 30% for heating stoves)
Output 2.3: *Operational locally produced energy efficient industrial stoves for income generating local enterprises and efficient BETs supported*	• Cost sharing & market delivery mechanisms put in place and starting to be utilized by communities & industries within Year 1, month. • Number of partnerships established by EOP.	0 0	1 10	1 11	**S**	Partnerships were established with 3 local fabricators, 6 suppliers of heating stoves and with the NGOs BAoWE and Tarayana for implementation. Also, a partnership with the Non-formal Education of the Department of Adult and Higher Education was established. A procurement and subsidy distribution scheme was developed and the market delivery throughout SRBE defined.
Output 2.4: *Locally produced 20,000 energy-efficient stoves in rural households and community-based institutions for space heating and cooking needs implemented and promoted for replication*	• Number of furnaces/stoves installed & being used on a daily basis by households in targeted areas by EOP. • Number of men/women trained and participating as technicians in the construction and installation of stoves.	0 0	20,000 20	13,510 300	**S**	Considering the revised number of stoves to be implemented (13,500), the EOP target will be achieved. Training of technicians were conducted in all 20 dzongkhags with more than 300 persons participating in training programmes.
Output 2.5: *Implemented and operational BET Full Scale Models on:* *[1] Wood briquetting/ pelleting technology for the production of bioenergy fuels and* *[2] Biomass gasification for electricity services and thermal applications*	• Existence & operating performance of BET Full-Scale Models in different districts & industries by EOP. • Number of wood briquetting plants that are operational by EOP. • Number of biomass gasification for electricity services & thermal	0 0	3 1	1 1	**MU**	At EOP, there is 1 briquetting plan to be operational. However, due to unviable economics, the gasification component had to be dropped.

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
	applications that are operational by EOP. • Number of enterprises that locally produces stoves by EOP.	0 0	2 5	0 6		
Component 3: Capacity building and knowledge management						
Outcome 3: Improved knowledge, awareness and capacities of policy makers, financiers, suppliers and end-users on benefits and market opportunities for modern biomass energy technologies	• Number of participants trained in different aspects of biomass energy such as policy, financing, technology & market mechanisms by EOP. • Number of relevant stakeholders whose skills and knowledge have been increased in assessing, implementing & operating BETs by EOP.	0 0	200 20	>1,300 125	**HS**	More than 1,300 stakeholders trained in different aspects of biomass energy such as policy, financing, technology & market mechanisms. International Symposium on RE conducted in 2015, with 100 participants. A Special stakeholder meeting with District SRBE Focal officers was held in 2015 to discuss progress and challenges related to SRBE project and train them on improves BETs (25 participants).
Output 3.1: *Established and operational Knowledge and Learning Platform for Bhutan from where documented project lessons and best practices are disseminated*	• Knowledge & Learning Platform for Bhutan existing within DRE and operational within Year 1, month. • Number of workshops and seminars conducted on BETs and biomass resources each year. • Number, quality & frequency of information packages prepared and disseminated each year.	0 0 0	1 2 6	0 2 15	**MU**	In principle, during the dissemination of improved stoves specific awareness activities were conducted among users in all 20 districts. In addition, the Project has made available a website and use of social media (like Facebook and Youtube). But although several workshops and information activities were provided, the *Knowledge & Learning Platform* was not available at the TE review and is not likely to be available at EOP. This is regarded moderately unsatisfactory, since the Platform is to be considered crucial element for replication of project results and know-how developed under SRBE.

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
Output 3.2: *Rural development planners trained on integrated rural energy planning and biomass resource assessment*	• Number of participants trained on integrated rural energy planning and biomass resource assessment by EOP.	0	40	46 – in country 14 – Ex country	**HS**	Sensitization of Dzongdags and Gup by DAHE Training of district planning officers and education officers Training of NGO officials/technicians Awareness tour on briquette technology to India and Thailand conducted (7 participants)
Output 3.3*: Project developers and micro-entrepreneurs trained on different aspects of BETs*	• Number of agencies, project developers and micro-entrepreneurs trained on different aspects of BET applications & services by EOP. • Number of micro-entrepreneurs involved in start-ups & BET production by EOP.	0 0	25 10	40 6	**S**	Workshops were held in 2013 and 2014 on efficient cook stoves and BET were attended by fabricators, saw millers, government, and NGO representative; Project Implementers trained on integrated rural energy planning at BSM, Thailand; Overall target in respect to stakeholder participation (at least 25) was achieved
Output 3.4: *Communities and institutions trained on the installation and maintenance of biomass gasifiers, biodigesters and energy-efficient cook stoves/ furnaces*	• Number of representatives of communities & institutions trained on the installation, operation and maintenance of biomass gasifiers, briquetting machines and energy-efficient furnaces/stoves by EOP.	0	50	334 NFEIs, 28 BAoWE officials in 17 Dzongkhags 16 technicians	**HS**	Trained 334 (121 male and 213 Female) Non Formal Education Instructors (NFEI) in 16 Districts on improves cook stoves / heating stoves out of which 63.77 % were women. No trainings on gasifiers or bio-digesters conducted within the Project; Trained 78 (60 male and 18 Female) technicians by Bhutan Association of Women Entrepreneur (BAoWE) in Zhemgang, Tsirang and Dagana Districts; Trained 16 (15 Male and 1 Female) technicians by Tarayana Foundation in Sarpang District; Refresher course in Trashigang completed; Training of private sector (metal fabricators) in heating stoves completed.
Output 3.5: *Completed specialized Training of 100 Trainers on community forestry*	• Number of trainers trained on community forestry & sustainable forest wood energy by EOP.	0	100	2	**S**	Target of 100 trainers was too high and not realistic compared to budget provision/allocation. The budget allocated was sufficient for only 2 officials.

Project Strategy	Indicator	2009 Baseline Level	2015 End of Project Target	2016 End of Project Status	Achievement Rating	TE Comments
and sustainable forest wood energy	• Number of trainings carried out by the trainers that received specialized training on community forestry & sustainable forest wood energy by EOP.	0	50	878		Trained 878 community forest management group members on sustainable fuel wood plantation with 37% female representation ToT training completed by SFED (In China). In total, this output has been satisfactorily achieved.
***Output 3.6**: Completed site visits to successfully operated BET applications and dialogues with policy makers, regulators, technology developers, entrepreneurs and financiers*	• Number of participants to site visits to successfully operated BET applications in India, Thailand or Cambodia as well as to full scale demonstration sites in Bhutan by EOP. • Number of participants to International symposia in Bhutan to meet counterparts from countries with more developed RE Policies by EOP. • Number of solutions exchange supported solutions to issues raised by Bhutanese entrepreneurs/experts	0 0 0	10 50 5	22 46 2	**S**	Study tour for Project Management Team (DRE, SFED, and DAHE) completed (Thailand and Cambodia); Inspection and testing of stoves including training completed at AIT, Bangkok; Site visit/study tour for project staffs (DAHE, Tarayana, BAoWE and DRE) in Nepal completed; Study tour for PB members to Laos on role of energy on mitigating climate change completed. Study tours can be counted as contribution to achievement of final indicator

4.3.2 Relevance

The key criteria for assessing the project relevance have been defined in the UNDP guidance for terminal evaluations[8] as follows:

- the extent to which the activity is suited to local and national development priorities and organizational policies, including changes over time;
- the extent to which the project is in line with the GEF Operational Programs or the strategic priorities under which the project was funded.

Further it is noted that, retrospectively, the question of relevance often becomes a question as to whether the objectives of an intervention or its design are still appropriate given changed circumstances.

The project was approved for funding under the Climate Change Strategic Program 4: "Promoting sustainable energy production from biomass" of the Focal Area Strategies and Strategic Programming for GEF-4. As successful outcome for this strategic program "the adoption of modern and sustainable practices in biomass production, conversion and use as energy" with indicators such as *"tons of CO_{2e} avoided; the adoption of modern biomass conversion technologies, improved efficiency of biomass energy use, kWh of electricity and heat generated from biomass sources, and energy services produced on the basis of biomass"* were listed, while also emphasizing the need to ensure *"that biomass energy use is sustainable and does not, therefore, contribute to deforestation, reduced soil fertility, or increased GHG emissions beyond project boundaries."* The topic and the stated targets of the project are in accordance with this expected outcome and the principles outlined above have been fully respected in the project design.

As mentioned above, the Project fits the objectives of Bhutan's national development priorities, the UNDAF, and MDGs. consistent with Bhutan's policies reflected in the 10th Five Year Plan, National Poverty Reduction Strategy Program, Renewable Energy Master Plan and the draft Renewable Energy Policy. Bhutan is a Party to the United Nations Framework Convention on Climate Change (UNFCCC), having ratified it on 25 August 1995. Bhutan is eligible for technical assistance from UNDP, and this Project is endorsed by the Gross National Happiness Commission of the Royal Government of Bhutan.

Rating:

By taking into account all of the above and as further confirmed by the interviews during the TE mission as well as by the observations of the project mid-term evaluation, **the project can be considered as relevant (R)** addressing some key barriers to result in a reduction of annual biomass/fuel wood consumption in Bhutan through the gradual utilization of biomass-based energy systems and efficient use of biomass for cooking in households, while also contributing to the national strategic priorities in the energy and environmental field together with those of the UNDP and the GEF. No such changes have taken place in the project environment and other circumstances during its implementation either that would have diminished this relevance.

4.3.3 Country ownership

As already discussed in chapters 4.1.7 and 4.1.8, the project design is consistent with the national development plans (especially 10th and 11th Five-Year Plan) of the RGoB. The importance and benefits of the project and increased focus on energy efficiency for cooking and heating purposes within rural households, together with its benefits of improved indoor air quality and overall health were also unanimously emphasized in all stakeholder interviews conducted during the evaluation mission.

As evidenced by the annual Project Implementation Reviews as well as by the minutes of the Project Board meetings, the country representatives both at the governmental level as well as CSOs/NGOs and few private sector entities have actively participated in the project implementation and decision making. The Project Board has been consulted on all important decisions and approval sought before the final decision. The composition of the Project Board can be considered as adequate by taking into account the scope of the project.

Overall, the main governmental stakeholders (most of them involved in the PB anyway) have expressed during individual meetings their full satisfaction and positive experiences made under the umbrella of the SRBE Project, and concluded at the presentation of the TE mission results that a continuation of national activities to promote

[8] http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf

the further distribution of ICS/HS and support mechanisms for engaging private sector in BET replication on the Bhutanese market shall be sought.

