INDEPENDENT EVALUATION DIVISION
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

Independent Terminal Evaluation

THAILAND

PROMOTING SMALL SCALE BIOMASS POWER PLANTS IN RURAL THAILAND FOR SUSTAINABLE RENEWABLE ENERGY MANAGEMENT AND COMMUNITY INVOLVEMENT

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AKNOWLEDGEMENTS

This Terminal Evaluation report sets out findings, conclusions, lessons learnt and recommendations for the project titled 'Promoting Small Scale Biomass Power Plants in Rural Thailand for Sustainable Renewable Energy Management and Community Involvement'. The report is developed in compliance with the terms of reference for the assignment. The conclusions and recommendations set out in the following pages are solely those of the evaluators and are not binding on the project management and sponsors. The evaluation team comprised of Ms. Umm e Zia, International Evaluator and Ms. Sopin Wachirapuwadon, National Evaluator.

The authors would like to thank all who assisted in the Terminal Evaluation, particularly the PMU and UNIDO Thailand for providing technical and logistic support, and all the stakeholders who consented to be interviewed.

ABBREVIATIONS AND ACRONYMS

BOI	Board of Investment
DEDE	Department of Alternative Energy Development and Efficiency
EGAT	Electricity Generating Authority of Thailand
EPPO	Energy Policy and Planning Office
ERC	Energy Regulatory Commission
GEF	Global Environment Facility
MOAC	Ministry of Agriculture and Cooperatives
MOE	Ministry of Energy
MOI	Ministry of Industry
MONRE	Ministry of National Resources and Environment
NCPO	National Council for Peace and Order
NEPC	National Energy Policy Committee
PEA	Provincial Electricity Authority
Phrae PAO	Phrae Provincial Administrative Organization
PPA	Power Purchase Agreement
PPG	Project Preparation Grant
PSC	Project Steering Committee
SAO	Sub-District Administrative Organization
STRI-CMU	Science and Technology Research Institute, Chiang Mai University
TERI	The Energy Research Institute
VSPP	Very Small Power Producer
UNIDO	United Nations Industrial Development Organization

EXECUTIVE SUMMARY

The GEF-funded project "***Promoting Small Scale Biomass Power Plants in Rural Thailand for Sustainable Renewable Energy Management and Community Involvement"*** also referred to as the Thailand Biomass project is a medium-sized project funded by the GEF and implemented by UNIDO. Implemented by UNIDO in partnership with the Ministry of Energy (MoE) Thailand, the project aims to demonstrate two larger-scale plants, namely a 250kWe bamboo waste gasification power plant at Phrae Province and a 1MWe rice husk gasification plant in the Udon Thani Province by providing support to capacity building and policy.

The overall objective of this Terminal Evaluation (TE) is to independently assess the project in order to help UNIDO improve the performance and results of ongoing and future programmes and projects. The evaluation covered the criteria of: **relevance, effectiveness, efficiency, sustainability and impact.** In addition, the **Project Design, Finance/Co-Finance and Gender Mainstreaming** were also reviewed. Accordingly, a set of conclusions and recommendations has been provided to inform future programming.

A detailed review of the project document revealed that the **project design was *Unsatisfactory.*** The TE team found the design to be oversimplified, as it did not take into consideration the regulatory regime governing private sector power plants in the country. In particular, the design did not reflect the due diligence required by the strictly enforced power sector regulations for the establishment of Very Small Power Plants (VSPPs). Consequently, the processes, timelines, and stakeholder responsibilities provided in the design were not in line with practical reality.

In addition, interviews with local stakeholders, including the local government and communities revealed that the project was designed without consultations with these critical stakeholders. This is considered a critical planning gap as these entities were not only the ultimate planned project beneficiaries but also were expected to contribute to the establishment and operations of the proposed community-owned power plant.

Further, in view of the project's operational performance with regards to adaptive management, monitoring, and financial planning, **Efficiency is rated as *Unsatisfactory.*** The planned project activities were found to be aligned with and relevant to the power sector's strategic priorities at the time of the design in 2009-10. However, the project became irrelevant after the announcement of the new draft policy in 2015 which required the establishment of any Renewable Energy (RE) plants to be subjected to a competitive bidding process as well as Power Plant Development Zoning to be announced by the ERC. Moreover, in a departure from earlier policy, the Power Development Plan (PDP) of 2015 accorded higher priority to solar and municipal waste generated electricity, while lower priority was given to biomass generated power.

However, the project failed to make necessary changes in its approach to adapt to the changed policy context. Instead, the project opted to seek special exemptions from the ERC and the Energy Policy and Planning Office (EPPO) and be given permission to be implemented as originally planned. While waiting for the ERC and EPPO to make a decision, the project remained dormant for nearly two and half years, from Q3-2015 to Q3-2018. Accordingly, the project has been repeatedly awarded no-cost extensions, delaying the project closure by 4 years and four months, thereby taking 144% additional time for project completion.

To get out of this deadlock, in November **2018**, the Project Steering Committee (PSC) decided to change the project approach in order to be compatible with the policy regime. Accordingly, instead of pursing the establishment of community-owned grid-connected units, the project focus was shifted towards the setting up of units at research institutes in the country to demonstrate biomass gasification technology. It was expected that this alternative exit strategy will help as the power generation units ordered immediately upon the project initiation in 2013 would be absorbed by the research facilities. However, the TE team observed that insufficient and unrealistic timelines were allocated for the installation and operation of the power plants by the selected research institutes.

Moreover, according to the Project Document, the PMU was to be established at the STRI-CMU. However, the PMU was established at the UNIDO's office in Bangkok, staffed by a coordinator and supervised by a project manager based in the UNIDO HQ in Vienna. The evaluators observed that this move had several adverse implications in terms of staffing, technical capacity and independent monitoring.

Further, as of February 2019, only 68% of the GEF budget has been utilized and the remaining 32% funds remain unspent. Moreover, due to the challenges faced by the project, none of the co-financing materialized. Instead, the funds allocated to the project by the Phrae provincial government were allotted to other development activities, while ReLab Energy, the private sector partner withdrew its commitment from the project in 2015.

Effectiveness was assessed based on the quality of outcomes and outputs under the three project components. However, due to the challenges faced by the project and limited efficiency, the project has not been able to deliver on any one of its planned objectives, thus far. Therefore, effectiveness of the project is rated ***Highly Unsatisfactory.***

Moreover, as the project has had no substantial outcomes, the **impact** of the project cannot be rated at this time. However, in terms of economic feasibility of operating a small scale biomass gasification plant in the context of Thailand, it has been determined that the cost of electricity generated through this technology is 10 Baht/kWh as compared to the current price of 2.35-4.42 Baht/kWh1 supplied from the grid. Under this

1 https://www.pea.co.th/Portals/0/Document/Rate2015Update.pdf

scenario, **sustainability** through future replication or upscaling of this technology is ***Highly Unlikely***.

The following table provides an overview of the project's performance ratings.

	Evaluation criteria	**TE Rating**
A	**Impact**	Not possible to rate at this time
B	**Project design**	
1	• Overall design	Unsatisfactory
2	• Log frame	Unsatisfactory
C	**Project performance**	
1	• Relevance	Moderately Unsatisfactory
2	• Effectiveness	Highly Unsatisfactory
3	• Efficiency	Unsatisfactory
4	• Sustainability of benefits	Not possible to rate at this time
D	**Cross-cutting performance criteria**	
1	• Gender mainstreaming	Not possible to rate at this time
2	• M&E: ✓ M&E design ✓ M&E implementation	Unsatisfactory
3	• Results-based Management (RBM)	Unsatisfactory
E	**Performance of partners**	
1	• UNIDO	Unsatisfactory
2	• National counterparts	Unsatisfactory
3	• Donor	Unsatisfactory
F	**Overall assessment**	Highly Unsatisfactory

The TE team has provided a set of recommendations in light of the lessons learned from the implementation of the 'Thailand Biomass' project. These are divided into two categories, including future project design and implementation. Moreover, since the project is planned to continue until December 2019, specific recommendations have also been provided to guide the activities planned for the remainder of the project.

A. PROJECT DESIGN

1. **Flexible Project Design:** The landscape of renewable energy continues to rapidly evolve in terms of technology, economics, and environmental impact, etc. Therefore, in order to remain relevant, it is recommended that any future RE focused projects should be designed and implemented within a short period of three to five years, while keeping a close eye on sectoral developments. Moreover, the design of RE projects should remain flexible in order to adapt to any major changes in policy or

technology. For instance, the choice of technology should be kept open ended at the time of design.

2. **Due Diligence:** Private sector power generation is a highly regulated sector. It is therefore highly recommended to base project design on thorough due diligence to understand the overall regulations and timelines involved for particular activities. Similarly, to ensure successful project outcome, key project activities must be based on a sound economic feasibility study.

3. **Participatory Design:** In order to design programs that are responsive to the needs of different stakeholders it is recommended that consultations are carried out with all potential project partners, including institutional partners, implementing agencies, private sector organizations, and target communities in order to include the priorities and concerns of key stakeholders into the design.

B. IMPLEMENTATION

4. **Project Management Unit (PMU):** Management of projects having various stakeholders and focusing on innovative ideas requires dedicated support from project staff. Moreover, in the case of technology-focused projects, effective project implementation is facilitated by bringing the management and technical staff under the same roof. It is therefore recommended that any such future projects are housed at a dedicated and well-staffed PMU. In addition, to facilitate independent monitoring, the PMU should be established separately from UNIDO and led by a participating technical agency with expertise in the project's domain.

5. **Finance and Procurement**: Since the country-level PMU is responsible for coordinating all key stakeholders, it is important to ensure that the PMU has access to all project financial information. Moreover, in order to ensure that the project is not constrained by major expenditures, procurement decisions must be finalized only after ensuring the satisfactory delivery of all other associated factors, e.g. economic analysis, availability of project site, and review of regulations, etc.

6. **Stakeholder Collaboration:** Active risk mitigation is a critical element of efficient monitoring. In the case of projects that are implemented in complex environments, a key factor to risk management is through frequent collaboration between the project stakeholders. In this regard, it is important to incorporate regular (monthly or quarterly) review and planning meetings into the project's annual work plan.

7. **Project Implementation Reviews:** Independent reviews can present an objective assessment of a project's health and help give perspective on resolving issues faced by the implementation team. It is therefore recommended that, regardless of their size, all projects should be subject to either a mid-term review or a project implementation review.

C. Project Specific Recommendations

8. **Installation of Power Plants:** While a contract has been signed with KAPI-KU for the installation of the 125kWe plant, the identification of another institution for the other 125kWe plant is still outstanding. Considering the limited time available for implementation, it is imperative that the other institution is finalized without further delay.

9. **Economic Analysis:** The KAPI-KU plans to use electricity generated from the biomass plant to electrify its operational facilities in order to offset the high cost of power being supplied from the main grid currently. However, reportedly KAPI has not undertaken an economic analysis of the electricity to be generated from the biomass plant to be provided by the project and has no information whether the electricity generated from this source will cost less than the grid. It is therefore recommended that before proceeding with any further activities, KAPI must undertake such an economic analysis.

10. **Re-assessment of Activity Timeline and Costs:** With support from CMU as the project's technical adviser, the PMU should review the timelines allotted to the various outstanding activities to ensure that these assigned schedules are realistic. Accordingly, all outstanding contracts must be revised to ensure that all planned activities can be finished by the project's closure in December 2019.

    Moreover, as the contract for equipment purchase from TERI was signed in 2013 for a delivery date of 2014-15. However, the delivery has been delayed for several years on the project's request and 2019 is the revised date of shipment. It is therefore likely that the prices of various components to be procured by TERI for fabricating the plant may have changed. Hence, it is recommended that the financial proposal submitted by TERI is revised and finalized accordingly.

1. INTRODUCTION

The GEF-funded project "***Promoting Small Scale Biomass Power Plants in Rural Thailand for Sustainable Renewable Energy Management and Community Involvement"*** is a medium-sized project that was initiated in September 2012 and is planned to close in December 2019. The project was implemented by UNIDO in partnership with the Ministry of Energy (MoE) Thailand. In accordance with UNIDO M&E policies and procedures, all full and medium-sized UNIDO supported and GEF financed projects are required to undergo a terminal evaluation upon completion of implementation.

1.1. RATIONALE AND PURPOSE OF EVALUATION

1.1.1. OBJECTIVES OF THE EVALUATION

The overall objective of this Terminal Evaluation (TE) is to independently assess the project in order to help UNIDO improve the performance and results of ongoing and future programmes and projects. In particular, the evaluation was carried out with the objective to:

A. Promote accountability for the achievement of project objectives through the assessment of project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact; and
B. Promote learning, feedback and knowledge sharing on results and lessons learned among UNIDO and its partners, as basis for decision-making on policies, strategies, program management, and projects and to improve design and implementation of new and ongoing projects by UNIDO.

The Terminal Evaluation (TE) will covered the duration of the project from its starting date of September 2012 to February 2019.

1.2. SCOPE OF EVALUATION

The scope of the TE covers the entire project and its components. The evaluation covered the criteria of: **relevance, effectiveness, efficiency, sustainability and impact.** In addition, the **Project Finance/Co-Finance and Gender Mainstreaming** were also reviewed. Accordingly, a set of conclusions and recommendations has been provided to inform future programming.

The **key evaluation questions** assessed included:

(a) What are the key drivers and barriers to achieve the long-term objectives? To what extent has the project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long-term objectives?

(b) How well has the project performed? Has the project done the right things? Has the project done things right, with good value for money?

(c) What have been the project's key results (outputs, outcome and impact)? To what extent have the expected results been achieved or are likely to be achieved? To what extent the achieved results will sustain after the completion of the project?

(d) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the project?

In addition to the standard evaluation questions, the evaluation also posed the following project specific questions in the following areas:

(a) What were the considerations in **project design** for issues of policy, regulatory environment, and infrastructure availability?

(b) What were the major **challenges** faced by the project?

(c) What was the process of **monitoring risk assessment and mitigation** during project delivery?

(d) What were some of the key **unintended** outputs and impact of the project?

Moreover, the **performance of partners** was also undertaken, including both the quality of implementation and execution of the GEF Agencies and project executing entities (EAs) in discharging their expected roles and responsibilities.

In addition, the terminal evaluation also assessed need for follow up, co-financing, and environmental and social safeguards.

2. EVALUATION, APPROACH AND METHODOLOGY

The Terminal Evaluation was undertaken by a team comprising of an international evaluation expert and a national evaluation expert2. The section below details the approach and methodology used to undertake the evaluation:

2.1. APPROACH

The TE was undertaken using an evidence-based, participatory approach in accordance with the UNIDO Evaluation Policy3 and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle4. In addition, the GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies were applied.

The evaluation used a theory of change approach and mixed methods to collect data and information from a range of sources and informants in order to triangulate the data and information collected before forming its assessment. Accordingly, all key parties associated with the project were consulted. In addition, the evaluation team leader liaised with the UNIDO Independent Evaluation Division (ODG/EIO/IED) on the conduct of the evaluation and methodological issues.

2.2. METHODOLOGY

The evaluation team carried out the standard methodology of literature review, development of evaluation tools, meetings with project stakeholders, and visits to project field sites.

2.2.1. LITERATURE REVIEW

A detailed review of the related documents by the consultants facilitated their understanding of the various dynamics of this project. A complete list of some of the key documents reviewed is provided in Annex 01

Based on this review the programmatic and geographic scope of the evaluation activities as well as samples for interviews and field visits were determined. The project logical framework, including the entire UNIDO/GEF-funded project and its components constituted the programmatic scope.

2 Ms. Umm e Zia and Ms. Sopin Wachirapuwadon
3 UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)
4 UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

2.2.2. EVALUATION TOOLS

The key tools used to undertake this evaluation included List of Stakeholders to be Met, Key Informant Interview Guidelines, and an assignment work plan. These tools were shared with UNIDO in an Inception report and finalized upon receiving feedback from various stakeholders, including the Office of Evaluation and the PMU.

The updated assignment work plan is provided in Annex 02. The KII guide sheets pertaining to the various project participants are presented in Annex 03.

2.2.3. IN-COUNTRY MISSION AND DATA COLLECTION

The International Evaluator visited Thailand from **18 March to 25 March 2019**. Stakeholder interviews to be undertaken during the mission were scheduled by the National Evaluation Expert in advance and were conducted by both the International and National Evaluation expert. These interviews were conducted in Bangkok, Phrae province, and Chiang Mai. The mission schedule along with the list of stakeholders interviewed and sites visited is presented in Annex 04.

At the end of the mission, a preliminary debriefing presentation was delivered to the current and previous national project coordinators and their feedback was incorporated in the evaluation report.

After the in-country mission, follow up Skype interviews were also conducted with the UNIDO Evaluation Manager and Project Manager based in Vienna.

2.2.4. DEVELOPMENT OF EVALUATION REPORT

After completion of the in-country mission, a draft report has been developed according to the outline provided in Annex 05. The draft report covers the criteria of relevance, effectiveness, efficiency, sustainability, impact, and gender mainstreaming. Based on this analysis, ratings are provided according to the criteria and scales provided in Annex 06. Moreover, the draft report includes an analysis of the Project Finance and Co-finance.

At the end of the report, Conclusions, Recommendations, and Lessons learnt from the project implementation experience have been provided to inform future UNIDO, GEF, and Government of Thailand programming.

The draft report is shared with UNIDO's Independent Evaluation Unit to be further circulated to UNIDO staff and national stakeholders associated with the project for factual validation and comments.

2.2.5. DE-BRIEFING AND FINALIZATION OF EVALUATION REPORT

After submitting the draft report to UNIDO, the International consultant will develop a de-briefing presentation to be delivered to key stakeholders at UNIDO HQ in Vienna. Any comments or responses, or feedback on any errors of fact to the draft report and de-

briefing presentation provided by the stakeholders will be sent to UNIDO's Independent Evaluation Division for collation and onward transmission to the project evaluation team who will be advised of any necessary revisions. On the basis of this feedback, and taking into consideration the comments received, the evaluation team will prepare the final version of the terminal evaluation report.

3. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

In 2008, the total power generation of Thailand was around 148,200 GWh, out of which 71.2% was produced from natural gas and around 22% from coal and lignite, with hydroelectricity, fuel oil and diesel accounting for only 5.4%, 1.1% and 0.1% respectively. The electricity demand of the country increased steadily every year, with a peak in 2009 and an average forecasted growth rate of 4.2%.

Within this context, the National Government developed a National Renewable Energy Master Plan (2008-2022), aiming at increasing the share of renewable energy production in the country's overall energy supply up to 20.3% by 2022. The plan fosters to more than double the biomass-based electricity from 1,610 MWe to at least 3,700 MWe by 2022, mainly from agricultural residues.

In parallel, one of the main challenges was to balance the increased electricity production with the greenhouse gas (GHG) emissions, which are forecasted to grow steadily, according to a study carried out in 2009 by the Thailand Greenhouse Organisation. To mitigate GHG emissions without hampering its economic development, the Government of Thailand responded with new policies and regulatory frameworks such as: a) Energy Industry Act (2007); b) Energy policy and Development Plan (2007-2021); c) National Renewable Energy Master Plan (2008-2022); d) National Strategy on Climate Change (2008-2012). Despite all the efforts from the Government and the responsible Ministries, the successful establishment of small-scale biomass gasification power plants was still minimal at the time this project was conceived, mainly because of:

- Difficulty in identification of qualified equipment suppliers;
- Inadequate human and institutional capacity;
- Lack of professional project development practice;
- Lack of equipment standardization;
- Lack of successful demonstration projects;
- High up-front investment costs;
- Lack of systematic learning programme;
- Lack of proper information and of confidence in the technology; and
- Lack of appropriate policy/planning to promote gasification-based power plants at the community level.

3.1. PROJECT OBJECTIVE

To overcome the above-mentioned barriers and challenges, the Government of Thailand sought the technical support of UNIDO. The project *Promoting small scale biomass power plants in rural Thailand for sustainable renewable energy management and community*

involvement, funded by the GEF and implemented by UNIDO, aims at promoting renewable energy, mainly in the form of small-scale biomass gasification power plants in rural Thailand.

