GEF EO Terminal Evaluation – Project ID 13

1. PROJECT DATA				
			Review date:	02/28/2010
GEF Project ID:	13		at endorsement (Million US$)	at completion (Million US$)
IA/EA Project ID:	762	**GEF financing:**	6.8	6.8
Project Name:	Removal of Barriers to Biomass Power Generation and Co-generation in Thailand	IA/EA own:		
Country:	Thailand	Government:	54.89	
		Other*:	46.74	
		Total Cofinancing	101.63	90.04
Operational Program:	OP6	**Total Project Cost:**	**108.43**	**96.84**
IA	UNDP	Dates		
Partners involved:	Energy for Environment Foundation (EFE)	Effectiveness/ Prodoc Signature (i.e. date project began)		June 2001
		Closing Date	Proposed: June 2008	Actual: June 2009
Prepared by: Rajesh Koirala	Reviewed by: Ines Angulo	Duration between effectiveness date and original closing (in months): 84	Duration between effectiveness date and actual closing (in months): 96	Difference between original and actual closing (in months): 12
Author of TE: UA		TE completion date: May 2009	TE submission date to GEF EO: June 2009	Difference between TE completion and submission date (in months): 1

* Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

2. SUMMARY OF PROJECT RATINGS AND KEY FINDINGS

Please refer to document GEF Office of Evaluation Guidelines for terminal evaluation reviews for further definitions of the ratings.

Performance Dimension	Last PIR	IA Terminal Evaluation	IA Evaluation Office evaluations or reviews	GEF EO
2.1a Project outcomes	S	N/A	-	S
2.1b Sustainability of Outcomes	**N/A**	ML	-	MU
2.1c Monitoring and evaluation	**--**	HS	-	S
2.1d Quality of implementation and Execution	**NA**	**NA**	NA	S
2.1e Quality of the evaluation report	**N/A**	**N/A**	-	S

2.2 Should the terminal evaluation report for this project be considered a good practice? Why? Yes. The terminal evaluation examines project achievements, outlining strength and weaknesses of the project. It also presents lessons learned from the project that could be applicable for future projects.
2.3 Are there any evaluation findings that require follow-up, such as corruption, reallocation of GEF funds, mismanagement, etc.? No such evidence is presented in the terminal evaluation. A follow-up is not required.

3. PROJECT OBJECTIVES

3.1 Project Objectives

a. What were the Global Environmental Objectives of the project? Were there any changes during implementation?

The global environmental objective of the project, according to the project appraisal document, was *"reduction of the potential adverse social, environmental and economic consequences of global climate change caused by GHG from combustion of fossil fuels through removal of the major barriers to the development of biomass co-generation and power generation in Thailand."*

Based on terminal evaluation, no change was made in the global environmental objective of the project.

b. What were the Development Objectives of the project? Were there any changes during implementation? (describe and insert tick in appropriate box below, if yes at what level was the change approved (GEFSEC, IA or EA)?)

According to the project appraisal document, the project had following immediate objectives:

1. *"To (build capacity to) provide relevant and useful information and services to potential biomass power developers and other players in the biomass area."*
2. *"To improve regulatory framework to encourage biomass power/cogeneration projects."*
3. *"To increase access to commercial financing for biomass power/cogeneration projects."*
4. *"To demonstrate the technical and financial viability and reduce risks for the biomass power/co-generation technologies."*

As mentioned in the terminal evaluation, there was no formal change in immediate objectives of the project, but to adapt to changing context, objectives were modified to focus on renewable energy such as wind and solar.

