PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: FULL SIZED PROJECT
THE GEF TRUST FUND

Submission date: 4 November 2009
Re-submission date: 15 December 2009

PART I: PROJECT IDENTIFICATION

GEFSEC PROJECT ID: 4165 **PROJECT DURATION: 48 MONTHS**
GEF AGENCY PROJECT ID: PIMS 3937
COUNTRY(IES): Thailand
PROJECT TITLE: Promoting Energy Efficiency in Commercial Buildings in Thailand (PEECB)
GEF AGENCY(IES): UNDP
OTHER EXECUTING PARTNERS: Department of Alternative Energy Development and Efficiency (DEDE), under Ministry of Energy
GEF FOCAL AREAS: Climate Change
GEF-4 STRATEGIC PROGRAM(S): CC-SP1: Promoting Energy Efficiency in Residential and Commercial Buildings
NAME OF PARENT PROGRAM/UMBRELLA PROJECT: Framework for Promoting Low Greenhouse Gas Emission Buildings (PIMS 4228)

INDICATIVE CALENDAR	
Milestones	**Expected Dates**
Work Program (for FSP)	Jan. 2010
CEO Endorsement/Approval	Dec 2010
GEF Agency Approval	Jan 2011
Implementation Start	Feb 2011
Mid-term Review	Aug 2012
Implementation Completion	Mar 2014

A. PROJECT FRAMEWORK (PLEASE REFER TO PART II, SEC. A FOR DETAILS)

Project Objective: Promotion and facilitation of the widespread application of building energy efficiency technologies and practices in commercial buildings[1] in Thailand

Project Components	Inv/ TA/ STA	Expected Outcomes	Expected Outputs	Indicative GEF Financing*		Indicative Co-financing*		Total ($)
				($)	%	($)	%	
1: Awareness Enhancement on Building EE Technologies and Practices	TA	- Enhanced awareness of the government, building sector and banks on EE technologies and practices	- A system of information exchange and dissemination on EE technologies and practices more widely for commercial buildings (office buildings, convention/conference centers etc.); - Developed, elaborated blueprint and promoted energy use simulation models for commercial building design (hotel, hospital, retail, office buildings, including convention centers); - Developed guidelines on most feasible approaches for inclusion of EE technologies and practices for new and existing commercial	1,575,000	24	4,900,000	76	6,475,000

[1] 'Commercial building' in this project proposal refers to: hotel, hospital, retail and office buildings, including convention centers.

			buildings including guidelines on design, maintenance and operation of these systems; - Completed training courses on EE technologies and practices and access to financial support mechanisms; - Completed training courses on financial assessment of EE application projects in commercial buildings; - Established business linkages between suppliers of EE technologies, building owners, banks and building practitioners.					
2: EE Building Policy Frameworks	TA	- Establishment and enforcement of, and compliance to, favorable policies that encourage EE technologies and practices in commercial buildings	- Revised evaluation criteria for the building labeling scheme for existing buildings - Reviewed and updated energy efficiency standards in existing buildings on a voluntary basis; - Recommended new fiscal incentives and improvements to existing incentives for commercial building sector ; - Draft energy efficiency promotion Action Plan (short and long term) to supplement DEDE activities.	627,273	19	2,700,000	81	3,327,273
3: EE Building Technology Applications Demonstrations	TA	-Improved confidence in the feasibility, performance, energy, environmental and economic benefits of EE technologies and practices in commercial buildings; -Improved local technical and managerial capacity to design, manage and maintain EE	- Installed and operational demonstration projects in selected buildings; - Documentation of the demonstration projects and available EE technologies in the markets; - Completed training courses for building or facilities management personnel (e.g., hotel chief engineers) of commercial building in the energy conserving	1,100,000	24	3,400,000	76	4,500,000

		technologies and practices; -Replication of demonstration projects within the commercial building sector	operation and maintenance of building system; and - Completed project documents/recommendations for replication projects in the commercial building sector.					
4. Project Management Cost				335,000	25	1,000,000	75	1,335,000
Total Project Costs				3,637,273	23	12,000,000	77	15,637,273

*STA = Scientific & Technical Analysis.

B. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE and by NAME (in parenthesis) if available, **($)**

Sources of Co-financing	**Type of Co-financing**	**Project**
Project Government Contribution	Cash and in-kind	6,500,000
Private Sector (hotels, private hospitals, office buildings, shopping malls, banks, financial institutions, suppliers of EE technologies)	Cash	5,000,000
NGO (Green Leaf Foundation, Thai Hotel Association, Engineers Association)	Cash and in-kind	500,000
Total Co-financing		12,000,000

C. INDICATIVE FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Previous Project Preparation Amount (a)	**Project (b)**	**Total c = a + b**	**Agency Fee**
GEF financing	0	3,637,273	3,637,273	363,727
Co-financing	0	12,000,000	12,000,000	
Total	0	15,637,273	15,637,273	363,727