4.3.4 Mainstreaming

UNDP supported GEF financed projects are key elements in UNDP country programming. As such, the objectives and outcomes of the project should align with UNDP country programme strategies as well as to GEF-required global environmental benefits as outlined in global environmental conventions.

The UNDP Guidance for Terminal Evaluation therefore requires an assessment to what extent the project is "*mainstreaming other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and women's empowerment"*.

In 2008, Bhutan adopted the latest approach for enhancing UN coherence on a voluntary basis, known as Delivering as One (DaO). The approach aims to increase the effectiveness and impact of the UN through more coherent programmes and reduce transaction costs for Implementing Partners. The United Nations Development Assistance Framework (UNDAF) is the key instrument for enhancing UN coherence at the country level. It is the strategic document of the United Nations Country Team (UNCT) in its efforts to contribute more effectively to national development priorities and describes the collective response of the UN system to the priorities laid out in the Five Year Plans (FYP) of the Royal Government of Bhutan (RGoB).

The current UNDAF was fully aligned with the 10th Five Year Plan and the UN Country Team chose to extend the current cycle by one year to bring it in line with the planning cycle for the 11th Five Year Plan. The new One Programme is fully aligned with the 16 National Key Result Areas of the 11th FYP and is structured around the four pillar of Gross National Happiness (GNH).

The overall SRBE project focus is in line with the **One Programme Monitoring and Evaluation (M&E) Framework:**

- **UNDAF Outcome 1: By 2018, sustainable and green economic growth that is equitable, inclusive, climate and disaster resilient and promotes poverty reduction, and employment opportunities particularly for vulnerable groups enhanced.**

  "*Output 1.1: Policies and studies for integrated natural resource management, climate change adaptation/ mitigation and poverty-environment nexus developed"* (especially referring to the indicator *"1.1.2 Number of households using fuel-efficient stoves for cooking/heating"),* furthermore with "Output *1.2 National and local institutions and individuals are better prepared and able to respond to and reduce climate change induced and other disaster risks*", with "*Output 1.5: Youth, women and other vulnerable groups have access to sustainable employment with a focus on cottage, small and micro enterprises in line with the RGOB's commitment to a green economy*" and with "*Output 1.6: The rural poor and under-employed have access to alternative income generation opportunities*."

And also to some extent with other outcomes:

- **UNDAF Outcome 2: By 2018, increased and equitable access, utilization and quality of inclusive essential social services for all with a focus on sustaining the MDGs and addressing emerging challenges.**
- **UNDAF Outcome 3: By 2018, communities and institutions strengthened at all levels to achieve enhanced gender equality, empowerment and protection of women and children.**

Gender mainstreaming—as a process and as a strategy—is used by the UN in Bhutan to promote gender equality and women's empowerment across all outcome areas. The UN wants to ensure that gender mainstreaming is central to all its activities—from policy development, research, advocacy/dialogue, legislations, resource allocation, and planning, implementation and monitoring of programme, projects and activities.

The project has been included by UNDP CO in the Gender Mainstreaming Initiative under which it set 3 goals for the Gender Action Plan. These goals were:

- At least one women in every cook stove owning household trained in basic O&M of improved stoves
- Improved health of women and children by use of the improved stoves
- Both men and women will participate actively in the fuel wood plantation and management.

The project has had the mandate to train a number of technicians and community members on construction of stoves and on sustainable fuel wood plantation, from which at least one-third were expected to be female. Through this gender mainstreaming exercise the project was successful in surpassing its gender target. The project

has achieved 36% of the total participants in plantation programme as women. The Project has also encouraged women participation in the construction of improved stoves and 54% are women technicians. Women were always given highest priority in this project and they played key role for successful implementation of stove project. The NFEIs and NGO technicians were provided with an opportunity to create awareness on improved stoves and render technical assistance to the end users. In turn, they would have earned some money for travelling to project sites and hence benefitting themselves since they come from low income group. With the implementation of energy efficient stoves, the livelihood of the women is greatly enhanced, since they are less exposed to smoke and better sanitation are being maintained.

The project has brought about significant positive impacts on the lives of people in rural Bhutan. The dissemination of fuel-efficient cook stoves in rural Bhutan has not only enhanced health and sanitation in households, but will in the long-term also result in the reduction of greenhouse gas emissions. The project has, so far disseminated 13,210 stoves across the country and the feedback provided by beneficiaries is very encouraging.

Gender stereotypes with respect to household tasks and responsibilities was still found to be prevalent; cooking is almost entirely carried out by women, requiring on average about 4 hours a day for cooking using a TCS.

4.3.5 Sustainability

Sustainability is generally considered to be the likelihood of continued benefits after the project ends. Consequently, the assessment of sustainability considers the risks that are likely to affect the continuation of project outcomes.

Considering *sustainability* within UNDP supported GEF financed projects, the GEF guidelines establish four areas for considering risks to sustainability, each of which should be separately evaluated and then rated as to the likelihood and extent that they will impede sustainability of the project outcomes. These risks include:

1) financial risks,
2) socio-economic risks,
3) institutional framework and governance risks; and
4) environmental risks.

The following rating is applied in evaluating the Project's sustainability prospects:

- 4 = Likely (L): negligible risks to sustainability;
- 3 = Moderately Likely (ML): moderate risks to sustainability;
- 2 = Moderately Unlikely (MU): significant risks to sustainability; and
- 1 = Unlikely (U): severe risks to sustainability.

The overall rating is equivalent to the lowest sustainability ranking score of the 4 dimensions. Referring to the dimensions of sustainability presented in the paragraphs below, the overall prospects of sustainability of the SRBE Project are considered to be <u>moderately likely</u>.

4.3.5.1 Financial risks to sustainability

In line with the development of a Roadmap to support BET market uptake and promotion of energy efficiency technologies across the country, there is also the financing question to be solved in the future. A major risk looking forward after project termination is therefore the non-availability of funding and financing means to support further installations of efficient stoves in Bhutan.

The financial risk has been already addressed within the MTR mentioning about the absence of RGoB funding under the current 11th Five-Year Plan to support the implementation of improved cook stoves after EOP. While the project was to develop and deploy (under output 2.2) fiscal incentives, such as smart subsidies, to enable market mechanisms to be introduced for BET applications, the resulting subsidy scheme was applied with a focus on the co-funded SRBE project, yet without a clear strategy on how financial sustainability should be achieved in the future.

Nevertheless, the institutional arrangements created under the Project involving DRE and DAHE, and SFED, MoAF, are well positioned to support the ongoing efforts if incremental funds will be made available from RGoB or other sources to continue the work on improved cook stove installation targeting remaining low income households in the rural areas.

To achieving financial sustainability, a pure subsidy-based scheme is not mandatory for a successful BET program, if e.g. improved stoves are affordable even to the rural poor. As the experience from SRBE shows, low-cost stoves can be achieved if they are built mostly from locally available materials. Using funds for capacity building and motivation rather than subsidizing stoves or their components would help develop a sustainable system whereby users were willing to pay the full costs and purchase cook stoves for their benefits.

In regard to the financial risk the Project sustainability is therefore considered to be moderately likely.

Likely	Moderately Likely	Moderately Unlikely	Unlikely
	ML		

4.3.5.2 Socio-economic risks to sustainability

The Project was promoting the idea to make improved stoves available to rural population at a low cost. The stoves were delivered at a subsidy but villagers had to mobilize the remaining cost of the stoves and contribute their work force for free. Nevertheless, the rural poor with no or few means of earning cash would find it difficult to mobilize money to pay for the cost of the stoves. Although it was initially considered in the ProDoc to provide credit through the Bhutan Development Finance Corporation and micro-finance institutions being initiated through the RGoB's support, the poor would still not be able to access credit because of the need for collateral as a pre-requisite for taking loans.

In addition, most of the installations and capacity-building activities (in 16 districts) were conducted and supervised by NFED, DAHE, District Education Offices and the NFE Instructors. Their experience and involvement were all in all very positive and enriching, and it is also believed by NFED and DAHE were successful in achieving their targets. However, NFED/ DAHE considering the main mandate of NFED being focussed on vocational education and increasing adult literacy rate, further involvement of NFED/DAHE structures in the future is expected, if at all, at a much lower level. Their scale of involvement would need to be marginal, shorter time period or mostly focused on education and advocacy component, which provides a general risk on how to ensure on-site support and instructions to villagers on the implementation of efficient stoves.

In line with the rating provided in the MTR, the sustainability in regard to socio-economic risks is to be considered moderately likely. The main reason for this is that the cost of re-designed cook stoves have been significantly reduced (by approx. 75% of the original cost) and construction of cook stoves in village is carried out using locally available resources and in-kind contribution of the household. The main cost associated with the cook stove is that of the fabricated metallic parts and delivery from fabrication shop to the village. Currently the project activities do not lead to an assumption by EOP which ensures that supply of cook stove part would continue especially in the rural areas to those who are willing to bear the cost, although fabricators of metallic parts have expressed continued interest from the market and their readiness to supply materials in the future.

Rating:

Likely	Moderately Likely	Moderately Unlikely	Unlikely
	ML		

4.3.5.3 Institutional Framework and Governance risks to sustainability

As mentioned in chapter **Error! Reference source not found.**, with assistance from the Project, the draft RE Policy w as supposed to be detailed within a Roadmap for the promotion of sustainable biomass production and utilization, requiring the Policy to be incorporated into a set of appropriate legislations and regulations so that the Policy would take on a legal status and allow proper monitoring of the effectiveness of its implementation. The initially foreseen development of a Biomass Roadmap has been going to be covered under the Renewable Energy Master Plan (under finalisation), however, without having the coherent & comprehensive RE Policy in place by EOP, the Project is running risk to not achieve progress on the framework conditions to promote biomass energy technologies.

In addition, although several workshops and information activities were provided, the Project is not to come up with the foreseen *Knowledge & Learning Platform*. This is regarded moderately unsatisfactory, since the Platform is to be considered crucial element for replication of project results and know-how developed under SRBE.

All in all, the sustainability in regard to institutional framework and governance related risks of SRBE are considered moderately likely. This is due to the institutional commitment involvement of DRE, MoEA, Ministry of Education, district and community level officials as well as CBOs and NGOs in the rural-level implementation of efficient stoves. The future dissemination of improved stoves to rural households is likely to be further supported local and regional stakeholders, which keeps the risk on a moderate level. However, the Project should have used more resources to ensure that capacity building and knowledge management be better consolidated so that practitioners and professionalists could be further engaged in establishing "communities of practice" and put them to work sharing their knowledge, insights and experience to address specific challenges in BETs adoption and dispersion.