The project includes demonstration of power plants, capacity building, and policy components. Since most of the small-scale gasification power plants of less than 200kWe proved to be not successful in Thailand due to the already-mentioned reasons, the project aims at demonstrating two larger-scale plants, namely a 250kWe bamboo waste gasification power plant at Phrae Province and a 1MWe rice husk gasification plant in the Udon Thani Province.

The project consists of three components and eight outputs, as outlined in Table 01

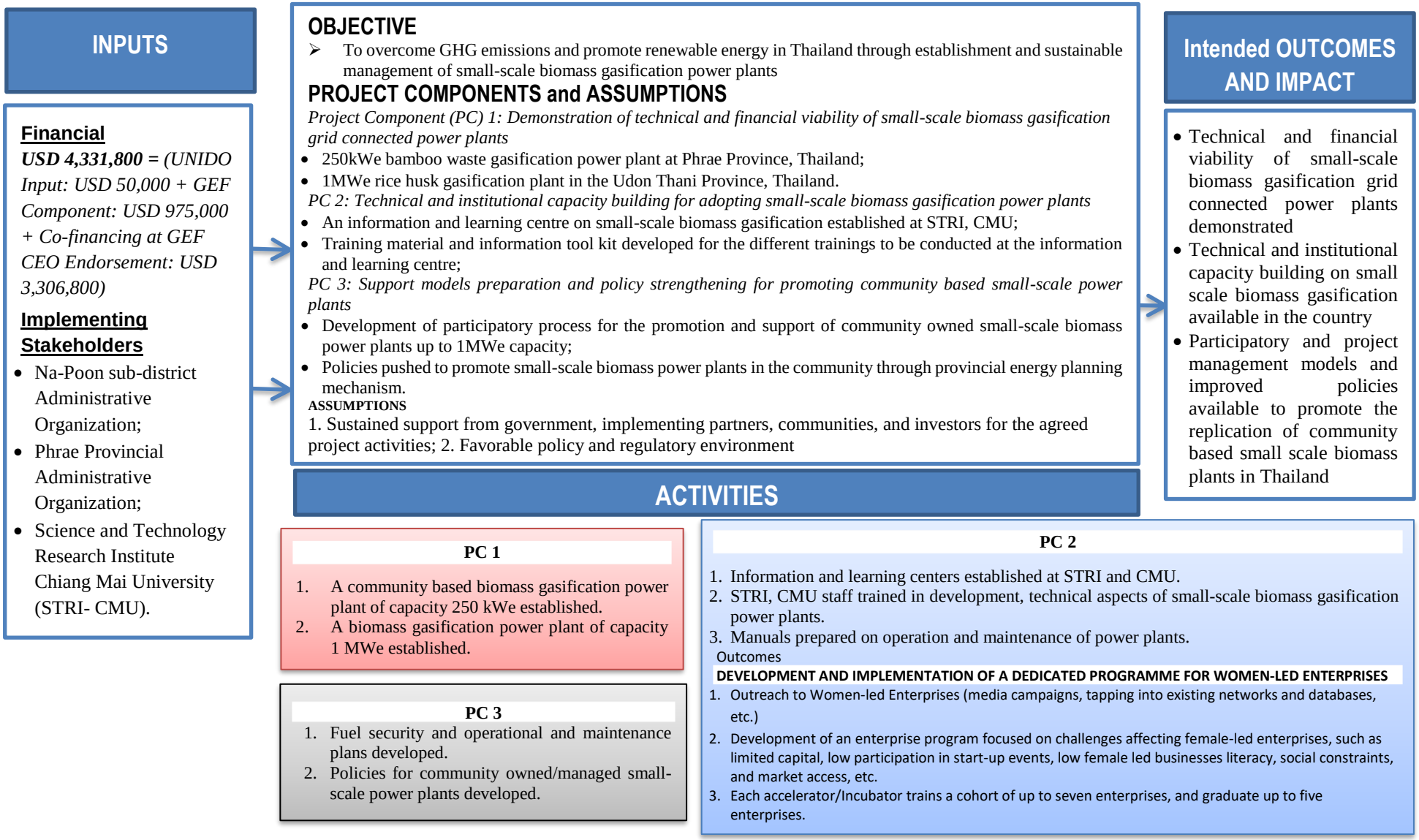
TABLE 1: PROJECT COMPONENTS

Project Component (PC)	Outputs	
PC 1 : Demonstration of technical and financial viability of small-scale biomass gasification grid connected power plants	**1**	250kWe bamboo waste gasification power plant at Phrae Province, Thailand;
	2	1MWe rice husk gasification plant in the Udon Thani Province, Thailand.
(PC2): Technical and institutional capacity building for adopting small-scale biomass gasification power plants. Expected outputs:	**1**	An information and learning centre on small-scale biomass gasification established at STRI, CMU;
	2	Information and learning centre staff trained on development, technical aspects, operation and maintenance (O&M) of small scale biomass gasification power plants
	3	Training material developed for the different trainings to be conducted at the information and learning centre; and
	4	Information toolkit prepared for agro-industries on developing small-scale biomass gasification power plants.
(PC3): Support models preparation and policy strengthening for promoting	**1**	Development of participatory process for the promotion and support of community owned small-scale

Project Component (PC)	Outputs	
community based small-scale power plants		biomass power plants up to 1MWe capacity;
	2	Policies pushed to promote small-scale biomass power plants in the community through provincial energy planning mechanism.

A Theory of Change (TOC) figure representing the project objective, components and outcomes is presented in Figure 01 below. It is important to note that this TOC is based on the information provided in the project document and differs from the actual implementation scenario, as in reality, the project has not been able to deliver on any of its components due to various challenges discussed in the evaluation findings.

FIGURE 1: THEORY OF CHANGE (TOC)



3.2. PROJECT DURATION

As specified in CEO document, the planned project implementation timeframe was September 2012 – August 2015. However, the project has received several no-cost extensions from GEF and the latest revised closing date is **December 2019**.

3.3. MAIN STAKEHOLDERS

The project is executed by UNIDO in collaboration with the Ministry Of Energy (MOE), Na Poon Sub-District Administrative Organization (SAO), Phrae Provincial Administrative Organization (PAO), and Science And Technology Research Institute, Chiang Mai University (STRI, CMU). A brief overview of the expected role of each stakeholder is provided as follows:

UNIDO is responsible for: a) management and monitoring of the project; b) reporting to GEF; c) procuring the international expertise needed for delivering the planned outputs; d) approving the selected companies for the power plants construction; e) approving the national experts participating for delivering the planned outputs; f) managing, supervising and monitoring the work of international teams and ensuring that the deliverables are technically sound and consistent with the project requirements.

Phrae PAO / Na Poon SAO have been responsible for: a) constructing the 250 kWe biomass gasification power plant; b) designing and constructing the information and learning centre at STRI, CMU; c) establishing short rotation bamboo plantation; d) constructing emergency/first aid health centre near the power plant site; e) procuring a part of equipment/ facilities and providing staff for project management for the 250 kWe power plant. (Note: some parts of this component were transferred to the Kasetsart University in January 2019).

STRI-CMU has been responsible for: a) providing staff for the information and learning centre; b) preparing various training material targeting different stakeholders; c) human and institutional capacity building in small scale biomass gasification, by conducting suitable trainings; d) sustained operation of the information and learning centre.

Policy and Strategy Management Office, Office for the Permanent Secretary and Phrae Provincial Energy Office, MoE was chair of the Project Steering Committee. In addition, they were responsible for: providing support for the recommendations on strengthening the existing supporting policies with special attention to favour community owned small scale biomass gasification plants. Moreover, this office

The Project Management Unit (PMU), consisting of a Project Manager and a Project Administrative Assistant has been responsible for: a) coordinating all the project activities carried out by the national experts and other partners by having close association with the Phrae PAO/ Na Poon SAO, Policy and Strategy Management Office, Office for the Permanent Secretary and Phrae Provincial Energy Office, MoE, STRI, CMU

and UNIDO; b) day-to-day management, M&E of project activities; c) organizing the training to be carried out under project component 2 and various stakeholders consultations to be carried out under project component 3.

A Project Steering Committee (PSC), chaired by MoE and composed by members from Phrae PAO/ Na Poon SAO, UNIDO, and PMU, representatives, had the responsibility to: a) review progress in project implementation; b) facilitate coordination among project stakeholders; c) maintain transparency in ensuring ownership and to support the sustainability of the project.

Figure 02 below structurally illustrates the project implementation arrangements.

4. EVALUATION FINDINGS

FIGURE 2: PROJECT IMPLEMENTATION ARRANGEMENTS

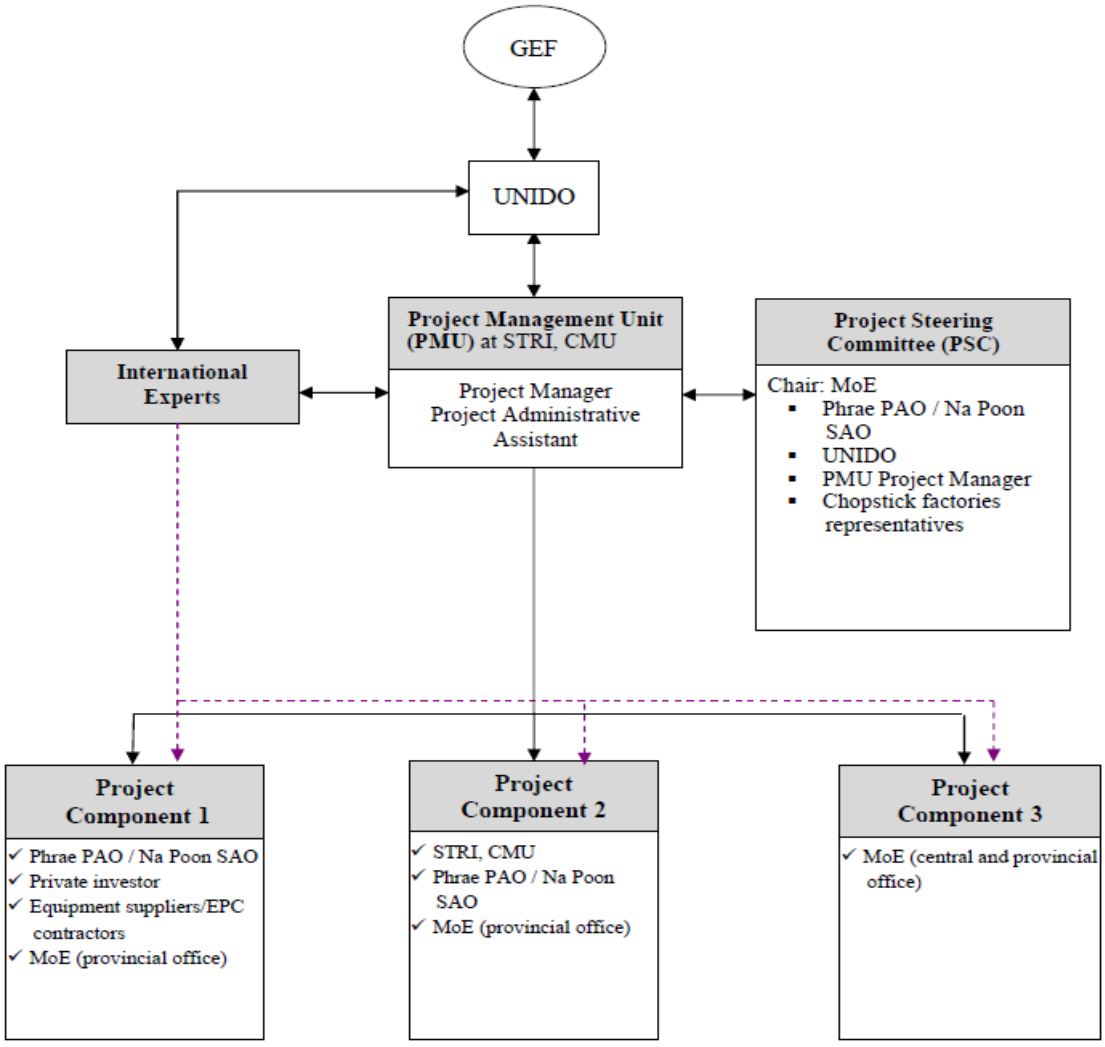


Figure 10: Diagram of project implementation arrangement

UNIDO will closely coordinate the on-going as well as planned relevant initiatives to ensure maximum synergies and overall impact of the Climate Change related technical assistance to Thailand.

4.1. OVERVIEW OF DESIGN AND IMPLEMENTATION

In order to facilitate the reader in getting a ready understanding of the evaluation findings, this section first provides a brief objective overview of the background associated with project design and the project implementation process.

4.1.1. OVERVIEW OF DESIGN

In response to the Government of Thailand's One Village-One Biomass Unit, in 2009, the Forest Industry Organization of the Ministry of Natural Resources and Environment (FIO-MONRE) and the Department of Alternative Energy Development and Efficiency (DEDE) designed the project. Accordingly, in partnership with UNIDO Thailand, a Project Identification Form (PIF) was submitted to the GEF in January 2010, with the FIO as the main Executing Agency. The premise of the design was to use biomass waste from the FIO's various furniture manufacturing facilities through the establishment of community-owned small scale biomass plants5 that would sell electricity to the main grid. Moreover, future upscaling through replication was integrated into the design through potential replication of activities in FIO's 99 candidate plantation sites across 28 provinces, potentially generating 200 MWe through community-owned VSPPs. However, despite the PIF approval, in 2011 the FIO withdrew its support to the project due to various critical factors, including lack of community consent; legal constraints on use of chip wood plantation; and fear of deforestation and illegal logging. Based on the learnings from the operations of the installed units, the project also intended to establish an information and learning center, and promote policy related to biomass.

Consequently, the Ministry of Energy (MOE) was approached by UNIDO to act as the Executing Partner. Therefore, the eventual request for CEO Endorsement submitted in 2011 listed the MOE, STRI-CMU, Phrae Provincial Administrative Organization (Phrae PAO), and Na Poon Sub-district Administrative Organization (Na Poon SAO) were listed as Executing Partners. Also, the implementation approach departed from the PIF with the idea of splitting the power plants into two categories, including a 250 KW community-owned plant in (Na Poon6) Phrae province and a 1 MW privately owned plant in Udon Thani7 province.

The GEF CEO Endorsement was received for this three-year project in 2012 and the project was initiated in 2013 after receiving endorsement from the MOE.

4.1.2. ASSESSMENT OF PROJECT DESIGN

A detailed review of the PIF and project document revealed that the design was rather oversimplified, as it did not take into consideration the regulatory regime governing

5 3 units of 400 KW each; of which two were to be funded by GEF and one through FIO sources
6 Na Poon was elected based on an assessment carried out by the STRI-CMU that determined sufficient availability of biomass generated from local bamboo processors
7 A private sector company (ReLab Energy) showed interest in the establishment of a 1MW unit in Udon Thani

private sector power plants in the country. Consequently, the processes, timelines, and stakeholder responsibilities provided in the design were not in line with practical reality.

To being with, the design did not reflect the due diligence required by the strictly enforced power sector regulations for the establishment of Very Small Power Plants (VSPPs)8. According to these regulations, an entity wishing to establish a VSPP with the intention to sell power to the main grid must obtain the power producer business licensing approval of the Energy Regulatory Commission (ERC). This approval is subject to the satisfactory proof of key factors, including i) proof of financing, ii) availability of feeder capacity, iii) availability of land, iv) environmental implications, v) technical specifications of the plant/equipment, vi) availability of feed stock; and vii) consent of the community where the plant is to be established. The flow chart in Annex 09 presents an overview of the process involved in obtaining a license.

Each of these factors is ruled by stringent conditions which an applicant to the ERC must meet. For instance, power plants that are community owned and/or financed by the government are not eligible under the ERC power purchase regulations. Similarly, the land on which the power plant is situated must not be public property. Moreover, power purchases are subject to the ERC's purchasing announcement in accordance with the National Power Development Plan (PDP)9, a document that presents a strategic outlook of the power sector and determines power purchasing quota from different resources.

Instead of considering a comprehensive look at the above-mentioned factors, the project design only ensured feedstock availability and technology, and did not make provisions for determining any of the other factors.

Governed by this simplified approach to implementation, the timelines associated with different activities is unrealistic, as it takes at least two years for a private sector entity to obtain a power generation license in the country. Similarly, the roles of national and international consultant detailed in the project documents are focused only on the selection and installation of physical equipment and no experts are assigned to the procedures required to be undertaken in regards to obtaining a power generating license.

This approach to design also led to a defective exit strategy, as no alternatives were presented in the event of the ERC's rejection of the proposed power plants. Moreover, while it was assumed that the provision of training and impetus to policy will promote replication through the establishment of additional biomass gasification power plants in the country. However, the heavy investment associated with such an endeavor were overlooked since the equipment to be installed by the project for the demonstration purposes and the associated physical equipment would be heavily subsidized by funds from GEF and the local government.

8 The 250 kWe and 1 MW plants proposed by the project fall in the VSPP category

9 The PDP is a strategic plan that governs the GOT's overall policy related to promotion and purchase of energy from different sources. A PDP is updated generally after 4 to 5 years.

Further, the MOE is the designated GOThailand executing partner of the project, and the Policy and Strategy Office (PSO) of the Permanent Secretary of MOE has been given the responsibility of execution. However, as the PSO is focused on policy and strategy oversight, while being a community and private sector focused, the project was action oriented. Consequently, the project was not well aligned with the strategic priorities or operational capacities of the PSO, thereby limiting the potential support that the MOE could provide to ensure successful project delivery.

In addition, interviews with local stakeholders, including the local government and communities revealed that the project was designed without consultations with these critical stakeholders. This is considered a critical planning gap as these entities were not only the ultimate planned project beneficiaries but also were expected to contribute to the establishment and operations of the proposed community-owned power plant. Consequently, the design was deemed as a top-down initiative. For instance, the Phrae provincial government expressed a preference towards simpler technology that would generate electricity only towards basic farm operations instead of being sold to the grid.

Finally, the design only briefly provides the roles and responsibilities of the various executing partners (UNIDO, MOE, STRI-CMU, Phrae PAO, community) without delving into the details of institutional organization collaboration and support mechanisms.

In conclusion, due to the lack of thorough due diligence associated with private sector plants in Thailand, limited stakeholder participation in development of design, and absence of clearly outlined roles and responsibilities of stakeholders, the overall design of the project is rated ***Unsatisfactory.***

4.1.3. OVERVIEW OF IMPLEMENTATION

Upon the initiation of the project in **2013**, during the first PSC meeting, it was decided to establish the PMU at the UNIDO Thailand office instead of the STRI-CMU as was stipulated in the CEO Endorsement. Instead, the STRI-CMU was assigned as the technical consultant to the project. Moreover, an international bid was floated for the provision of the biomass gasification units of 250kWe, and The Energy and Resource Institute (TERI), an international firm was awarded the contract for USD 451,000, amounting to 46.25% of the total GEF grant.

In **2014**, the key local-level stakeholders for the 250 kWe, including the Phrae provincial government (Phrae PAO), Na Poon sub-district administration (Na Poon SA), and the community in Na Poon were mobilized. After extensive dialogue, the community gave consent for the establishment of the plant as they realized the potential economic benefits of selling electricity to the main grid through the utilization of local agriculture waste. However, by September 2014, it was realized that the feeder capacity available at the

time of project design in 2011 was not available anymore10. Consequently, the location for the plant was moved to Wiang Ta sub district within the Phrae province.

Moving the intended location of the plant to Wiang Ta required another round of consultations with the community in that sub-district and the community's consent was finally obtained in June 2015.