D. GEF RESOURCES REQUESTED BY FOCAL AREA(S), AGENCY (IES) SHARE AND COUNTRY(IES): N.A.

PART II: PROJECT JUSTIFICATION

A. STATE THE ISSUE, HOW THE PROJECT SEEKS TO SOLVE IT, AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:

According to the Department of Alternative Energy Development and Efficiency (DEDE)[2], in 2004, the energy consumption in the commercial building sector, which includes offices, hotels, hospitals and retail stores, was 3,866 ktoe, accounting for 6.4% of Thailand's total energy consumption. The electricity consumption in the commercial building sector was 36,303 GWh, accounting for 31.56% of Thailand's total electricity consumption during the same period. Followed by the industrial sector, the commercial building sector is the second highest electricity consuming sector in Thailand. According to the country's first national communication to the UNFCCC, in absolute terms the contribution of the commercial building sector to the country's greenhouse gas (GHG) emissions is not the largest. However, it is the quickest growing sector. Considering the sector's present growth in annual energy consumption and the current inefficient energy utilization in the buildings that make up this sector, if nothing is done to improve its overall energy utilization performance, this sector will continue to contribute significantly to the country's GHG emissions (which is about 8% i.e. 21,078 ktons CO_2 of the total CO_2 emissions in the country 278,282 ktons in the year 2006). It is important to note that the increased demand for electricity will lead to an increased intensity of carbon emissions. It is projected that in Thailand

[2] Department of Alternative Energy Development and Efficiency (DEDE) (2004), Thailand Energy Situation report and Electric Power in Thailand 2004, Ministry of Energy, Thailand.

relatively more coal will be used for electricity generation in the future than other less-carbon intensive fuel resources, like natural gas or renewable energy.

Energy conservation is currently not a main concern in the building sector, where many barriers prevent the adoption and implementation of energy efficiency (EE) measures and approaches, energy conservation is not high on the agenda among the key players. The Energy Conservation and Promotion Act of 1992 and its revision (Ministerial Order, February 2009) established a building energy code for new buildings and retrofit of existing buildings (with floor space of more than 2,000 m^2); and designated factories and buildings that consume more energy (with power capacity more than 1 MW) must comply with building energy code. The revised EC Act is effective since June 2009. It is rather premature to know the current level of enforcement of, and compliance to, this revised Act. The implementation and enforcement of this revised Act are under the Ministry of Interior. Many building developers and owners are not employing energy management and control techniques and practices in their buildings. Similar to the industry sector, where the priority for investment is on the enhancement of production, in the buildings sector, the priority is to sell building spaces. In order to sell spaces, building aesthetics is prioritized. To make the building owners and building practitioners interested in EE, they have to see for themselves an example of a working application on the ground operating within the conditions/environment that they are familiar with. Currently, there is no voluntary energy standard for existing buildings in Thailand, and in that regard, Component 2 of the PEECB project will address this issue by facilitating its establishment. The average Specific Energy Consumption (SEC) of Thai buildings (private buildings, commercial and high rise residential buildings) is about 216 kWh/m^2/y. This average SEC is relatively high compared to similar building types in the other Association of Southeast Asian Nations (ASEAN) countries. This building energy performance level will be evaluated in detail under the project to understand the various factors contributing to such a low energy utilization efficiency level, with the aim of identifying the: (1) realistically achievable SEC based on the current available applicable EE operation techniques and practices in buildings – "Standard Building SEC"; (2) realistically achievable SEC based on applicable EE building operation techniques and practices, as well as building EE technologies – "EE Building SEC"; and, (2) potentially best achievable SEC based on the best practices in the design and construction of EE buildings, and energy conserving operation and maintenance of buildings and building services - "Benchmark EE Building SEC". For the purpose of the voluntary energy standards, these will be established based on the building energy performance evaluation that will be carried out.

Because the majority of Thailand's buildings were build in the 1970s and 80s, the majority of existing city buildings are not compliant with the current energy efficiency regulations, and in that regard, emit a relatively high amount of GHG emissions. With the lifecycles of earlier installed building systems (particularly centralized air conditioning systems) ending in the next few years, Thailand's cities present a great potential to boost the building sector's energy efficiency significantly.

The proposed project aims at the reduction in the annual growth rate of GHG emissions from the operation of commercial buildings through the application of EE technologies and practices. The project objective is the *"Promotion and facilitation of the widespread application of building energy efficiency technologies and practices in commercial buildings in Thailand."* This project will aim to increase the demand for EE equipment and practices, so that manufacturing cost of EE equipments will gradually decrease to create business feasibility for banks for commercial buildings by focusing on existing and new commercial buildings.

It has been identified that lack of access to information about the latest technologies is one of the main barriers. It should be noted that capacity and expertise of local building practitioners for general building management is high; but not on the aspects of installing, operating and maintaining EE technologies in buildings. Local building managers are interested in incorporating these systems in new or existing buildings, but in Thailand, the interest of building owners usually overrides that of managers.

In terms of fiscal policy for energy conservation in Thailand, it is a government policy to support energy efficiency initiatives in the buildings sector. As a policy support program, the Government of Thailand (GOT) provides financial assistance to building owners for their EE projects (including EE technology applications). The financial assistance is

given through the Energy Conservation Fund (ENCON Fund) which was established as per the ENCON Act. The source of funds for the ENCON Fund is from a petrol sales tax of THB 0.04 (USD 0.001) per liter on all petroleum products sold in Thailand. This provides annual inflows of approximately THB 2 billion (USD 50 million) per year. In 2005, the ENCON Fund had a balance of more than THB 14 billion (USD 350 million). The allocation of money from the ENCON Fund to activities that support energy efficiency and renewable energy is an important government priority.

In terms of potential business opportunities for energy conservation in commercial building in Thailand, the market has not yet grown to be profitable among the local banks. In contrast to the industry sector, the cost saving through energy conservation in commercial building does not yet create an enabling financial environment for local banks, since this market still requires supporting fiscal policy measures, including tax incentives, subsidy and revolving fund.