Rating:

Likely	Moderately Likely	Moderately Unlikely	Unlikely
	ML		

4.3.5.4 Environmental risks to sustainability

There is no environmental risk to SRBE sustainability since the project is designed to reduce use of fuel wood in improved cook stoves which are more energy efficient and emit less compared to conventional three-stone cook stoves. This is consistent with RGoB's strategy to limit the energy demand by adopting and using efficient technologies.

In a future consideration of a governmental and/or private-sector supported initiative to distribute more efficient stoves and increasing the production of wood briquettes – thus removing the adverse environmental effects of sawmill disposal – the environmental risk associated to sustainability is expected to remain low.

The sustainability of the Project in respect to environmental risks is therefore likely.

Rating:

Likely	Moderately Likely	Moderately Unlikely	Unlikely
L			

4.3.6 Impact

The SRBE Project is providing significant impact on some of the main issues addressed in the design of this UNDP/GEF initiative:

- **Reduction of fuelwood consumption for cooking and heating in rural households**
  The SRBE Project has been very relevant for Bhutan since it is one of the countries with high per capita domestic fuel wood consumption (about 1.17 tonnes per person per year). With a total 70 percent of the population living in rural areas, fuel wood is still the main source of energy for cooking, heating and preparing fodder for animals. The inefficient fuel wood consumption has been contributing to high rate of deforestation and forest degradation, high levels of indoor air pollution and greenhouse gas (GHG) emissions.

  The Project is likely to achieve its revised reduction targets concerning fuelwood use and corresponding GHG emissions reduction. The impact of the activity on the overall project objective is therefore obvious, and potential to further expand the stoves in more households across the country will increase the impact.

  For the future programming of activities, two elements are suggested to be considered in regard to stove distribution and thus increasing their impact (refer also to recommendations provided at the end of this report): (1) Regardless of the technology of the stove, encouraging community participation in design, implementation, and monitoring of stoves will help increase ownership, ensuring sustainability. (2) The proper use and maintenance of stoves is important to maintaining the efficiency of the stoves. Thus, awareness programs need to be continued and enhanced in the future.

- **Reducing indoor air pollution caused by the inefficient burning of solid biomass cooking fuels**
  Extensive scientific research has consistently documented the ill-health effects of breathing smoke from biomass fuels commonly burned in the developing world for cooking and heating. The adverse effects of polluted air are a major concern because so many people are exposed daily to high levels of pollution in their homes. The World Health Organization (WHO) estimated that 2.4 billion people worldwide (up to 30 percent

of global population) rely on burning biomass fuels for cooking and heating their homes. People in the developing world are disproportionately exposed to polluted air due to use of biomass fuels for cooking and heating.

The SRBE project has been able to raise the issue of health impacts to beneficiaries, mainly women and children spending most of the time in rural houses and therefore suffering most of air pollution. However, since the project was mainly focussed on the technical aspects of developing and distributing more efficient stoves across the country, the actual health benefits have not been properly evaluated yet (e.g. scientific studies and evaluation of health impacts before/after installation of efficient cook stoves). A recommendation to be provided by this TE will be to follow-up such activities by involving relevant stakeholders (e.g. Ministry of Health) in any replication activity, to assess in-depth the effects on the indoor air-pollution and resulting health impacts.

- **Addressing the benefits of improved stoves and new emerging biomass energy technologies to mainly women involved in household kitchen daily routines**
  In Bhutan, like in other South-Asian countries, women play a significant and dominant role within the household cooking sector. Generally, women do most of the cooking and, therefore, are disproportionately affected by household air pollution caused by the inefficient burning of solid biomass cooking fuels. They are also required to spend a significant amount of time and effort collecting the traditionally used biomass fuels, a physically draining task that can take up to 20 or more hours per week.

  The project has achieved significant participation of women in different activities, education and capacity building (NFE instructors and representatives from CBOs like Tarayana and BAoWE) and participation in the construction of improved stoves. Women were always given highest priority in this project and they played key role for successful implementation of stove project. The NFEIs and NGO technicians were provided with an opportunity to create awareness on improved stoves and render technical assistance to the end users.

  With the implementation of energy efficient stoves, the livelihood of the women is greatly enhanced, since they are less exposed to smoke and better sanitation are being maintained. Most importantly, women and children's precious time is saved from collecting firewood, thereby ensuring their security and their time can now be used in other productive activities. Women are being empowered as they are engaged in creating awareness and decision making regarding BETs in rural gatherings and through such activities some village technicians are even aspiring to participate in local government elections.

- **Increasing awareness and education of rural villagers and potential users of BET applications in regard to their major benefits (fuelwood reduction, health impacts, gender-related roles and issues concerning cooking behaviour)**
  Based on experiences and feedback received from rural villagers (selected statements from TE mission site visits, conducted between 23rd and 27th July, 2016[9]), the impact of information and increased awareness is significant, because many observations made were very positive in respect to the use of improved cook stoves:
    - Households experienced better indoor air quality and consumed less fuelwood.
    - However, there were also households that mentioned the fuel wood demand to increase, but assumed by evaluation team mainly due to improper use of the stoves (e.g. doors opened). In several cases the fuel wood availability was not a concern for households.
    - Majority of households mentioned that they used the stoves basically every day for heating water and cooking fodder for cattle, also by using the 2-Pot Stoves.
    - Roughly one 1/3 of households mentioned they do not use the 2-Pot stove in the morning, as it is too slow to heat up while the three-stone fire is faster.
    - Households were generally satisfied with improved 2-Pot-Stoves. Even though they had to use their relative for construction and not the local technicians they were positive about the stove.
    - The general observation by households is that when they use small branches and twigs the fuel wood consumption in the ICS is higher, but when they use larger wood pieces or logs the efficiency is definitely higher in the ICS.
    - Another advantage of the ICS is that pots remain fairly clean compared to the traditional 3 stone stoves.
    - Stoves in most cases are used only occasionally for mass cooking and daily for cooking fodder.

[9] See mission agenda in Annex 1 for locations and districts visited

- Beneficiaries are highly satisfied with the cleanliness of the kitchen and the stove's utility in winter for both heating homes, water heating and heat retention.
- An additional benefit of the improved stoves that was highlighted was the fire disaster risk reduction. With the ICS, there is no risk of fire hazard of an unattended cooking or heating which is not the case with previous 3-stone fires in outhouses.
- It was observed in several cases that the chimneys were not out of the roof. Some households claimed to use the smoke for drying food, while others mentioned that they wanted to have the roofs done properly first. Where available, the exhaust smoke did exit the house properly.
- A house visited without electricity felt that an ICS would be of immense benefit for them. They have a traditional stove without chimney in a small bamboo hut with tons of smoke. They also spent a lot of time collecting firewood and lighting fires. The household is only about 400 m away from the main electric line but still not electrified.
- NFEIs had positive experience with the project and loved the opportunity. Trainings were also very practical, good and sufficient. Remuneration were also found adequate.
- NFEIs had mixed support from people with regard to acceptance on building stoves by women. Some appreciated their technical skills, while few were sceptical about a woman building the stove for the house.

Rating:

The overall impact of the SRBE Project is <u>significant</u>, due to the fact that major benefits of improved stoves and other BET applications that have been introduced are been considered for the first time in Bhutan, and do provide a chance for achieving even further benefits for replication programs to be considered in the future.

5 Conclusions, Recommendations & Lessons

5.1 Conclusions

- **The project has benefited from design modifications of the improved cook stoves based on the feedback received from users** during monitoring field visits and in line with the pre Annual Work Plan. The fodder stove has been considered by many beneficiaries as unpractical for use (due to its height and limited space for cooking large fodder pots) and therefore had low acceptance rates. Nevertheless, more than 3,700 stoves have been constructed, and could have been sourced for stove types with higher acceptance rates (e.g. 2-pot cooking stove, heating stove), if monitoring and feedback obtained from users would have been available.
- **Implementation of two further improved designs of cook stoves took off during the final SRBE project period.** Namely, the *Bhutan EcoStove 2015* (BES 2015) replacing the improved cook stove and the *Bhutan Multipurpose Stove 2015* (BMS 2015) replacing the fodder stove were designed, tested and were provided for implementation. The procurement of metallic parts for about 1,122 BES/BMS was completed, and the delivery to sites was under progress. It is anticipated that the construction of these stoves will be completed by December 2016, in Samtse, Sarpang, Tsirang, Pemagatshel and Lhuentse districts. This activity is also in line with the decision of the Project Board and the Annual Work Plan and will finally bring the total number of installed stoves to about 14,179.
- **Co-operation with NGOs/CSOs have proved to be crucial for success of SRBE project.** For the implementation of improved cook stoves programme in 4 districts, NGOs such as Bhutan Association of Women Entrepreneurs and Tarayana Foundation were involved in the rural areas. Tarayana Foundation was also engaged in implementation of Bhutan EcoStoves programme in Samtse, Sarpang, Tsirang, Pemagatshel and Lhuentse districts. The above organizations were key stakeholders in achieving the successful capacity-building and training/awareness activities as well as those properly managing the dissemination of cook stoves – by identifying the beneficiaries of the stoves and adequately provide technical support in construction of energy efficient stoves.
- **Co-operation with private sector entities to construct briquetting plant was halted for long time but finally financing agreements were reached**. The modalities for the implementation of one larger (instead 3 smaller-sized) briquetting plant to utilise sawdust from local sawmills have been delayed due to negotiations about funding from the Project and co-financing required from saw millers. Only after 7 promoters agreed to step in with additional own funds, the Bhutan Briquette Pvt. Ltd was founded, in association with the Bhutan

Association of Wood Based Industries. While construction of the briquetting plant at Khasadrapchu, Thimphu was ongoing throughout the TE, putting into operation was scheduled to the end of quarter three 2016.

