GEF EO Terminal Evaluation Review Form

1. PROJECT DATA				
			Review date:	November 2006
GEF Project ID:	540		at endorsement (Million US$)	at completion (Million US$)
IA/EA Project ID:	884	**GEF financing:**	2.50	2.50
Project Name:	Building Chiller Replacement Project	IA/EA own:		
Country:	Thailand	Government:		
		Other*:		
		Total Cofinancing	2.74	2.74
Operational Program:	5	**Total Project Cost:**	5.24	5.24
IA	World Bank	Dates		
Partners involved:		Work Program date		10/01/1998
		CEO Endorsement		04/23/2001
		Effectiveness/ Prodoc Signature (i.e. date project began)		10/25/2001
		Closing Date	Proposed: 09/30/2005	Actual: 09/30/2005
Prepared by: Anna	Reviewed by: Siv	Duration between effectiveness date and original closing: 3 years 11 months	Duration between effectiveness date and actual closing: 3 years 11 months	Difference between original and actual closing: None
Author of TE: Neeraj Prasad		TE completion date: 06/27/2006	TE submission date to GEF EO: 11/08/2006	Difference between TE completion and submission date: 5 months

* 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

GEF EO Ratings for project impacts (if applicable), outcomes, project monitoring and evaluation, and quality of the terminal evaluation: Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory (MU), Unsatisfactory (U), Highly Unsatisfactory (HU), not applicable (N/A) and unable to assess (U/A). GEF EO Ratings for the project sustainability: Highly likely (HL), likely (L), moderately likely (ML), moderately unlikely (MU), unlikely (U), highly unlikely (HU), not applicable (N/A), and unable to assess (U/A).
Please refer to document "Ratings for the achievement of objectives, sustainability of outcomes and impacts, quality of terminal evaluation reports and project M&E systems" for further definitions of the ratings.

	Last PIR	IA Terminal Evaluation	Other IA evaluations if applicable (e.g. IEG)	GEF EO
2.1 Project outcomes	**S**	**S**	**S**	**S**
2.2 Project sustainability	**N/A**	**HL**	**HL**	**L**
2.3 Monitoring and evaluation	**S**	**N/A**	**N/A**	**S**
2.4 Quality of the evaluation report	**N/A**	**N/A**	**MS**	**MS**

Should this terminal evaluation report be considered a good practice? Why? No.

The ICR is straightforward in its presentation and is well argued. Good lessons are drawn. However, its quality is really only marginally Satisfactory, because of numerous small deficiencies which could have easily been corrected, namely:

- Annex 1 does not allow easy comparison of actual versus expected outcomes.
- Annex 2 has no actual project cost figure
- The varying statements of objectives are not analyzed
- The results of Component 2 are not clearly reported.
- Section 3.2 says the project was closed "ahead of schedule", whereas Section 1 indicates that the closing date was not changed.
- Bank staff costs are reported differently in Section 7.2 and in Annex 4

Furthermore, this is an unusual type of project. The project was financed by loans from the GEF and the MP and the PAD states:

> This project is not a conventional IBRD lending instrument or grant technical assistance from the GEF and MLF. As an implementing agency and a trustee for the funds from GEF and MLF, the Bank will provide a loan to IFCT under the same terms and conditions as approved by GEF/MLF. IFCT will repay the Bank in Baht, adjusted for losses due to technology shortfall and/or foreign exchange risk, if any.

In other words, it is a GEF grant that was administered like a revolving fund. It cannot be a loan because there is no mechanism for the WB to repay a loan to the GEF.

Is there a follow up issue mentioned in the TE such as corruption, reallocation of GEF funds, etc.? No.

3. PROJECT OBJECTIVES, EXPECTED AND ACTUAL OUTCOMES

3.1 Project Objectives

- **What are the Global Environmental Objectives? Any changes during implementation?** No.

The original objective was to assist Thailand to (i) improve energy efficiency and reduce greenhouse gas emissions in the building chiller sector, and (ii) reduce consumption of ozone depleting substances (ODS) consistent with its targets under the Montreal Protocol on Substances that Deplete the Ozone Layer (MP).

- **What are the Development Objectives? Any changes during implementation?** Yes.

Specifically, the project aimed to establish conditions to facilitate early replacement of energy-inefficient, CFC-using chillers with 30 % more efficient non-CFC chillers, by demonstrating actual energy savings from replacing about 24 old CFC chillers.