Several government agencies have access to ENCON Fund. The EE Revolving Fund is the scheme that DEDE set up in 2006 for accessing the ENCON Fund. As of 2008, 11 major local banks have participated in the "Energy Efficiency Revolving Fund," which is used to support local banks in providing loans to energy conservation projects (7 years payback time, max. interest 4%). This revolving fund has proven to be a success, having been able to support more than 200 factories and buildings just over the period of 3 years of operation[3]. The DEDE revolving fund was designed to achieve a target energy saving. Until such target is achieved, it will continue to operate until the targeted energy savings are achieved, initially set by 2012. There is no separate budget allocation set aside for commercial buildings and the approval of loan applications for eligible projects is on a first-come-first-serve basis.

However the recipients of this revolving fund are predominantly industries and there are only a few borrowers from the commercial building sector. This is due to the fact that most commercial buildings are tenanted, and building owners are thus reluctant to implement energy efficiency measures as they are not responsible for paying the energy bills; and the payback period for commercial building is much longer than the industry sector because of the high investment cost for EE equipment due to the lack of demand. Among the interventions of the PEECB project is the redesign of the current DEDE Revolving Fund (including the amendment of the policies, terms and conditions, and implementing rules and regulations of the current funding mechanisms). This is mainly in order to increase the number of EE building projects supported by the revolving fund. Specifically, the revised mechanisms are meant to accommodate the financing of more commercial buildings that intends to carry out retrofit projects to improve their energy utilization efficiency. These include the building EE projects that will be assisted by the PEECB. All the necessary technical assistance in the redesign of the revolving fund as well as the capacity building that is needed to enable all the relevant entities (particularly the participating banks) in implementing the revised mechanisms and implementing rules and regulations. Currently the Revolving Fund of DEDE has the following terms and conditions:

Loan Period	7 years maximum
Eligible Borrowers	Facilities' Owners, ESCOs and Project Developers
Eligible Projects	EE improvement or RE development and Utilization
Loan Size from revolving fund	Up to 100% less than 1.25 million USD
Interest rate	Not more than 4% (negotiable)

The participating banks are applying their own lending criteria (e.g., evaluation of the financial capability of the borrower, etc.), in addition to the above mentioned conditions.

[3] Latest information is available up to 2008 (it start year is 2006). The revolving fund is still ongoing.

The proposed project very much encourages this linkage of meeting a specific level of building energy performance. Achieving a set SEC for the building EE projects that are applied for financing shall be included as one of the criteria for accessing the revolving fund. The inclusion of such criterion is one of the amendments to the current framework and terms and conditions of the revolving fund. A target voluntary energy standard will be specified. For example, projects that perform better than the set target SEC will be given an incentive ("bonus") in the form of reduced loan interest rate. Those that underperform will incur a penalty in form of increased interest rate. The details of the feasible "carrot and stick" mechanisms based on the achievement of set target SECs will be part of the re-design of the revolving fund framework, terms and conditions that will be carried out during the project.

There is a significant variation in the secondary data that were used as basis for estimating the cost of the preliminarily identified pilot projects which vary from USD 0.25 million to USD 1 million. Among the 7 demo projects, 3 are funded by the project owners. The indicative budgets for these demos were provided to the PEECB project team, and these are among the baseline cost of the demonstration activities of the PEECB. The required incremental funds are for the: (1) technical assistance in the demo project preparation (feasibility studies, energy audits, etc.); (2) technical assistance in the incorporation of EE features to the baseline project design; and, (3) capacity building for the people who will operate the installed EE systems in each project. The other 4 demo projects will be partly funded by the project owners (own funds). The rest of the investment cost will be secured through loans, primarily from the DEDE Revolving Fund.

The amount of funds that can be secured from the revolving fund is currently unknown. Note that as per the current framework of the revolving fund, the role of DEDE and the participating banks are clearly delineated. The DEDE cannot force, or dictate to, banks to fund certain projects, as it is under the discretion and decision of the participating banks to the Fund. The current estimates of the co-financing for the demonstration is the best estimate that can be had at the moment, although these are also based on the previous loans that the participating banks have provided to eligible borrowers. This is why the co-financing costs are considerably low in the earlier version of the PIF. For the incremental cost for Component 3 (mainly on the demos) this has been adjusted (i.e., increased) based on the assumption that the incremental activities for the 3 other demo projects are more or less the same as in these 4 remaining demos. During the PPG exercise, the PEECB project team will conduct evaluate further the preliminarily identified demo projects to come up with more accurate estimates of the demo project costs (baseline and incremental).

In summary, for EE technologies and practices for commercial building applications, the following barriers have been identified:

(1) Awareness barriers (consisting of low level of awareness about EE applications in buildings among local banks, building owners and managers; lack of convincing materials (or demonstrations) and lack of information on the costs and benefits of EE systems in buildings; lack of knowledge of available financial resources and financing schemes to finance building EE projects; lack of knowledge in banks about building energy conservation business opportunities; risk aversion of building owners to invest in EE technologies);
(2) EE building policy and fiscal policy barriers (consisting of lack of practical examples/guidelines on how to implement EE projects in commercial buildings; lack of enforcement of EE policies; lack of enforcement of energy consumption reporting requirements);
(3) Technical barriers (consisting of limited experience with the technical, economic and environmental aspects of EE applications; lack of experience in incorporating specific technologies and practices to improve the energy utilization efficiency in new and existing buildings; lack of technical expertise on how to operate EE building systems).

To address these barriers, the proposed project will implement activities grouped into project components, each of which addressing specific type of barriers, as described below.