However, in July of **2015** a new ministerial regulation on town planning for Phrae province was announced which declared Wiang Ta as a green area, thereby prohibiting the establishment of a power plant. Around the same time, a draft policy of the Energy Regulatory Commission (ERC) was announced for the purchase of renewable energy. According to this draft policy, electricity purchase from all new RE projects will be subject to a competitive bidding process, while RE will also be subject to a Power Plant Development Zoning, integrating various renewable sources, e.g. Solar, MSW, Biogas, Biomass, Wind, etc. Consequently, grid/feeder capacity will be made available in accordance with this zoning scheme. However, no particular timeframe was announced for the implementation of the policy, including zoning and bidding, etc. In addition, according to the draft policy, RE plants supported through government agencies and/or community-owned plants will be ineligible to supply electricity to the main grid. Moreover, in a departure from earlier policy, the Power Development Plan (PDP)11 of 2015 accorded higher priority to solar and municipal waste generated electricity, while lower priority was given to biomass generated power.

In the light of these strategic developments, the project could not continue with the implementation of the 250 kWe community-owned units in Phrae province. In addition, the regulatory environment also discouraged the private sector partner ReLab Energy from continuing with investment in biomass technology and withdrew its commitment from establishing the 1 MW unit.

In order to enable continuation of the project, the project sent three letters to the ERC and the Energy Policy and Planning Office (EPPO), one each in 2015, 2016, and 2017, requesting exemption of the power units to be installed under the project from the current regulations. However, to date no favorable response has been received from either office. As a result, with the exception of some consultations with the ERC and the holding of PSC meetings, the project remained dormant from **Q3-2015 to Q3-2018**.

Finally, in the 5th PSC meeting held in November **2018**, it was decided to shift the direction of the project activities from the establishment of the community-owned grid-connected units to the setting up of units at research institutes in the country to demonstrate biomass gasification technology. It was expected that this exit strategy will help as the power generation units ordered from TERI in 2013 would be absorbed by the research facilities, who will in turn facilitate meeting the project's objectives of

10 A biomass plant of 8 MW had reserved all available capacity in the area

11 The PDP is a strategic plan that governs the GOT's overall policy related to promotion and purchase of energy from different sources. A PDP is updated generally after 4 to 5 years.

demonstration and training based on the installed units. Accordingly, a request for bids was opened.

At the time of this terminal evaluation in March 2019, bids were received from two institutions, including the Faculty of Forestry and the Kasetsart Agricultural and Agro Industrial Production Institute (KAPI) of Kasetsart University (KU), each requesting a 125 kW unit. Of these, the agreement with KAPI was finalized in February 2019 with the planned installation date of June 2019. On the other hand, the bid received from the Faculty of Forestry was still under review.

A timeline of key events during implementation is presented in Annex 07. Based on the above sequence of events, the project's initially planned end date of June 2015 has been extended to December 2019, resulting in a total of 05 no cost extensions.

4.1.4. ASSESSMENT OF IMPLEMENTATION

Implementation was evaluated while assessing the project's relevance, efficiency, effectiveness, impact, and sustainability. In addition, gender was reviewed as a cross-cutting theme.

4.2. RELEVANCE

At the time of the project design in 2009, the Government of Thailand aimed to improve the contribution of REs in the total energy resource mix. Accordingly, the National Renewable Energy Master Plan (2008-2022) aimed at increasing the share of RE production in the country's overall energy supply to 20.3% by 2022, including increasing biomass based electricity from 1,610 MWe to 3,700 MWe by 2022. Under the plan, the GoThailand aimed to establish small-scale biomass units across the country under the one village-one biomass unit program.

However, the 2015 ERC announcement of a draft RE power purchasing policy highlighted the change in priorities in terms of energy sources, with a higher priority accorded to solar energy. Subsequent strategies and regulations have been aligned with this policy. For instance, the Power Development Plan (PDP) of 2018-19 plans to increase the purchase of solar energy supplied to the main grid by approximately 25% per annum over the next five years. In contrast, the planned purchase of biomass generated electricity is expected to stay flat at an increase of only 3% to 4%. According to stakeholder interviews, these preferences were guided by factors such as cost of production and environmental implications. As a consequence of this preferential direction towards solar vs. biomass has discouraged new private sector entrants from investing in the latter.

It is therefore concluded that the planned project activities was aligned with the power sector's strategic priorities at the time of the design in 2009-10. However, the project became irrelevant after the announcement of the new draft policy in 2015. As no eventual adjustments were made to align the project's activities to the energy sector strategies, the project's relevance is rated as ***Moderately Unsatisfactory.***

4.3. EFFICIENCY

Project efficiency was assessed while considering various operational factors, including adaptive management, monitoring and reporting, staffing, procurement, partnership and coordination, timeliness, and financial management.

4.3.1. ADAPTIVE MANAGEMENT

Adaptive management refers to the continual mitigation of risks arising throughout the project implementation period by adapting the project design to the ongoing contextual changes occurring in the implementation environment.

As the assessment of design and project relevance revealed, considerable design adjustments were required to ensure effective delivery. In this regard, major issues included aligning the project activities with energy sector regulations, drawing up detailed TORs of each executing partner with clearly defined roles and responsibilities, readjustment of funds, and the development of a suitable exit strategy.

The TE team observed that some adaptive management was undertaken, including the shifting of project from Na Poon to Wiang Ta in 2014 due to lack of feeder capacity, and the opening of bids in 2019 to research institutions for the establishment of the biomass units instead of community-owned and private sector units. However, since 2015, most required corrective measures have either not been taken or when taken, or have been carried out with unwarranted delay.

While initially, the project was quick to relocate the target area from Na Poon to Wiang Ta due to the lack of available grid capacity in the former. However, despite having realized in 2015 that community-owned or government funded power plants were not eligible under the power purchasing guidelines, no change was made to the implementation approach, e.g. opening up the bidding to private sector. Instead, it was expected that the ERC would give special exemption to the power plants established under the project. However, these expectations were unrealistic as private sector power generation in Thailand is a highly competitive and therefore strictly controlled sector. In fact, project activities had to be indefinitely put on hold for at least three years (Q3-2015 to Q3-2018) while waiting for a favorable response from the ERC and then EPPO to the project's request for exemption. In essence, the project failed to develop a timely exit strategy to accommodate for the possibility of its request being rejected by the ERC.

Moreover, no detailed roles and responsibilities were drawn up for the executing partners, including UNIDO, MOE, Phrae Provincial government, Wiang Ta sub-district, and the participating communities, to clearly define roles and responsibilities. The only exception to this was the TOR assigned to STRI-CMU, which was assigned a limited role in terms of community mobilization and establishment of the I&LC. Consequently, the particular role to be played by each key executing partner in the project was unclear. For instance, the responsibility of reviewing regulations for the installation of the 250 kWe community-owned plant.

Similarly, according to the project design, the initiation and delivery of components 2 and 3 (establishment of an Information and Learning Center, and policy) were entirely dependent on the success of component 1 (installation of power plants). However, although component 1 experienced significant challenges and delays, no measures were taken to modify the design in order to adjust the activities or funding associated with the other two components.

In the absence of such timely adaptive measures, the project original project closing date of August 2015 has been postponed to December 2019, while no tangible outputs could be achieved.

4.3.2. TIMELINESS

Owing to the implementation challenges faced, the project has been repeatedly awarded no-cost extensions, with a fifth extension granted in April 2019. Accordingly, the latest project closing date is December 2019, delaying the project closure by 4 years and four months, thereby taking 144% additional time for project completion. Figure 03 provides an overview of the various extensions awarded to the project.

FIGURE 3: OVERVIEW OF THE EXTENSIONS AWARDED TO THE PROJECT.

These extensions have been awarded by the UNIDO-GEF committee based in UNIDO HQ, Vienna, upon the written request of MOE as the head of the Project Steering Committee (PSC). The evaluation team observed that in addition to regulatory challenges faced by the project, another reason for multiple extensions has been the setting of unrealistic timelines when planning activities. For instance, once it was decided in November 2018 to establish the 250 kWe power plants at research institutions, a time frame of six months (January to June 2019) was assigned to this activity. This included the time for floating a request for proposals, reviewing and finalizing bids, establishment of infrastructure, e.g. buildings to house the power plants, importation of the plant equipment from TERI, training of staff on operations and maintenance, and initiation of operations.

However, at the time of this TE in March 2019, only one bid (KAPI-KU) had been accepted for a 125kWe unit and the institution had only three months left to complete the remaining activities. Conversely, another bid from the Forestry Department at KU for the remaining 125kWe was still under review by UNIDO. Consequently, the project had to request an additional no-cost extension until December 2019. However, considering the potential and real complications involved in the process, e.g. time required to establish infrastructure, the imported equipment clearing customs, and the installed unit to become operational, it is still not clear whether the project will be able to effectively wrap up all activities by the end of 2019.

Similarly, according to its amended TORs, the STRI-CMU has been given six months (January to June 2019) for the establishment of the I&LC; designing and conduction various trainings on small scale biomass gasification plants, including a TOT and separate trainings of investors, representatives of financial institutions, and local government representatives; development of gasification operation and maintenance manual; preparation of an information toolkit; development of a policy report; and a documentary video.

4.3.3. PROJECT MANAGEMENT

According to the Project Document, the PMU was to be established at the STRI-CMU. Although, the reasoning behind this decision is not provided in the project document, it is assumed by the TE team that since there is a range of technical expertise available at the CMU in the areas of Biomass power plants, including technologists and private sector power plant development, a PMU at the STRI could benefit from this extensive and readily available resource. Staffed by a project manager and administrative assistant, this PMU would manage the day to day activities of the project and provide regular monitoring reports to UNIDO in line with GEF-UNIDO project implementation guidelines.

However, the PMU was actually established at the UNIDO's office in Bangkok, staffed by a coordinator and supervised by a project manager based in the UNIDO HQ in Vienna. The evaluators observed that this move had several adverse implications in terms of staffing, technical capacity and monitoring.

Firstly, none of the technical staff at the PMU had any experience of the Thai private power sector, thereby resulting in serious knowledge gaps regarding regulations and affecting adaptive management and project delivery. Moreover, the PMU at UNIDO was responsible for day to day planning and management of activities, a role that requires dedicated attention and follow ups, therefore better suited to Implementing Partners. Instead, the coordinator assigned to the project was also simultaneously responsible for three more projects. Similarly, the project manager in Vienna has been responsible for managing 10-15 projects across various countries in Asia and Africa. Consequently, the PMU ended up functioning more as a project secretariat instead of a management unit. Finally, the establishment of PMU at UNIDO diluted the overall supervisory role of UNIDO, since it did not warrant independent monitoring of activities.

4.3.4. FINANCE

As shown in table 02, the total planned project budget was USD 4.28 million, including a GEF grant of USD 975,000 (equaling 23% of the total funds) and co-financing from public and private sector in Thailand of USD 3.3 million (77% of the total budget).

TABLE 2: BUDGET DISTRIBUTION AND EXPENDITURE

Project Component	GEF Funds				*Co-finance Funds*		
	Planned Budget (USD)	Percent of Total Planned Budget	*Actual Expenditure (USD)*	Percent Actual Expenditure	Planned Budget (USD)	Percent of Total Planned Budget	*Actual Expenditure (USD)*
1. Demonstration of technical and financial viability of small-scale biomass gasification grid connected power plants.	700,000	72%			2,716,800	82%	
2. Technical and institutional capacity building for adopting small scale biomass gasification power plants.	100,000	10%			290,000	9%	
3. Support models preparation and policy strengthening for promoting community based small-scale power plants	85,000	9%			100,000	3%	
Project Management	90,000	9%			200,000	6%	
Total (USD)	**975,000**				**3,306,800**		

GEF Funds: As of February 2019, only 68% of the GEF budget has been utilized and the remaining 32% funds remain unspent. Of this, the main expenditure has been procurement of the 250 kWe biomass gasification plant at 48% of the total GEF contribution, followed by contractual services equaling 10.45%. The remaining fund has been used for management activities such as staff and travel. Details of item-wise expenditure are presented in Annex08

Co-Financing: On the other hand, due to the challenges faced by the project, none of the co-financing materialized. Instead, the funds allocated to the project by the Phrae provincial government were allotted to other development activities, while ReLab Energy, the private sector partner withdrew its commitment from the project in 2015.

Moreover, it was ascertained that as the Project Manager is based in the UNIDO HQ in Vienna, all financial information for the project is tracked at that level and only limited data is available to the PMU located in Thailand. Since the PMU is responsible for coordinating various stakeholders associated with the project, not knowing the exact financial picture of the project can sometimes make it challenging from the PMU staff to undertake their responsibilities effectively.

4.3.5. PROCUREMENT

Contracts with the technical advisor (STRI-CMU) and the equipment supplier (TERI) have been the two major procurement items under the project.

A contract was signed with the STRI-CMU in 2013, assigning the institute as the technical consultant for the project. The total contract value of STRI-CMU was USD 185,000 (19% of GEF grant, and an initial payment of USD 50,000 has been released to STRI-CMU. In addition, an international request for proposals was launched by the UNIDO HQ for the supply of the 250kWe plant, to which only one supplier, TERI, responded. After a review of the bid, TERI was selected and a contract was signed in 2013, the initial year of project implementation, with a total contract value of USD 451,000, representing 46% of the total GEF grant. In accordance with contract conditions, TERI was paid a first and second tranche of USD 290,000.

Due to the delay caused by various issues arising in 2014 and 2015 with regard to feeder capacity and power purchasing guidelines of the ERC, the services of both vendors have been put on hold. However, once the decision was made in 2018 for opening the bids of establishing the 250kWe to research organizations, the contracts with both TERI and STRI-CMU were revived. The PMU expects for the delivery on both contracts to be completed by the latest project closing date of December 2019.

As shown in table 03 below, the TE team observed that according to the CEO Endorsement, a total of USD 450,000 from the GEF budget was to be used towards purchase of the proposed power plants. This included USD 90,000 for purchasing equipment of the 250 kWe plant and USD 360,000 for the purchase of the 1 MW plant. In addition, the Phrae provincial government and Na Poon Sub-district administration were

to make financial contribution towards the biomass gasification power plant besides other things.

However, based on the agreement with TERI, the entire sum of USD 450,00012 allocated was used to the purchase of the 250 kWe, thereby leaving no GEF contribution for the 1 MW plant. Since ReLab Energy, the planned private sector investor of the 1 MW plant had not retracted its commitment from the project until 2014-15, it is not clear why the funds for 1 MW were directed towards the purchase of the 250kWe plant, as the reasons for this funding reallocation and the process to arrive at the decision have not been adequately documented in the project monitoring reports. Moreover, no contribution was made by the Phrae or Na Poon governments towards this contract.

TABLE 3: PROJECT EXPENDITURE

Unit Size	Total Cost (USD)	GEF Contribution	
		Development Activities (USD)	**Equipment (USD)**
250 kWe	1,050,949	100,000	90,000
1 MW	1,450,000	150,000	360,000
Total GEF Contribution (USD)		250,000	450,000

Moreover, the technical bid submitted for the supply of equipment was reviewed only by the Project Manager without the involvement of key in-country stakeholders, including STRI-CMU (the project's technical adviser) or the recipient government and community in Phrae province. Therefore, local considerations and priorities for the plant, for instance local environmental considerations, etc., were not incorporated in the approved technical proposal for the plant equipment. Further, as the plant was procured without due diligence regarding the other key factors, e.g. ensuring availability of feeder capacity or land, a considerable proportion of funds were tied up to this activity up front. This restricted the management's ability for adaptive management, since the only technology the project could now use was small scale biomass gasification.

4.3.6. STAKEHOLDER COLLABORATION

Considering the complicated nature of the project and interconnected roles of the various executing partners, continuous collaboration between stakeholders was crucial to ensure effective project outcomes. However, it was observed that the annual PSC meetings have been the only forum where all key stakeholders except the participating communities (UNIDO, MOE, STRI-CMU, and Phrae government) came together. Apart from this, most

12 A contract of USD 451,000 was signed with TERI for the supply of the 250 kWe unit

collaboration was one on one, and conducted often between UNIDO and the respective stakeholders.

Moreover, significant delays were observed in conveying key project information to stakeholders and facilitating coordination where necessary. For instance, despite the limited window available for the implementation of activities by KAPI-KU, no contact was established between KAPI and STRI-CMU (the technical advisor for the project) until the time of this evaluation in March 2019. Similarly, KAPI found the plant specifications shared by TERI to have incorrect dimensions and was therefore unable to move ahead with setting up the buildings required for housing the plant. However, corrected plans were not shared with KAPI at least until March 2019.

It was concluded that the lack of frequent contact was one of the factors responsible for delayed action due to the lack of an active dialogue focused on problem solving and decision making.

4.3.7. MONITORING AND EVALUATION (M&E)

The project's monitoring plan was developed in accordance with UNIDO-GEF project guidelines, and included: Quarterly Reports, Annual PIRs, minutes of PSC meetings. The PMU was responsible for monitoring project activities and regular submission of the mentioned monitoring reports to UNIDO. In addition, a Project Steering Committee (PSC) chaired by MOE and comprised of key project stakeholders, including UNIDO, PMU, and Phrae provincial and sub-district government representatives. The role of the PSC was to review project progress and facilitate coordination among stakeholders. Moreover, UNIDO was responsible for organizing an independent terminal evaluation. However, no mid-term review was incorporated in the design, since this was a mid-size project.

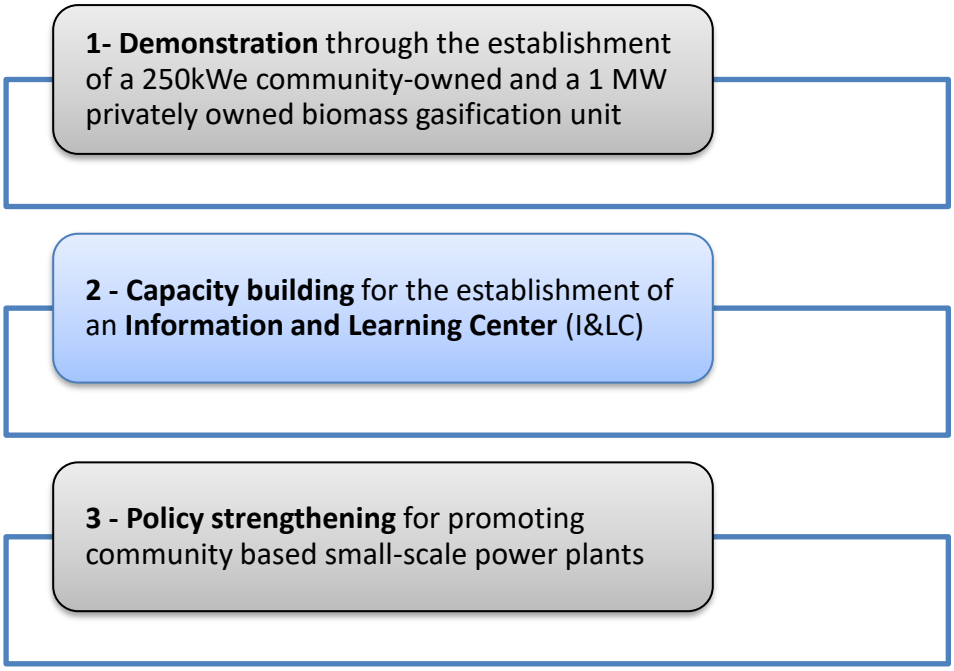
A review of monitoring processes suggests that project monitoring reports have been submitted on time, and most activities and issues faced during project implementation were duly recorded. Moreover, with the exception of 2017, regular PSC meetings were held on annual basis. However, the reporting lacked the depth to provide sufficient background information for key decisions, e.g. the establishment of PMU at UNIDO instead of STRI-CMU, the decision for funding the 250 kWe plant equipment entirely with GEF funds, and the reasons for the withdrawal of support by the private sector partner for the 1 MW unit, etc. Moreover, as detailed in the section on Adaptive Management, there were chronic delays in undertaking mitigation measures for several key issues faced by the project. Moreover, while the PSC members and observers included key project stakeholders, representation from the community and private sector was missing from these meetings.