- **The Social Forestry and Extension Division, Department of Forests & Part Services, Ministry of Agriculture & Forests, was successfully engaged in the plantation programme across the country.** The SFED has involved Community Forest Management Groups (CFMG) in planting trees in the barren land and nurturing the planted trees to increase survival rate. Under the sustainable fuel wood plantation programme, the SFED has brought 111 hectares of degraded land area under sustainable fuel wood plantation. The project has also trained 878 community forest management group members with 36% of participants being women.
- **The project has been included by UNDP CO in the Gender Mainstreaming Initiative and has achieved significant participation of women in different activities**, education and capacity building (NFE instructors and representatives from CBOs like Tarayana and BAoWE) and participation in the construction of improved stoves.
- **Quality issues with suppliers have led to delays in the implementation phase.** A major problem in the project progress and its implementation was the failure by the supplier (M/S S Dorji Fabrication Unit) in supplying the metallic parts for Trashigang, which had led to a complex arbitration and legal case for the PMU. The supplier had failed to deliver the metallic parts on time and also had quality issues. The case had been resolved after two years as of August 30, 2016 after penalizing the supplier for his failure and all cost taken care as per the contract terms and conditions.

  But more than the legal battle and its implications to various people, the major impact however, was on the project's work schedule as the piloting of the initial design of stoves were not possible due to that. Therefore, the PMU instead of having a pilot in Trashigang, as envisaged earlier, went ahead and rolled out the ICS implementation in all the 20 Dzongkhags. The reason for doing this was to catch up on the time loss due to the failed supply, which makes perfect sense. Unfortunately, whether the newly improved stoves – BES 2015 and BMS 2015 could have been implemented instead of the 2-Pot/3-Pot or the Fodder stove in the 19 Dzongkhags is only to been seen after the implementation of the new designs by Tarayana.

5.2 Recommendations

With the GEF-funded SRBE project terminating on December 31, 2016, the following recommendations are provided in regard to corrective actions in the design of succeeding Project activities and proposals for future follow-up actions. Some of the recommendations are coming from the MTR being considered still valid (or not properly been addressed during the second part of project implementation), while others are added based on the final review and overall achievements of the Project made towards the termination date (in fact about 3 months remaining for last implementation activities).

Corrective actions for the design, implementation, monitoring and evaluation of the Project:

- **Appropriate MRV system** to be included in all projects of such dimension. The Project shall be continuously monitoring its main indicators, in the case of SRBE referring to fuel consumption, heat generation and related GHG reduction data from the newly installed improved stoves. The developed Bioenergy Database provided on the project website (http://bioenergy.gov.bt/biomass/public/biomass/index/index) could have been extended in its functionality to link the number of installations with the indicators fuel consumption/reduction against baseline and corresponding GHG emissions. Efforts towards this direction were started during the final evaluation, but would have been worth starting already earlier. Additionally, the **Project's monitoring and continuous reporting of progress** on the output/activity level (against planned versus achieved tasks provided in the logframe) shall be consistently reviewed and progress reported (in more detail).
- **Calculation of GHG emission reductions related to carbon capture from lower fuel wood use and afforestation/plantation programmes**. Considering the combined effect of the community forestry for carbon sequestration and efficiency improvement, the overall post-project GHG emission reduction benefit from SRBE is envisaged to be better than originally estimated during the project design. Therefore, as mentioned already in MTR, the Project could have taken the opportunity to work with SFED and other stakeholders (e.g. NEC being responsible for providing the National Inventory and monitoring of the country's GHG emissions) to factor in the contribution of the project in reducing greenhouse gas emissions from as a result of direct intervention made due to community forestry plantations. Studies have showed a high rate of CO_2 absorption by the plants during the first 10 years. The use of standard methodologies of IPPC and UNFCCC to estimate GHG emission reductions from forestry activities (mainly afforestation/plantation programmes)

is a recommendation for the stakeholders to further pursue, throughout the termination of the SRBE project or follow-up activities thereafter. Reference materials and calculations are provided within the IPCC's 'The Good Practice Guidance for Land-Use and Land Use Change and Forestry'[10], and UNFCCC's CDM 'Methodology on Afforestation and reforestation of lands except wetlands' (AR-ACM0003)[11].

- **Develop a "Lessons Learnt Report" for in-country dissemination.** As a follow-up or concluding activity, although not planned, it is recommended that the PMU is to compile and disseminate across the main project stakeholders "lessons learnt" from the Project to contribute to the project's knowledge management, learning and information dissemination strategy. An analytical, thorough and, as required, also critical report summarizing experience and findings of the Project achievements and conclusions for future action would highly benefit the country activities and UNDP's country engagement. As a part of that, an analysis of the efficient stoves implementation program, the briquetting plant's operational achievements and results concerning capacity-building, training and awareness shall be considered in such compilation. Excerpts of such "Lessons learnt" review shall be considered for public dissemination.

- **Project to provide grounds for continued awareness programs on efficient stoves and their benefits.** While the project had a focus on awareness-raising and building capacity among villagers and household owners related to the benefits and use of improved cook stoves / heating stoves, the sustainability of the Project could be enhanced by foreseeing further (continuous) activities on a country-level to increase the awareness of the population and the user behaviour. The initially foreseen development of a *"Knowledge and Learning Platform"* should encompass also a public awareness strategy. PR elements to be foreseen are the use of different media, e.g. video program on national TV, radio, and social networks (WeChat/Facebook), mainly on following aspects: benefits of improved stoves, correct use of stoves, correct placement and installation of chimney, correct way of working with the regulating knobs and also on the benefits of keeping the stove door shut. An awareness program on TV/ Radio/ Social network such as WeChat and Facebook by DRE team would be good for the general users to understand the concepts and manage the stoves themselves.

  On another end, preparation and implementation of awareness education on benefits and use of ICS to schoolchildren in the project sites. This activity may be initiated as a workshop by the NFEIs in the areas to the local schools for a day.

Proposals for future directions underlining main objectives

- **Quality Assurance Mechanism for improved stoves required.** While different organizations outside the country are able to carry out field testing of improved stoves, there is lack of a uniform national testing methodology. Actually, there is no institution responsible for testing stoves to determine if they actually perform as claimed by those promoting them. Claims of efficiency, pollution reduction, and durability are not actually tested by objective, outside groups. This is especially relevant for the newly introduced Bhutan EcoStove 2015 (BES 2015) and the Bhutan Multipurpose Stove 2015 (BMS-2015).

  In the long-run, DRE as the Renewable Energy and Energy Efficiency nodal agency could also initiate discussions on establishment of a code of conduct/standard for open or 3-stone fires across the country using fuel wood. This should be framed and implemented with relevant agencies such as Forestry Department, Local Governments and Ministry of Health. Once a national standard on limiting of open/ 3-stone fires are made then user would shift from the traditional open fires to improved stoves as fuel wood reduction is not their priority right now.

- **Indoor air pollution and other health issues being further considered in the design of stoves programmes.** The 'Multisectoral National Action Plan for the Prevention and Control of Non-Communicable Diseases', which was approved by the RGoB in 2015[12], has called for specific measures to promote health and reduce associated risks. Under action area 2.6., the Ministry of Health (MoH) being the leading agency together with DRE is to establish standards for indoor air quality promotion, monitoring, and identify communities with exposure to poor indoor air quality and educate communities. In order to link the issue of associated health risks with quality of improved cooking and heating stoves, testing of stoves in regard to efficiency gains (e.g. related to fuelwood use) but also indoor air pollution effects need to be performed and incorporated into national standards for improved stoves.

[10] Report is available on http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf
[11] Methodology is available on https://cdm.unfccc.int/methodologies/DB/C9QS5G3CS8FW04MYYXDFOQDPXWM4OE
[12] Refer to http://www.health.gov.bt/wp-content/uploads/moh-files/2015/12/The-Multisectoral-National-Action-Plan-for-the-Prevention-and-Control-of-NCDs-2015-2020.pdf

- **Appropriate design facilities and national research for new BET.** Likewise, the above mentioned limited testing methodologies available in the country, there are also limited appropriate design facilities and research centres conducting research and development of new cook stove designs. Mostly, these activities have been limited to DRE's engagement and the availability of donor-led programs (e.g. UNDP/GEF, but previously Austrian government). Women's involvement within design facilities and research institutions has generally been very limited.

  Regardless of the technology of the stove, encouraging community participation in design, implementation, and monitoring of stoves will help increase ownership, ensuring sustainability. Stove designs should be based on cooking needs. As the primary users of cook stoves, women have better knowledge about their needs and should be involved more systematically within the entire market system of ICS. Women's perspectives could play a central role in product design, quality assurance, research, capacity building activities, and increasing access to finance. Thus, it is important to include household level research to assist with designs of improved stoves, making them more user friendly.

- **Enhance the support of capacity-building and skills programmes for beneficiaries.** The SRBE project has made big efforts to build the technical skills of rural villagers, also to mention especially the involvement of women, in the production of improved stoves, but it has not included or led to supporting women in establishing new ICS enterprises. To date, there has been a lack of long-term, women-focused training programs or incubation support available especially for women entrepreneurs, and provision of follow-up services and resources to encourage women to be a part of improved stoves and fuel value chains. In addition, women entrepreneurs have limited access to finance. Training and capacity building therefore remain essential components of any future successful BET programmes. Training can be provided to entrepreneurs, program staff, CBOs/NGOs involved in implementation, and end users (especially women) in technology, design, maintenance, and troubleshooting. In order to increase the dissemination of improved household energy technologies and acceptance by users, programmes must develop strategies to provide adequate user training and after-sales service. Such a user-training component should lay particular emphasis on women.

- **Awareness and motivation about BET benefits to be effectively communicated and maintained.** Discussions with consumers typically indicated that they are not aware of the substantial benefits of improved stoves. They are often familiar with the fact that smoke removal leads to less burning of eyes and cleaner pots, but they rarely associate this with long-term health benefits. Bringing about behavioural change by increasing awareness of health issues and the benefits of improved cook stoves could help create a demand approach to improved stoves. Thus, the importance of raising awareness of long-term benefits, such as better health and avoided death, resulting from reduction in indoor air pollution due to the use of improved cook stoves should not be underestimated.

  Villagers and rural households should be made aware of other benefits, such as time savings due to faster cooking, and the development of the rural economy and improvement in the living conditions of the villages. If people are aware of all benefits, the willingness-to-pay for and the acceptance level of improved cook stoves is likely to improve considerably.
  New stoves or products must be effective in removing indoor air pollution and reducing fuel consumption. In this regard, the monitoring of stoves in actual use by households for a significant period of time and having quality products available in the marketplace are essential before embarking on a publicity campaign. As mentioned a few paragraphs above, the possibilities to organise public information campaigns (e.g. TV, radio, and social media) are vast and should be considered in future programmes.

- **Maintenance of stoves**: there does not seem to be a common contact point for the beneficiaries to seek help or complain on technical issues or maintenance-related questions. It might be necessary for future stove suppliers to have a contact number of the concerned office so that people can ask for help. Similar to a help line, but not dedicated and specialized.