Component 1: Awareness Enhancement on Building EE Technologies and Practices - This component is intended to address the barriers related to low level of awareness on EE technologies and practices in commercial buildings among the public, government agencies, building developers/owners/managers and local building practitioners (e.g., architects, engineers), local banks and the difficulty in finding appropriate financial resources (and lack of awareness of them) for implementing EE application projects.

The expected outcome from this component is enhanced awareness of the government, building sector and banks on EE technologies and practices. The expected outputs that will contribute to the realization of these outcomes are: (1) A system of information exchange and dissemination on EE technologies and practices more widely for commercial buildings (office buildings in provinces and convention/conference centers); (2) Developed, elaborated blueprint and promoted energy use simulation models for commercial building design (hotel, hospital, retail, office buildings, including convention centers); (3) Developed guidelines on most feasible approaches for inclusion of EE technologies and practices for new and existing commercial buildings including guidelines on design, maintenance and operation of these systems (4) Completed training courses on EE technologies and practices and access to financial support mechanisms; (5) Completed training courses on financial assessment of EE application projects in commercial building; and (6) Established business linkages between suppliers of EE technologies, building owners, banks and building practitioners.

To deliver these outputs, the envisaged activities were preliminarily identified to be carried out include: (1) Implementation of awareness raising campaigns on EE technologies and practices for commercial buildings; (2) Establishment of information dissemination network supporting EE technology information needs; (3) Implementation of awareness raising and training activities for local banks/financial institutions to promote EE application projects and secure their interest and cooperation; (4) Analyzing the latest modeling and building design techniques for developing customizable building simulation models for various types of commercial buildings, including hospitals, convention centers, and office buildings; (5) Conducting training courses on EE technologies and practices and techno-economic feasibility analyses for financing, especially for those interested in retrofitting existing commercial buildings (for government and stakeholders in the commercial building sector); (6) Establishment of business links between owners/managers of commercial buildings, EE technology suppliers, commercial banks and building practitioners; (7) Preparation of an analysis of existing financial schemes and recommendations for improvement of existing schemes promoting the use of EE technologies and possibly suggestions for new financial schemes; and (8) Training courses to chief engineers of hotels, hospitals, shopping malls, convention centers and office buildings on the maintenance and operation of EE technologies and practices. It is envisaged that these activities will be implemented in cooperation with, amongst others, Greenleaf Foundation, local universities/vocational institutes, local/international ESCOs and the Clinton Climate Initiative (CCI).

Component 2: EE Building Policy Frameworks – The identified EE building policy and fiscal policy related barriers to the widespread application of EE technologies and practices in the commercial building sector will be addressed under this component. The expected outcome from this component is the establishment, implementation of, and compliance to, favorable policies that encourage EE technologies and practices for commercial building in Thailand. The expected outputs that contribute to the realization of this outcome are: (1) Revised evaluation criteria for the building labeling scheme for existing buildings; (2) Reviewed and updated policies on energy efficiency standards in existing buildings on a voluntary basis; (3) Recommended new fiscal incentives and improvements to existing incentives for commercial building sector; and (4) Draft energy efficiency promotion Action Plan (short and long term) to supplement DEDE activities.

To deliver these outputs, this component will consist of activities such as: (1) Establishment of a voluntary energy standard, energy benchmarking and energy performance rating system for existing buildings. Such a standard and system will provide a framework for building owners to manage and control the energy use in buildings; (2) Revised Specific Energy Consumption (SEC) index for commercial buildings; (3) Evaluation of the most feasible options and approaches for inclusion of building EE technologies and practices in the design and operation of various types of commercial buildings. The assessment shall include the provision of applicable guidelines on the proper design, specifications, maintenance and operation of these systems in various types of commercial buildings; (4) Recommendation of EE standards, specifically related to best approaches and practices to management and control energy use in different types of commercial buildings; (5) Adoption of the EE revolving fund for commercial building sector and if necessary, formulation of new fiscal policies to promote EE building design for new and existing buildings. Also information on the fiscal incentives will be disseminated amongst building owners and managers; (6) Preparing draft energy efficiency promotion Action Plan (short and long term) to supplement DEDEs activities; and (7) Completed analysis and recommendation for expanding existing EE revolving fund to commercial buildings. It is envisaged that these activities

will be implemented in cooperation with, amongst others, the Board of Investment, other relevant government agencies, Thai Association of Chief Engineers and Thai Association of Architects.

Component 3: EE Building Technology Applications Demonstrations – This component is comprised of activities that will address the barriers related to the lack of technical expertise in the application and operation of the latest building EE technologies and practices in the commercial building sector. The approach to remove such barriers is through demonstrations of the application and impacts of these environmentally sound technologies in these buildings. The outcomes from this component include: (1) Improved confidence in the feasibility, performance, energy, environmental and economic benefits of the EE technologies and practices in hotels, hospitals, shopping malls, convention centers and office buildings; (2) Improved local technical and managerial capacity to design, manage and maintain EE technologies and practices; and, (3) Replication of demonstration projects within the commercial building sector over a period of 10 years. These demonstrations are intended to be replicated in other buildings after the project, in as much as bulk of the estimated CO_2 emission reductions will come from such replications. The expected outcome of the demonstrations is the improved confidence in the feasibility, performance, energy, environmental and economic benefits of building EE technology applications.

The outputs from this component are: (1) Installed and operational demonstration projects in selected buildings; (2) Documentation of the of the demonstration projects and available EE technologies in the markets; (3) Completed training courses for building or facilities management personnel (e.g., hotel chief engineers) of commercial building in the energy conserving operation and maintenance of building system; and (4) Completed project documents/recommendations for replication projects in the commercial building sector.