Component 1: The project included an investment component that aimed to replace 24 building chillers. The estimated costs were USD 4.97 million, financed by loans from the Multilateral Fund (MLF) and the GEF.

Component 2: The project included an Evaluation component that would allow an assessment of the pilot program and the development of a follow-up program. This component was entirely financed by the Government.

After a one-year extension of the new non-CFC chillers commissioning date from September 30, 2002 to September 30, 2003, 17 CFC chillers had been successfully replaced. More participants could not be persuaded to join the conversion activities proposed by the project due to a number of factors including changes in market conditions that rendered the project's terms and conditions unattractive. Eventually it was decided to close the project ahead of schedule at the level achieved, without any restructuring.

3.2 Outcomes and Impacts

- **What were the major project outcomes and impacts as described in the TE?**

According to the ICR the project helped convert seventeen chillers with non-CFC systems which led to energy savings superior to the initial targets, enabling a very competitive return on the investment with lower average unit costs than originally projected. The ODS Phase-out achievements were also met. The calculated annual reduction of ODS supported by the project were not less than 14.45 tons, as targeted. All the CFC chillers replaced did not have any post-completion failures. The average internal rate of return was calculated at 29.9 percent, ranging from an astounding 50.3 % (Grand Hyatt) to 16.42 percent (Amarin Plaza Chiller No. 3). Although the initially targeted number of chillers replacement could not be achieved, the demonstration effect regarding energy savings and reduced consumption of ODS was fully met.

Both the evaluation of the installed chillers and the follow-up scheme prepared by DIW confirmed, according to the ICR, the finding that the target energy savings were achieved as well as the reduction of ODS consumption. The evaluation is based on four actual data records collected for the purpose, and reported energy data for the remaining locations. The follow-up schemes are under the Government consideration.

4. GEF EVALUATION OFFICE ASSESSMENT

4.1 Outcomes

A Relevance **Rating: S**

- **In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies? Explain.**

The outcomes and outputs are consistent with the climate change focal area and the strategies of OP5 to reduce GHG emissions from the transport sector.

According to the IEG ICR review the project was designed to remove barriers to the adoption by the private sector of chiller units which are energy efficient and do not use CFCs. As such, it was fully consistent with the CAS goal of supporting the government in protecting the environment, as well as improving the efficiency of the private sector, and also with the government's obligations as a signatory to the Climate Change Convention and the Montreal Protocol. The project was consistent with GEF's Operational Program #5.

B Effectiveness **Rating: S**

- **Are the project outcomes as described in the TE commensurable with the expected outcomes (as described in the project document) and the problems the project was intended to address (i.e. original or modified project objectives)?**

According to the IEG ICR review As a result of the lingering effects of the Asian financial crisis, falling market interest rates, which made the project sub-loans less attractive, and competition from other programs with less rigorous monitoring provisions, uptake of project sub-loans was less than expected. Even though the deadline was extended by a year, just 17 units were replaced, about 75% of the 24 expected at appraisal. Because of cost savings, disbursement of the loans was about 50% of estimates. However, the reduced number of units was sufficient to have the planned demonstration effect (sub-objective (i)) and the ICR describes the market for energy efficient, non-CFC chillers as "flourishing". The phase-out of ozone depleting substances exceeded appraisal targets, as did energy savings.

Regarding sub-objective (ii), the project has clearly led the way in supporting Thailand to meet its obligations under the two treaties.

However, according to the IEG ICR review, an unresolved issue is the disposal of CFCs from the old chillers. These were expected to be recycled to other older units but, in fact, they are too contaminated for further use without expensive reconditioning, which is not available in Thailand. The issue has been left to a follow-on project.

C Efficiency (cost-effectiveness) **Rating: HS**

- **Include an assessment of outcomes and impacts in relation to inputs, costs, and implementation times based on the following questions: Was the project cost –**

effective? How does the cost-time Vs. outcomes compare to other similar projects? Was the project implementation delayed due to any bureaucratic, administrative or political problems and did that affect cost-effectiveness?
According to the IEG ICR review no economic or financial rates of return were calculated at appraisal, though a cash flow analysis and GEF incremental cost analysis were done. Actual financial performance was very satisfactory and the ICR calculates a 30% financial rate of return. Bank supervision costs were 8% of disbursed amounts, which is high but understandable in light of the small size of the loans and the nature of a Learning and Innovation Loan (LIL), even allowing that some early costs may not have been captured.