Overall Environmental Objectives	Project Development Objectives	Project Components	Any other (specify)
	Objectives were modified to focus on renewable energy such as wind and solar.		

c. If yes, tick applicable reasons for the change (in global environmental objectives and/or development objectives)

Original objectives not sufficiently articulated	Exogenous conditions changed, due to which a change in objectives was needed	Project was restructured because original objectives were over ambitious	Project was restructured because of lack of progress	Any other (specify)
	X			

4. GEF EVALUATION OFFICE ASSESSMENT OF OUTCOMES AND SUSTAINABILITY

4.1.1 Outcomes (Relevance can receive either a satisfactory rating or a unsatisfactory rating. For effectiveness and cost efficiency a six point scale 6= HS to 1 = HU will be used)

a. Relevance **Rating: S**

According to the project appraisal document, the project outcomes are consistent with GEF Operational Program 6 (Promoting the adoption of renewable energy by removing barriers and reducing implementation costs). It is also consistent with GEF Strategic Priority 2 (Increased access to local sources of financing) and Strategic Priorities 3 (Policy Frameworks Supportive of Renewable Energy). As mentioned in the terminal evaluation, the project achievements are "very useful" to meet the government objectives on renewable energy.

b. Effectiveness **Rating: S**

According to the terminal evaluation, the project was able to provide relevant information to potential developers of biomass power plants, it succeeded in changing policy framework and increasing access to financing, and it established two demonstration plants. These efforts enabled proliferation of biomass power plants in Thailand, and as a result to fit the dynamic context, project had to broaden its focus to solar and wind, which was beyond the expectation of project document. Further achievement of the project for each objective is presented below:

Build capacity to provide information and services to potential biomass power project investors: According to the terminal evaluation, the project conducted a biomass resource study around the country involving five universities. Energy for Environment Foundation (EFE) website was developed and updated in 2008, and is still operational. The website contains information on renewable energy technologies such as solar and wind, biomass manual, EFE materials, database and links to relevant external websites. The website receives 60,000 hits a year compared to that of

1,500 per hits target. The project also delivered information service through publications, web board, phone-in, and walk-in. Other outreach activities targeting the communities, potential developers and academics consisted of public education, seminars and workshops, community participation, and media activities. Biomass Handbook in Thai and English was published and distributed.

Improve the regulatory framework to provide financial incentives to biomass power project investors: According to the terminal evaluation, the Government of Thailand, based on a study by the project, included a provision of "specific technology incentives" in the revised renewable energy 'adder' tariffs. The policy framework also lowered the "grid-connection fee for Very Small Power Producers (VSPPs)" from 2 million to 0.4 million Thai Baht. The project efforts led government assist VSPP grid-connections overcome regulation barriers to their implementation through the Provincial Electricity Authority. The government also increased capacity limit of VSPPs from 1 MW to 10 MW.

Increase access to commercial financing for biomass co-generation and power projects: This was the less successful component of the project. In terms of budget expenditure, the least amount was spent for this compared with other components of the project. The EFE developed a simple template of financial model to assist project developers carry out initial assessment of financial viability of new renewable energy plants. The project facilitated the plant developers by "matching" the bank and business plan developers. A study was conducted on risk credit guarantee facilities in 2006. The project provided trainings to six to seven local banks and financial institutions (up to 40 staff every year from 2003 to 2008) on issues related to renewable energy financing such as assessing and mitigating the financial risks of renewable energy technologies. Some challenges were faced: the staff provided trainings were shifted to other bank departments with unrelated functions. The project document had envisioned collaborating with a development bank, but after the bank was merged with a commercial bank, the initial agreement was not adhered to. Also the bank required financial guarantee of parent company, this hindered small biomass and biogas plants from receiving financing from the bank; however 10 banks are financially supporting an increasing number of renewable projects.

Facilitate the implementation of two initial biomass power plants: The project set up two biomass pilot plants – Roi-Et Green in North-East Thailand and Gulf Yala Green in Southern Thailand. The Roi Et Green uses rice husk as fuel, and has a capacity of 9.8 MW, whereas Gulf Yala Green uses waste rubber wood as fuel, and has a capacity of 23 MW.

c. Efficiency (cost-effectiveness) **Rating: MS**

According to the terminal evaluation, most of the activities carried out by the project were cost effective. However, the project invested "heavily" in training and overseas study trips for staff and partner organisations, but it could not retain trained staff until the end of the project. In 2005 when the project entered into the second phase, most of the trained staff left the project and started working in the private sector. Therefore the terminal evaluation, quoting from mid-term evaluation report, states that the investment was "wasteful". Moreover there was "considerable" delay in establishing organizational structure at the beginning, and project completion was delayed by a year.