The activities that will be carried out under this component include: (1) Conduct of comprehensive feasibility analyses, costing and engineering studies/design of selected projects to demonstrate the application of EE technologies and techniques in commercial buildings; (2) Installation, operation and evaluation of the seven demonstration projects (4 hotel buildings, 2 hospital buildings and another 1 in a shopping mall); (3) Documented results of the demonstration projects; (4) Documentation of information on the availability and quality of EE technologies and practices applied in Thailand so far, and in other countries; (5) Conduct of training courses (including come-back trainings each year) for chief engineers and facilities/general services managers of selected buildings in the operation and maintenance of EE technologies, including commissioning skills; (6) design and preparation of project plans and engineering drawings of eligible EE building replication projects in hotel, hospital, and office buildings and shopping malls; (7) Technical and financial assistance in the performance of energy audits in hotels, hospitals, shopping malls and office buildings to identify the best EE technology applications; (8) Conduct of feasibility study of standardization of EE technologies in hotels, hospitals, shopping malls and office buildings and (9) Assist building owners comply with the ECPA 1992, building practitioners in designing new buildings that are EE buildings, retrofitting existing buildings to make them EE buildings and suppliers develop or make possible easy and affordable access to EE building materials.

The demonstrations are not specifically only for showing the technology application, but mainly the process by which the applications are carried out in a holistic and integrated-manner. The demonstration covers the entire process of integrated EE project conceptualization, assessment, planning, designing, engineering, financing, installation, commissioning, operation, M&E and maintenance. There are two reasons for this: (i) project approach for EE buildings and (ii) the Fund expansion necessity.

- Project approach for EE buildings: *All the 30 EE building projects that were financed through the revolving fund involved only a "piece-meal" approach to energy utilization efficiency improvement (e.g. replacement of a chiller, re-lamping a particular floor). None of these projects were designed based on an integrated/holistic approach. As part of the lessons learned, such piece-meal approach has not generated the optimal and cost-effective energy saving. The proposed project will showcase the cost-effectiveness and energy saving through demonstrations with a holistic EC approach, which has so far not been applied in the 30 projects that were funded and implemented through the revolving fund.*

- The Fund expansion necessity: *Compared to the number of factory projects that are successfully accessed the revolving fund (177 projects), the number of EE building projects (30 projects) is much smaller in number. The reason for this, as gleaned from the lessons learned so far from the revolving fund operations include: (1) lack of interest and motivation by building owners and managers as they are not responsible for paying energy bills (the building tenants are practically paying for this); and (2) much longer payback period, often more than 7 years, for EE building projects compared to the EE projects in factories.*

The above emphasizes the importance of expanding the revolving fund's portfolio to accommodate more building EE projects. The PEECB will involve pertinent activities that will help facilitate such expansion (e.g., revision of the current framework, terms and conditions and implementing rules and regulations).

Apart from the demonstrations, this component will also include activities that will provide technical and informational support to commercial building owners/managers, building designers and engineers on the benefits, operation and maintenance of EE building systems. The expected outcome from this is the improved local technical and managerial capacity to operate and maintain EE technologies and practices through the implementation of the following envisioned activities.

For building designers and engineers:

1) Assessment of the existing capacities of local building practitioners (e.g., architects, civil engineers, etc.) and managers/engineers in building EE technology design, operation and maintenance;
2) Enhancement of the local capacity for providing engineering and consultancy services for the commercial buildings sector, including guidelines and examples of feasible EE technology applications projects in the commercial building sector;
3) Technical assistance in the assessment of the availability and quality of EE technologies for hotels, hospitals, shopping malls, convention centers and office buildings in the local market;

For building owners and managers:

1) Informational materials such as user-friendly manual designed for building owners and managers to understand the feasibility of energy conservation projects in commercial buildings; and
2) Seminars and workshops aimed at building owners and managers to disseminate the results of demonstrations and energy conservation in buildings in general.

It is envisaged that these activities will be implemented in cooperation with, amongst others, Greenleaf Foundation, Clinton Climate Initiative, building practitioner professional associations, local and international suppliers of building EE technologies, Chulalongkorn University and international universities.

Emission Reductions

Data from the Green Leaf Foundation shows that in 2007, there were around 6,000 hotels in Thailand and the total number increased to 6,500 in 2008 with approximately 300,200 guest rooms. If this trend continues the numbers of hotels will reach over 10,000 in 2014. It is estimated that power demand for hotels will increase from 2,695 MW in 2007 to over 4,000 MW in 2011. Total CO_2 emission from hotels will increase from 14 million tonne per annum in 2007 to around 20 million tonne in 2011. Furthermore, data from the Greenleaf Foundation shows that for four hotels with each around 150 rooms where they performed measurements, have an electricity consumption of around 4,000,000 kWh per year. The estimated order of magnitude of energy consumption in hotels nationwide is currently in excess of 10,000,000 MWh[4].

The Green Leaf Foundation experienced that when a hotel joins their energy efficiency program, which involves "soft" energy efficiency measures like training of staff to switch off lights, cleaning air conditioners regularly, etc, energy

[4] 2700 MW * 8760h * 0.5 (average load factor of max power demand)

consumption can go down by about 15% in 4 years time. Experience of the Clinton Climate Initiative, after performing various energy audits and installing EE technologies in commercial buildings, such as hospitals and shopping malls, in developing countries, energy saving of 20% can be reached. This percentage largely depends on the type of building and the existing energy management practices. Combining "soft" energy measures and installation of building EE technologies might result in energy savings of more than 30%. One example of this is the energy efficiency project of Krung Thai Bank in one of its building in Thailand that earned them the ASEAN Energy Award in 2006 in the retrofitted building category. The bank achieved 23-25% savings in its annual energy consumption saving through a holistic approach in the retrofitting of its building. Based on this, a conservative minimum of 20% improvement of energy use performance is considered for the demo projects.
The project envisages implementing 4 pilot projects in hotels. Two larger hotels (with more than 450 rooms) and two smaller hotels (around 150 rooms) will be chosen. The direct emission reductions of these pilot projects will be around 814 tCO_2e per year, and 8,144 tonne CO_2e over a 10-years period[5].