- **Financial aspects: ensuring that the promotion of BET in Bhutan is not totally dependent on grant financing and financially sound business models are introduced.** Properly targeted subsidies are fundamental to the sustainability of cook stove programs. Subsidies often create a mind-set of subsidy dependence among households. Cash income obviously is scarce among many households using biomass fuels, and they are often willing to wait for subsidized stoves despite looking at the benefits they provide to them. As subsidized BET are yet limited in quantity, the spread of improved technology becomes self-limiting. In such a situation, subsidized supply of improved cook stoves results in a low market demand and could actually suppress entrepreneurship in the development of new markets. However, the continuation of national programmes with some limited level of subsidies provided could help to promote market development while taking into

consideration the needs of various income groups. Therefore, in the case of Bhutan, it will be important in future to think about a proper subsidy scheme to promote improved cook stoves and combine market development with specific types of subsidies that would promote equity and access to private financing means (e.g. through specific schemes providing guarantees or collateral for private entrepreneurs, introducing micro-financing schemes for women and rural technicians, etc.).

- **Expedite the implementation of briquetting project with private sector saw mills to better understand the future demands of the market for briquettes.** Since the briquetting project has only lately picked up and expected the pilot plant to be operational towards the last 2-3 months of the project only, the benefits achieved on the local market need to be documented before EOP and a strategy be put in place on how private sector, which faces constraints on account of restrictions imposed by RGoB and the banks can be further supported and seek for business models which will be easy to replicate in the future. In addition, as expressed by the AWBI, it is also necessary for existing national environmental standards and procedures to be monitored in the saw mill industry to ensure environmentally unsafe dumping of wood waste.
- **Insurance schemes to help provide more safety and security in project implementation.** The TE evaluators were informed that there were two cases of accidents and loss of a life directly related to the SRBE project. Without knowing the exact details of the cause and situations it is not possible for the TE team to comment on the situation. However, there are experiences from a LDCF-funded NAPA I Project implemented by UNDP and executed by the Department of Geology and Mines in the Lunana Lake mitigation. General Personal Accident (GPA) Insurance was purchased by the project for part-time workers and other officials going on the strenuous 9 days and 2-ways trek and working up at 4500 masl. While SRBE and other projects are not as risky and difficult, there are definitely risk factors involved. Thus, purchase of similar insurance schemes from the local insurance companies can be thought of and approved by the Project Boards/Steering Committees. However, it has to be noted that RGoB officials are considered to be part of the Civil Service Welfare Scheme and it may not be necessary to cover them under any insurance depending on the situation.

5.3 Lessons Learned

- **SRBE Project in line with governmental priorities.** The project was proposed during the 10th FYP 2008-2013 and implemented between the 10th FYP and 11th FYP (2013-2018). The main thrust area for the energy sector in the 11th FYP is "Energy Security for Sustainable Development" The Sector Key Result Areas are "Energy Security Maintained" and "Meaningful and Purposeful Renewable Energy Promoted". The SRBE project is very much in line with this strategy of energy security enhancement, meaningful use of renewable energy, and also GHG emission reduction in line with clean energy choices.

  The 12th FYP plan is currently under preparation. However, it was learnt from GNHC (the planning body) that the SRBE project and related projects are very much in line with the country's philosophy of "Green Development" and "Environmental Protection" while also looking at socio-economic development.

- **Information on fuel wood consumption change initiated by SRBE project.** There were mixed information available about the actual fuel wood consumption across Bhutan. According to a *Kuensel* article of July 17, 2016[13], it mentions that fuelwood consumptions at household levels, both in urban and rural areas have decreased due to grid-electrification, LPG penetration after getting road connectivity and also availability of biogas plants. However, the overall fuelwood supplied by the Natural Resources Development Corporation (NRDCL) show its supply of firewood increased by 1,165 truckloads in the past six years. From 31,176 cubic metres equivalent to 3,896 truckloads in 2010, it increased to 35,826 cubic metres in 2012, and further up to 35,988 cubic metres in 2014. The increase in total fuel wood is attributed mostly to institutions and schools where they do mass cooking using fuel wood.

- **Functionality and appropriateness of the Database website by DRE.** The database had information of the project, list of Dzonkhangs with their respective stoves, pdf copies of all the documents published through the SRBE Project and few other applications. However, the database is limited in terms of mapping or analysis applications. There is no functionality of analysis or mapping. If only static reports and figures these were going to be uploaded it would not have been necessary to set up a database, and used only the Department/Ministry website with a link to the project. Plus, who and how will the database be maintained in future is not certain. There are also frequently reported cases of the system being off-line due to various security breaches.

[13] Refer to article: http://www.kuenselonline.com/firewood-consumption-declines/

- **Importance of local considerations when designing cook stoves.** The initially provided cook stove design by Austrian experts was finally too costly, and thus the major challenge was to convince/attract it to beneficiaries due to their low affordability. A re-design of the cook stove provided through a local Bhutanese consultant resulted in a cost reduction by almost 50%; the new design used local materials in construction and helped to reduce the metallic components, which in turn had brought down the costs significantly. The cost effective solution helped the project to design the financial support mechanism, which allowed for supplying metallic parts cook stove from Project funds, while the beneficiary households were supposed to provide locally made mud bricks and their work force for free.

- **The general experience in implementing pilot demonstration elsewhere has highlighted the importance of location of pilot demonstration site, which requires careful consideration with a preference to logistics and ease of access.** This is based on the fact, and borne out of experience that a pilot faces many unforeseen challenges during its implementation and therefore easy access to its location makes the field monitoring easy and also helps in addressing the issues in a timely manner as they arise, a key to the success.

- **The project implementation faced the challenges of time involved in travelling in the hilly terrain of the country, weather and remote location of villages.** Project activities, choice of intervention locations, workplans, monitoring and budgets should always consider the challenges of working in remote rural areas that can be especially difficult to access during inclement weather.

- **Adequate staffing of the partner agencies involved in the project implementation is important in a national level projects as the amount of coordination required is high.** Frequent changes of staff in DAHE had an adverse effect on the project progress. Project Board must maintain an oversight on the staffing requirement since the project has tight time-line for completing all the activities within 3 years.

- **Financial sustainability of cook stove programmes is a key for future replication.** To achieving financial sustainability, a pure subsidy-based scheme is not mandatory for a successful BET program, as long as improved stoves are affordable to the rural poor. As the experience from SRBE shows, low-cost stoves can be achieved if they are built mostly from locally available materials. Using funds for capacity building, quality assurance during the construction and motivation of users rather than subsidizing stoves or their components would help develop a sustainable system whereby users would be willing to pay the full costs and purchase cook stoves for their benefits.

- **Project's interaction with financial sector stakeholders was poor and requires appropriate strategy while looking into replication.** An in-depth interaction with the banks and other stakeholders in Bhutan's financial sector was not carried out during project preparation. Without full information of the financial barriers the project document and the PPM has few outcomes to provide fiscal incentive and create market for BET. However, in the current situation of the financial market, these are unlikely to be achieved by EOP. The banks in Bhutan have imposed restriction on offering loans to the private sector under the directive of the RGoB to maintain the foreign currency exchange to contain the current account deficit. With the situation likely to continue, the project may not possibly be in a position to extend the fiscal incentives and push for any market linked mechanisms.

- **Implementation support through local stakeholders has been ensured with future replication to be effectively designed.** The project has made implementation arrangements with the help of another RGoB agency DAHE, which has helped in the implementing the key project activities through awareness creation and installations of improved stoves, as the NFEI had strong links with rural population. The implementation capabilities and the support required by DAHE to ensure smooth roll out of cook stoves in 16 districts, however, has been limited and DAHE had confessed that the SRBE project had a negative impact on their core mandate, which is to educate rural population to increase their adult literacy rate. The findings from the field visits of the TE team warrants a strengthening of the role and engagement of CBOs and NGOs in future replication of improved stoves and BET dissemination and monitoring of the use, functionality, spare parts provision and maintenance of the stoves, which was not mandated neither to NFEIs nor to the CBOs involved in the SRBE project so far. Therefore, effective functionality checking and monitoring the use were raised as necessary elements to understand the real benefits and issues in any future replication project.

- **Linkages with other initiatives and programmes are key for maintaining exchange of experiences and know-how.** Since there are similar activities ongoing in countries of the region e.g. Bangladesh, Nepal, or India addressing the issues of efficient fuelwood use, or avoidance of indoor air pollution, linking similar projects and initiatives should be considered. Also, with reference to international donor programs, NGOs' activities or public-private partnerships such as the *Global Alliance for Clean Cookstoves (GACC)* shall be pursued, to

enhance the knowledge about efficient BET at stakeholder levels, from the central government to district administration level, Community Based Organizations and private sector players.

6 Annex

6.1 Annex 1: Mission programme (July 2016)

DATE	DAY	TIME	Office	Persons Met
18/07/2016	Mon		Arrival of IC	
19/07/2016	Tue	9:30 AM	Department of Renewable Energy, Ministry of Economic Affairs, Thimphu	Mewang Gyeltshen, Director, Minjur, Engineer, Chhimi Dorji, Chief, AED.
		11:30 AM	Gross National Happiness Commission, Thimphu	Phuntsho Wangyel, Chief Throwa Tenzin and Tashi Dorji
		2:30 PM	UNDP, Thimphu	Nawaraj Chhetri, Portfolio Manager
		4:00 PM	Bhutan Association for Women Entrepreneurs, Thimphu	Damchae Dem, CEO Nima Lhamo, Project Manager Tshering Pelden, Project Manager
20/07/2016	Wed	9:30 AM	Non-Formal Education Division, Department of Adult and Higher Education, Ministry of Education	Tshewang Tandin, Director General Norbu, Chief Ugyen, and Tenzin Rabgye, Project Focal Person
		11:00 AM	Tarayana Foundation	Sonam Pem, Director, Program Karma Wangchuk, Project Manager
		12:30 PM	Bhutan Trust Fund for Environmental Conservation	Ugyen Lhendup, Chief Program Officer
		2:30 PM	National Environment Commission Secretariat	Tshewang Zangmo, Planning and Policy; Tshewang Dorji, Climate Change Division
		4:00 PM	Department of Forests and Park Services	Pasang Wangchen Norbu, Chief, Social Forestry and Extension Division
21/07/2016	Thu	9:30 AM	Association of Bhutanese Wood Based Industries	Sangay Gyeltshen, General Secretary Passang, Chairman
		11:00 AM	Karma Fabrication	Karma Sherub, Managing Director
		12:30 PM	UNDP, Thimphu	Nar Bdr, Project Manager
		2:00 PM	UNDP, Thimphu	Niamh Coler Smith, DRR; Nar Bdr and Nawaraj Chhetri
		3:00 PM	Thimphu Site visits- Kharsadrapchhu Mewang Gewog and Zanglakha, Genekha Gewog, Thimphu	Briquette Plant site; Tashi Pem, Dago; Dophu and Daw. Tenzin Rabgye (NFED), Minjur (DRE) and Cheki Zangpo (NFEI)
22/07/2016	Fri	8:30 AM	Thimphu to Wangdue	3 Hrs Drive
			Wangdue Site visit – Pasakha village, Gaselo Gewog, Wangdue Phodrang district	Wangdue District Education Officer- Kencho; Tenzin Rabgye, NFED; Palkey and Phub Zangmo NFE Instructors; Phub Tshering; Phub Gyem and Sonam.
23/07/2016	Sat	8:30 AM	Punakha Site visits – Omtekha Forest Plantation	Kezang Jamtsho, Forest Extension Officer
			Barp Gewog- Chimi Pang	Kaka Dem, and Kezang Om
			Yoelwa Kha	Lotey