4.1.2 Impacts: summarize the achieved intended or unintended impacts of the project.

According to the terminal evaluation, because of the implementation of this project combined with the government policy on "adder tariff", there was unexpectedly rapid take-up of biomass technology using new feed stocks. As result of the project, according to the PIR 2008, total 1,199,722 tons of CO_2 emission was reduced since the beginning of the project. An unintended impact was that the early developers of biomass or biogas plants had to bear "much higher" fuel prices than anticipated when their plants were first proposed, because no such competition for biomass was expected while designing biomass plants. The terminal evaluation terms this condition as "victim of its own success".

As a consequence of better information services, capacity development and heightened awareness, there has been more investment and subsidies on green energy projects, primarily at the community-scale, such as micro-hydro, small wind, solar power voltage and "waste-to-energy". It can be inferred that more investment means more opportunities and easier access to clean energy for local population.

4.2 Likelihood of sustainability. Using the following sustainability criteria, include an assessment of **risks** to sustainability of project outcomes and impacts based on the information presented in the TE. Use a four point scale (4= Likely (no or negligible risk); 3= Moderately Likely (low risk); 2= Moderately Unlikely (substantial risks) to 1= Unlikely (High risk)). The ratings should be given taking into account both the probability of a risk materializing and the anticipated magnitude of its effect on the continuance of project benefits.

a. Financial resources **Rating: ML**

According to the terminal evaluation, the Energy Service Company (ESCO) provides venture capital to operate the renewable plants that have been installed. The Energy Saving and Conservation Fund is also established to support project outcomes. However, the terminal evaluation, quoting the opinions of project stakeholders and EFE staff, states that financial sustainability of the project after the GEF funding is "a significant challenge."

b. Socio political **Rating: MU**

As stated in the terminal evaluation, ongoing renewable energy plant development faces "a major barrier" from opposition of local communities. Because of poor performance of biomass plants prior to this project, people are still not convinced. There is an "outstanding need" for educating people about the successful examples of the project. Other stakeholders are supportive of renewable energy (biomass, wind and solar).

c. Institutional framework and governance **Rating: L**
As described in the terminal evaluation, EFE possesses skilled staff for policy making and advocacy of renewable energy, and it is restructured to better integrate the function of the Biomass Clearing House (BCH) for the Green energy Mechanism (GEM) and ESCO work.
d. Environmental **Rating: ML**
Biomass plants meet high environmental standards, but according to the terminal evaluation and the PIR 08, shortage of agricultural residue as the biomass fuel is a new challenge.

4.3 Catalytic role

a.. Production of a public good According to the PIR 2008, the project generated public goods that have both global and local environmental significance such as avoidance of CO_2 emission, availability of cheaper energy (because of low cost technology compared to wind and solar), and no harmful impact to natural environment as the raw materials used are plant residues. As mentioned in the PIR, cumulative avoidance of CO_2 emission since the beginning of the project was 1,199,722 tons. Similarly during 2008, "grid-connected" renewable energy plants installed under the influence of the project generated 358,250MWh/year of electricity, and rural renewable energy plants installed under the influence of the project produced 59,400MWh/year of electricity. According to the terminal evaluation, experience and skills gained working in this project helped its staff secure job in other institutions. For example, the ESCO fund manager's role was secured on the basis of EFE's experience with the project. Similarly the Green Energy Mechanism programme was inspired by the experience gained by EFE staff during the Project. As a result of this project, biomass power plants proliferated in the country. Local people have been benefitted with marketability of their agricultural residues. General public has improved knowledge and awareness of biomass and renewable energy. As stated in the PIR 2007, local community can express their views on environmental concern if the power plants are located in the vicinity.
b.. Demonstration As one of the objectives, the project had operated two biomass pilot plants – Gulf Yala Green (GYG) and Roi-Et Green (REG) – for demonstration purposes. Learning from these plants and BCH, as mentioned in the terminal evaluation, Malaysia began an initiative called QUANGO, similar to EFE, which after two years was fully integrated into the Malaysian government. According to the PIR 2008, the project provided technical and construction design services to seven biogas plants, and financial advice to banks on the viability of biogas and biomass projects. Specifically for demonstration of renewable energy at community level, a mobile 'induction and synchronous testing' motor was developed.
c.. Replication Although not fully materialized yet, according to the terminal evaluation, EFE plans to work with the World Bank and the department of energy (of the Thai government) on the Clean Development Mechanism, such as micro-hydro power. For this purpose, "project idea notes" have already been prepared.
d.. Scaling up As a result of the project, according to the terminal evaluation, the Ministry of Energy provides a partial investment subsidy to small renewable energy projects, and a price subsidy to high cost projects based mainly on wind and solar technologies to increase the share of green energy in power production.