Concerning hospitals, Thailand has 340 hospitals with more than 35,000 beds. Figures for 2007 (Greenleaf, 2008) show that for 12 hospitals in Bangkok (average size around 100 beds), the average annual electricity consumption was 12,730,000 kWh. Thus, it can be estimated that energy consumption in hospitals nationwide is probably in excess of 4,000,000 MWh. The project envisages the implementation of 2 pilot projects in hospitals. One large hospital (more than 300 beds) and one smaller hospital (around 100 beds) will be selected. The direct emission reductions of these pilot projects will be around 518 tCO_2e per year, and 5,176 tonne CO_2e over a 10-years period.[6]

The project plans one pilot project for a large scale shopping malls with a floor area of more than 40,000 m^2 and a specific energy consumption of about 311 $kWh/m^2/y$. This pilot is envisaged to showcase the application of EE features that will save more than 20% of energy consumption[7]. The estimated direct emission reductions that can be achieved from this demonstration will be 1,294 tCO_2e/year, and 12,938 tCO_2e over a 10-year period.[8]

With the various interventions that will be carried out under this proposed project and the expected outputs, it is estimated that by end-of-project, building EE technologies and practices in 4 hotels, 2 hospitals and 1 shopping mall will have been installed, resulting in 8,144 + 5,176 + 12,938 = **26,257 tCO_2e direct emission reductions over a period of 10 years**.

The expected number of EE building projects that will be funded by the revised framework of the DEDE Revolving Fund (i.e., mainly to accommodate more commercial building EE projects) is 150 during the 10 year influence period. Under the current framework of the revolving fund (baseline), only about 50 building EE projects can be funded by the revolving fund[9]. Compared to the baseline, there will be 150 building EE projects that will be funded by the revolving fund (under the alternative scenario that the PEECB project will bring about). Hence, the improvement (as compared to the baseline) is 100 building EE projects[10].

[5] The average hotel floor area considered is 11,448 m^2 with an average specific energy consumption of 171 $kWh/m^2/y$. It is considered that 20% energy saving could be achieved. 4 hotels * 11,448 m^2/hotel * 0.171 $MWh/m^2/y$ * 20% savings * 0.52 tCO_2e/MWh = 814 tons/yr
[6] The average hospital floor area considered is 17,280 m^2 with an average energy consumption of 144 $kWh/m^2/y$. It is considered that 20% energy saving could be achieved. 2 hospitals * 17,280 m^2/hospital * 0.144 $MWh/m^2/y$ * 20% savings * 0.52 tCO_2e/MWh = 518 tons/yr
[7] Energy consumption figure used is based on Lurenzi eds (2007, p.150) that report on an energy conservation project of a large size shopping mall (with more than 40,000 m^2 sales area) in Thailand.
[8] 1 shopping mall * 40,000 m^2/shopping mall * 311 $kWh/m^2/y$ * 20% * 0.52 = 1,294 tons/yr. 311 $kWh/m^2/y$ was adopted as benchmark from
[9] Based on earlier experience with the Revolving Fund's current terms and conditions, only the 30 building EE projects were funded during the first 3 years operation of the fund. Assuming an annual 10% increase in the number of building EE project funded, a total of 51 projects would have been funded by the revolving fund. On a conservative basis, a total of 50 building projects will be funded by the revolving fund under the current financing framework.
[10] Under the alternative scenario, it is assumed that 10 building EE projects will be funded each year during the 10 year influence period plus the assumed 10% increase in number of funded building EE projects each year. This leads to a total of 59 projects, but on a conservative basis estimated at 50. Hence, there will be a total of 150 building EE projects funded through the revolving fund projects during the 10-year influence period. Comparing this to the baseline, the improvement is 100 projects.

Inasmuch as some of the project activities under Component 3 such as: (a) design and preparation of project plans and engineering drawings of eligible EE building projects in hotel, hospital, and office buildings and shopping malls that are approved for funding through the revolving fund; (b) technical and financial assistance in the performance of energy audits in hotels, hospitals, shopping malls and office buildings to identify and design the appropriate and feasible EE system applications; and, (c) conduct of feasibility study of standardization of EE technologies in hotels, hospitals, shopping malls and office buildings, whatever CO_2 emission reductions that such projects will bring about are considered directly attributable to the PEECB as direct post project CO_2 emission reductions (i.e., those implemented after the PEECB implementation). Hence, the direct post project emission reductions are calculated based on the expected 100 projects that will be funded by the revolving fund. In this regard, the **direct post project** emission reduction is estimated at **375,099 tCO_2e over a period of 10 years.**[11] This translates to an overall CO_2 emission reductions that are directly attributable to the PEECB Project of about 401.4 ktons CO_2e**.** Moreover, the project is expected to influence the implementation of future EE building projects and such projects will bring about CO_2 emission reductions that can be indirectly attributed to the PEECB. Assuming a replication factor of 3, **the indirect emission reductions over an influence period of 10 years will be 78,771 t CO_2e (26,257 * 3)** based on a bottom-up approach.