		3:30 PM	Punakha to Tsirang	3.0 hrs Drive
DATE	**DAY**	**TIME**	**Office**	**Persons Met**
24/07/2016	Sun	8:30 AM	Tsirang to Dagana	2 Hrs Drive
			Drujeygang Gewog. Pang Serbu	Sonam Rinchen; Om Nath, Tsendengang Village Technician
		3:30 PM	Dagana to Tsirang	2 Hrs Drive
			Tsholingkhar Gewog, Drupchugang	Surjey Ram Parajuli; and Dema
25/07/2016	Mon	9:30 AM	Tsirang, Rangthangling Gewog, Dartsha Gang village	Rupa Maya Tamang; and Bishnu Maya Tamang
			Dajay Community Forest, Rangthangling Gewog	D.B. Darlami – Chairman; M.B Rai, member; Nima Tamang, member and Tilak Mongar- Treasurer.
		3:30 PM	Salami, Kilkorthang Gewog	Tshering Yangden (w/o Tshewang Norbu) and Timsina.
26/07/2016	Tue	8:30 AM	Tsirang to Paro	Travel- 7 hrs drive.
27/07/2016	Wed	8:30 AM	Paro – Jukha, Hungrel Gewog and Zhigang, Shari Gewog	Chencho Pem (NFEI); Ugyen Tshering; Peday; Chunda; and Phub Zangmo
		2:30 PM	Paro- Satsam, Tsento Gewog and Nemjo, Lungni Gewog	Sonam Wangmo (Tarayana); Tshering Gyem; Choden,Ugyen Lhaden; and Tshewang Lhamo
28/07/2016	Thu	2:30 PM	UNDP CO	Mission Debriefing
29/07/2016	Fri		Depart, Flight 0730	

6.2 Annex 2: Evaluation Criteria Matrix

Evaluative Criteria	Questions	Indicators	Sources	Methodology
Relevance: How does the project relate to the main objectives of the UNCBD and GEF focal areas, and to the environment and development priorities at the local, regional and national levels for biodiversity conservation in Carpathian mountain grassland ecosystems?				
How does the project support the GEF focal area and strategic priorities?	• How does the project support the objectives of the UNCBD? •Does the project support other international conventions, such as the UNFCCC?	• UNCBD priorities and areas of work incorporated in project design • Level of implementation of UNCBD in Bhutan, and contribution of the project • Priorities and areas of work of other conventions incorporated in project design • Extent to which the project is actually implemented in line with incremental cost argument	• Project documents • National policies and strategies to implement the UNCBD, other international conventions, or related to environment more generally • UNCBD and other international convention web sites	• Documents analyses • Interviews with project team, UNDP and other partners
How does the project support the energy security, environment and sustainable development objectives of the Royal Government of Bhutan?	• How does the project support the GEF CC focal area and strategic priorities?	• Existence of a clear relationship between the project objectives and GEF CC focal area	• Project documents • GEF focal areas strategies and documents	• Documents analyses • GEF website • Interviews with UNDP and project team

Evaluative Criteria	Questions	Indicators	Sources	Methodology
What was the level of stakeholder participation and ownership in project design and implementation?	• How does the project support the environment and sustainable development objectives of Bhutan? • Is the project country-driven? • What was the level of stakeholder participation in project design? • What was the level of stakeholder ownership in implementation? • Does the project adequately take into account the national realities, both in terms of institutional and policy framework in its design and its implementation? • Is there coordination and complementarity between donors?	• Degree to which the project supports national environmental objectives • Degree of coherence between the project and nationals priorities, policies and strategies • Appreciation from national stakeholders with respect to adequacy of project design and implementation to national realities and existing capacities • Level of involvement of government officials and other partners in the project design process • Coherence between needs expressed by national stakeholders and UNDP-GEF criteria	• Project documents • National policies and strategies • Key project partners	• Documents analyses • Interviews with UNDP and project partners
Is the project addressing the needs of target beneficiaries at the local and regional levels?	• How does the project support the needs of relevant stakeholders? • Has the implementation of the project been inclusive of all relevant stakeholders? • Were local beneficiaries and stakeholders adequately involved in project design and implementation?	• Strength of the link between expected results from the project and the needs of relevant stakeholders • Degree of involvement and inclusiveness of stakeholders in project design and implementation	• Project partners and stakeholders • Needs assessment studies • Project documents	• Document analysis • Interviews with relevant stakeholders

Evaluative Criteria	Questions	Indicators	Sources	Methodology
Is the project internally coherent in its design?	• Are there logical linkages between expected results of the project (log frame) and the project design (in terms of project components, choice of partners, structure, delivery mechanism, scope, budget, use of resources etc)? • Is the length of the project sufficient to achieve project outcomes?	• Level of coherence between project expected results and project design internal logic • Level of coherence between project design and project implementation approach	• Program and project documents • Key project stakeholders	• Document analysis • Key interviews
How is the project relevant with respect to other donor-supported activities?	• Does the GEF funding support activities and objectives not addressed by other donors? • How do GEF-funds help to fill gaps (or give additional stimulus) that are necessary but are not covered by other donors? • Is there coordination and complementarity between donors?	• Degree to which program was coherent and complementary to other donor programming nationally and regionally	• Documents from other donor supported activities • Other donor representatives • Project documents	• Documents analyses • Interviews with project partners and relevant stakeholders
Does the project provide relevant lessons and experiences for other similar projects in the future?	• Has the experience of the project provided relevant lessons for other future projects targeted at similar objectives		• Data collected throughout evaluation	• Data analysis

Evaluative Criteria	Questions	Indicators	Sources	Methodology
Effectiveness: To what extent have/will the expected outcomes and objectives of the project been/be achieved?				
Has the project been effective in achieving the expected outcomes and objectives?	• To what extent have/will the expected outcomes and objectives of the project been/be achieved? * Outcome 1: Implementation of strengthened support policies and regulatory frameworks and institutional capacity for adoption of sustainable practices production, conversion and use of biomass resources in Bhutan. * Outcome 2: Implementation of BET applications due to improved confidence in their feasibility, performance, environmental and economic benefits through demonstration projects, market mechanisms and increased private sector participation * Outcome 3: Improved knowledge, awareness and capacities of policy makers, financiers, suppliers and end-users on benefits and market opportunities for modern biomass energy technologies	• See indicators in project document results framework and logframe	• Project documents • Project team and relevant stakeholders • Data reported in project annual and quarterly reports	• Documents analysis • Interviews with project team • Interviews with relevant stakeholders

Evaluative Criteria	Questions	Indicators	Sources	Methodology
How is risk and risk mitigation being managed?	• How well are risks, assumptions and impact drivers being managed? • What was the quality of risk mitigation strategies developed? Were these sufficient? • Are there clear strategies for risk mitigation related with long-term sustainability of the project?	• Completeness of risk identification and assumptions during project planning and design • Quality of existing information systems in place to identify emerging risks and other issues • Quality of risk mitigations strategies developed and followed	• Project documents • UNDP, project team, and relevant stakeholders	• Document analysis • Interviews
What lessons can be drawn regarding effectiveness for other similar projects in the future?	• What lessons have been learned from the project regarding achievement of outcomes? • What changes could have been made (if any) to the design of the project in order to improve the achievement of the project's expected results?		• Data collected throughout evaluation	• Data analysis

Evaluative Criteria	Questions	Indicators	Sources	Methodology
Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?				
Was project support provided in an efficient way?	• Was adaptive management used or needed to ensure efficient resource use? • Did the project logical framework and work plans and any changes made to them use as management tools during implementation? • Were the accounting and financial systems in place adequate for project management and producing accurate and timely financial information? • Were progress reports produced accurately, timely and responded to reporting requirements including adaptive management changes? • Was project implementation as cost effective as originally proposed (planned vs. actual) • Did the leveraging of funds (cofinancing) happen as planned? • Were financial resources utilized efficiently? Could financial resources have been used more efficiently? • Was procurement carried out in a manner making efficient use of project resources? • How was results-based management used during project implementation?	• Availability and quality of financial and progress reports • Timeliness and adequacy of reporting provided • Level of discrepancy between planned and utilized financial expenditures • Planned vs. actual funds leveraged • Cost in view of results achieved compared to costs of similar projects from other organizations • Adequacy of project choices in view of existing context, infrastructure and cost • Quality of results-based management reporting (progress reporting, monitoring and evaluation) • Occurrence of change in project design/ implementation approach (i.e. restructuring) when needed to improve project efficiency • Cost associated with delivery mechanism and management structure compare to alternatives	• Project documents and evaluations • UNDP • Project team	• Document analysis • Key interviews