4.4 Assessment of processes and factors affecting attainment of project outcomes and sustainability.

a. Co-financing. To what extent was the reported cofinancing (or proposed cofinancing) essential to achievement of GEF objectives? Were components supported by cofinancing well integrated into the project? If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If it did, then in what ways and through what causal linkages?
Total co-financing, as intended to materialize by the completion of the project, was US$ 90.04 million, which was about 10% lower than expected in the project appraisal document. This discrepancy, according to the terminal evaluation, was due to 13% lower award of subsidies from the Enco Fund to biomass Small Power Producers (SPPs). But the PIR 2007 gives different reason for why all expected co-financing was not realized. According to the PIR, co-financing committed by Japan Bank for International Cooperation (JBIC), which was supposed to channel through Industrial Finance Corporation of Thailand (IFCT), was not provided to the project as IFCT merged with Thai Military Bank (TMB). The extent of materialization did not affect project's outcome because, as mentioned in the terminal evaluation, the discrepancy was partially offset by increase in the both the debt and equity financing requirement for the pilot projects relative to the original estimate. As the co-financing is much higher than the GEF funding (US$ 6.8 million), it can be stated that project of this scale would not have been possible without co-financing.

b. Delays. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If it did, then in what ways and through what causal linkages?
The project was designed to be completed in seven years, from June 2001 to June 2008. But its completion was delayed by a year. According to the terminal evaluation, the extension was "to complete substantive inputs with no budget increase." There was "considerable" delay in establishing organizational structure, mostly recruiting well-qualified staff, for project implementation. As mentioned in the terminal evaluation, the project was initially designed to be executed by the Energy Policy and Planning Office (EPPO), but shortly after operations commenced in 2001, the Energy for Environment Foundation (EFE) was restructured to execute the project. Therefore delay occurred to recruit staff, establish the working relationships between the EFE, Biomass One Stop Clearing House (BOSCH) and the Project Steering Committee (PSC), and set up a financial and accounting system.
c. Country Ownership. Assess the extent to which country ownership has affected project outcomes and sustainability? Describe the ways in which it affected outcomes and sustainability highlighting the causal links.
According to the terminal evaluation, in 2001 the government introduced a power purchasing price "adder" for renewable energy based on competitive tender, with an average concessional premium of 0.18 Thai Baht per unit to the standard wholesale power tariff awarded to 14 projects. This policy "stimulated" the growth of renewable energy sector in Thailand. In 2006, the Ministry of Energy revised and improved the 'adder' tariffs, setting adder levels based on renewable energy plant type. This regulatory support measure, adopted partly based on project's recommendations, provided a further boost to the biomass energy sector – particularly for Very Small Power Producers (VSPPs) with comparatively low project development periods. Another policy recommendation of the project, to raise the capacity threshold for power sold to the grid from 1 MW to 10 MW, was also accepted by the government, which "further boosted" VSPPs. According to the PIR 2008, the Ministry of Energy also approved a proposal (for the Clearinghouse) to manage the Energy Saving and Conservation Fund.