D Impacts
• **Has the project achieved impacts or is it likely that outcomes will lead to the expected impacts?**
As far as the ODS phase-out is concerned, according to the ICR, a draft Project Completion Report was submitted to the Bank's Environment Department in March 2005 as required by the MLF. The report covers all converted chillers, accounting for a phase-out of 14.45 Tons of CFC-11 as per the PAD calculations (50 kg per unit per year for 17 years and 24 units, and no residual adjustment for HFC-123 use). It should be noted there was an inconsistency in the 1998 MLF approved target of 13.2 ODP Tons of CFC and the PAD's target of 20.4 ODP Tons. The MLF PCR prepared for the project reported the ODS phase-out target of 13.19 tons CFC.

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.

A Financial resources	**Rating: L**
Given the difficulty of measuring sustainability, this rating should be read with caution according to the IEG ICR Review. Nevertheless, the ICR makes a good case that the project investments have been catalytic in opening the door for considerable private sector investment in chiller replacement - exactly what the GEF is intended to do. According to the ICR the financial attractiveness of the energy efficiency gains, as well as the highly economical costs of chillers at levels lower than anticipated, provides the ideal environment and incentive for replicating the benefits of the project. Additionally, the Ministry of Energy is providing financial incentives in terms of low interest loans totaling USD 50 million to finance energy efficiency activities including replacing old CFC chillers with new energy efficient non-CFC chillers.	
B Socio political	**Rating: L**
It has been demonstrated that the non-CFC chiller replacement market which was virtually nonexistence before the project has been created by replacing 17 CFC chillers. This market now is flourishing as the private enterprises have been replacing their old CFC chillers with the new non-CFC and energy efficient chillers without any subsidies from the government. As reported by one supplier, annually, more than 50 non- CFC chillers are being installed by private fund replacing the old CFC chillers.	
C Institutional framework and governance	**Rating: L**
According to the ICR, the government's commitment to project objectives is clear, and the evaluation component is focused on examining whether this will be replicated. The Government is committed to phasing out of ODS, and it is well understood that there will not be ready availability of CFCs beyond 2009	
D Environmental	**Rating: L**
With the private sector non-CFC chiller replacement market flourishing it is highly likely that ODS-phase out will continue and result in more environmental impacts. The risk that chillers using ODS refrigerants will replace non-CFC systems is very small.	

Provide only ratings for the sustainability of outcomes based on the information in the TE:

A Financial resources	**Rating: HL**

B	Socio political	Rating: HL
C	Institutional framework and governance	Rating: HL
D	Environmental	Rating: HL

4.3 Catalytic role

1. Production of a public good - It has been demonstrated that the non-CFC chiller replacement market which was virtually nonexistence before the project has been created by replacing 17 CFC chillers. This market now is flourishing as the private enterprises have been replacing their old CFC chillers with the new non-CFC and energy efficient chillers without any subsidies from the government.
2. Demonstration - The replacement of 17 non-CFC chillers had a demonstration effect that stimulated the market. The non-CFC chiller replacement market is now flourishing.
3. Replication - The project clearly demonstrated that it is possible to successfully replace CFC chillers with non-CFC chiller systems and replication is carried out by private enterprises without any subsidies.
4. Scaling up - The project has not lead to any policy decisions.

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

A. In retrospection, was the M&E plan at entry practicable and sufficient? (Sufficient and practical indicators were identified, timely baseline, targets were created, effective use of data collection, analysis systems including studies and reports, and practical organization and logistics in terms of what, who, when for the M&E activities) Rating: S
The PAD outlines M&E responsibilities Industrial Finance Corporation of Thailand (IFCT), Department of Industrial Works (DIW), other government agencies and the Bank including such as semi-annual progress reports, an annual independent project audit report, monitoring implementation of all individual subprojects to ensure full compliance with environmental and safety standards, and equipment disposal agreements, and a project completion report Annex 1 of the PAD presents a small, clear set of performance indicators and expected outcomes. However, Annex 1 of the ICR does not use this format and presents very few data - others are in the ICR text. The ICR mainly discusses the monitoring and evaluation of the installed chillers and the follow-up scheme by DIW. Component 2 of the project was dedicated to evaluating the pilot program. According to the ICR the assessment of the pilot program and the development of a follow-up program were satisfactory. It consisted of 2 parts: a) An evaluation of the CFC chillers replacement: This began one year after the last chiller was installed. It comprised of four actual case studies analyzing the actual data that were retrieved from additional data loggers. The findings confirmed that the target energy savings were achieved as well as the reduction of ODS consumption. b) The design of a financial scheme covering 400 more CFC chillers: This included a set of participant incentives including options such as Carbon finance (Kyoto Protocol, Clean Development Mechanism), a review of the financial subsidies, and regulatory and policy recommendation on the recovered and recycling CFCs. Consultation workshops with key stakeholders were organized.
B. Did the project M&E system operate throughout the project? How was M&E information used during the project? Did it allow for tracking of progress towards projects objectives? Did the project provide proper training for parties responsible for M&E activities to ensure data will continue to be collected and used after project closure? Rating: S
The project had rigorous requirements for the installation of data loggers with the new equipment to allow actual energy use to be monitored. According to the IEG ICR Review, the additional cost