This does not include the resulting energy savings and CO_2 emission reduction from possible energy efficiency measures that maybe carried out in fuel-fired systems in commercial buildings (e.g., steam boilers, LPG cookers/heaters, etc.). Reliable data (neither aggregated nor disaggregated) is not available on the use of these fuels in commercial buildings. Nonetheless, the majority of energy use in these buildings is electricity.

These rough estimates of the potential energy savings and CO_2 emission reductions from the implementation of EE technologies and techniques in the commercial building sector will be ascertained and confirmed during the project design. Also energy savings due to reduced use of fossil fuels will be determined. It is also envisioned that the successful implementation of the project will promote significantly the application of building EE technologies in residential buildings, resulting in greater potentials for energy saving and GHG emissions reduction.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL PRIORITIES

Thailand's Tenth Social and Economic Development Policy 2007-2011 promotes the “sufficiency economy,” which aims for the balanced development of human, social, economic, and environmental resources. Within these broader goals, an important national priority is to increase energy conservation and efficiency.

The project is in line with the 4-year National Climate Change Strategies of Thailand (2008-2012). Strategy 2 on Climate Change Mitigation emphasizes the need to support improvement and building of energy-saving buildings at the household, office, and commercial levels; as well as provide incentives and create awareness to increase energy efficiency in production and consumption.[12] The project is in line with the identified priorities and needs in the Technology Needs Assessment (TNA) and the First National Communication (FNC) of Thailand. In the TNA and FNC energy conservation is mentioned as one of the main priority areas. The National Energy Policy also emphasized the importance of energy conservation. The commercial building sector is considered as an area where significant energy savings can be made. At the ministerial level, the project also supports the Ministry of Energy’s policy in enhancing “the creation of energy saving discipline as a national culture and encourage the Local Administration Organizations to be focal points for disseminating Energy Saving Culture.” In 2008, the Ministry has adjusted the national energy saving target from 10.8% to 20% by the year 2011.[13]

[11] This is based on a rough estimate of 3,750 tCO_2e reduction per project (based on the 7 demonstration projects) multiplied by 100 replication projects

[12] Thailand National Climate Change Strategies (2008-2012), Office of Natural Resources and Environmental Policy and Planning Ministry of Natural Resources and Environment, January 2008.

[13] Minister of Energy Policy Statement 13 October 2008.

The proposed project is expected to make a significant contribution to the above mentioned objectives. In that regard, the project is contributing to the national priority on the promotion of energy efficiency and facilitation of measurable reductions in GHG emissions. The proposed project itself is expected to lead to investments in building EE technologies and practices in the commercial building sectors in Thailand.

The project is in accordance with UNDP Thailand Country Programme Document and the 3-year work plan (2009-2011) on the thematic area of climate change mitigation, aiming at developing Low Carbon City with Local Administration organizations in Thailand's growing cities.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND FIT WITH STRATEGIC PROGRAMS:

The project fits the objectives of the GEF's strategic program on Promoting Energy Efficiency in Residential and Commercial Buildings (SP-1), and will contribute to the reduction of GHG emissions through the transformation of Thailand's buildings market towards more energy-efficient technologies and practices.

D. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES:

Bulk of the activities that will be carried out under the proposed project is for the removal of barriers to the widespread application of EE technologies and techniques in commercial buildings in Thailand. In that regard, the requested GEF funds will be used as grant. The proposed barrier removal activities are the incremental activities that are needed to facilitate and/or influence the realization of the global environmental benefits (i.e., CO_2 emission reduction associated from the electricity savings that will be derived from the implementation of EE technologies and techniques in buildings). The GEF funds will be used for: (a) fully funding some of the proposed incremental activities; (b) augment the funds for implementing some of the baseline activities; and (c) supplement the co-financing for proposed alternative activities. The GEF resources will be invested into activities for building EE policies and regulatory frameworks, building EE technology applications demonstration and replication and capacity building on building EE technologies/techniques, and awareness raising on EE in buildings.

E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES

The project will further establish coordination with other national initiatives related to technology applications, such as those undertaken by EGAT, Greenleaf Foundation, Clinton Climate Initiative, by involving all relevant partners in design and implementation of the project, including through membership of the board of this project management. In particular, partners will be identified with comparative advantages to assist in delivery of project outcomes. For example, the TEENET (Thailand Energy and Environment Network), which is funded by EPPO, caters to the demands from both the government and the private sector for energy information by linking various institutions within the country via the Internet.

During the project design, the project proponents will closely coordinate with key stakeholders including the Thai Hotel Associations, Thai Architect and Engineers Association, Ministry of Energy, EGAT, hospital association/groups and other institutions that are engaged in policy making and research and development on energy conservation in buildings.

By targeting the demand-side management of energy efficiency, the project will also complement another GEF intervention at the regional and national levels to promote energy efficiency standards and labeling (ES&L), i.e. "Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling Project" (BRESL).[14] The design of the proposed project will also be coordinated with the project team working on the UNIDO-GEF Industrial EE project.

[14] The implementing partner of this project in Thailand is Thailand Greenhouse Gas Management Organization (TGO), under the Ministry of Natural Resources and Environment.

Furthermore, the project will also be developed in close cooperation with the UNDP-GEF Regional Coordination Unit for Asia-Pacific in Bangkok (UNDP-GEF Asia-Pacific RCU).The UNDP country office in Bangkok will be fully involved in the project development through its participation in the various stakeholder and co-financing consultation meetings and technical workshops during the project development phase, and in the multipartite review meetings. Consultations will also be done with UNDP-GEF, New York during the project development phase.