4.5 Assessment of the project's monitoring and evaluation system based on the information in the TE

a. M&E design at Entry Rating (six point scale): MS
The project document includes M&E framework, including indicators to measure performance of the project. All indicators, however, are not clear and SMART. Baseline information is lacking. The executing agency was identified as a principal institution to carry out PIRs and quarterly reports.
b. M&E plan Implementation Rating (six point scale): S
According to the terminal evaluation, the implementation of M&E was "thorough and perfect". The mid-term evaluation was executed, and it emphasized on operational recommendations for potential improvement of project performance. As mentioned in the terminal evaluation, there were three levels of regular monitoring. EFE advisory board chairman and the National Project Director separately reviewed the project with the National Project Manager almost every month, the EFE board met in every two months to discuss activities throughout the project period, and the project steering committee convened, twice a year up to 2005 and once a year thereafter, to review annual implementation activities and work plan for next year.
b.1 Was sufficient funding provided for M&E in the budget included in the project document? The project document allocates US$120,000 for M&E, which appears to be sufficient.
b.2a Was sufficient and timely funding provided for M&E during project implementation? As terminal evaluation mentions that implementation of M&E was "thorough and perfect", it can be inferred that funding provided for M&E was sufficient and timely.
b.2b To what extent did the project monitoring system provided real time feed back? Was the information that was provided used effectively? What factors affected the use of information provided by the project monitoring system? The mid-term provided recommendations to the project and they were effectively applied. Before the mid-term evaluation, according to the terminal evaluation, the project focused on biomass plants and provided fee-based services mostly to private sector. But after the mid-term evaluation, based on its feedback, the project broadened its focus, from biomass to solar and wind energy plants, to adapt to emerging dynamic renewable energy field in Thailand. Following the feedback, the project also paid more attention on public services through policy studies and advocacy both for biomass projects, and for other renewable energy technologies, including wind and solar power.
b.3 Can the project M&E system (or an aspect of the project M&E system) be considered a good practice? If so, explain why. Yes. The M&E system provided timely recommendations to the project, which enabled project to adapt to the dynamic renewable energy industry in Thailand.

4.6 Assessment of Quality of Implementation and Execution

a. Overall Quality of Implementation and Execution (on a six point scale): S
b. Overall Quality of Implementation – for IA (on a six point scale): S
Briefly describe and assess performance on issues such as quality of the project design, focus on results, adequacy of supervision inputs and processes, quality of risk management, candor and realism in supervision reporting, and suitability of the chosen executing agencies for project execution. UNDP successfully implemented the project, but the earlier selection of an executing agency appears to be inadequate. As mentioned in the terminal evaluation, the Energy Policy and Planning Office (EPPO) was selected as an executing agency, but shortly after operations commenced in 2001, the Energy for Environment Foundation (EFE) was restructured to execute the project. As envisaged in the project document, UNDP commissioned both mid-term and terminal evaluation of the project. The implementing agency monitored and assured project performance through field visits, consultation meetings, annual seminars and Project Steering Committee meetings with project stakeholders. PIRs, prepared for every year from the beginning to the completion year of the project, provided justified ratings of project performance for each expected outcome. Incorporating annual financial reports submitted by the executing agency and its own project-related expenditures, UNDP prepared a combined delivery report (CDR) and got audited at the end of the financial year by a commercial accountant firm.
c. Quality of Execution – for Executing Agencies[1] (rating on a 6 point scale) S
Briefly describe and assess performance on issues such as focus on results, adequacy of management inputs and processes, quality of risk management, and candor and realism in reporting by the executive agency. The Energy for Environment Foundation (EFE) executed the project, on behalf of the Energy Policy and Planning Office (EPPO), under the Ministry of Energy. Information service to potential developers of biomass plant was provided by the Biomass Clearing House (BCH). The EA did "necessary adaptation" to changing context of renewable energy by focusing work in public and broadening the focus from biomass to other renewable energy technologies such as solar and wind. However because of this shift in focus to public from "fee-based work in private sector", the majority of technical staff left the project. Such reduction in staff led to consistent under-spending of quarterly budgets – since resources could not always be mobilized to meet the quarterly work plan. To overcome the situation, independent consultants were hired for specific assignments, but in overall there were fewer outputs and fewer PSC meetings. But in the areas of information dissemination, policy, and in establishing relevant renewable energy sector programs for the post-project period, the project achieved "significant outcomes". While establishing the second power plant, according to the PIR 2003, the project faced protest from local people, especially from those who might lose the benefit from land ownership. The issue was solved through an extensive community relations program including a series of local consultation, and awareness raising campaigns. Financial reports were submitted to UNDP quarterly and annually. The routine reporting carried out for the Project was "thorough and well documented". The project performance in achieving its objectives has been reported satisfactory yearly until PIR 2008.