In view of the project's operational performance in the areas of adaptive management, monitoring, financial planning, and stakeholder collaboration, Efficiency is rated as ***Unsatisfactory.***

4.3.8. EFFECTIVENESS

Effectiveness was assessed based on the quality of outcomes and outputs under the three project components, as listed in figure 04:

FIGURE 4: PROJECT COPONENTS



However, due to the challenges faced by the project and limited efficiency, the project has not been able to deliver on any one of its planned objectives, thus far. Therefore, effectiveness of the project is rated ***Highly Unsatisfactory.***

Moreover, due to lack of progress, the PSC decided in Q3 – 2018 to re-orient the project approach through the establishment of the 250kWe plant at research centers and universities. The only proposal approved in this regard until February 2019 was submitted by KAPI-KU. KAPI has proposed to establish the unit as a learning facility and to supply off grid power to the research facility. While the effectiveness of this alternative approach can be assessed only after implementation, the evaluation team has some reservations about this exit strategy.

The team believes that while this approach will lead to the utilization of the entire GEF grant, it will not enable the project to meet its main objective of demonstrating community-owned grid-connected small Biomass gasification power plants. Moreover, the time allotted to STRI-CMU for the completion of activities related to the establishment of I&LC, design and delivery of trainings, and policy review is not sufficient to carry out these activities effectively.

4.3.9. IMPACT

As the project has had no substantial outcomes, the impact of the project cannot be rated at this time.

4.3.10. SUSTAINABILITY

As the project has had no substantial outcomes, the impact of the project cannot be assessed at this time.

However, in terms of economic feasibility of operating a small-scale biomass gasification plant in the context of Thailand, it has been determined that the cost of electricity generated by through this technology is 10 Baht/kWh as compared to the current price of 2.35-4.42 Baht/kWh13 supplied from the grid. Under this scenario, future replication or upscaling of this technology is highly unlikely.

4.3.11. GENDER

Gender was assessed as a cross-cutting theme under this evaluation. Since the project was developed under GEF IV, the design conditions did not include specific inclusion of gender considerations. Moreover, since the technical project activities could not take off during the implementation, it was not possible for the TE team to assess the effectiveness or impact from the gender-lens.

In the retrospect however, had the project worked delivered on its objectives a review of the participation of and benefits accruing to women could have been assessed. This could potentially have included the impact on women workers at the bamboo processing and rice milling companies and women in community-owned enterprises.

4.3.12. PERFORMANCE OF PARTNERS

In the absence of detailed TORs provided to executing partners, a detailed assessment of the partners' performance was not feasible under this evaluation. Moreover, as none of the project components were delivered, a number of stakeholders, including the Phrae PAO/SAO, the community, and the private sector did not have a chance to contribute to the project.

On the other hand, UNIDO and MOE were active stakeholders. In the context of this project, since risk mitigation was the most important factor, the performance of these partners was rated in accordance with this criterion. In this regard, as detailed in the section on Adaptive Management, the response to challenges and decision making faced significant delays. Moreover, the project's budgetary planning was less than satisfactory as nearly half of the project amount was committed to equipment purchase early on in

13 https://www.pea.co.th/Portals/0/Document/Rate2015Update.pdf

the project without ensuring that all other procedures were in place. This aspect made any subsequent chance of steering the course of the project nearly impossible.

In addition, GEF's approval of the over simplistic project design demonstrated the need for detailed due diligence in future private sector power generation development projects. Similarly, multiple extensions have been granted to the project without undertaking an implementation review to assess the root cause of the delays. Finally, according to an interview with the GEF Focal Point in Thailand, the project is showing closed in 2015 (the original closing date) in the GEF database and has therefore not been tracked at the country level.

Based on these observations, the performance of partners has been rated ***Unsatisfactory***.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

Key conclusions from the evaluation of the 'Promoting of Small Scale Biomass Power Plants for Sustainable Renewable Energy Management and Community Involvement in Thailand' project are:

- The project design is not reflective of the realities of private sector power plant establishment in Thailand
- Major financial planning decisions made at the start of the project made it difficult to correct future course of action
- The project management and staffing structure is not conducive to sound planning, independent monitoring, and timely risk mitigation
- Decisions on critical adaptive management measures were delayed, leading to multiple extensions

The overall project ratings are presented in table 04:

TABLE 4: PROJECT EVALUATION CRITERIA

#	Evaluation criteria	TE Rating
A	**Impact**	Not Possible to Rate at This Time
B	**Project design**	
1	• Overall design	Unsatisfactory
2	• Log frame	Unsatisfactory
C	**Project performance**	
1	• Relevance	Moderately Unsatisfactory
2	• Effectiveness	Highly Unsatisfactory
3	• Efficiency	Unsatisfactory
4	• Sustainability of benefits	Not Possible to Rate at This Time
D	**Cross-cutting performance criteria**	
1	• Gender mainstreaming	Not Possible to Rate at This Time
2	• M&E:	Unsatisfactory

#	Evaluation criteria	TE Rating
	✓ M&E design ✓ M&E implementation	
3	• Results-based Management (RBM)	Unsatisfactory
E	**Performance of partners**	
1	• UNIDO	Unsatisfactory
2	• National counterparts	Unsatisfactory
3	• Donor	Unsatisfactory
F	**Overall assessment**	Highly Unsatisfactory

5.2. LESSONS LEARNED and RECOMMENDATIONS

Based on the thorough review of the design and implementation of the project, a number of key lessons have emerged. In order to inform future programming, this section provides an overview of the lessons learned along with recommendations of the TE team to inform future programming. These are divided into two categories, including future project design and implementation. Moreover, since the project is planned to continue until December 2019, specific recommendations have also been provided to guide the activities planned for the remainder of the project.

D. PROJECT DESIGN

1. **Flexible Project Design:** The landscape of renewable energy continues to rapidly evolve in terms of technology, economics, and environmental impact, thereby driving official regulations. Therefore, in order to remain relevant, it is recommended that any future RE focused projects should be designed and implemented within a short period of three to five years, while keeping a close eye on sectoral developments. Moreover, the design of RE projects should remain flexible in order to adapt to any major changes in policy or technology, etc. and facilitate a practical exit strategy in accordance with the changing situation. For instance, the choice of technology should be kept open ended at the time of design.

2. **Due Diligence: P**rivate sector power generation is highly regulated in Thailand and most other countries. It is therefore highly recommended to base project design on thorough due diligence to understand the overall regulations and timelines involved for particular activities. Similarly, to ensure successful project outcome, key project activities must be based on a sound economic feasibility study carried out at the time

of project design and periodically reviewed during the course of project implementation.

3. **Participatory Design:** In order to design programs that are responsive to the needs of different stakeholders. It is therefore recommended that consultations are carried out with all potential project partners, including institutional partners, implementing agencies, private sector organizations, and target communities in order to include the priorities and concerns of key stakeholders into the design. The absence of such participatory processes at the time of design can lead to low level of ownership as well as limited effectiveness in terms of responsive programming.

E. IMPLEMENTATION

4. **Project Management Unit (PMU):** Management of projects having various stakeholders and focusing on innovative ideas requires dedicated support from project staff. Moreover, in the case of technology-focused projects, effective project implementation is facilitated by bringing the management and technical staff under the same roof. It is therefore recommended that any such future projects are housed at a dedicated and well-staffed PMU. In addition, to facilitate independent monitoring, the PMU should be established separately from UNIDO and led by a participating technical agency with expertise in the project's domain.

5. **Finance and Procurement**: Since the country-level PMU is responsible for coordinating all key stakeholders, it is important to ensure that the PMU has access to all project financial information. This will not only ensure transparency of operations but also keep the local UNIDO staff updated on the project's financial health and enable them to suggest activities and solutions accordingly. Moreover, in order to ensure that the project is not constrained by major expenditures, procurement decisions must be finalized only after ensuring the satisfactory delivery of all other associated factors, e.g. economic analysis, availability of project site, and review of regulations, etc.

6. **Stakeholder Collaboration:** Active risk mitigation is a critical element of efficient monitoring. In the case of projects that are implemented in complex environments, a key factor to risk management is through frequent collaboration between the project stakeholders. In this regard, it is important to incorporate regular (monthly or quarterly) review and planning meetings into the project's annual work plan. Such regularity in contact can not only ensure the active participation of all concerned stakeholders but also facilitate brainstorming potential solutions to issues arising during implementation.

7. **Project Implementation Reviews:** Independent reviews can present an objective assessment of a project's health and help give perspective on resolving issues faced by the implementation team. It is therefore recommended that all projects should be subject to either a mid-term review or a project implementation review.

F. Project Specific Recommendations

In addition to the above general recommendations, this section provides specific recommendations to be considered by the project to guide its outstanding activities until project closure in December 2019.

8. **Installation of Power Plants:** While a contract has been signed with KAPI-KU for the installation of the 125kWe plant, the identification of another institution for the other 125kWe plant is still outstanding14. Considering the limited time available for implementation, it is imperative that the other institution is finalized without further delay. However, only those institutions should be considered which can propose realistic plans for the utilization of the unit.

9. **Economic Analysis:** An interview with KAPI-KU revealed that the organization plans to use electricity generated from the biomass plant to electrify its operational facilities in order to offset the high cost of power being supplied from the main grid currently. However, reportedly KAPI has not undertaken an economic analysis of the electricity to be generated from the biomass plant to be provided by the project and has no information whether the electricity generated from this source will cost less than the grid. It is therefore recommended that before proceeding with any further activities, KAPI must undertake such an economic analysis.

10. **Re-assessment of Activity Timeline and Costs:** With support from CMU as the project's technical adviser, the PMU should review the timelines allotted to the various outstanding activities to ensure that these assigned schedules are realistic. Accordingly, all outstanding contracts must be revised to ensure that all planned activities can be finished by the project's closure in December 2019.

    Moreover, as the contract for equipment purchase from TERI was signed in 2013 for a delivery date of 2014-15. However, the delivery has been delayed for several years on the project's request and 2019 is the revised date of shipment. It is therefore likely that the prices of various components to be procured by TERI for fabricating the plant may have changed. Hence, it is recommended that the financial proposal submitted by TERI is revised and finalized accordingly.

11. **Stakeholder Coordination:** Considering the limited timeframe available to wrap up the project activities, smooth coordination among the key stakeholders is critical. It is therefore recommended that instead of relying on the annual PSC meetings, going forward the PMU should organize monthly meetings between all concerned stakeholders to facilitate prompt resolution to issues and ensure timely delivery.

14 The project has to install a total of 250kWe capacity

ANNEXES

ANNEX 01: LIST OF DOCUMENTS REVIEWED

1. PROJECT EVALUATION TERMS OF REFERENCE 2018
2. UNIDO PROJECT EVALUATION MANUAL
3. PROJECT INCEPTION REPORT GUIDLINES
4. PROJECT STEERING COMMITTEE MEETING REPORTS **[** 2013, 2015, 2016, 2018 &2019**]**
5. PROJECT MONITORING AND REPORTING SHEET FOR COORDINATORS
6. PROJECT STEERING COMMITTEE; COMPOSITION OF THE PROJECT
7. UNIDO ANNUAL PROJECT IMPLEMENTATION REPORT **[**2013-14**]**
8. PROJECT PROGRESS REPORT **[**2014**]**
9. ADDENDUM-TO THE FIRST PROGRESS REPORT
10. WORK PLAN 2013-16, CHIANG MAI UNIVERSITY
11. WORK PLAN GEF **[**2014**]**
12. INTERIM PROGRESS REPORT
13. UNIDO ANNUAL PROJECT IMPLEMENTATION REPORT **[**2014-15**]**
14. UNIDO ANNUAL PROJECT IMPLEMENTATION REPORT **[**2015-16**]**
15. UNIDO ANNUAL PROJECT IMPLEMENTATION REPORT **[**2016-17**]**
16. UNIDO ANNUAL PROJECT IMPLEMENTATION REPORT **[**2017-18**]**
17. EXECUTIVE SUMMARY REPORT **[**2016**]**
18. PROJECT SUMMARY REPORT **[**2017**]**
19. PROJECT PROGRESS UPDATE REPORT UNIDO**/**GEF **[**2017**]**
20. RISKS ENDORSEMENT DOCUMENT
21. UPDATED WORK PLAN FOR FISCAL YEAR 2017 UNIDO**/**GEF

ANNEX 02: ASSIGNMENT WORKPLAN

Deliverable	Content	Timing	Responsibilities
Inception Report	Evaluator provides clarifications on timing and method	27 February 2019	Evaluator submits to responsible UNIDO Evaluation Manager
De-briefing Presentation	Initial Findings	25 March 2019	To Local Stakeholders in Thailand
Draft Final Report	Full report, (per annexed template) with annexes	10 April 2019	Delivered to Independent Evaluation Division (IED) of UNIDO, reviewed by GEF OFPs and other stakeholders
De-briefing Presentation	Presentation to be delivered by the International Evaluation Consultant	15 April 2019	Delivered to IED, Project Management and any other relevant units in UNIDO HQ, Vienna
Final Report	Revised report	Within 1 week of receiving UNIDO comments on draft	Sent to IED, UNIDO

ANNEX 03: QUESTIONNAIRE SHEETS

UNIDO Project Management

Date:

Location

Meeting Participants: Name and Designation

Contact Information

QUESTIONNAIRE

PROJECT BACKGROUND

When was the project developed and when did implementation start?

- Year of Project Design: ----------
- Year of GEF Approval: ----------
- Year and Month of Implementation Start: ----------
- Year and Month of Project Closing (Planned) : Program Closing ---------- Administrative Closing ------
- Year and Month of Project Closing (Revised): Program Closing ------Administrative Closing ---------
- Date of PMU Establishment:

PROJECT DESIGN

1. What was the process of project design? E.g. baseline survey, consultative meetings, research, etc.?

2. Who were the main stakeholders involved in the design?

3. When did the design process start and end?

4. What were the key challenges faced when designing the project? E.g. lack of cooperation by some key stakeholders, lack of information, etc.

5. What were the initial identified risk to the project and what was the process of assessing these risks?

6. What was the process of design approval?

7. What are the major shortcomings of the project design?

8. What opportunities were missed due to the lack of integrating gender considerations into the project design?

9. What are your recommendations for the design of similar projects in the future?

TIMELINESS

1. Have there been any significant delays in implementation of activities (delay of three months or more)? If yes, how much was the delay?

2. What was the reason for delay and which activities were affected by this delay?

3. How did these delays affect the project's progress?

4. What measures were undertaken by the key stakeholders, including PSC, PMU, UNIDO, and GEF to overcome these challenges?

5. Did the delay in activities lead to extending the date for project closure? If yes, how many times has the project received extension? Please elaborate

6. What was the process of approving this extension?

ADAPTIVE MANAGEMENT

1. During the time of implementation, have there been any changes to the project approach or activities that were not part of the project design? If yes, what were these changes and why were these made?

2. Were these changes incorporated in the project's log frame and document?

3. What was the process of having these changes approved? E.g. approval from PSC, approval from GEF, etc.

SUPPORT FROM UNIDO

1. What has been the key role played by UNIDO in project implementation and adaptive management?

2. How has this support been helpful towards project implementation? linkages with international experts, provision of M&E support, etc.

3. What has been the role of the UNIDO in monitoring and course correction? E.g. lobbying with relevant agencies for resolution of issues affecting the project, etc.

4. What have been some of the challenges in providing this supportive role? E.g. change in policy, lack of cooperation from relevant agencies, etc.

5. How could the role of the UNIDO have been improved? E.g. more proactive support to resolution of issues, timely budget releases, simpler reporting formats, etc.

6. What, if any, support has been provided by GEF towards project implementation? E.g. provision of technical expertise, lobbying with relevant agencies for resolution of issues affecting the project, etc.

PROJECT MANAGEMENT UNIT

1. What is the role played by the PMU in the implementation of the project? Please provide details, e.g. M&E, Coordination, Reporting, and associated processes

2. What have been the major challenges in dealing with the PMU? E.g. technical capacity, high turnover, delayed reporting, etc.

3. How could the role of the PMU be improved in similar future projects?

PROJECT STEERING COMMITTEE

1. What were some of the major decisions/actions taken in the PSC meetings that were important for the project's implementation and what were the outcomes of some of these decisions? Please provide details

2. How could the role of the PSC have been improved?

3. What is the selection criteria and process of selection of the PSC members?

PARTNERSHIP and COORDINATION

1. Which particular stakeholders under each project outcome have been particularly active in ensuring the project's success? How?

2. How has the project collaborated with some of the **other GEF assisted biomass or EE programs** (e.g. UNDP, etc.) and with other development partners, e.g. WB, JICA, etc.

3. What have been some of the synergies or positive outcomes of these collaborations?

MONITORING and EVALUATION

1. How is the log frame used for purposes of Planning, M&E, and Reporting? What problems have been faced by the PMU when reporting against the log frame?

2. Who is responsible for monitoring the project's activities?

3. What is the process of monitoring the project's activities against the identified outputs/outcomes?

4. What have been some of the major problems regarding project monitoring?

5. What have been the key risk mitigation measures undertaken in regards to the project?

6. What are your recommendations for improving the monitoring of future similar projects?

BUDGET and CO-FINANCING

1. Was the budget sufficient for the proposed activities? If no, what problems has the project faced regarding budget allocations? What efforts have been made to resolve some of these problems?

2. Were there any budgetary reallocations/changes during the course of the project implementation?

3. Were all the key stakeholders, such as local governments, private company, and communities, etc. able to meet their co-financing requirements? If no, what was the reason and how did the lack of this financing affect the project?

IMPACT

1. What are some of the intended and unintended impacts of the project?

2. Although gender is not integrated in the project design, did the project have any direct or indirect impact on women? If yes, please elaborate

3. Which of the project activities/components have had the highest impact? Why?

4. Which of the project activities/components have had the least impact? Why?

5. What problems were faced in assessing the impact? E.g. lack of an M&E system to assess impact, lack of cooperation of project stakeholders in reporting progress/impact, etc.

6. What change (positive or negative) can be attributed to the project?

SUSTAINABILITY

1. Which outcomes/results of the project are particularly sustainable? Why?

2. Which outcomes/results of the project are least sustainable? Why?

3. What are the major risks to the sustainability of the project's activities? E.g. lack of funding, high product cost, lack of technical capacity, etc.

RECOMMENDATIONS

1. What were some of the major lessons learned from project implementation?

2. What are your recommendations for the implementation of similar projects in the future?

Project Management Unit (PMU)

Date:

Location

Meeting Participants: Name and Designation

Contact Information

QUESTSIONNAIRE

Project Background

When was the project developed and when did implementation start?

- Year of Project Design: ----------
- Year of GEF Approval: ----------
- Year and Month of Implementation Start: ----------
- Year and Month of Project Closing (Planned) : Program Closing ---------- Administrative Closing ------
- Year and Month of Project Closing (Revised): Program Closing ------Administrative Closing —---------
- Date of PMU Establishment:

1. Who are the key **public and private sector stakeholders** and what is the role of each?

PROJECT MANAGEMENT

1. What is the role played by the PMU in the implementation of the project? Please provide details, e.g. M&E, Coordination, Reporting, and associated processes

2. How many staff work at the PMU and what is the respective function of each staff member? Please provide organogram of the PMU

3. Has the project faced any HR challenges, e.g. insufficient or under qualified staff, high turnover, non-availability on in country technical knowhow, etc.? If yes, how have these been resolved?

4. Has there been a turnover/change in personnel on key project positions, e.g. PMU Director, Project Manager, etc.? If yes, when, and how has this lack of continuity affected the project?

5. Did the project undertake any special measures to ensure gender diversity in recruitment and staffing?

PROJECT DESIGN

1. What was the process of project design? E.g. baseline survey, consultative meetings, research, etc.?

2. Who were the main stakeholders involved in the design?

3. When did the design process start and end?

4. What were the key challenges faced when designing the project? E.g. lack of cooperation by some key stakeholders, lack of information, etc.

5. What were the reasons for not integrating gender in the project design? How did this affect the project delivery?

6. What was the process of design approval?

7. In your opinion, how could the process of project development be improved?

8. What are your recommendations for the design of similar projects in the future?

9. Was the project design consistent with and adequate to address the country's energy policy, or national energy policy strategic goal? If no, what were the shortcomings?