seems to have been well justified to support the demonstration objective, the learning aspect of the Learning and Innovation Loan (LIL) and to facilitate dissemination of the new technology. Monitoring results were well utilized for these purposes and may well represent best practice for this kind of project.
C. Was M&E sufficiently budgeted and was it properly funded during implementation? **Rating: U/A**
There is no information on the budget amounts and expenditures for M&E in the ICR.
Can the project M&E system be considered a good practice? Perhaps, but we would need more details about the system to be able to judge.

4.5 Lessons
Project lessons as described in the TE

What lessons mentioned in the TE that can be considered a good practice or approaches to avoid and could have application for other GEF projects?
1. The assumption underlying the GEF greenhouse gas program - that there are barriers to adoption of energy saving technology with attractive rates of return, which can be removed by a small investment like this - was shown to be correct in this case. 2. Reuse of recovered CFC refrigerants is likely to be a problem where there are no domestic facilities for decontaminating the gases. A refrigerant management strategy may be needed from the outset. 3. Computerized monitoring systems may add to the initial cost of chiller replacement but can also produce benefits in optimizing operations.

4.6 Quality of the evaluation report 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 the "Criteria for the assessment of the quality of terminal evaluation reports" in the document "Ratings for the achievement of objectives, sustainability of outcomes and impacts, quality of terminal evaluation reports and project M&E systems" for further definitions of the ratings.

4.6.1 Comments on the summary of project ratings and terminal evaluation findings
In some cases the GEF Evaluation Office may have independent information collected for example, through a field visit or independent evaluators working for the Office. If additional relevant independent information has been collected that affect the ratings of this project, included in this section. This can include information that may affect the assessment and ratings of sustainability, outcomes, project M&E systems, etc.
None.

4.6.2 Quality of terminal evaluation report	**Ratings**
A. Does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives? The assessment of outcomes and impacts is well argued and presented. The outcomes of Component 2 and the presentation of Annex 1 on performance indicators could have been clearer.	**S**
B. Is the report internally consistent, is the evidence complete/convincing and are the IA ratings substantiated? There are some weaknesses and inconsistencies in the ICR: • Annex 1 does not allow easy comparison of actual versus expected outcomes. • Annex 2 has no actual project cost figure • The varying statements of objectives are not analyzed • The results of Component 2 are not clearly reported. • Section 3.2 says the project was closed "ahead of schedule", whereas	**MS**

Section 1 indicates that the closing date was not changed. • Bank staff costs are reported differently in Section 7.2 and in Annex 4	
C. Does the report properly assess project sustainability and /or a project exit strategy? Sustainability of the project is briefly assessed and well presented..	**S**
D. Are the lessons learned supported by the evidence presented and are they comprehensive? The lessons presented in the ICR are good.	**S**
E. Does the report include the actual project costs (total and per activity) and actual co-financing used? Expenditures are missing. Costs per the 2 components of the project are presented, but there is no analysis of expenditures by activity such as M&E. Annex 2 has more financial data, but no actual project cost figures.	**MS**
F. Does the report present an assessment of project M&E systems? The assessment of project M&E is incomplete, but there is a good assessment of Component 2: Assessment of the pilot program and the development of a follow-up program.	**MS**

4.7 Is a technical assessment of the project impacts described in the TE recommended? Please place an "X" in the appropriate box and explain below.	**Yes: X**	**No:**
Explain: To understand more completely the reasons behind the project's success and how to replicate them in other countries, to confirm whether sustainability is Highly Likely and to examine in more detail some of the innovative features, such as the combination of GEF and MP resources, the use of a loan mechanism and the value added of the Learning and Innovation Loan (LIL) designation. The audit might be part of a cluster of similar projects.		

4.8 Sources of information for the preparation of the TE review in addition to the TE (if any)

Project document (PAD), IEG ICR Review, PIR05.