5. LESSONS AND RECOMMENDATIONS

Assess the project lessons and recommendations as described in the TE

a. Briefly describe the key lessons, good practice or approaches mentioned in the terminal evaluation report that could have application for other GEF projects
Lessons learned from this project, as described in terminal evaluation, are summarized below: 1. Project performance could have further improved through more effective staff recruitment, development and retention. The staff recruitment and retention could have been better managed with "upfront clarity" in financial self-sustainability. 2. In order to better accommodate rapidly changing context, the need for project adaptation, such as changes in project's scope and objectives, incorporation of new institutional entities and revisions in financial requirements, should be anticipated while designing the project. 3. Barriers during project implementation could have been avoided through collection of accurate information regarding available biomass resources and number of biomass plants in a country. 4. A power plant needs to build community support and focus consistently on local environmental impacts. 5. The subsidized risk guarantee facility appears to be a poor approach to promote the growth of renewable

[1] Executing Agencies for this section would mean those agencies that are executing the project in the field. For any given project this will exclude Executing Agencies that are implementing the project under expanded opportunities – for projects approved under the expanded opportunities procedure the respective executing agency will be treated as an implementing agency.

energy sector in Thailand or similar market environment.

6. Regulatory and information support provided by the project is more significant than financial support to enhance growth of renewable energy in Thailand.
7. Major barriers to renewable energy plant development in Thailand arise from lack of up-to-date information on available natural resources, reliable policies and sector support programs, and weak relations between plant developers and the community.

b. Briefly describe the recommendations given in the terminal evaluation

The terminal evaluation presents following recommendations for executing agency:

1. Develop strong links with a range of government and academic institutions.
2. Stabilize a long-term platform for the project and complementary activities, both before and after the Project term.
3. Provide strong technical skills to private sector on project development related to renewable energy.

6. QUALITY OF THE TERMINAL EVALUATION REPORT

6.1 Comments on the summary of project ratings and terminal evaluation findings based on other information sources such as GEF EO field visits, other evaluations, etc.

NA

Provide a number rating 1-6 to each criteria based on: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, and Highly Unsatisfactory = 1. Please refer to document GEF Office of Evaluation Guidelines for terminal evaluations review for further definitions of the ratings. Please briefly explain each rating.

6.2 Quality of the terminal evaluation report	**Ratings**
a. To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives? The report thoroughly assesses relevance, effectiveness and efficiency of each project objective.	S
b. To what extent the report is internally consistent, the evidence is complete/convincing and the IA ratings have been substantiated? Are there any major evidence gaps? The report is consistent, and the ratings have been substantiated. The rating is provided for each outcome, but overall rating is not given.	S
c. To what extent does the report properly assess project sustainability and /or a project exit strategy? The report includes an appraisal of sustainability of each project objective.	S
d. To what extent are the lessons learned supported by the evidence presented and are they comprehensive? Most of the lessons learned are supported by evidence from the project experience, and they all are comprehensive.	S
e. Does the report include the actual project costs (total and per activity) and actual co-financing used? The report includes actual project cost (total and per project objective) and total co-financing. Further break down of co-financing is not presented.	S
f. Assess the quality of the reports evaluation of project M&E systems? The report presents comprehensive assessment of project M&E systems.	S

7. SOURCES OF INFORMATION FOR THE PRERATATION OF THE TERMINAL EVALUTION REVIEW REPORT EXCLUDING PIRs, TERMINAL EVALUATIONS, PAD.

NA