ADAPTIVE MANAGEMENT

1. During the time of implementation, have there been any changes to the project approach or activities that were not part of the project design? If yes, what were these changes and why were these made?

2. Were these changes incorporated in the project's log frame and document?

3. What was the process of having these changes approved? E.g. approval from PSC, approval from GEF, etc.

4. What project risk assessment, risk mitigation/risk implementation measures were designed were taken? (Especially, after the initial phase was extended from 2015 to 2019 or some activities were design to pending during 2016-2018)

TIMELINESS

1. Have there been any significant delays in implementation of activities (delay of three months or more)? If yes, how much was the delay?

2. What was the reason for delay and which activities were affected by this delay?

3. How did these delays affect the project's progress?

4. What was the impact of activity delays on other components and activities?

5. What measures were undertaken by the key stakeholders, including PSC, PMU, UNIDO, and GEF to overcome these challenges?

6. Did the delay in activities lead to extending the date for project closure? If yes, how many times has the project received extension? Please elaborate

7. What was the process of approving this extension?

8. How did these multiple extensions affect achievement of project results?

SUPPORT FROM UNIDO

1. What has been the key role played by UNIDO in project implementation and adaptive management?

2. How has this support been helpful towards project implementation? linkages with international experts, provision of M&E support, etc.

3. What has been the role of the UNIDO in monitoring and course correction? E.g. lobbying with relevant agencies for resolution of issues affecting the project, etc.

4. What have been some of the challenges in coordinating the project activities with UNIDO?

5. How could the role of the UNIDO have been improved? E.g. more proactive support to resolution of issues, timely budget releases, simpler reporting formats, etc.
6. What, if any, support has been provided by GEF towards project implementation? E.g. provision of technical expertise, lobbying with relevant agencies for resolution of issues affecting the project, etc.

PROJECT STEERING COMMITTEE

1. Who are members of the PSC? Please provide a list

2. Are the members permanent or changed from time to time? If members were changed, what were the reasons for making these changes?

3. Were all the PSC meetings held on time? If no, what are the reasons?

4. What were some of the major decisions/actions taken in the PSC meetings that were important for the project's implementation and what were the outcomes of some of these decisions? Please provide details

5. How could the role of the PSC have been improved?

PARTNERSHIP and COORDINATION

1. Which particular stakeholders under each project outcome have been particularly active in ensuring the project's success? How?

2. Did any stakeholders not meet their commitments? If yes, who are they and what was the reason?

3. What are some of the important coordination activities undertaken by the PMU? E.g. annual or bi-annual meetings of stakeholders, etc.

4. How has the project collaborated with some of the **other GEF assisted biomass or EE programs** (e.g. UNIDO, etc.) and with other development partners, e.g. WB, JICA, etc.

5. What have been some of the synergies or positive outcomes of these collaborations?

6. How has the collaboration between the various stakeholders leveraged the project performance?

7. What have been the major challenges faced by the PMU in regards to coordination with stakeholders? How were some of these challenges mitigated?

SUB-CONTRACTOR ENGAGEMENT

1. What are the key sub-contracted activities under the project? When did each activity start and finish?

Sub-Contracted Activity	Organization /Consultant	Start Date	End Date	Contract Value (USD)

2. Are there any outstanding activities in any of the sub-contracts?

3. What were the challenges in sub-contracting? E.g. availability of local expertise, cost, coordination, commitment and timely delivery by sub-contractors, etc.?

4. What was the process of sub-contractor selection? How did the project ensure transparency in selection of sub-contractor organizations?

BUDGET and CO-FINANCING

1. Was the budget sufficient for the proposed activities? If no, what problems has the project faced regarding budget allocations? What efforts have been made to resolve some of these problems?

2. Were all the committed finances (GEF) delivered on time? If no, please provide details, e.g. reason for delay in provision of funds, impact of delayed funds on project progress and achievement of outcomes, etc.

3. What was the project's annual delivery rate for each year since project start? Was the ADR particularly low in any year? How were these issues resolved?

4. Were there any budgetary reallocations/changes during the course of the project implementation?

5. Were all the key stakeholders, such as local governments, private company, and communities, etc. able to meet their co-financing requirements? If no, what was the reason and how did the lack of this financing affect the project? If yes, was the co-financing equal to or more than the expectation in the project design? What was the reason for the low or high co-financing? E.g. change in GOT policy, interest of consumers, etc.

6. Have regular project financial audits been undertaken? Were these audits satisfactory? If not, what were the reasons and how were these issues resolved?

MONITORING and EVALUATION

1. What have been the major monitoring methods used by the PMU? E.g. progress review meetings, field visits, etc.

   Was the monitoring plan at the point of project approval practical and sufficient?

2. How is the log frame used for purposes of Planning, M&E, and Reporting? What problems have been faced by the PMU when reporting against the log frame?

3. Have all the reports been submitted to UNIDO on time? If no, please provide reasons for delay

4. What have been some of the major problems regarding project monitoring?

5. What are your recommendations for improving the monitoring of future similar projects?

6. What was the process of sub-contractor results monitoring/reporting? and how frequently were these monitoring activities undertaken?

IMPACT

1. What are some of the intended and unintended impacts of the project?

2. Although gender was not integrated in the project design, did the project have any direct or indirect impact on women? Please explain.

3. Which of the project activities/components have had the highest impact? Why?

4. Which of the project activities/components have had the least impact? Why?

5. What problems were faced in assessing the impact? E.g. lack of an M&E system to assess impact, lack of cooperation of project stakeholders in reporting progress/impact, etc.

SUSTAINABILITY

1. What have been the key measures of sustainability/replicability embedded in the project design and delivery?

2. Which outcomes/results of the project are particularly sustainable? Why?

3. Which outcomes/results of the project are least sustainable? Why?

4. What are the major risks to the sustainability of the project's activities? E.g. lack of funding, high product cost, lack of technical capacity, etc.

5. How are the activities related to production or utilization of biomass plants being replicated and scaled up? E.g. continuation of trainings, availability of financing, etc.

RECOMMENDATIONS

1. What were some of the major lessons learned from project implementation?

2. What are your recommendations for the implementation of similar projects in the future?

ERC (Energy Regulatory Commission) & DEDE (Department of Alternative Energy Department and Efficiency)

Date:

Location

Meeting Participants: Name and Designation

Contact Information

QUESTSIONNAIRE

BACKGROUND

1. What is the primary role of your organization/agency in determining/implementing Renewable Energy policy and/or Regulating of power purchasing scheme in the country?

2. What are some of the other key agencies which are involved in this role, especially in relevance to 'Biomass Energy'?

3. What are the current priorities of the Government of Thailand in terms of renewable energy, especially as they relate to biomass energy? Especially support to small scale biomass power plant

UNIDO Biomass Energy Project

4. Has your organization been involved in the design and/or implementation of the UNIDO's biomass project? If yes, please provide details

5. If no, how could your organization be involved in in the project's design and implementation?
6. In your opinion, how did this lack of involvement affect the project's implementation?

Lessons and Recommendations

7. What have been some of the other small biomass projects being implemented in Thailand over the past five years?

   Note: based on ERC' database, it's were some of the small biomass gasification power plant registered under VSPP scheme and got PPA approval until it was COD. Some were revoked or terminate the PPA or cancellation it's application. However, the database could show only the number accumulate tracking, it could not indicate how much this power plant are still continue operating and running.

8. What have been the main opportunities and challenges faced by these projects?

9. What are the positive and negative implications of small biomass energy projects for women across the value chain?

10. What are the major challenges to the development of biomass energy in Thailand? E.g. Govt. priority, technology, pricing, etc.

11. Currently what is the key policy mechanism driving the Renewable energy business in Thailand?

12. What are your recommendations for the development of future small biomass energy projects in Thailand? Especially - Community based-small scale biomass power plant in rural areas.

GEF Focal Point

Date:

Location

Meeting Participants: Name and Designation

Contact Information

QUESTSIONNAIRE

BACKGROUND

1. What are GEF priorities and current programming in Thailand in reference to Renewable Energy?

2. In addition to GEF, what are some of the other key agencies which are involved in this role, especially in relevance to 'Biomass Energy'?

3. What are the current priorities of the Government of Thailand in terms of renewable energy, especially as they relate to biomass energy?

4. Has your organization been involved in the design and/or implementation of the UNIDO's biomass project? If yes, please provide details

5. If no, what was the reason for the lack of involvement of your organization in the project's design and implementation?

UNIDO Biomass Energy Project

6. What are some of the major achievements of the small biomass project in Thailand (based on GEF project involvement or Government project participation)?

7. What are some of the critical challenges that were faced by the project? And what measures were taken to mitigate these?

8. In your opinion, how did the design of the project contribute to these achievements and challenges?

Lessons and Recommendations

9. What have been some of the other small biomass projects being implemented in Thailand over the past five years?

10. What have been the main opportunities and challenges faced by these projects?

11. What are the positive and negative potential consequences for women of small biomass energy projects in the country?

12. What are the major challenges to the development of biomass energy in Thailand? E.g. Govt. priority, technology, pricing, etc.

13. What are your recommendations for the development of future small biomass energy projects in Thailand?

Chiang Mai University (STRI - CMU)

Date:

Location

Meeting Participants: Name and Designation

Contact Information

QUESTSIONNAIRE

Project Background

1. What was the role played by your organization in the project's design? E.g. technical feasibilities, etc.

2. What was the major role played by your organization in the project's implementation? Please provide details

3. What was the process of project activity design? E.g. baseline survey, consultative meetings, research, etc.?

4. What were the key challenges faced when implementing the project? E.g. lack of cooperation and supporting by other stakeholders, lack of information, etc.

3. In your opinion, what have been the major flaws or shortcomings in the project's design? How did these affect the implementation?

4. What were the major challenges faced in implementation? What measures were taken to address these issues?

5. To your knowledge, are there any other small biomass energy units in Thailand? If yes, what factors have been responsible for their success and failure?

6. What are the major lessons learned from the implementation of the UNIDO's biomass project?

7. What are your recommendations for the implementation of similar future projects?

TIMELINESS

1. Have there been any significant delays in implementation of activities (delay of three months or more)? If yes, how much was the delay?

2. What was the reason for delay and which activities were affected by this delay?

3. How did these delays affect the project's progress?

4. What the process of project activities risk assessment, risk mitigation/risk implementation measures were designed and taken?

PARTNERSHIP and COORDINATION

1. Which particular stakeholders under project have been particularly active in ensuring the project's success? How?

2. What is the role played by the PMU in the implementation of the project? Please provide details, e.g. M&E, Coordination, Reporting, and associated processes

3. What have been some of the synergies or positive outcomes of these collaborations of the particular stakeholder?

4. What have been some of the challenges in supportive role of each particular stakeholder? E.g. change in policy/regulatory driven, lack of cooperation from relevant agencies, etc.

MONITORING and EVALUATION

1. What have been the major monitoring methods used by the STRI-CMU? E.g. progress review meetings, field visits, etc.

2. How is the log frame used for purposes of Planning, M&E, and Reporting? What problems have been faced when reporting against the log frame?

3. When was the sub-contractor regularly reporting submit? Have all the reports been submitted to UNIDO on time? If no, please provide reasons for delay

4. What have been some of the major problems regarding project monitoring?

5. What are your recommendations for improving the monitoring of future similar projects?

Lessons and Recommendations

1. What have been some of the other small biomass projects being implemented in Thailand over the past five years?

2. What are the major challenges to the development of biomass energy in Thailand? E.g. Govt. priority, technology, pricing, etc.

3. What have been the main opportunities and challenges faced by these projects?

4. What are your recommendations for the development of future small biomass energy projects in Thailand?

KASETSART Uni.

(Agricultural and Agro Industrial Production Institute KAPI)

Date:

Location

Meeting Participants: Name and Designation

Contact Information

QUESTSIONNAIRE

BACKGROUND

1. How did your institution hear about the UNIDO/GEF biomass project?
2. What was the reason for your interest in partnering with the project? Please elaborate
3. What was the process of formalizing the partnership with the project? E.g. EOI, short-listing, negotiation, etc.
4. What are the main reasons/needs for participating in this project? E.g. establishment of local power unit, development of a learning center, etc.?
5. How will the support from this project help you in achieving this objective? E.g. financial support, technical support, etc.
6. In case, this support was not available through the UNIDO project, how would you satisfy your needs? E.g. applying to alternative sources, continuing business as-is, etc.
7. What are the comparative advantages of the opportunity available through the UNIDO project?

IMPLEMENTATION

1. What is the agreed start date and closing date of the project?
2. What is the current implementation status of the project?
3. What problems have you faced so far in implementing the project?
4. Also, what additional problems do you foresee in the future that can affect the implementation of the project?
5. Do you think that the project will be able to complete all agreed activities by the agreed close date?
6. If not, which major activities do you expect to remain outstanding?
7. How is this expected to affect the project's overall effectiveness?

SUSTAINABILITY

1. What challenges do you foresee to the sustainability of this project?
2. In your opinion, what measures can be taken to overcome these challenges?
3. What will be the major risks to the sustainability of the project's activities? (foresee)
   E.g. lack of funding, high product cost, lack of technical capacity, etc.
4. Which of the project activities/components is foreseen to have the highest risk impact to the project sustainability in long-term? Why?

RECOMMENDATIONS

1. What are your recommendations for the implementation of similar projects in the future?

What are your recommendations for the development of future small biomass energy projects in Thailand? Especially - Community based-small scale biomass power plant in rural area

ANNEX 04: LIST OF STAKEHOLDERS INTERVIEWED

Mission Schedule – Terminal Evaluation of Biomass Energy (UNIDO Thailand)				
Date	**Meeting Time**	**Stakeholder Meeting Activities**	**Key persons**	**Location**
Monday (18.03.2019)	9:30 am– 12:30 pm	Meeting between International Evaluator and National Evaluator	Ms.Umm e Ms.Sopin	UNIDO Thailand office
	1.30 – 4.30 pm	Meeting with UNIDO Project management unit (PMU)	Mr.Supalerk Tel: 061 787 9545 Ms.Jutamanee Tel: 061 417 4500	UNIDO Thailand office
Tuesday (19.03.2019)	9.30 am – 11.00 am	GEF Focal Point, Thailand (UNIDO will send letter directly to GEF, with phone called follow up to Office of International Cooperation on Natural Resources and Environment, Office of the Permanent Secretary-MoNRE	MoNRE acknowledges and accept in situation that this project going on as MoE requested for extending project to UNIDO. Note: from MoNRE point of view, they were involved in this project only beginning phase of CEO endorsement, after that they have not involved anything on this project activity.	As our time slot remaining is not available for them. So MoNRE suggested, to evaluate based on the information we got from UNIDO, without directly face-to-face meeting interview.
	01.00 pm – 02.30 pm	Representative of Kasetsart University - Faculty of Forestry	Forestry: Dr. Pongsak Hengniran Tel: 087 366 3013 ช	Meeting Room @10th FL., Building 72th year-Faculty of Forestry
	02.30 pm – 05.00 pm	Representative of Kasetsart University-Research Institute team - KAPI	KAPI: Dr.Maliwan Haruthaithanasan Tel: 086 555 2816	Kasetsart University (KU-Bangkok campus) place & room to be confirmed.

Mission Schedule – Terminal Evaluation of Biomass Energy (UNIDO Thailand)				
Date	**Meeting Time**	**Stakeholder Meeting Activities**	**Key persons**	**Location**
Wednesday (20.03.2019)	09.30 am – 12.00 pm	Meeting with DEDE officer, training division	DEDE: Mr.Narong: 086 100 5591 Bureau of Energy Human Resource Development	Energy Conservation building, Rangsit Klong 5
	02.30 Pm – 05.00 Pm	Meeting with ERC representation	ERC: Ms.Narinporn Malasri Acting Director Energy Plan and Procurement Regulation Department	ERC office building, Chamchuri square
Thursday (21.03.2019)	** Travelling start from BKK flight in morning to Phrae			
	02.00 pm – 04.30 pm	Meeting with Phrae Provincial Energy Officer, MoE	Mr.Noppadol Soangpadith Tel: 087 671 0558 Meeting Room @ Phrae-PEO office (Provincial Energy office, MoE-Phrae)	
Friday (22.03.2019)	7:30 am – 8.30 am	Travel from Phrae City to PAO (45 mins to 1 hr)		
	8.30 am – 10.30 am	Meeting with Phrae Provincial Administrative Organization and (PAO)	Mr.Wattana Phathong Tel: 081 950 7338 Meeting with Deputy of Chief Executive of the Phrae PAO (Mr.Wattana)	
	10:30-2:30 (incl. lunch in car)	Travel to Chiang Mai		
Saturday (23.03.2019) AM	Tbc and Check flight time	Travelling back from Chiang Mai, flight back to BKK		
Sunday				

Mission Schedule – Terminal Evaluation of Biomass Energy (UNIDO Thailand)				
Date	**Meeting Time**	**Stakeholder Meeting Activities**	**Key persons**	**Location**
Monday (25.09.2018)	9:30 am– 12:00 pm	Representative of Policy and Strategy Office of the Permanent Secretary, MoE	MoE: Ms.Tanwan Topoklang Tel: 082 450 2649 Meeting Room @ MoE office fl.23 building B.	MOE
	01:00 am– 04:30 pm	De-briefing to UNIDO PMU	Ms.Umm e and Ms.Sopin With UNIDO Thailand	
Open.	Flight back to Islamabad	Open.	Open.	

ANNEX 05: OUTLINE OF IN-DEPTH PROJECT EVALUATION REPORT

Executive summary

- Evaluation purpose and methodology
- Key findings
- Conclusions and recommendations
- Project ratings
- Tabular overview of key findings – conclusions – recommendations

1. **Introduction**
   - 1.1. Evaluation objectives and scope
   - 1.2. Overview of the Project Context
   - 1.3. Overview of the Project
   - 1.4. Theory of Change
   - 1.5. Evaluation Methodology
   - 1.6. Limitations of the Evaluation
2. **Project's contribution to Development Results - Effectiveness and Impact**
   - 2.1. Project's achieved results and overall effectiveness
   - 2.2. Progress towards impact
     - 2.2.1.Behavioral change
       - 2.2.1.1. Economically competitive - Advancing economic competitiveness
       - 2.2.1.2. Environmentally sound – Safeguarding environment
       - 2.2.1.3. Socially inclusive – Creating shared prosperity
     - 2.2.2.Broader adoption
       - 2.2.2.1. Mainstreaming
       - 2.2.2.2. Replication
       - 2.2.2.3. Scaling-up
3. **Project's quality and performance**
   - 3.1. Design
   - 3.2. Relevance
   - 3.3. Efficiency
   - 3.4. Sustainability
   - 3.5. Gender mainstreaming
4. **Performance of Partners**
   - 4.1. UNIDO
   - 4.2. National counterparts
   - 4.3. Donor
5. **Factors facilitating or limiting the achievement of results**
   - 5.1. Monitoring & evaluation
   - 5.2. Results-Based Management
   - 5.3. Other factors
   - 5.4. Overarching assessment and rating table
6. **Conclusions, recommendations and lessons learned**
   - 6.1. Conclusions
   - 6.2. Recommendations
   - 6.3. Lessons learned
   - 6.4. Good practices

Annexes (to be put online separately later)

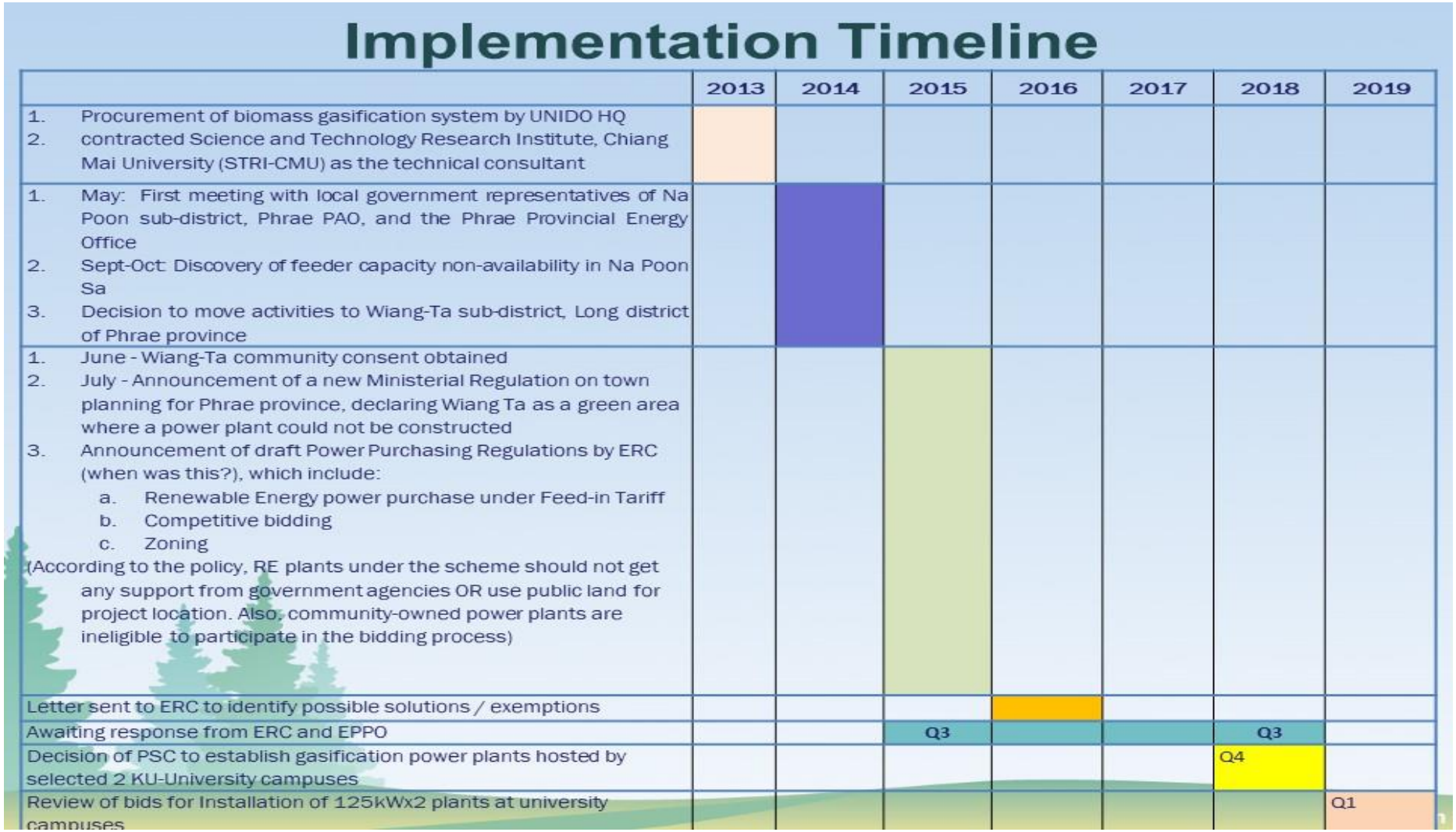
- Evaluation Terms of Reference
- Evaluation framework

- List of documentation reviewed
- List of stakeholders consulted
- Project log frame/Theory of Change
- Primary data collection instruments: evaluation survey/questionnaire
- Statistical data from evaluation survey/questionnaire analysis

ANNEX 06: EVALUATION RATING SCALE

Score		Definition	Category
6	Highly satisfactory	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	
4	Moderately satisfactory	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory	Level of achievement is negligible and there are severe shortcomings.	

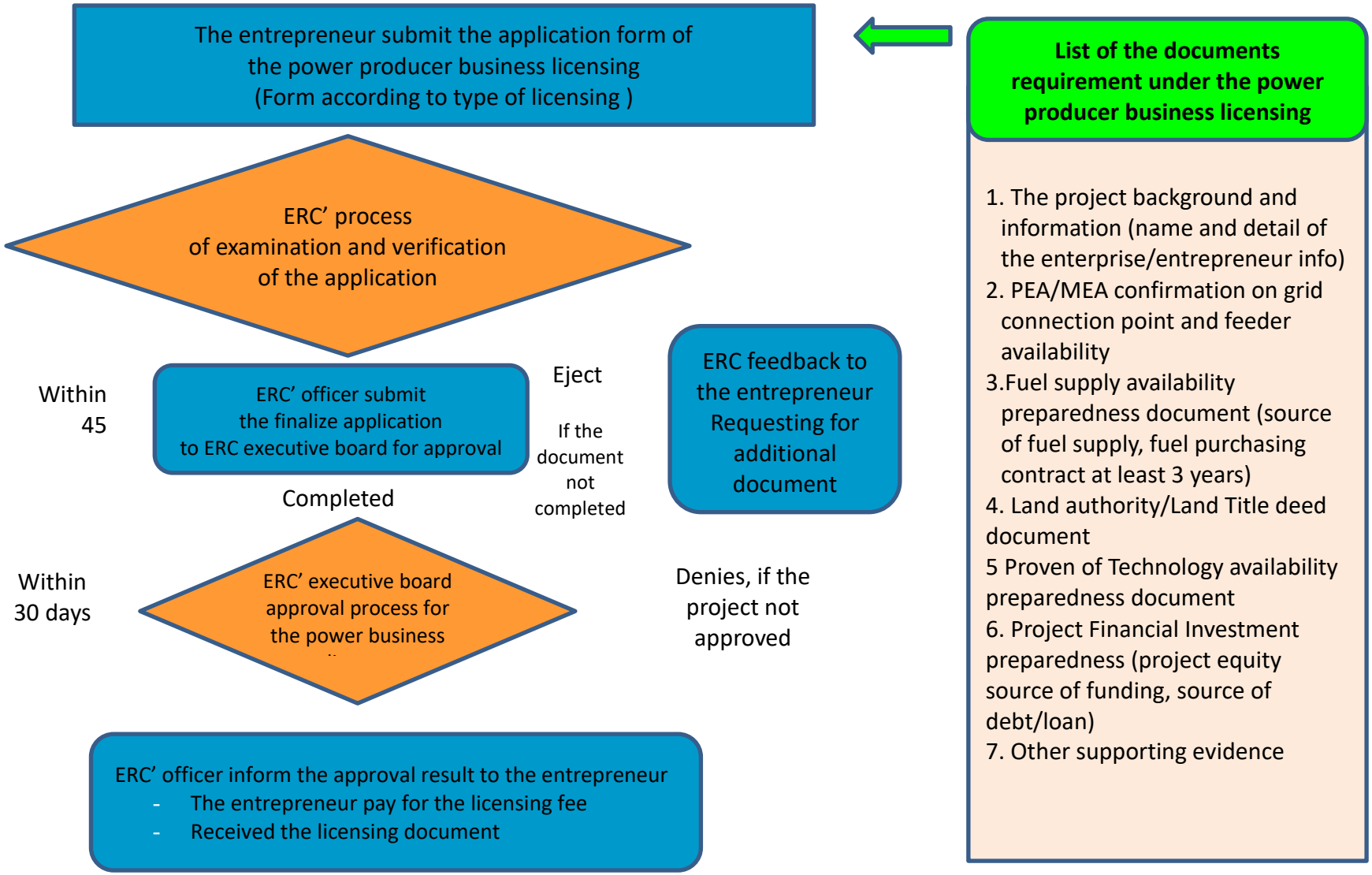
ANNEX 07: IMPLEMENTATION OF TIMELINE



ANNEX 08: BUDGET EXECUTION BY UNIDO

Items of expenditure	2013	2014	2015	2016	2017	2018	Total expend.	% over total expenditure	% of total planned project budget
Contractual Services	50,000	0	50,000	1,878	32	0	101,910	15.2%	2.4%
Equipment	465,500	0	-20	0	0	0	465,480	69.6%	10.9%
International Meetings	0	0	0	0	2,505	0	2,505	0.3%	0.06%
Local travel	369	3,874	1,312	74	0	0	5,629	0.8%	0.13%
Nat. Consult./Staff	13,606	16,564	0	0	0	46,192	76,362	11.5%	1.8%
Other Direct Costs	1,063	4,342	2,905	503	0	29	8,842	1.4%	0.21%
Staff & Intern Consultants	0	0	0	3,724	0	3,871	7,595	1.2%	0.18%
Grand Total	530,538	24,780	54,197	6,179	2,537	50,092	668,323	100%	15.6%

ANNEX 09: PROCESS TO OBTAIN PRIVATE SECTOR LICENCING



ANNEX 10: TERMS OF REFERENCE

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

TERMS OF REFERENCE

Independent terminal evaluation of project

[Title]

UNIDO ID: [Status]

GEF Project ID: 4184

October 2018

Contents

I. Project background and context

1. Project factsheet[15]

Project title	[Title]
UNIDO ID	
GEF Project ID	4184
Region	South-East Asia
Country	Thailand
Project donor(s)	GEF
Project implementation start date	September 2012
Expected implementation end date	December 2018
GEF Focal Areas and Operational Project	Climate change, SP4 – Promoting sustainable energy production from biomass
Implementing agency	UNIDO
Government coordinating agency	Ministry of Energy (MoE)
Executing Partners	Na-Poon sub-district Administrative Organisation (SAO), Phrae Provincial Administrative Organisation (PAO), Science and Technology Research Institute (STRI), Chiang Mai University (CMU)
Donor funding	USD 975,000
Project GEF CEO endorsement / approval date	13 July 2012
UNIDO input (in kind, USD)	USD 50,000
Co-financing at CEO Endorsement, as applicable	USD 3,306,800
Total project cost (USD), excluding support costs and PPG	USD 4,281,800
Planned terminal evaluation date	December 2019

(Source: Project document)

2. Project context

In 2008 the total power generation of Thailand was around 148,200 GWh, out of which 71.2% was produced from natural gas and around 22% from coal and lignite, with hydroelectricity, fuel oil and diesel accounting for only 5.4%, 1.1% and 0.1% respectively. The electricity demand of the country increased steadily every year, with a peak in 2009 and an average forecasted growth rate of 4.2%.

Within this context, the National Government developed a National Renewable Energy Master Plan (2008-2022), aiming at increasing the share of renewable energy production in the country's overall energy supply up to 20.3% by 2022. The plan fosters to more than double the biomass-based electricity from 1,610 MWe to at least 3,700 MWe by 2022, mainly from agricultural residues.

The Government of Thailand took significant steps in the last 20 years to promote power generation from biomass, in particular throughout the successful establishment of several power plants between 2 to 50 MWe mostly using steam thermal technology. Concerning, on the other

[15] Data to be validated by the Consultant

hand, the small scale biomass power generation, i.e. below 1MWe size, gasification is considered to be the most suitable technology. This is mainly because of the characteristics of the Thai industrial scenario, dominated by small agro and wood processing industries, where biomass residues are either unutilised or underutilised.

In parallel, one of the main challenges was to balance the increased electricity production with the greenhouse gas (GHG) emissions, which are forecasted to growth steadily, according to a study carried out in 2009 by the Thailand Greenhouse Organisation. To mitigate GHG emissions without hampering its economic development, the Government of Thailand responded with new policies and regulatory frameworks such as: a) Energy Industry Act (2007); b) Energy policy and Development Plan (2007-2021); c) National Renewable Energy Master Plan (2008-2022); d) National Strategy on Climate Change (2008-2012). Despite all the efforts from the Government and the responsible Ministries, the successful establishment of small-scale biomass gasification power plants was still minimal at the time this project was conceived, mainly because of:

- difficulty in identification of qualified equipment suppliers;
- inadequate human and institutional capacity;
- lack of professional project development practice;
- lack of equipment standardization;
- lack of successful demonstration projects;
- high up-front investment costs;
- lack of systematic learning programme;
- lack of proper information and of confidence in the technology;
- lack of appropriate policy/planning to promote gasification-based power plants at the community level.

3. Project objective and expected outcomes

To overcome the above-mentioned barriers and challenges, the Government of Thailand sought the technical support of UNIDO. The project *Promoting small scale biomass power plants in rural Thailand for sustainable renewable energy management and community involvement*, funded by the GEF and implemented by UNIDO, aims at promoting renewable energy, mainly in the form of small-scale biomass gasification power plants in rural Thailand. The project is based on a holistic approach encompassing demonstration of power plants, capacity building and policy components.

Since most of the small-scale gasification power plants of less than 200kWe proved to be not successful in Thailand due to the already-mentioned reasons, the projects aims at demonstrating two larger-scale plants, namely a 250kWe bamboo waste gasification power plant at Phrae Province and a 1MWe rice husk gasification plant in the Udon Thani Province.

The project consists of three components and eight outputs:

Project Component 1 (PC1): demonstration of technical and financial viability of small-scale biomass gasification grid connected power plants. Expected outputs:

1) 250kWe bamboo waste gasification power plant at Phrae Province, Thailand;
2) 1MWe rice husk gasification plant in the Udon Thani Province, Thailand.

Project Component 2 (PC2): technical and institutional capacity building for adopting small-scale biomass gasification power plants. Expected outputs:

1) An information and learning centre on small-scale biomass gasification established at STRI, CMU;
2) Information and learning centre staff trained on development, technical aspects, operation and maintenance (O&M) of small-scale biomass gasification power plants;
3) Training material developed for the different trainings to be conducted at the information and learning centre;
4) Information toolkit prepared for agro-industries on developing small-scale biomass gasification power plants.

Project Component 3 (PC3): support models preparation and policy strengthening for promoting community based small-scale power plants.

1) development of participatory process for the promotion and support of community owned small-
   scale biomass power plants up to 1MWe capacity;
2) policies pushed to promote small-scale biomass power plants in the community through provincial energy planning mechanism.

4. Project implementation arrangements

The project is executed by UNIDO in collaboration with the concerned Federal Ministries, State Governments and the private sector stakeholders.

UNIDO is responsible for: a) management and monitoring of the project; b) reporting to GEF; c) procuring the international expertise needed for delivering the planned outputs; d) approving the selected companies for the power plants construction; e) approving the national experts participating for delivering the planned outputs; f) managing, supervising and monitoring the work of international teams and ensuring that the deliverables are technically sound and consistent with the project requirements.

Phrae PAO / Na Poon SAO are responsible for: a) constructing the 250 kWe biomass gasification power plant; b) designing and constructing the information and learning centre at STRI, CMU; c) establishing short rotation bamboo plantation; d) constructing emergency/first aid health centre near the power plant site; e) procuring a part of equipment/ facilities and providing staff for project management for the 250 kWe power plant.

STRI, CMU are responsible for: a) providing staff for the information and learning centre; b) preparing various training material targeting different stakeholders; c) human and institutional capacity building in small scale biomass gasification, by conducting suitable trainings; d) sustained operation of the information and learning centre.

Policy and Strategy Management Office, Office for the Permanent Secretary and Phrae Provincial Energy Office, MoE are responsible for: providing support for the recommendations on strengthening the existing supporting policies with special attention to favour community owned small scale biomass gasification plants.

The ***Project Management Unit (PMU),*** established within the STRI, CMU, and consisting of a Project Manager and a Project Administrative Assistant will be responsible for: a) coordinating all the project activities carried out by the national experts and other partners by having close

association with the Phrae PAO/ Na Poon SAO, Policy and Strategy Management Office, Office for the Permanent Secretary and Phrae Provincial Energy Office, MoE, STRI, CMU and UNIDO; b) day-to-day management, M&E of project activities; c) organizing the training to be carried out under project component 2 and various stakeholders consultations to be carried out under project component 3.

Relab Energy (private investor) will be responsible for: a) constructing the 1MWe biomass gasification power plant; b) procuring the equipment/facilities for the 1MWe power plant.

A ***Project Steering Committee (PSC),*** chaired by MoE and composed by members from Phrae PAO/ Na Poon SAO, UNIDO, PMU, PM and chopstick factories' representatives, has the responsibility to: a) review progress in project implementation; b) facilitate coordination among project stakeholders; c) maintain transparency in ensuring ownership and to support the sustainability of the project. The project management structure as designed has been provided.

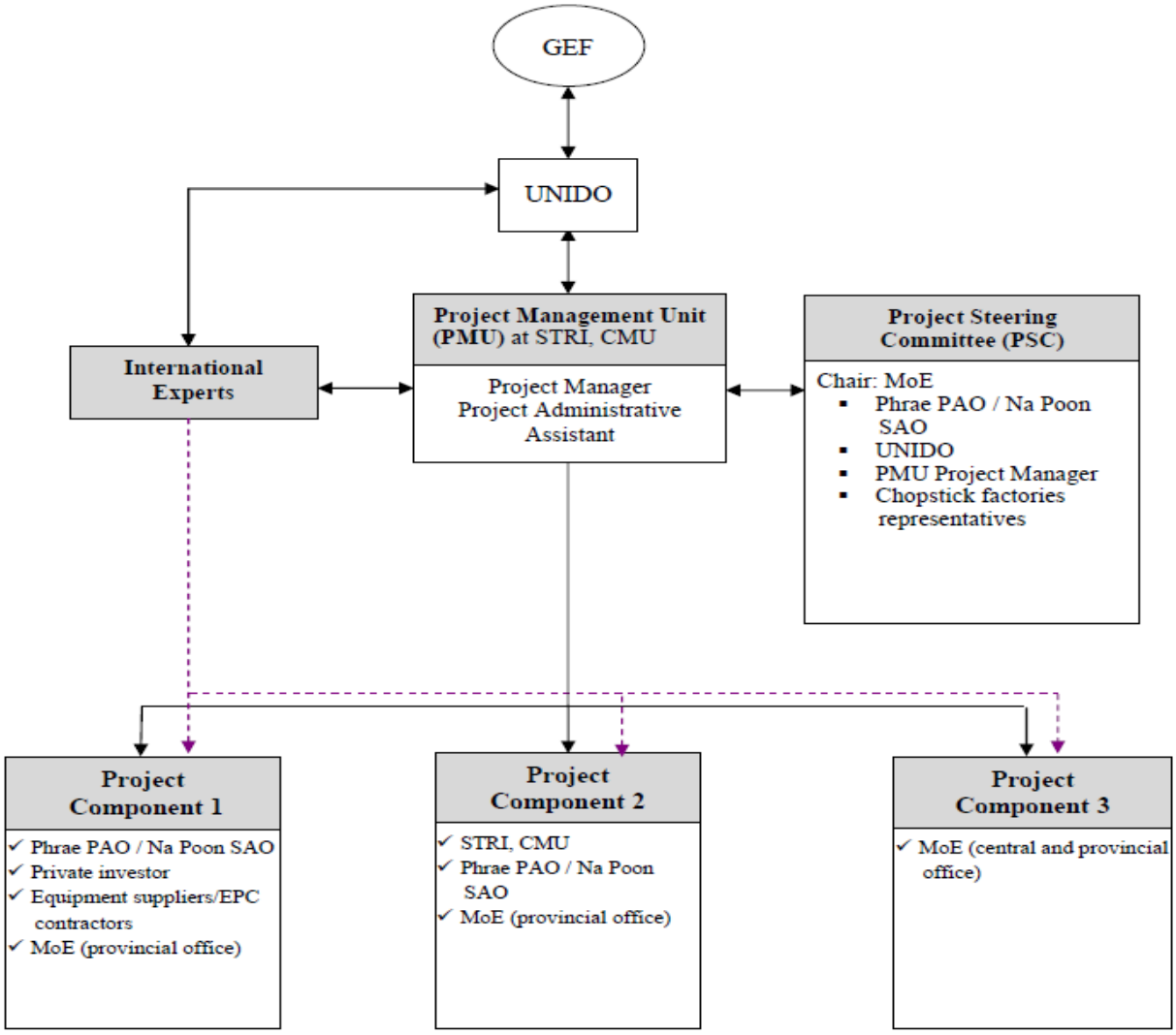


Figure 10: Diagram of project implementation arrangement

UNIDO will closely coordinate the on-going as well as planned relevant initiatives to ensure maximum synergies and overall impact of the Climate Change related technical assistance to Thailand.

5. Budget information

Table 1. Financing plan summary

USD	*Project Preparation*	*Project*	*Total (USD)*
Financing (GEF / others)	25,000	975,000	1,000,000
Co-financing (Cash and In-kind)	110,000	3,306,800	3,416,800
Total (USD)	**135,000**	**4,281,800**	**4,416,800**

Source: Project document / progress report

Table 2. Financing plan summary - Outcome breakdown[16]

Project outcomes	Donor (GEF/other) (USD)	Co-Financing (USD)	Total (USD)
1 – Demonstration of technical and financial viability of small-scale biomass gasification grid connected power plants	700,000	2,716,800	**3,416,800**
2 – Technical and institutional capacity building for adopting small scale biomass gasification power plants	100,000	290,000	**390,000**
3- Support preparation of models and policy strengthening for promoting community based small-scale power plants	85,000	100,000	**185,000**
4 – Project management	90,000	200,000	**290,000**
Total (USD)	**975,000**	**3,306,800**	**4,281,800**

Source: Project document / progress report

Table 3. Co-Financing source breakdown

Name of Co-financier (source)	In-kind	Cash	Total Amount (USD)	% over total
Na Poon SAO *(Local Government)*	320,000	1,636,800	**1,956,800**	*59,2%*
Ministry of Energy (MoE)		100,000	**100,000**	*3%*

[16] Source: Project document.

Name of Co-financier (source)	In-kind	Cash	Total Amount (USD)	% over total
(National Government)				
UNIDO *(Implementing Agency)*		50,000	**50,000**	*1,5%*
Relab Energy *(Private investor)*		1,200,000	**1,200,000**	*36,3%*
Total Co-financing (USD)	320,000	2,986,800	**3,306,800**	*100%*

Source : Project document

Table 4. UNIDO budget execution (Grant n. 2000001414)

Items of expenditure	2013	2014	2015	2016	2017	2018	Total expend.	% over total
Contractual Services	50,000	0	50,000	1,878	32	0	**101,910**	*15,2%*
Equipment	465,500	0	-20	0	0	0	**465,480**	*69,6%*
International Meetings	0	0	0	0	2,505	0	**2,505**	*0,3%*
Local travel	369	3,874	1,312	74	0	0	**5,629**	*0,8%*
Nat. Consult./Staff	13,606	16,564	0	0	0	46,192	**76,362**	*11,5%*
Other Direct Costs	1,063	4,342	2,905	503	0	29	**8,842**	*1,4%*
Staff & Intern Consultants	0	0	0	3,724	0	3,871	**7,595**	*1,2%*
Grand Total	**530,538**	**24,780**	**54,197**	**6,179**	**2,537**	**50,092**	**668,323**	***100%***

Source: UNIDO Project Management database as of 2 October 2018

II. Scope and purpose of the evaluation

The purpose of this summative evaluation is to independently assess the project to help UNIDO improve performance and results of ongoing and future programmes and projects. The terminal evaluation (TE) will cover the whole duration of the project from its starting date in to the estimated completion date in 31/12/2018.

The evaluation has two specific objectives:

(i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact; and
(ii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

III. Evaluation approach and methodology

The TE will be conducted in accordance with the UNIDO Evaluation Policy[17] and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[18]. In addition, the GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies will be applied.

The evaluation will be carried out as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the project will be informed and consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Independent Evaluation Division (ODG/EIO/IED) on the conduct of the evaluation and methodological issues.

The evaluation will use a theory of change approach and mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning.

The theory of change will identify causal and transformational pathways from the project outputs to outcomes and longer-term impacts, and drivers as well as barriers to achieve them. The learning from this analysis will be useful to feed into the design of the future projects so that the management team can effectively manage them based on results.

1. Data collection methods

Following are the main instruments for data collection:

(a) **Desk and literature review** of documents related to the project, including but not limited to:
- The original project document, monitoring reports (such as progress and financial reports, mid-term review report, output reports, back-to-office mission report(s), end-of-contract report(s) and relevant correspondence.
- Notes from the meetings of committees involved in the project.

(b) **Stakeholder consultations** will be conducted through structured and semi-structured interviews and focus group discussion. Key stakeholders to be interviewed include:
- UNIDO Management and staff involved in the project; and
- Representatives of donors, counterparts and stakeholders.

(c) **Field visit** to project sites in Thailand.

2. Evaluation key questions and criteria

The key evaluation questions are the following:

(e) What are the key drivers and barriers to achieve the long-term objectives? To what extent has the project helped put in place the conditions likely to address the drivers, overcome barriers and contribute to the long-term objectives?

(f) How well has the project performed? Has the project done the right things? Has the project done things right, with good value for money?

[17] UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)

[18] UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

(g) What have been the project's key results (outputs, outcome and impact)? To what extent have the expected results been achieved or are likely to be achieved? To what extent the achieved results will sustain after the completion of the project?

(h) What lessons can be drawn from the successful and unsuccessful practices in designing, implementing and managing the project?

The evaluation will assess the likelihood of sustainability of the project results after the project completion. The assessment will identify key risks (e.g. in terms of financial, socio-political, institutional and environmental risks) and explain how these risks may affect the continuation of results after the project ends.

Table below provides the key evaluation criteria to be assessed by the evaluation. The details questions to assess each evaluation criterion are in annex 2.

Table 5. Project evaluation criteria

#	Evaluation criteria	Mandatory rating
A	**Impact**	**Yes**
B	**Project design**	**Yes**
1	• Overall design	Yes
2	• Logframe	Yes
C	**Project performance**	**Yes**
1	• Relevance	Yes
2	• Effectiveness	Yes
3	• Efficiency	Yes
4	• Sustainability of benefits	Yes
D	**Cross-cutting performance criteria**	
1	• Gender mainstreaming	Yes
2	• M&E: ✓ M&E design ✓ M&E implementation	Yes
3	• Results-based Management (RBM)	Yes
E	**Performance of partners**	
1	• UNIDO	Yes
2	• National counterparts	Yes
3	• Donor	Yes
F	**Overall assessment**	Yes

Performance of partners

The assessment of performance of partners will ***include*** the quality of implementation and execution of the GEF Agencies and project executing entities (EAs) in discharging their expected roles and responsibilities. The assessment will take into account the following:

- Quality of Implementation, e.g. the extent to which the agency delivered effectively, with focus on elements that were controllable from the given GEF Agency's perspective and how well risks were identified and managed.
- Quality of Execution, e.g. the appropriate use of funds, procurement and contracting of goods and services.

Other Assessments required by the GEF for GEF-funded projects:

The terminal evaluation will assess the following topics, for which ***ratings are not required***:

a. **Need for follow-up**: e.g. in instances financial mismanagement, unintended negative impacts or risks.

b. **Materialization of co-financing**: e.g. the extent to which the expected co-financing materialized, whether co-financing was administered by the project management or by some other organization; whether and how shortfall or excess in co-financing affected project results.

c. **Environmental and Social Safeguards**[19]: appropriate environmental and social safeguards were addressed in the project's design and implementation, e.g. preventive or mitigation measures for any foreseeable adverse effects and/or harm to environment or to any stakeholder.

3. Rating system

In line with the practice adopted by many development agencies, the UNIDO Independent Evaluation Division uses a six-point rating system, where 6 is the highest score (highly satisfactory) and 1 is the lowest (highly unsatisfactory) as per the below table.

Table 6. Project rating criteria

Score		Definition	Category
6	Highly satisfactory	Level of achievement clearly exceeds expectations and there is no shortcoming.	SATISFACTORY
5	Satisfactory	Level of achievement meets expectations (indicatively, over 80-95 per cent) and there is no or minor shortcoming.	

[19] Refer to GEF/C.41/10/Rev.1 available at: http://www.thegef.org/sites/default/files/council-meetingdocuments/ C.41.10.Rev_1.Policy_on_Environmental_and_Social_Safeguards.Final%20of%20Nov%2018.pdf

Score		Definition	Category
4	Moderately satisfactory	Level of achievement more or less meets expectations (indicatively, 60 to 80 per cent) and there are some shortcomings.	
3	Moderately unsatisfactory	Level of achievement is somewhat lower than expected (indicatively, less than 60 per cent) and there are significant shortcomings.	UNSATISFACTORY
2	Unsatisfactory	Level of achievement is substantially lower than expected and there are major shortcomings.	
1	Highly unsatisfactory	Level of achievement is negligible and there are severe shortcomings.	

IV. Evaluation process

The evaluation will be conducted from November 2018 to January 2019. The evaluation will be implemented in five phases which are not strictly sequential, but in many cases iterative, conducted in parallel and partly overlapping:

i. Inception phase: The evaluation team will prepare the inception report providing details on the methodology for the evaluation and include an evaluation matrix with specific issues for the evaluation; the specific site visits will be determined during the inception phase, taking into consideration the findings and recommendations of the mid-term review (if any).

ii. Desk review and data analysis;

iii. Interviews, survey and literature review;

iv. Country visits;

v. Data analysis and report writing.

V. Time schedule and deliverables

The evaluation is scheduled to take place from December 2018 to March 2019. The evaluation field mission is tentatively planned for January 2019. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project in . The tentative timelines are provided in Table 7 below.

After the evaluation field mission, the evaluation team leader will visit UNIDO HQ for debriefing and presentation of the preliminary findings of the terminal evaluation. The draft TE report will be submitted 4 to 6 weeks after the end of the mission. The draft TE report is to be shared with the UNIDO PM, UNIDO Independent Evaluation Division, the UNIDO GEF Coordinator and GEF OFP and other stakeholders for receipt of comments. The ET leader is expected to revise the draft TE report based on the comments received, edit the language and form and submit the final version of the TE report in accordance with UNIDO ODG/EIO/EID standards.

Table7. Tentative timelines

Timeline	Tasks
November 2018	Desk review and writing of inception report
End of November 2018	Briefing with UNIDO project manager and the project team based in Vienna through Skype
December 2018	Field visit to Thailand
End of December 2018	Debriefing in Vienna Preparation of first draft evaluation report
January 2019	Internal peer review of the report by UNIDO's Independent Evaluation Division and other stakeholder comments to draft evaluation report
End of January 2019	Final evaluation report

VI. Evaluation team composition

The evaluation team will be composed of one international evaluation consultant acting as the team leader and one national evaluation consultant. The evaluation team members will possess relevant strong experience and skills on evaluation management and conduct together with expertise and experience in innovative clean energy technologies. Both consultants will be contracted by UNIDO. The tasks of each team member are specified in the job descriptions annexed to these terms of reference. The ET is required to provide information relevant for follow-up studies, including terminal evaluation verification on request to the GEF partnership up to three years after completion of the terminal evaluation. According to UNIDO Evaluation Policy, members of the evaluation team must not have been directly involved in the design and/or implementation of the project under evaluation.

The UNIDO Project Manager and the project team in Thailand will support the evaluation team. The UNIDO GEF Coordinator and GEF OFP(s) will be briefed on the evaluation and provide support to its conduct. GEF OFP(s) will, where applicable and feasible, also be briefed and debriefed at the start and end of the evaluation mission.

An evaluation manager from UNIDO Independent Evaluation Division will provide technical backstopping to the evaluation team and ensure the quality of the evaluation. The UNIDO Project Manager and national project teams will act as resourced persons and provide support to the evaluation team and the evaluation manager.

VII. Reporting

Inception report

This Terms of Reference (ToR) provides some information on the evaluation methodology, but this should not be regarded as exhaustive. After reviewing the project documentation and initial interviews with the project manager, the Team Leader will prepare, in collaboration with the national consultant, a short inception report that will operationalize the ToR relating to the

evaluation questions and provide information on what type of and how the evidence will be collected (methodology). It will be discussed with and approved by the responsible UNIDO Evaluation Manager.

The Inception Report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework ("evaluation matrix"); division of work between the International Evaluation Consultant and national consultant; mission plan, including places to be visited, people to be interviewed and possible surveys to be conducted and a debriefing and reporting timetable[20].

Evaluation report format and review procedures

The draft report will be delivered to UNIDO's Independent Evaluation Division (the suggested report outline is in Annex 4) and circulated to UNIDO staff and national stakeholders associated with the project for factual validation and comments.

Any comments or responses, or feedback on any errors of fact to the draft report provided by the stakeholders will be sent to UNIDO's Independent Evaluation Division for collation and onward transmission to the project evaluation team who will be advised of any necessary revisions. On the basis of this feedback, and taking into consideration the comments received, the evaluation team will prepare the final version of the terminal evaluation report.

The ET will present its preliminary findings to the local stakeholders at the end of the field visit and take into account their feed-back in preparing the evaluation report. A presentation of preliminary findings will take place at UNIDO HQ after the field mission.

The TE report should be brief, to the point and easy to understand. It must explain the purpose of the evaluation, exactly what was evaluated, and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons.

The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

Findings, conclusions and recommendations should be presented in a complete, logical and balanced manner. The evaluation report shall be written in English and follow the outline given in annex 4.

VIII. Quality assurance

[20] The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by the UNIDO ODG/EVQ/IEV.

All UNIDO evaluations are subject to quality assessments by UNIDO Independent Evaluation Division. Quality assurance and control is exercised in different ways throughout the evaluation process (briefing of consultants on methodology and process of UNIDO Independent Evaluation Division, providing inputs regarding findings, lessons learned and recommendations from other UNIDO evaluations, review of inception report and evaluation report by UNIDO's Independent Evaluation Division).

The quality of the evaluation report will be assessed and rated against the criteria set forth in the Checklist on evaluation report quality, attached as Annex 5. The applied evaluation quality assessment criteria are used as a tool to provide structured feedback. UNIDO Independent Evaluation Division should ensure that the evaluation report is useful for UNIDO in terms of organizational learning (recommendations and lessons learned) and is compliant with UNIDO's evaluation policy and these terms of reference. The draft and final evaluation report are reviewed by UNIDO Independent Evaluation Division, which will submit the final report to the GEF Evaluation Office and circulate it within UNIDO together with a management response sheet.

Annex 1: Project Logical Framework

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
Goal	To reduce and avoid GHG emission from the energy sector of Thailand.	1. Incremental CO_2 emission reduction due to increased biomass power plants.	1. CO_2 emission due to fossil fuel based power generation.	1. 1.25 MWe (cumulative capacity) biomass gasification based power plant capacity added during the project period. 2. At least 25 MWe biomass based gasification power plant capacity added during next 10 year period.	1. Physical verification of projects in operation. 2. End of project survey.	Continuous support of all participating organizations, State governments, Ministries and project investors.
Objective of the project	To promote grid connected small scale biomass based gasification power plants and to sustainably manage and use biomass residues in rural Thailand.	1. 250 kWe community owned grid connected biomass gasification based power generation. 2. 1 MWe grid connected biomass gasification based power generation. 3. Percentage increase in investments on community based small scale biomass projects. 4. Increased capacity to implement, operate and maintain small scale biomass gasification plants. 5. Policies strengthened for community based small scale biomass power	1. Only very few grid connected small scale gasification power plants of size less than 1 MWe available. 2. Inadequate technical capacity (human and institutional). 3. No exclusive policy to support community based small scale biomass power plant. 4. Lack of participation process model and mechanism in promoting small	1. 1.25 MWe (cumulative capacity) grid connected biomass gasification power plants established. 2. Policy regime strengthened. 3. 25 MWe (cumulative capacity) of biomass gasification plants added in next 10 years as a result of increased investments 4. At least 5 institutions and 5 private developers available for developing small scale biomass gasification power plants. 5. Participatory model for supporting and promoting community managed small scale biomass gasification	1. Physical verification of the implemented projects. 2. Physical verification of the plantation. 3. End of project survey. 4. Government reports. 5. M&E reports	1. Sustained support from government and investor for the agreed project activities. 2. Commitment from Government agencies and CMU in building capacity and strengthening policies. 3. Phrae PAO / Na Poon SAO and MoE

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
		generation. 6. Participatory and project management models developed.	scale biomass power plants	power plants 6. Project management model for sustainable development and operation of community managed plants. 7. Support mechanism for community managed small scale biomass power plants.		
Outcome 1	Technical and financial viability of small scale biomass gasification power plants demonstrated.	Power plants operate and sell electricity to the national grid.	Successfully operating grid connected biomass gasification power plants of sizes less than 1 MWe are fewer.	1. Biomass gasification power plants in operation. 2. Biomass based electricity exported to grid, which replaces fossil fuel based electricity.	1. Physical verification of technical and financial reports of biomass gasification power plants.	Sustained support from government, Phrae PAO, Na Poon SAO / private investor for the agreed project activities.
Project Component 1- Demonstration of technical and financial viability of small scale biomass gasification grid connected power plants						
Output 1.1	250 kWe biomass gasification power plant established in Phrae Province, Thailand.	1. A community based biomass gasification power plant of capacity 250 kWe established. 2. Power plant operates smoothly and provides electricity to the national grid. 3. CO_2 emission reduction from renewable electricity usage.	1. Community based grid connected biomass gasification power plant of size 250 kWe not available. 2. Fossil fuel based power generation in the absence of biomass based electricity.	1. A Community based biomass gasification based power plant is in operation. 2. 13,338 t CO_2 emission reduction for life time from biomass electricity usage. 3. Above 1,530 MWh of annual electricity supply to national grid from the community based biomass gasification power plant.	1. Physical verification of the implemented power plant. 2. Commissioning report. 3. Annual reports and monitoring reports of the biomass gasification power plant. 4. Site visit/seminar.	Sustained support from government, Phrae PAO/Na Poon SAO and investor.

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
					5. Seminar material, leaflets, various publications and website.	
Output 1.2	1 MWe biomass gasification power plant established in Udon Thani Province, Thailand.	1. A biomass gasification power plant of capacity 1 MWe established. 2. Power plant smoothly operates and provides electricity to the national grid. 3. CO_2 emission reduction from renewable electricity usage.	1. Successfully operating grid connected biomass gasification power plant of size 1 MWe are not available. 2. Fossil fuel based power generation in the absence of biomass based electricity.	1. A biomass gasification based power plant is in operation. 2. 53,703 t CO_2 emission reduction for lifetime from biomass electricity usage. 3. Above 6,160 MWh of annual electricity supply to national grid from the biomass gasification power plant.	1. Physical verification of the implemented power plant. 2. Commissioning report. 3. Annual reports and monitoring reports of the biomass gasification power plant. 4. Site visit/seminar. 5. Seminar material, leaflets, various publications and website.	Sustained support from government and private investor.
Outcome 2	Technical and institutional capacity on small scale biomass gasification available in the country.	Percentage increase in the stakeholders possessing necessary capacity to develop, install, operate and maintain small scale biomass gasification power plants.	Inadequate technical and institutional capacity in developing, operating and maintaining small scale biomass gasification power plants.	1. CMU staff capacity strengthened in development of small scale biomass gasification power plants. 2. Human capacity increased in operation and maintenance of the power plant. 3. To strengthen the capacity of at least 100 persons from	1. Number of CMU staff trained. 2. Number of non-institutional trained persons. 3. Number of training courses offered. 4. Physical verification of operating	Sustained support from CMU, Phrae PAO / Na Poon SAO for the agreed project activities

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
				CMU, other universities, experts, planners, etc. to support small scale biomass gasification power plant development in the country.	personnel in the power plant. 5. Training materials. 6. Training evaluation reports.	
Project Component 2 - Technical and institutional capacity building for adopting small scale biomass gasification power plants						
Output 2.1	An information and learning centre on small scale biomass gasification established at STRI, CMU.	1. Information and learning centre established at STRI, CMU. 2. Operation of information and learning centre.	No information and learning centre for biomass gasification technology available in Thailand.	Information and learning centre developed.	1. Physical verification of the information and learning centre. 2. Government reports. 3. End of project M&E report.	Sustained support from Phrae PAO / Na Poon SAO, STRI, CMU.
Output 2.2	Information and learning centre staff trained on development, technical aspects, operation and maintenance (O&M) of small scale biomass gasification plants.	STRI, CMU staff trained in development, technical aspects, O&M of small scale biomass gasification power plant available.	Neither trained staff nor an information and learning centre available for small scale biomass gasification available in the country.	At least 30 staff from STRI, CMU trained in development, technical aspects, operation and maintenance (O&M) of small scale biomass gasification plant.	1. Physical verification of the learning centre. 2. Number of staff trained. 3. End of project M&E report. 4. End of project survey.	Sustained CMU support for the agreed project activities.
Output 2.3	Training materials developed for the different trainings to be conducted at the information and	Manuals prepared on small scale biomass gasification power plant development, technical aspects, operation and maintenance.	No manuals or training materials available in the country.	To conduct at least 12 trainings on various aspects of small scale biomass gasification before the end of the project	1. Physical verification of training materials and reports. 2. Number of training	Sustained support from Phrae PAO / Na Poon SAO and CMU for the agreed project activities.

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
	learning centre.				materials / manuals purchased.	
Output 2.4	Information toolkit prepared for agro-processing industries on developing small scale biomass gasification power plants.	Information toolkit available for guiding the agro-industries in developing small scale biomass gasification power plants.	No toolkits or guidelines available in Thailand.	Information toolkit prepared for guiding the development of small scale biomass gasification power plant step by step.	1. Physical verification of toolkit/guide book. 2. Number of users of the toolkit. 3. Number of agro-industries taking initiatives for developing biomass gasification plants.	Sustained support from Phrae PAO, Na Poon SAO/ and CMU for the agreed project activities.
Outcome 3	Participatory and project management models and improved policies available to promote the replication of community based small scale biomass plants in Thailand.	1. Participatory and project management model available 2. Policies favouring community based small scale biomass power plants available.	1. Lack of participation process model and mechanism in promotion and drive for small scale biomass power plants. 2. No policies favouring community involvement and ownership of small scale biomass power plants available	1. Various support mechanisms / plans / models available to support the involvement of community and the sustainable development and operation of community managed plants in the province (Phrae) and country (Thailand). 2. Policies strengthened to favour replication of community based biomass gasification power plants in the country.	Government reports.	Sustained support from STRI, CMU and Phrae PAO, Na Poon SAO.
Project Component 3 - Support models preparation and policy strengthening for promoting community based small-scale power plants						

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
Output 3.1	Development of participatory process for the promotion and support of community owned small scale biomass power plants up to1 MWe capacity	Recommendation reports	Lack of participation process model and mechanism in promoting small scale biomass power plants	1. Participatory model for supporting and promoting community managed plants. 2. Project management model for sustainable development and operation of community managed plants. 3. Financial model for community managed / owned small scale biomass power plant. 4. Support mechanisms for community managed plants.	1. Government reports. 2. Project M&E report.	Sustained support from STRI, CMU, Phrae PAO / Na Poon SAO and MoE.
Output 3.2	Policies pushed to promote small scale biomass power plant in the community through provincial energy planning mechanism	Fuel security and operation and maintenance plans / policies for community owned / managed small scale biomass power plants Policy report to drive and support the project	Lack of plans / policies for the sustainable development and operation of small scale biomass gasification based community plants	Project replication in other potential areas.	1. Government reports. 2. Project M&E report.	Support from STRI, CMU, Phrae PAO / Na Poon SAO and MoE.

Annex 2: Detailed questions to assess evaluation criteria: See Annex 2 of the UNIDO Evaluation Manual

Annex 3: Job descriptions

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
TERMS OF REFERENCE FOR PERSONNEL UNDER INDIVIDUAL SERVICE AGREEMENT (ISA)

Title:	International evaluation consultant, team leader
Main Duty Station and Location:	Home-based
Missions:	Missions to Vienna, Austria and Thailand
Start of Contract (EOD):	15th November 2018
End of Contract (COB):	31st January 2019
Number of Working Days:	26 working days spread over the above-mentioned period

1. ORGANIZATIONAL CONTEXT

The UNIDO Independent Evaluation Division (ODG/EIO/IED) is responsible for the independent evaluation function of UNIDO. It supports learning, continuous improvement and accountability, and provides factual information about result and practices that feed into the programmatic and strategic decision-making processes. Independent evaluations provide evidence-based information that is credible, reliable and useful, enabling the timely incorporation of findings, recommendations and lessons learned into the decision-making processes at organization-wide, programme and project level. ODG/EIO/IED is guided by the UNIDO Evaluation Policy, which is aligned to the norms and standards for evaluation in the UN system.

2. PROJECT CONTEXT

Detailed background information of the project can be found the terms of reference (TOR) for the terminal evaluation.

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
1. Review project documentation and relevant country background information (national policies and strategies, UN strategies and general economic data). Define technical issues and questions to be addressed by the national	• Adjusted table of evaluation questions, depending on country specific context; • Draft list of stakeholders to interview during the field missions. • Identify issues and questions to be	5 days	Home-based

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
technical evaluator prior to the field visit. Determine key data to collect in the field and adjust the key data collection instrument if needed. In coordination with the project manager, the project management team and the national technical evaluator, determine the suitable sites to be visited and stakeholders to be interviewed.	addressed by the local technical expert		
2. Prepare an inception report which streamlines the specific questions to address the key issues in the TOR, specific methods that will be used and data to collect in the field visits, confirm the evaluation methodology, draft theory of change, and tentative agenda for field work. Provide guidance to the national evaluator to prepare initial draft of output analysis and review technical inputs prepared by national evaluator, prior to field mission.	• Draft theory of change and Evaluation framework to submit to the Evaluation Manager for clearance. • Guidance to the national evaluator to prepare output analysis and technical reports	3 days	Home based
3. Briefing with the UNIDO Independent Evaluation Division, project managers and other key stakeholders at UNIDO HQ (included is preparation of presentation).	• Detailed evaluation schedule with tentative mission agenda (incl. list of stakeholders to interview and site visits); mission planning; • Division of evaluation tasks with the National Consultant.	1 day	Through skype
4. Conduct field mission to Thailand in 2018[21].	• Conduct meetings with relevant project stakeholders, beneficiaries, the GEF Operational Focal Point (OFP), etc. for the	7 days	Thailand (specific project site to be identified

[21] The exact mission dates will be decided in agreement with the Consultant, UNIDO HQ, and the country counterparts.

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
	collection of data and clarifications; • Agreement with the National Consultant on the structure and content of the evaluation report and the distribution of writing tasks; • Evaluation presentation of the evaluation's preliminary findings, conclusions and recommendations to stakeholders in the country, including the GEF OFP, at the end of the mission.		at inception phase)
5. Present overall findings and recommendations to the stakeholders at UNIDO HQ	• After field mission(s): Presentation slides, feedback from stakeholders obtained and discussed.	2 days	Vienna, Austria
6. Prepare the evaluation report, with inputs from the National Consultant, according to the TOR; Coordinate the inputs from the National Consultant and combine with her/his own inputs into the draft evaluation report. Share the evaluation report with UNIDO HQ and national stakeholders for feedback and comments.	• Draft evaluation report.	5 days	Home-based
7. Revise the draft project evaluation report based on comments from UNIDO Independent Evaluation Division and stakeholders and edit the language and form of the final version according to UNIDO standards.	• Final evaluation report.	3 days	Home-based
	TOTAL	26 days	

REQUIRED COMPETENCIES

Core values:
1. Integrity
2. Professionalism
3. Respect for diversity

Core competencies:
1. Results orientation and accountability
2. Planning and organizing
3. Communication and trust
4. Team orientation
5. Client orientation
6. Organizational development and innovation

Managerial competencies (as applicable):
1. Strategy and direction
2. Managing people and performance
3. Judgement and decision making
4. Conflict resolution

MINIMUM ORGANIZATIONAL REQUIREMENTS

Education:

Advanced degree in environment, energy, engineering, development studies or related areas.

Technical and functional experience:

- Minimum of 10 years' experience in evaluation of development projects and programmes.
- Good working knowledge in environmental management.
- Knowledge about GEF operational programs and strategies and about relevant GEF policies such as those on project life cycle, M&E, incremental costs, and fiduciary standards.
- Experience in the evaluation of GEF projects and knowledge of UNIDO activities an asset.
- Knowledge about multilateral technical cooperation and the UN, international development priorities and frameworks.
- Working experience in developing countries.

Languages:

Fluency in written and spoken English is required.

All reports and related documents must be in English and presented in electronic format.

Absence of conflict of interest:

According to UNIDO rules, the consultant must not have been involved in the design and/or implementation, supervision and coordination of and/or have benefited from the programme/project (or theme) under evaluation. The consultant will be requested to sign a declaration that none of the above situations exists and that the consultants will not seek assignments with the manager/s in charge of the project before the completion of her/his contract with the UNIDO Independent Evaluation Division.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
TERMS OF REFERENCE FOR PERSONNEL UNDER INDIVIDUAL SERVICE AGREEMENT (ISA)

Title:	National evaluation consultant
Main Duty Station and Location:	Home-based
Mission/s to:	Travel to potential sites within Thailand
Start of Contract:	15th November 2018
End of Contract:	31st January 2019
Number of Working Days:	24 days spread over the above-mentioned period

ORGANIZATIONAL CONTEXT

The UNIDO Independent Evaluation Division (ODG/EIO/IED) is responsible for the independent evaluation function of UNIDO. It supports learning, continuous improvement and accountability, and provides factual information about result and practices that feed into the programmatic and strategic decision-making processes. Independent evaluations provide evidence-based information that is credible, reliable and useful, enabling the timely incorporation of findings, recommendations and lessons learned into the decision-making processes at organization-wide, programme and project level. ODG/EIO/IED is guided by the UNIDO Evaluation Policy, which is aligned to the norms and standards for evaluation in the UN system.

PROJECT CONTEXT

The national evaluation consultant will evaluate the project according to these terms of reference (TOR) under the leadership of the team leader (international evaluation consultant). S/he will perform the following tasks:

MAIN DUTIES	Concrete/measurable outputs to be achieved	Expected duration	Location
Desk review Review and analyze project documentation and relevant country background information; in cooperation with the team leader, determine key data to collect in the field and prepare key instruments in English (questionnaires, logic models); If need be, recommend adjustments to the evaluation framework and Theory of Change	Evaluation questions, questionnaires/interview guide, logic models adjusted to ensure understanding in the national context; A stakeholder mapping, in coordination with the project team.	5 days	Home-based

MAIN DUTIES	Concrete/measurable outputs to be achieved	Expected duration	Location
in order to ensure their understanding in the local context.			
Carry out preliminary analysis of pertaining technical issues determined with the Team Leader. In close coordination with the project staff team verify the extent of achievement of project outputs prior to field visits. Develop a brief analysis of key contextual conditions relevant to the project	• Report addressing technical issues and question previously identified with the Team leader • Tables that present extent of achievement of project outputs • Brief analysis of conditions relevant to the project	5 days	Home-based
Coordinate the evaluation mission agenda, ensuring and setting up the required meetings with project partners and government counterparts, and organize and lead site visits, in close cooperation with project staff in the field.	• Detailed evaluation schedule. • List of stakeholders to interview during the field missions.	1 day	Home-based
Coordinate and conduct the field mission with the team leader in cooperation with the Project Management Unit, where required; Consult with the Team Leader on the structure and content of the evaluation report and the distribution of writing tasks. Conduct the translation for the Team Leader, when needed.	• Presentations of the evaluation's initial findings, draft conclusions and recommendations to stakeholders in the country at the end of the mission. • Agreement with the Team Leader on the structure and content of the evaluation report and the distribution of writing tasks.	9 days (including travel days)	In Thailand
Follow up with stakeholders regarding additional information promised during interviews Prepare inputs to help fill in information and analysis gaps (mostly related to technical issues) and to prepare of tables to be included in the evaluation report as agreed with the Team Leader. Revise the draft project evaluation report based on comments from UNIDO Independent Evaluation Division and stakeholders and proof read the final version.	• Part of draft evaluation report prepared.	4 days	Home-based
TOTAL		24 days	

REQUIRED COMPETENCIES

Core values: 1. Integrity 2. Professionalism 3. Respect for diversity *Core competencies:* 1. Results orientation and accountability 2. Planning and organizing 3. Communication and trust 4. Team orientation 5. Client orientation 6. Organizational development and innovation	*Managerial competencies (as applicable):* 1. Strategy and direction 2. Managing people and performance 3. Judgement and decision making 4. Conflict resolution

MINIMUM ORGANIZATIONAL REQUIREMENTS

Education: Advanced university degree in environmental science, engineering or other relevant discipline like developmental studies with a specialization in industrial energy efficiency and/or climate change.

Technical and functional experience:

- Excellent knowledge and competency in the field of renewable energy and/or energy production from biomass.
- Evaluation experience, including evaluation of development cooperation in developing countries is an asset.
- Exposure to the needs, conditions and problems in developing countries.
- Familiarity with the institutional context of the project is desirable.

Languages: Fluency in written and spoken English and Thai is required.

Absence of conflict of interest:

According to UNIDO rules, the consultant must not have been involved in the design and/or implementation, supervision and coordination of and/or have benefited from the programme/project (or theme) under evaluation. The consultant will be requested to sign a declaration that none of the above situations exists and that the consultants will not seek assignments with the manager/s in charge of the project before the completion of her/his contract with the UNIDO Independent Evaluation Division.

Annex 4- Outline of an in-depth project evaluation report

Executive summary (maximum 5 pages)

Evaluation purpose and methodology
Key findings
Conclusions and recommendations
Project ratings
Tabular overview of key findings – conclusions – recommendations

7. Introduction
- 7.1. Evaluation objectives and scope
- 7.2. Overview of the Project Context
- 7.3. Overview of the Project
- 7.4. Theory of Change
- 7.5. Evaluation Methodology
- 7.6. Limitations of the Evaluation

8. Project's contribution to Development Results - Effectiveness and Impact
- 8.1. Project's achieved results and overall effectiveness
- 8.2. Progress towards impact
  - 8.2.1.Behavioral change
    - 8.2.1.1. Economically competitive - Advancing economic competitiveness
    - 8.2.1.2. Environmentally sound – Safeguarding environment
    - 8.2.1.3. Socially inclusive – Creating shared prosperity
  - 8.2.2.Broader adoption
    - 8.2.2.1. Mainstreaming
    - 8.2.2.2. Replication
    - 8.2.2.3. Scaling-up

9. Project's quality and performance
- 9.1. Design
- 9.2. Relevance
- 9.3. Efficiency
- 9.4. Sustainability
- 9.5. Gender mainstreaming

10. Performance of Partners
- 10.1. UNIDO
- 10.2. National counterparts
- 10.3. Donor

11. Factors facilitating or limiting the achievement of results
- 11.1. Monitoring & evaluation
- 11.2. Results-Based Management
- 11.3. Other factors
- 11.4. Overarching assessment and rating table

12. **Conclusions, recommendations and lessons learned**
- 12.1. Conclusions
- 12.2. Recommendations
- 12.3. Lessons learned
- 12.4. Good practices

Annexes (to be put online separately later)

- Evaluation Terms of Reference
- Evaluation framework
- List of documentation reviewed
- List of stakeholders consulted
- Project logframe/Theory of Change

- Primary data collection instruments: evaluation survey/questionnaire
- Statistical data from evaluation survey/questionnaire analysis

Annex 5: Checklist on evaluation report quality

Project Title:
UNIDO ID:
Evaluation team:
Quality review done by: Date:

Report quality criteria	UNIDO IEV assessment notes	Rating
a. Was the report well-structured and properly written? (Clear language, correct grammar, clear and logical structure)		
b. Was the evaluation objective clearly stated and the methodology appropriately defined?		
c. Did the report present an assessment of relevant outcomes and achievement of project objectives?		
d. Was the report consistent with the ToR and was the evidence complete and convincing?		
e. Did the report present a sound assessment of sustainability of outcomes or did it explain why this is not (yet) possible? (Including assessment of assumptions, risks and impact drivers)		
f. Did the evidence presented support the lessons and recommendations? Are these directly based on findings?		
g. Did the report include the actual project costs (total, per activity, per source)?		
h. Did the report include an assessment of the quality of both the M&E plan at entry and the system used during the implementation? Was the M&E sufficiently budgeted for during preparation and properly funded during implementation?		
i. Quality of the lessons: were lessons readily applicable in other contexts? Did they suggest prescriptive action?		
j. Quality of the recommendations: did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?'). Can these be immediately implemented with current resources?		
k. Are the main cross-cutting issues, such as gender, human rights and environment, appropriately covered?		
l. Was the report delivered in a timely manner? (Observance of deadlines)		

<u>Rating system for quality of evaluation reports</u>
A rating scale of 1-6 is used for each criterion: Highly satisfactory = 6, Satisfactory = 5, Moderately satisfactory = 4, Moderately unsatisfactory = 3, Unsatisfactory = 2, Highly unsatisfactory = 1, and unable to assess = 0.

Annex 6: Guidance on integrating gender in evaluations of UNIDO projects and Projects

A. Introduction

Gender equality is internationally recognized as a goal of development and is fundamental to sustainable growth and poverty reduction. The UNIDO Policy on gender equality and the empowerment of women and its addendum, issued respectively in April 2009 and May 2010 (UNIDO/DGB(M).110 and UNIDO/DGB(M).110/Add.1), provides the overall guidelines for establishing a gender mainstreaming strategy and action plans to guide the process of addressing gender issues in the Organization's industrial development interventions.

According to the UNIDO Policy on gender equality and the empowerment of women:

Gender equality refers to the equal rights, responsibilities and opportunities of women and men and girls and boys. Equality does not suggest that women and men become 'the same' but that women's and men's rights, responsibilities and opportunities do not depend on whether they are born male or female. Gender equality implies that the interests, needs and priorities of both women and men are taken into consideration, recognizing the diversity of different groups of women and men. It is therefore not a "women's" issue. On the contrary, it concerns and should fully engage both men and women and is a precondition for, and an indicator of sustainable people-centered development.

Empowerment of women signifies women gaining power and control over their own lives. It involves awareness-raising, building of self-confidence, expansion of choices, increased access to and control over resources and actions to transform the structures and institutions which reinforce and perpetuate gender discriminations and inequality.

Gender parity signifies equal numbers of men and women at all levels of an institution or organization, particularly at senior and decision-making levels.

The UNIDO projects/projects can be divided into two categories: 1) those where promotion of gender equality is one of the key aspects of the project/project; and 2) those where there is limited or no attempted integration of gender. Evaluation managers/evaluators should select relevant questions depending on the type of interventions.

B. Gender responsive evaluation questions

The questions below will help evaluation managers/evaluators to mainstream gender issues in their evaluations.

B.1. Design

- Is the project/project in line with the UNIDO and national policies on gender equality and the empowerment of women?
- Were gender issues identified at the design stage?
- Did the project/project design adequately consider the gender dimensions in its interventions? If so, how?

- Were adequate resources (e.g., funds, staff time, methodology, experts) allocated to address gender concerns?
- To what extent were the needs and priorities of women, girls, boys and men reflected in the design?
- Was a gender analysis included in a baseline study or needs assessment (if any)?
- If the project/project is people-centered, were target beneficiaries clearly identified and disaggregated by sex, age, race, ethnicity and socio-economic group?
- If the project/project promotes gender equality and/or women's empowerment, was gender equality reflected in its objective/s? To what extent are output/outcome indicators gender disaggregated?

B.2. Implementation management

- Did project monitoring and self-evaluation collect and analyze gender disaggregated data?
- Were decisions and recommendations based on the analyses? If so, how?
- Were gender concerns reflected in the criteria to select beneficiaries? If so, how?
- How gender-balanced was the composition of the project management team, the Steering Committee, experts and consultants and the beneficiaries?
- If the project/project promotes gender equality and/or women's empowerment, did the project/project monitor, assess and report on its gender related objective/s?

B.3. Results

- Have women and men benefited equally from the project's interventions? Do the results affect women and men differently? If so, why and how? How are the results likely to affect gender relations (e.g., division of labour, decision making authority)?
- In the case of a project/project with gender related objective/s, to what extent has the project/project achieved the objective/s? To what extent has the project/project reduced gender disparities and enhanced women's empowerment?