F. DESCRIBE THE INCREMENTAL REASONING OF THE PROJECT:

EE technologies and practices for commercial buildings have not been widely applied in Thailand because of the lack of awareness, lax enforcement of EE policies and regulations applicable to buildings, and the absence of convincing financial models and replicable demonstrations. With the GEF's interest in supporting interventions that would bring about global environment benefits (in terms of CO_2 emissions reduction), this project is being proposed for GEF funding support in facilitating and promoting building EE technologies and practices in commercial buildings in Thailand. This support is sought to remove the barriers to the widespread application of building EE technologies. Without the GEF support, the potential significant global environmental benefits from the application of building EE technologies in Thailand's commercial buildings sector will not be realized. If the current barriers that hinder building developers/owners in applying building EE technologies and practices persist, the current inefficient practices of accounting, managing and control (or the lack of) the utilization of energy in buildings will continue, resulting in diminishing opportunity for the improvement of the specific energy consumption of buildings. Furthermore, the country would have limited capability in properly and more accurately monitoring the energy performance of the commercial buildings sector. The promotion of energy efficiency in the building sector as an effective policy and institutional instrument for achieving the country's energy objectives would also be of limited success if the current energy management and accounting practices will remain in place.

With the GEF support for the incremental cost needed to promote financial policy schemes and awareness that support application of building EE technologies and practices in commercial buildings, capacity building to improve local skills in building design, operation and maintenance of these systems, as well as in improving the market demand for building EE technologies, the anticipated energy savings in the commercial buildings sector can be achieved. In that regard, the GEF support for this project will ultimately help achieve significant GHG emission reduction in Thai commercial buildings sector.

G. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED. OUTLINE THE RISK MANAGEMENT MEASURES, INCLUDING IMPROVING RESILIENCE TO CLIMATE CHANGE, THAT THE PROJECT PROPOSES TO UNDERTAKE:

While all possible efforts will be done to ensure the successful implementation of the proposed project, there are certain risks that are anticipated, which the project will also endeavor to mitigate. The following table summarizes the potential risks that might prevent the project objective(s) from being achieved, the level of risk and the proposed mitigating actions for each risk:

Risk	Level of Risk	Mitigating Action
Stakeholder coordination - Too many stakeholders may prevent efficient decision-making	L	Identification of the appropriate lead agency and appropriate number of members for the National Steering Committee and the Technical Advisory Committee during the project design stage
Co-financing for demonstration - Disbursements of funds for demonstration projects not meeting the scheduled dates	L	Securing firm commitments of responsible agencies during the project design stage
Lack of proper selection of demonstration sites	L	Identification of targeted buildings, setting-up of a realistic

- Too many buildings to cover may incur costlier building analysis		schedule and cost-sharing arrangements among responsible agencies during the project design stage
Lack of commitment and low participation from the private sector	M	Involvement of the private sector from the project designing stage, dissemination of the latest information through right channels and identification of their needs and demand through continuous dialogue.

The overall level of risk is low.

H. DESCRIBE, IF POSSIBLE, THE EXPECTED COST-EFFECTIVENESS OF THE PROJECT (e.g. $/ton of CO_2 abated).

The proposed project will facilitate and promote building energy efficiency technologies and practices in commercial buildings in Thailand, aiming to increase the rate of greenhouse gas emission reduction from these buildings, through the barrier removal activities and other capacity building and technical assistance activities. The proposed approach of barrier removal is considered as most appropriate, holistic and cost effective considering the fact that the commercial building sector's GHG emissions in Thailand are quite big and have been growing rapidly.

The approach of letting the building owners/managers carry out their individual energy conservation initiatives, as in the past, would have benefits limited to the building owners and to some extent but not usually, the building tenants. The impacts would also be limited to those that are directly involved in the project, unlike if such initiatives are part of a program that will disseminate the results and lessons identified.

Considering the cumulative amount of CO_2 emissions avoided that can be considered as directly attributable to the proposed project is 401,356 tCO_2e. There is also an indirect CO_2 emission reduction of about 78,771 tCO_2e indirect, the approximate unit abatement cost (UAC) is around US$ 9.06 per t CO_2 (US$ 3,637,273 / (26,257+ 375,009 tCO_2e)). The UAC will be tracked using a monitoring and evaluation system that the proposed project will develop. This preliminary UAC figure will be re-evaluated and updated during the project design particularly in quantifying the potential energy savings from the confirmed demonstration projects and projected replications and in coming up with the CO_2 emission reduction estimates. These rough estimates of the potential energy savings in hotels and hospital sector will be determined and confirmed during the project design. The updated CO_2 emission figures and UAC will be indicated in the project document that will be submitted later for CEO endorsement.

I. JUSTIFY THE GEF AGENCY COMPARATIVE ADVANTAGE (leave blank if GEF Agency is within the comparative advantage matrix)

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):
(Please attach the country endorsement letter(s) or regional endorsement letter(s) with this template).

NAME	POSITION	MINISTRY	DATE *(Month, day, year)*
Mr. Saksit Tridech	Permanent Secretary	Ministry of Natural Resources and Environment	26 Oct 2009

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for project identification and preparation.

Agency Coordinator, Agency name	Signature	Date *(Month, day, year)*	Project Contact Person	Telephone	Email Address
John Hough Deputy Executive Coordinator, UNDP-GEF		December 15, 2009	Takaaki Miyaguchi, Regional Technical Specialist	+66 (2) 288 2674	Takaaki.miyaguchi @undp.org