Evaluative Criteria	Questions	Indicators	Sources	Methodology
How efficient are partnership arrangements for the project?	• To what extent partnerships/ linkages between institutions/ organizations were encouraged and supported? • Which partnerships/linkages were facilitated? Which ones can be considered sustainable? • What was the level of efficiency of cooperation and collaboration arrangements? • Which methods were successful or not and why?	• Specific activities conducted to support the development of cooperative arrangements between partners, • Examples of supported partnerships • Evidence that particular partnerships/linkages will be sustained • Types/quality of partnership cooperation methods utilized	• Project documents and evaluations • Project partners and relevant stakeholders	• Document analysis • Interviews
Did the project efficiently utilize local capacity in implementation?	• Was an appropriate balance struck between utilization of international expertise as well as local capacity? • Did the project take into account local capacity in design and implementation of the project? • Was there an effective collaboration between institutions responsible for implementing the project?	• Proportion of expertise utilized from international experts compared to national experts • Number/quality of analyses done to assess local capacity potential and absorptive capacity	• Project documents and evaluations • UNDP • Beneficiaries	• Document analysis • Interviews
What lessons can be drawn regarding efficiency for other similar projects in the future?	• What lessons can be learnt from the project regarding efficiency? • How could the project have more efficiently carried out implementation (in terms of management structures and procedures, partnerships arrangements etc…)?		• Data collected throughout evaluation	• Data analysis

Evaluative Criteria	Questions	Indicators	Sources	Methodology
	• What changes could have been made (if any) to the project in order to improve its efficiency?			
Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?				
How far have sustainability issues been incorporated in project design/implementation?	• Were initiatives designed to have sustainable results given the identifiable risks? • Did they include an exit strategy? • How does UNDP propose to exit from projects that have run for several years?	Does/did the project have an exit strategy? To what extent does the exit strategy take into account the following: - Political factors (support from national authorities) - Financial factors (available budgets) - Technical factors (skills and expertise needed) - Environmental factors (environmental appraisal)	• Project documents • UNDP, project team, and relevant stakeholders	• Document analysis • Interviews
What were drivers/barriers to make sustainability of project results more likely?	• What issues emerged during implementation as a threat to sustainability? • What corrective measures were adopted? • How has UNDP addressed the challenge of building national capacity on governmental and societal level?	• What unanticipated sustainability threats emerged during implementation? • What corrective measures did UNDP take?	• Data collected throughout evaluation	• Document analysis • Interviews

Evaluative Criteria	Questions	Indicators	Sources	Methodology
Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved energy security?				
Does the project adequately take into account the national realities, both in terms of institutional and policy framework towards reduced environmental stress and enhanced energy security in the country in its design and its implementation?	• Has the project had effect on the policy/institutional framework regarding biomass productive use? • Which aspects of reduced environmental stress or enhanced energy security have been addressed through the project? • How has UNDP integrated these aspects in the design of the project? • Which are the most relevant impacts to take the issue further into future programmatic activities?		• Project documents and evaluations • UNDP • Project team	• Document analysis • Key interviews
Are there any indicators that the project has contributed towards reducing fuelwood consumption?	• Have there been qualitative indicators available that were looking at changing forest use and management practices? • Which indicators where having most effect/impact? • Has there been some monitoring in place to measure quantifiable/qualitative impacts? • Which methods were successful or not and why?	• •	• Project documents and evaluations • Project partners and relevant stakeholders	• Document analysis • Interviews

Evaluative Criteria	Questions	Indicators	Sources	Methodology
Are there any indicators that the project has contributed in strengthening the supply side in particular fuelwood plantations?	• Has there been a visible (quantifiable) expansion of community forests taken place? • Has improvement of social/economic well-being and reduction of pressure on local forest resources been inorporateed into project design? • Which indicators are/were being used to monitor?	• Number of awareness raising activities • Number of population, businesses, stakeholder groups etc. reached throughout awareness and capacity-building activities	• Project documents and evaluations • UNDP • Beneficiaries	• Document analysis • Interviews
How has external project communication influenced the project impact being communicated among national stakeholders and beneficiaries?	• Have proper means of communication been 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?). • How far has expansion of educational or awareness aspects of the project to solidify a communications program taken place?		• Project documents and evaluations • UNDP • Beneficiaries	• Document analysis • Interviews

Evaluative Criteria	Questions	Indicators	Sources	Methodology
How has the project contributed to equality?	• To what extent was the UNDP initiative designed to appropriately incorporate in each outcome area contributions to attainment of gender equality? • To what extent did UNDP support positive changes in terms of gender equality and were there any unintended effects? How did the UNDP initiative take into account the plight and needs of vulnerable and disadvantaged to promote social equity, for example, women, youth, disabled persons?	• Provide example(s) of how the initiative contributes to gender equality. • Can results of the programme be disaggregated by sex? • How has UNDP programmed social inclusion into the initiative?	• Project documents and evaluations • UNDP • Beneficiaries	• Document analysis • Interviews

6.3 Annex 3: Summary of key findings of field visits

DATE	**Office**	**Key Findings**
19/07/2016	Department of Renewable Energy (DRE), Ministry of Economic Affairs, Thimphu	- Overall DRE had a very good experience implementing the project and considers it a success. - All partners were impressive and working relationships have been built with government agencies, local administrations and NGOs. - There were issues with the Stove designs. They have been realized and rectified during the course of the project itself. - DRE now has a set of technical team competent to plan, design and implement RET systems.
	Gross National Happiness Commission, Thimphu	- The Project objectives and goals are very much inline with the National Goals and Sectoral Objectives. This is also relevant for the on-going 11 FYP and upcoming 12 FYP. - An issue of how much wood based cooking stoves are relevant in the current scenario was raised. It has been observed that in many occasions the ICS are used only few times a year. - A cost benefit analysis of promoting fuelwood based ICS VS promotion of electricity-based stoves would also be a worthy study to understand the true benefits. - The selection of appropriate beneficiaries of the stoves was also raised. It was highlighted that the best beneficiaries would perhaps be REAP households.
	UNDP, Thimphu	- UNDP Bhutan is also of the opinion that the project met its objectives although there were some hiccups in the beginning due to various reasons. - The technical issues with stove designs were also jointly identified and improved. - A spinoff benefit of the project was also inclusion of Improved Cookstoves as a strategy in the Action Plan on Indoor Air Quality by the Ministry of Health. - Stressed on the long term strategy/ exit plan of DRE on future support to such initiatives on behalf of RGOB.
	Bhutan Association for Women Entrepreneurs, Thimphu	- BAWOE had thoroughly enjoyed the involvement in the project and value the collaboration. - It was also highlighted that a clean and efficient cookstove and kitchen is of immense benefit to women and children. - There is also more possibility of income generation, less health issues and better social well being due to the improved stoves. - BAWOE also found it difficult to convince beneficiaries to accept the Fodder Stoves and 3 Pot Stoves.

20/07/2016	Non-Formal Education Division, Department of Adult and Higher Education, Ministry of Education	- The NFED had a designated focal officer to work on the SRBE Project to ensure its success. - The overall experience by NFED, DAHE, District Education Offices and the NFE Instructors were positive and enriching. - It is also believed by NFED and DAHE that the project was successful in achieving its targets. - However, NFED/ DAHE confessed that the SRBE project did have a negative impact on the core mandate of the department/division to increase adult literacy rate. - NFED/DAHE is still interested to collaborate on such project due to their presence in every nook and corner of the country. But the scale of involvement would need to be marginal, shorter time period or mostly focused on education and advocacy component. - Officials have observed that only about 50% of the beneficiaries are ICS as the primary stoves regularly. - There were also cases where people were interested to see the fire going instead of having the stove doors shut. - Monitoring of the use, functionality, spare parts provision and maintenance of the stoves were not mandate of NFEIs. Effective functionality checking and monitoring use were raised as necessary to understand the real benefits and issues.
	Tarayana Foundation	- Tarayana has a very positive experience from the project collaboration in Sarbang District. - Previous house construction projects by Tarayana did not have stove component. Henceforth, all new house projects are likely to have an improved cooktstove as it is very relevant and beneficial for those families. - A new UN Women Project was also implemented in Paro by Tarayana which had used the same stoves implemented in the SRBE and built by technicians trained through SRBE. - DRE and Tarayana had also established a very good working relationship. Currently, 1000 additional stoves are being constructed by Tarayana across 5 districts in REAP households who are in need of the cookstoves. The revised design of cookstoves shall be built in those sites. - Tarayana is also of the opinion that the selection of beneficiaries based on lottery draw/lucky dip does not really allot the stoves to the most needy ones.
	Bhutan Trust Fund for Environmental Conservation	- BTFEC does not have much experience with the project directly as it is just a co-financer, but does know what is going on, and what are the issues. So far BTFEC is satisfied with the project progress and objectives. The project goals fit in very well with BTFEC's mandates and missions. - BTFEC is also likely to conduct its own set of evaluation of the project through its impact assessment procedure. - A concern was raised on the sustainability of the stoves in future as the NFEIs will get transferred or centers closed down and that there will be no one in the village who has the technical know-how of the stoves for maintenance or rebuilding.

	National Environment Commission Secretariat	- NECS is the national body on Environment, Climate Change, the DNA for CDM and the agency responsible for reporting to UNFCCC and other Climate Protocols and Commitments on behalf of RGOB including the INDC. - SRBE's goals and objectives and targets of GHG mitigation are definitely in line with NECS projects and missions. There had not been much involvement in the project implementation which is also the desire of NECS, but for such projects in future more discussions and joint planning would be beneficial. - The GEF supported TNA and TAP for Bhutan does not consider improved cook stoves as priority, probably since the SRBE was already there. - NECS officials believe that in the mid-term improved cook stoves might be the preferred technology, but for the long run perhaps there are other alternative energy stoves that needs to be supported. An assessment in this regard might be necessary.
	Department of Forests and Park Services	- SFED is of the opinion that the trainings and plantations are successful and met their objectives. - Mixed timber species, and mixed-use timber were encouraged in the plantation sites for the CFMGs to withstand against diseases, fire and for multi functionality of the products.
21/07/2016	Association of Bhutanese Wood Based Industries	- All equipment for the briquette plant had arrived; installation and shed construction are under process due to budget constraint. The co-financing from SRBE was only for purchase of equipment and not for other components such as the shed, construction, training and transportation. - Number of investors had declined over the course of the project duration that is the main cause of delay. - The main goal of the project is to take care of the sawdust and wood waste issues, which is environmentally disastrous, and not for profit making. - While the investors are stuck financially they are only requesting for policy intervention and support from the government. They wish that the RGOB mandate people bought briquette in the urban areas and for institutions such as schools, Dratshangs and Arm Forces that would make briquette competitive to cheap fuel wood in the market. - The other policy support from RGOB is in the form of enforcement of existing environmental regulations during renewal of Environmental Clearances for Saw Mills and Wood based industries wherein they are required to dispose off their wood waste properly. This would enforce wood industries to seek for a service provider such as a briquette plant that will take care of their waste.
	Karma Fabrication	- The fabrication company had a good learning curve on the project and also benefitted from the opportunity. - They believe that it is possible and viable for private entities to fabricate such stoves in future and sell in the market. - A major issue in the fabrication of the stove was lack of skilled Bhutanese manpower in the country. They discovered any technical institute in Bhutan does not provide fabrication trainings.

		- It was also experienced that at times beneficiaries came to receive the stoves only because they were free and not due to necessity. However, in places where advocacy and awareness had been created, recipients were way more receptive and interested.
	UNDP, Thimphu	UNDP DRR suggested to review and comment on the following issues: - TOR and draft report of the impact evaluation being done by DRE. - Check for DRE's Annual Plan, 12 FYP concepts and NKRA and SKRA.heck the recent Kuensel article against SRBE data. - Has there been proper and adequate means testing to see if the right beneficiaries been identified? What was the allocation formula? Has female headed HHs been preferred? - Functionality and appropriateness of the Database website by DRE. - What was the actual impact of the Stove supplier's contract breach to the project and how could that have been avoided? - What are the risks associated with the project and how can insurance schemes help provide more safety and security? - How have/can DRE be/been able to do the social/gender and health related awareness and their incorporation in the project plans and evaluations? - The GHG quantification could also consider the plantation sites as sinks.
	Thimphu Site visits- Kharsadrapchhu Mewang Gewog and Zanglakha, Genekha Gewog, Thimphu	Inspected following systems; Fodder Stove-1, 2 Pot Stove-2, Heating Stove- 3. Experiences are as below; - Definitely better indoor air quality. - 4/5 households mentioned minor or more fuelwood reduction, 1 household complaint that the heating stove consumed more wood. - 4/5 households were satisfied with the stoves and its benefits. Willing to pay or buy in future. - One household with a heating stove have stopped using the stove. They claimed that the stove was not fuel efficient nor is it burning properly. It was also mentioned that the smoke was coming out from the top lid and side door even when shut. - It was observed that in 3/5 cases the chimneys were not installed as desired. - All 3 cooking stoves are used everyday while the 2 heating stove are only used in the winter.
22/07/2016	Thimphu to Wangdue	
	Wangdue Site visit – Pasakha village, Gaselo Gewog, Wangdue Phodrang district	Inspected following systems and met officials; 2 Pot Stove-3, NFEI-2 and DEO.

		Experiences are as below; - Households experiences better indoor air quality and consumed less fuelwood. - All households mentioned that they used the stoves every day for heating water and cooking fodder for cattle on the 2 Pot Stoves. - 1/3 household said that they do not use the 2Pot stove in the morning, as it is too slow to heat up while the 3 stone fire is faster. Fuel wood availability is not a concern. - It was observed in all the 3 cases that the chimneys are not out of the roof. One claimed to use the smoke for drying food, while two other mentioned that they want to have the roofs done properly first. The exhaust smoke did exit the house houses properly. - NFEIs have positive experience with the project and loved the opportunity. Training was also very practical, good and sufficient. Remuneration were also found adequate. - NFEIs had mixed support from people with regard to acceptance on building stoves by women. Some appreciated their technical skills, while few were skeptical about a woman building the stove for the house. - It was found out that no awareness and advocacy were carried out for the local school children who could potentially be lighting up the stoves or educate other people in the households.
23/07/2016	Punakha Site visits – Omtekha Forest Plantation	- The Omtekha Plantation is doing well without any extraction right now. - Local people are motivated to maintain the CF, support is provided by the FEO.
	Barp Gewog- Chimi Pang	- Families without the ICS. Using 3 stone fires for cooking fodder in winter and heating water. - Difficult and expensive to get LPG cylinders. - Wood is collection from Menchuna area (15km) at the cost of about Nu. 4000/trip with 1 trip every year.
	Yoelwa Kha	- Family uses Biogas from cattle dung for cooking and had given up LPG use completely. - Heard about the ICS, but did not get one. Currently uses 3 stone fire for cooking fodder and Ara distillation. Believes that ICS would be required for a long time and interested to have one.
	Punakha to Tsirang	
24/07/2016	Tsirang to Dagana	
	Drujeygang Gewog. Pang Serbu	- A house without electricity feels that an ICS would be of immense benefit for them. They have a traditional stove without chimney in a small bamboo hut with tons of smoke. They also spent a lot of time collecting firewood and lighting fires. The household is only about 400m away from the main electric line but still not electrified. - In another house in Drujeygang, a fodder stove is lying out in the open with a sheet over it unused. Owner explained that he is getting a new house built in which he will have the stove be built. He has used it and does believe that it is beneficial.

		- Everyone knows the local technician, who is usually around, although not guaranteed. - Non ICS households all have an outhouse with 3 stone fire outside which are consuming a lot of fuel wood and emitting tons of smokes.
	Dagana to Tsirang	
	Tsholingkhar Gewog, Drupchugang	- A household with 2 Pot stove had dismantled the stove as it kept giving problems of not lighting properly and leaking smokes. The local technician also did not come to help on repeated requests. The family still uses a 3 stone fire to heat water and mass cooking in the house. - Another household with 2 Pot Stove is satisfied with the ICS. Even though they had to use their relative for construction and not the local technicians they are positive about the stove. - The general observation by households is that when they use small branches and twigs the fuel wood consumption in the ICS is higher, but when they use larger wood pieces or logs the efficiency is definitely higher in the ICS. - Another advantage of the ICS is that pots remain fairly clean compared to the traditional 3 stone stoves.
25/07/2016	Tsirang, Rangthangling Gewog, Dartsha Gang village	- The fodder stove is very good for making Roti/ bread and heating oil for frying Shel Rotis. - Two female technicians of the Gewog are extremely happy with the involvement in the project as they have learnt a new skill and are now being seen as someone with a skill in the village. They have also been able to get out of their own villages, see other villages and meet new people that were not possible before. - BAWOE, UNDP and DRE officials had visited the sites thrice for inspections and monitoring. - The technicians are also willing and able to provide support for fellow villagers for any support on the stoves in future, but they do need to be paid. - The 3 stoves visited were also constructed properly, maintained well and used occasionally in summer and regularly in winter.
	Dajay Community Forest, Rangthangling Gewog	- The CF with the new plantation through the project was very impressive and extremely well kept. - The CF members are also enthusiastic on their achievements so far and interested to continue doing so in future with a nursery of their own, set of bye-laws, a CFMG center being built and highly motivated office bearers. - The new plantation site didn't seem to be a barren land per-se, rather a less forested part of the CF that was fenced properly and planted with new saplings and given proper care.
	Salami, Kilkorthang Gewog	- A household had both the 2 Pot Stove and Fodder Stove. Their experience is positive with both the appliances. - The stove does have a positive impact on the drudgery of women and children and helps keep the kitchen clean. - One household had dismantled the 2 Pot stove as their kitchen had to be relocated. But their experience with the stove is also positive and there is even willingness to pay. The beneficiary is also of the opinion that few other people in the village are interested to have such stoves.

26/07/2016	Tsirang to Paro	
27/07/2016	Paro – Jukha, Hungrel Gewog and Zhigang, Shari Gewog	Met an NFEI, and visited 4 households with two 2 pot Stoves and two fodder stoves. - Overall experience with the stoves is positive both by the NFE and household members. - Stoves in most cases are used only occasionally for mass cooking and daily for cooking fodder. - Beneficiaries are highly satisfied with the cleanliness of the kitchen and the stove's utility in winter for both heating homes, water heating and heat retention. - Two of the fodder stove heights have been reduced by 10cm to make it convenient for the users. They thought it is better to compromise on the efficiency then having an unusable stove. - Reallocation of stoves had been done and new recipients were able to get the new stove. It was suggested that proper requirement analysis be done.
	Satsam, Tsento Gewog and Nemjo, Lungni Gewog	Visited three 2 pot stoves and one 3 Pot stove with a Tarayana officer; - All beneficiaries are happy with the stoves and appreciate the support. - Few households have even modified the stove's colour with grey clay and made an ash collection enclosure below the stove door. - A family also has the 2pot stove in the middle of their kitchen and living room and uses the stove as a room heater in the winter. - One stove was seen raised with few stones as a pot skirt for better combustion. The fire was burning well, but the smoke was coming into the room. It was later discovered that the user did not align the regulating knob properly. Several other people mentioned the same problem. - The chimney height was also short. - The 3 pot stove user mentioned that it would be better for the handles on the stove top opening not to be protected so that there is no direct contact between the fire and pot. This would keep the pots free of sooth from fire. - An additional benefit of the stove that was highlighted was the fire disaster risk reduction. With the ICS, there is no risk of fire hazard of an unattended cooking or heating which is not the case with previous 3 stone fires in outhouses.

6.4 Annex 4: List of Documents reviewed

Nr.	Document Title	Date of preparation
1.	UNDP/GEF Project Document	final version April 2012
2.	BHUTAN One Programme 2014-2018	April 2014
3.	UNDP Country Programme Document	February 2013
4.	Project Inception Report (final)	February 2014
5.	Alternative Renewable Policy 2013	April 2013
6.	Review of Biomass Policy Document	February 2015
7.	Minutes of Inception meeting & first board meeting	22 October 2012
8.	Minutes of board meetings 2-8	2013-2016
9.	Annual UNDP Progress Reports 2013, 2014, 2015	2013-2015
10.	Project Implementation Review 2014 & 2015	2014-2015
11.	Project Quarterly Progress Reports	2013-2015
12.	Mid-Term Review Report SRBE Project	November 2014
13.	Project Budget & Financial data	June 2016
14.	Assessment of Fuelwood Consumption and Baseline Health Impact Study in Bhutan	March 2014
15.	Feasibility Report Gasification	September 2013
16.	Feasibility study of Saw Dust Briquetting	March 2014
17.	Renewable Energy Symposium Final Report	June 2015

6.5 Annex 5: Evaluation Consultant Code of Conduct Agreement Form

Evaluators/Consultants:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Consultant: ANDREAS KARNER

Name of Consultancy Organization (where relevant): INDIVIDUAL CONSULTANT

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at _*VIENNA*_ *(Place)* on *2 Sept. 16 (Date)*

Signature: _____

6.6 Annex 6: Evaluation Report Clearance Form

Evaluation Report Reviewed and Cleared by:

UNDP Country Office

Name: Nar Bahadur Khatiwora, Programme Implementation Analyst

Signature:  Date: 2 September 2016

UNDP GEF RTA

Name:

Signature: Date: