UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Regional Office in Bangkok for the Kingdom of Cambodia, the Lao People's Democratic Republic, Malaysia, the Union of Myanmar and Thailand

Reference# L/051/2011

14 February 2011

Dear Mr. Witoon Simachokedee,

เอกสารประกอบเรื่องเพื่อ พิจารณา
เรื่องที่ ๑๓

Subjects: Endorsement of UNIDO/GEF "Industrial Energy Efficiency"

Refer to the UNIDO/ GEF project entitled ***"Thailand: CF: Industrial Energy Efficiency"*** under the Regional *CF: Reducing Industry's Carbon Footprint In South East Asia Through Compliance With a Management System for Energy (ISO 50,000) (PROGRAM)*, I am pleased to inform you that the project has been endorsed by Global Environment Facility on 4 February 2011. Please kindly find a copy of CEO endorsement letter as attached.

As the project has already been endorsed, the next step is to start implementation according to the attached project work plan. We would like to take this opportunity to thank you for your kind support in the process and we look forward to working with you.

Please be assured of our ongoing cooperation

Yours sincerely,

for Chin-Pen Chua
Representative and Director of Regional Office in Thailand

Mr. Witoon Simachokedee
Permanent Secretary
Ministry of Industry
Rama 6 Road, Bangkok 10400

cc. 1. Mr. Arthit Wuthikaro, Director General, Department of Industrial Promotion
2. Mr. Chaiyong Krittapholchai, Secretary General, Thai Industrial Standards Institute
3. Ms. Supa Tangkittikhun, Minister Counsellor, Office of Industrial Affairs
4. Ms. Suttinee Poopaka, Director General, Office of the Industrial Economics

Elcs. 1. Endorsement letter
2. Work plan

5th Fl., Department of Industrial Works Building, 57 Phrasumen Road, Banglamphoo, Pranakorn, Bangkok 10200, Thailand
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GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

MONIQUE BARBUT
Chief Executive Officer and Chairperson

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January 04, 2011

Dear Council Member:

The UNIDO as the Implementing Agency for the project entitled: *Thailand: CF: Industrial Energy Efficiency under the Regional: CF: Reducing Industry's Carbon Footprint In South East Asia Through Compliance With a Management System for Energy (ISO 50,000) (PROGRAM).* has submitted the attached proposed project document for CEO endorsement prior to final Agency approval of the project document in accordance with the UNIDO procedures.

The Secretariat has reviewed the project document. It is consistent with the project concept approved by the Council in November 2008 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by the UNIDO satisfactorily details how Council's comments and those of the STAP have been addressed.

We have today posted the proposed project document on the GEF website at www.TheGEF.org for your information. We would welcome any comments you may wish to provide by February 01, 2011 before I endorse the project. You may send your comments to gcoordination@TheGEF.org.

If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy ofthe document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Attachment: Project Document

Copy to: Country Operational Focal Point
GEF Agencies
STAP
Trustee

PROJECT DOCUMENT

GEFSEC Project ID	:	3786
Project Number	:	GFTHA11001
Title	:	Industrial Energy Efficiency in Thailand
Country	:	Thailand
Duration	:	5 years
GEF Implementing Agency	:	UNIDO
Lead Executing Partner	:	Department of Industrial Promotion (DIP)
Other Executing Partners	:	Department of Industrial Works (DIW); Thai Industrial Standards Institute (TISI); and Department of Alternative Energy Development and Efficiency (DEDE)

GEF Grant : US$ 3,620,000

Government Co-financing Contribution (cash & in-kind) : US$ 15,645,000

- Ministry of Industry (cash & in-kind) : US$ 2,445,000
- Ministry of Energy (Loan and in-kind) : US$ 5,200,000
  - *Loan* *US$ 5,000,000*
  - *in-kind* *US$ 200,000*
- SME Bank (Loan) : US$ 3,000,000
- CIMB Bank (Loan) : US$ 5,000,000

PROJECT SUMMARY

The final energy consumption in Thailand is dominated by the industry sector (37%), transportation (35%) and other sectors (28%). In the industrial sector, the energy mix is dominated by fossil sources which represented 73,8% of the total energy consumed in this sector. In terms of CO2 emissions in Thailand derived from energy consumption were estimated at 208 million tons in 2009 which is a 38% increase above the CO2 emissions level of 2000. From 1999 to 2009, the industry GHG emissions has grown by 75% showing the highest increase as compared to power generation and transportation with 42% and 14% increase respectively over the same period.

The Thai government has been proactive in fostering an energy efficiency culture and industry has been a receptive and active participant. Nevertheless, the realization of energy efficiency initiatives by industries to address the high energy consumption situation has been rather low. This is supported by the industrial information from the 2007 Industrial Census Whole Kingdom (National Statistical Office) that only 1,445 enterprises (5,5%) out of about 26,100 medium and large factories have participated in the government initiatives.

Despite of the present practices of energy efficiency improvements at the component levels, there is a general concern at the government level about the inefficiency improvement from energy usage in the industry. The EE programs and initiatives in the country have not delivered comprehensive capacity building focused on the Thai industrial sector for uptake of improvement of energy efficiency at the system levels. As a result, there is limited penetration of energy-efficient measures, technologies, and practices in the industries despite of the large potential of efficiency improvements. Based on this observed situation, it is likely that the energy consumption and GHG emissions will continue to increase in the industrial sector if business as usual persists.

The objective of this project is to promote industrial EE through adoption of ISO based energy management standards and system optimization approach for improvement of energy performance of industries to make its operations more reliable and competitive. The proposed project is designed to: i) increase awareness and reinforce Thailand's efforts to integrate EE as part of the management cycle for the realization of continuous energy savings, and ii) incorporate industrial energy systems optimization as a mean to maximize energy savings and reduce production costs.

The project is designed with the five components to deliver outcomes from the successful achievements of outputs and implementation of the activities as followed:

1. ISO Compliant Energy Management Systems
2. Industrial Energy Systems Optimization
3. Enhancement of Industrial EE Financing Capacity
4. Implementation of Energy Management and Systems Optimization Projects
5. Project Management

On Behalf of	Signature	Name and Title	Date
Government	_____	Mr. Pasu LOHARJUN Director General of Department of Industrial Promotion	_____
UNIDO	_____	Mr. Chin Pen CHUA UNIDO Representative and Director of Regional Office in Thailand	_____

REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project
THE GEF TRUST FUND

GEF

Submission Date: 8 September 2010
Resubmission Date: 21 December 2010

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 3786
GEF AGENCY PROJECT ID:XX/THA/08/X01
COUNTRY(IES): Thailand
PROJECT TITLE: Industrial Energy Efficiency
GEF AGENCY(IES): UNIDO
OTHER EXECUTING PARTNER(S): Department of Industrial Promotion (DIP); Department of Industrial Works (DIW); Thai Industrial Standards Institute (TISI); and Department of Alternative Energy Development and Efficiency (DEDE)
GEF FOCAL AREA(S): Climate Change
GEF-4 STRATEGIC PROGRAM(S): CC-SP2 – Industrial EE
NAME OF PARENT PROGRAM/UMBRELLA PROJECT: Reducing Industry's Carbon Footprint in South East Asia through Compliance with an Energy Management system (ISO 50001)

Expected Calendar (mm/dd/yy)	
Milestones	**Dates**
Work Program (for FSPs only)	
Agency Approval date	
Implementation Start	03/01/2011
Mid-term Evaluation (if planned)	06/01/2013
Project Closing Date	08/31/2016

A. **PROJECT FRAMEWORK** (Expand table as necessary)

Project Objective: Promote energy efficiency in the industries through introduction of ISO Energy Management Standard incorporating industrial energy systems optimization.								
Project Components	**Indicate whether Investment, TA, or STA[2]**	**Expected Outcomes**	**Expected Outputs**	**GEF Financing[1]**		**Co-Financing[1]**		**Total ($)** c=a+ b
				($) a	%	($) b	%	

1. ISO compliant energy management systems	TA	Compliance to a policy instrument, compatible with ISO energy management standard, in place delivering sustainable improvements in energy efficiency in industry and improved productivity and competitiveness	• 1.1. Training material and tools on energy management developed • 1.2. National awareness campaign launched on ISO 50001 • 1.3. National experts/factory personnel trained on ISO compliant energy management systems • 1.4. Peer-to-peer network between industrial enterprises established and operated	965,000	49	985,000	51	1,950,000
2. Industrial energy systems optimization	TA	A cadre of energy efficiency professionals created both within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively for providing industrial systems optimization services	• 2.1. Training material and tools on systems optimization developed • 2.2. National experts/factory personnel trained on optimization of steam, compressed air, pumping and fans systems • 2.3. Equipment vendors/suppliers trained on systems optimization	1,239,500	75	405,000	25	1,644,500

3. Enhancement of industrial EE financing capacity	TA	Increased availability of financial and institutional support for industrial energy efficiency initiatives	• 3.1. Harmonized EE project evaluation criteria • 3.2. Capacity of banks/FIs enhanced on EE projects financing • 3.3. Training material developed and industry managers trained on the development of financial proposals	262,000	57	200,000	43	462,000
4. Implementation of energy management and systems optimization projects	TA & Invest.	Increased adoption of energy management standards and system optimization energy efficiency projects by industry for continuous higher energy savings.	• 4.1. Energy management projects implemented • 4.2. Documented systems optimization demonstration projects • 4.3. Recognition program developed	668,500	5	13,350,000	95	14,018,500
Project Management				360,000	34	685,000	66	1,045,000
Monitoring and evaluation				125,000	86	20,000	14	145,000
Total Project Costs				3,620,000	19	15,645,000	81	19,265,000

(1) List the $ by project components. The percentage is the share of GEF and Co-financing respectively of the total amount for the component.

(2) TA = Technical Assistance; STA = Scientific & Technical Analysis.

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT (expand the table line items as necessary)

Name of Co-financier (source)	*Classification*	*Type*	*Project*	*%**
Ministry of Industry	Nat'l Gov't	Cash and in-kind *Cash* *In-kind*	2,445,000	16%
Ministry of Energy**	Nat'l Gov't	Loan and in-kind *Loan* *In-kind*	5,200,000 *5,000,000* *200,000*	33%
SME Bank	Govt owned bank	Loan	3,000,000	19%
CIMB Bank	Private bank	Loan	5,000,000	32%
Total Co-financing			15,645,000	100%

* Percentage of each co-financier's contribution at CEO endorsement to total co-financing

** Committed co-financing amount from the Ministry of Energy is more than expected investment requirement and hence only showed the amount which will be required in the project.

C. FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Project Preparation a	*Project b*	*Total* *c = a + b*	*Agency Fee*	*For comparison:* *GEF and Co-financing at PIF*
GEF financing	100,000	3,620,000	3,720,000	362,000	3,720,000
Co-financing	130,000	15,645,000	15,775,000		13,056,000
Total	230,000	19,265,000	19,495,000	362,000	16,776,000

D. GEF RESOURCES REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES)[1]

Not applicable, as it is a single focal area, single country and single GEF agency project.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	*Estimated person weeks*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*
Local consultants*	484	798,000	300,000	1,098,000
International consultants*	231	808,000		808,000
Total	715	1,606,000	300,000	1,906,000

* DETAILS TO BE PROVIDED IN ANNEX C.

F. PROJECT MANAGEMENT BUDGET/COST

Cost Items	*Total Estimated person months*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*
Project coordinator*	112	185,000		185,000
International consultants*	14	50,000		50,000
Project assistant		60,000		60,000
Local consultants			300,000	300,000
Project office			325,000	325,000
Office equipment		10,000	15,000	25,000

Furniture			15,000	15,000
Office supplies		7,000	15,000	22,000
Communication		8,000	15,000	23,000
Travel*		15,000		15,000
Vehicle		25,000		
Total	**126**	**360,000**	**685,000**	**1,045,000**

* Details to be provided in Annex C. ** For others, it has to clearly specify what type of expenses here in a footnote.

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? yes ☐ no ☒

(If non-grant instruments are used, provide in Annex E an indicative calendar of expected reflows to your agency and to the GEF Trust Fund).

H. DESCRIBE THE BUDGETED M&E PLAN:

The following table presents a concrete and fully budgeted monitoring and evaluation plan of this project.

M&E Activity	Responsible Parties	Budget (USD)	Timeframe
Prepare and hold Inception workshop Measure impact indicators	PMU, UNIDO, consultants	25,000	At project start
Carry out mid-term evaluation	UNIDO, consultants	40,000	At mid-point of project implementation
Carry out final evaluation	UNIDO, Independent consultants	60,000	Within 12 months after completion of project implementation
Complete project terminal report	PMU, UNIDO, consultants	20,000	Within 6 months of completion of external evaluation
Total Budget		**145,000**	

The GEF, the Ministry of Industry and UNIDO will contribute to the M&E budget in the tune of US$ 125,000 and US$ 20,000 respectively. The detailed monitoring and reporting activities are described in the UNIDO project document. The project result framework in Annex A is part of the monitoring and evaluation plan. The Project Management Unit (PMU) will be responsible for continuous monitoring of project activities execution, performance and track progress towards milestones. The UNIDO project manager will be responsible for tracking overall project milestones and progress towards the attainment of the set project outputs. The UNIDO project manager will also be responsible for narrative reporting to the GEF. The M & E Plan is detailed in the Annex I.

PART II: PROJECT JUSTIFICATION: In addition to the following questions, please ensure that the project design incorporates key GEF operational principles, including sustainability of global environmental benefits, institutional continuity and replicability, keeping in mind that these principles will be monitored rigorously in the annual Project Implementation Review and other Review stages.

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

Thailand macroeconomic Context

With a population of 63.4 million in 2008, Thailand is the second economy (behind Indonesia) and the fourth nation in terms of GDP per capita in South-East Asia. From 2000 to 2008, the Thai economy fluctuated between 2.5%5

and 7.1% with an average growth of 4.8% over this period[1]. As a consequence of the 2009 international financial crisis, Thailand has recorded the first real sustained contraction of the economy in nearly a decade in terms of GDP growth which has fallen to -5% during quarter one to three of 2009. The domestic consumption has declined slightly. Private investment has declined while investors await clarification of domestic politics. Several industries have begun to rebound, but the prices of agricultural products and tourism are still falling[2].

However, it is projected that the recovery will take place during 2010 due to public investment, vital for growth in the coming years. Inflation has fallen sharply in recent months because of reduced energy prices. The country has recently initiated a recovery program entitled, "Thailand: Investing from Strength to Strength". This program which will run until 2012 is expected to create about 1.5 million jobs and boost private consumption. The GDP at constant 1988 prices was 4,361 billion Baht in 2008 of which the manufacturing sector contributed at 41%, the residential and commercial sector and the transportation sector represent 33% and 10% respectively. The remaining is shared equally between electricity, construction and mining sectors (See figure 1 below)[3].

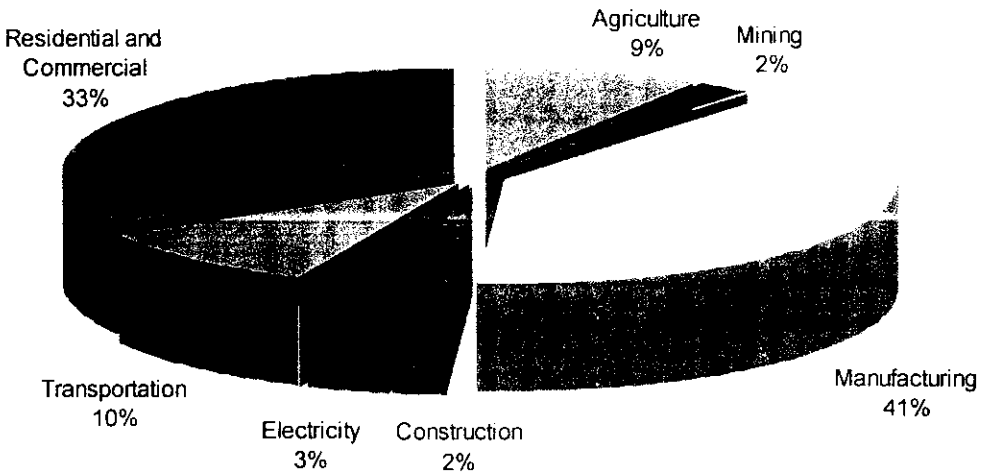

Figure 1: Thailand GDP Share per Sector in 2008[4]

Thai energy outlook

Thailand is the largest consumer of energy in the Southeast Asian region. In 2008, the total Energy supply which was estimated at 112,957 ktoe increased by 2.6% above the year 2007 level. Due to the economy's limited indigenous energy resources, Thailand relies heavily on energy imports. Of the total energy supplied in 2008, energy import and domestic production contribute to 44.5% and 55.5 % respectively[5]. The total value of Thailand's energy import in 2008 was almost US$35 billion or 19% of the country's import of which 89% was spent on crude oil import and refined oil products. Over 2000-2008, energy import increased by 240% above the year 2000 level or 27% per annum.

Table 1: Final Energy Consumption in Thailand (ktoe)[6]

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Petroleum	26,716	27,290	28,898	30,533	33,093	32,621	31,823	32,534	31,471
Electricity	7,704	8,183	8,741	9,345	10,095	10,664	11,145	11,649	11,833
Natural Gas	1,818	1,959	2,133	2,303	2,713	2,763	2,959	3,683	4,361
Coal/Lignite	3,058	3,416	4,143	4,362	5,254	6,189	6,288	6,635	7,838
Renewable Energy	8,599	8,443	9,043	9,751	10,516	10,824	10,993	11,645	12,245

[1] Office of the National Economic and Social Development Board (NESDB)
[2] NESDB
[3] NESDB
[4] Energy Policy and Planning Office (EPPO). Energy Statistics. http://www.eppo.go.th/info/index.html
[5] Department of Alternative Energy Development and Efficiency (DEDE), Thailand Energy Situation 2008
[6] NESDB, Key Statistic Data, 2008

Total	47,895	49,291	52,958	56,294	61,671	63,061	63,208	66,146	67,748

From Table 1, it can also be seen that petroleum (46.5%) was the most used energy form in Thailand in 2008 followed by natural gas (19%)[7]. The share of oil in Thailand's energy consumption has been relatively stable in the range between roughly 45% and 56% in the last 10 years. Renewable and waste energy arrived in third place with 18%. Coal is used to meet approximately 15% of the total energy needs. Due to limited indigenous energy resources, Thailand relies heavily on energy imports. The total value of Thailand's energy import in 2008 was 1,159 billion Baht (or almost US$35 billion at 1 US$ = 33 Baht) or 19% of the country's import of which 89% was spent on crude oil import and refined oil products. Over 2000-2008, energy import increased by 240% above the year 2000 level or 27% per annum while the total energy demand increased by 41.4% over the same period

The total installed electricity generation capacity of Thailand was 29,212 MW at the end of 2009, 49% of which belonged to the EGAT Public Company Limited. Independent Power Producers (IPPs), Small Power Producers (SPPs) and exchange/import from neighbouring countries, account for 42%, 7% and 2%, of the total installed electricity generation capacity, respectively. The total electricity generated was 148,221 GWh in 2008 mainly from natural gas at 70.5% and coal and lignite at 20.7%. The total electricity consumption was about 135,000 GWh of which industry share was 44.7% and the residential and business shared 21.3% and 24.6% respectively.

In terms of final energy consumption by sector in Thailand, it is dominated by industry (37%), transportation (35%) and other sectors (28%). The energy mix in the industrial sector is dominated by fossil sources which represented 73.8% of the total energy consumed in this sector.

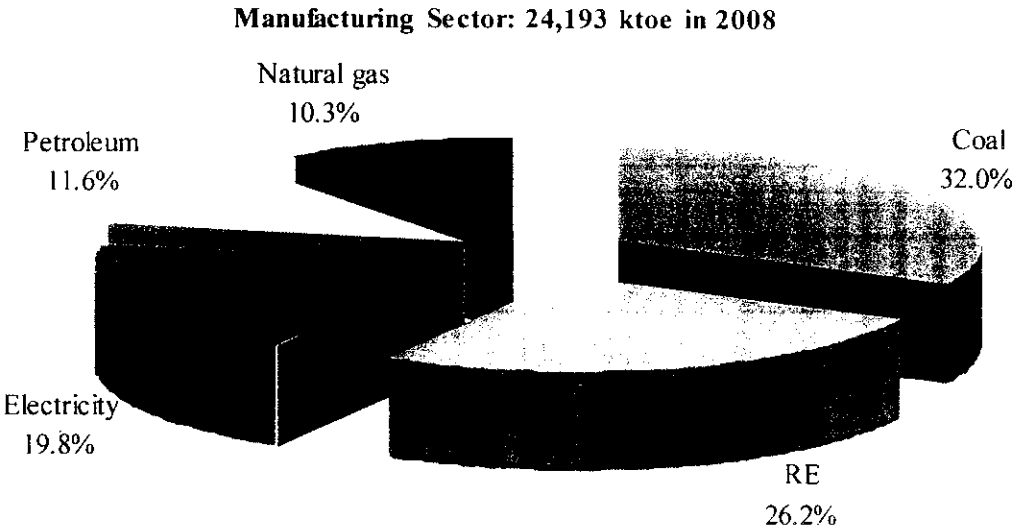

Figure 2: Energy Consumption by Source in the Manufacturing Sector[8]

The manufacturing sector accounted for 24,193 ktoe of the final energy consumption in 2008 of which consumption of coal contributed, the most with 32% followed by renewable energy, electricity, petroleum products, and natural gas which shared 26.2%, 19.8%, 11.6% and 10.3% respectively. From sectoral perspective, the energy consumption share of the non-metal, food and beverage, paper, chemical, fabricated metal, basic metal, and textiles was respectively 30.7%, 28.9%, 13.1%, 8.4%, 6.6%, 4.2% and 3.3% of the total manufacturing energy consumption in 2008.

The total CO2 emissions in Thailand from energy consumption were estimated at 208 millions tons in 2009 which is a 38% increase above the CO2 emissions level of 2000. The power generation sector is the largest emitter (40%) followed by transportation and industry sectors with 27% and 24% of the total emissions respectively. From 1999 to

[7] 70.5% and 20.7% of electricity generation is natural gas and coal based respectively.
[8] DEDE. 2008. Thailand Energy Situation

2009, the industry GHG emissions has grown by 75% showing the highest increase as compared to power generation and transportation with 42% and 14% increase respectively over the same period[9].

Energy efficiency situation

In South East Asia, Thailand has been a leader in the promotion of energy efficiency. The Thai government has been proactive in fostering an energy efficiency culture and industry has been a receptive and active participant. Taking stock of energy situation in the country in terms of high energy usage, import bills, energy security and environmental concerns, the Government of Thailand has structured its energy policy, legal and regulatory frameworks in place well back starting from early 1990's for promotion of energy efficiency and renewable energy. A summary of the policies and regulations related to energy efficiency and conservation that have been implemented is also presented in the Part II Section B.

Over time, the Thai industry has made significant investments in energy efficiency supported by several major initiatives supported through energy conservation fund, energy efficiency revolving fund, utility-based DSM, total energy management program and active ESCO industry. Despite of this, realization of energy efficiency initiatives by the industries to address the high energy consumption situation has been rather is low. This is supported by the industrial information from the 2007 Industrial Census Whole Kingdom (National Statistical Office) that only 1445 enterprises (5.5%) out of about 26,100 medium and large factories have participated in the government initiatives. One of the limit of the current efforts is the focus on the instititional side without creating a comprehensive market driven mechanism emphasizing not only on the end-users (industry). but also on services providers, consultants/designers, equipment vendors/suppliers and financing institutions.

The DEDE established the Energy Efficiency Revolving Fund using funds sourced from the Energy Conservation Promotion Fund (ENCON Fund) to stimulate investment in energy efficiency projects and subsidy program for installation of different standard measures and for implementation of customized energy efficiency projects. As of April 2008, 207 projects, out of which 177 are related to factories, received loans from the EE Revolving Fund. From 2002 to end of 2008, the total investment reached USD 500 million for 250 projects with about 60% for alternative energy (fuel switching) projects and combined cycle power plants. The government contribution was about USD 150 million through the EE Revolving Fund while the remaining was leveraged from local banks and projects proponents. To date projects were mainly carried out in designated facilities and involved energy auditing, low cost measures implementation and reporting. Even though facilities were required to submit targets and plans for increasing energy efficiency, few EE projects were actually implemented.

As in other countries in the region, Thai industries also tend to focus more on individual system components, such as motors, pumps, or boilers than on the whole system. Current practices show more emphasis on the replacement of components as of common equipment maintenance practices. For existing systems, current practice is the replacement of failing or aging equipment with equipment of similar or larger capacity without first conducting a thorough assessment of actual system needs. For new systems or those undergoing a major retrofit, this missed opportunity could be even greater, since these systems, once oversized or mismatched to load requirements, are likely to remain so for the life of equipment, which could be 10-20 years or more.

During a survey conducted on current energy management practices during the project preparation phase, it was observed that individual component level energy efficiency measures such as efficient lighting, leak detections and insulation were more preferred by the Thai industry. Main conclusions indicated that despite nearly two decades of intensive efforts to promote energy efficiency in Thailand, widespread application of best practices in energy usage is still a challenge. There is limited penetration of energy efficient measures and technologies at the system levels to capture higher level of energy savings.
Typically speaking, component level improvement has potential of increasing system energy efficiency of 2-5%. Virtually, there is no focus on improving energy efficiency at the system level which can provide higher savings in energy consumption and GHG emissions. The business-as-usual scenario would likely include continuation of oversized and poorly controlled industrial energy systems that inadequately match system supply to production demand. Opportunities may be lost to accelerate adoption of energy efficient best practices for the industrial sector in Thailand. This situation may put the country at risk of energy supply

[9] EPPO, Energy Statistics 2009

disruption and volatility of energy prices, apart from a substantial foreign currency loss. It is clear that the domestic energy reserves will not be able to adequately accommodate the increasing energy demand of the country due to its increasing economic growth[10].

Energy management is still ad-hoc practice in the Thai industry as it is not integrated with the management system. Though most industries seem to consider energy management important mainly for production cost reduction, the number of enterprises which have implemented energy management good practices within their facility is really low. The survey conducted during the project preparation phase indicated that only 18.8% of the respondent factories had one person spending full time on energy management. About 44% of the factories surveyed spent less than 10 hours per weak on energy management. The current practice does not institutionalize energy management and does not allow a comprehensive and integrated approach that ensures sustainable energy cost reduction and improves the facility productivity in an irreversible way.

Thailand has introduced national energy management standards targeted towards designated factories and buildings with power demand of more than 1,000 kW and/or that consume 20,000 GJ per year. This is a government initiative rooted in energy conservation laws and regulations. In the concept, the Thai energy management standards refers to international standards such as ISO 9001:2000, ISO 14000, ANSI/MSE 2000, Danish and UK energy management schemes. The existing standard is to reduce the energy consumption in industry and commercial sector by focussing more on management solution rather than engineering solution.While the basic notions of energy management are evoked, there is not a fully functional standard for energy management, particularly in the industrial sector though ISO 9000 and ISO 14000 are used in the sector. The current approach of energy management is mainly adopted to comply with the regulatory requirements than to institutionalize a comprehensive approach that incorporate energy management in the current management structure as it is done with ISO 9000 and ISO 14000.

Present practices of energy efficiency improvements at the component levels are good starters but they alone cannot lead towards greater energy and greenhouse gas emission savings. There is a general concern at the government level about the inefficiency improvement from energy usage in the industry. Increasing greenhouse gas emissions arising from fossil fuel combustion & electricity usage in industry and high fuel prices at the international markets are posing bigger challenges to the governments on sustainability of industry. The government is also conscious about the need to improve the competitiveness of the industry by reducing production cost and promoting sustainable and low-carbon development.

Despite encouraging efforts in terms of regulatory policy framework, establishment of energy conservation funds, tax benefits and other incentives from the government, limited achievements have been observed in the field. The EE programs and initiatives in the country have not delivered comprehensive capacity building focused on the Thai industrial sector for uptake of improvement of energy efficiency at the system levels. As a result, there is limited penetration of energy-efficient measures, technologies, and practices in the industries despite of the large potential of efficiency improvements. Based on the observed situation, it is likely that the energy consumption and GHG emissions will continue to increase in the industrial sector if business as usual scenario persists. Nevertheless barriers to energy efficient industrial operations remain and significant potential for improvement has yet to be fully exploited.

Barriers to Energy Management and Systems Optimization in the Industrial Sector

The trend of rising energy prices and tougher competition increases the demand to improve energy efficiency in Thai industry. However, the existence of various barriers often hinders the realization of even some cost-effective energy efficiency measures despite the efforts deployed by the government to promote efficient use of energy. In order to understand and identify the main constraints that prevent the adoption of energy management and energy efficiency projects at system level, UNIDO has invited the industry managers, and energy efficiency practitioners and service/equipment providers to share their own perception of main barriers faced by the Thai industry. The main barriers brought to light from the survey comprise the following.

Technical barriers: Most engineers are well skilled for component based improvement, but less qualified for systems optimization which is not a common practices in the industry. High turnover of plant personnel assigned to

[10] EPPO Energy Statistics 2009

the operation of industrial systems and changes in production lead to lack of persistence for systems optimization. Local manufacturers, vendors and consultants/designers also lack technical information and trainings for supporting decisions to implement energy efficiency through systems improvements.

Information barrier: Campaigns have been conducted by Government agencies (DEDE, DIP, EGAT) to promote the implementation of EE measures in Thailand's industrial enterprises, but the industry still does not know much about systems optimization and energy management. There is still trend to focus exclusively on individual system components. High systems efficiency cannot be achieved through component standards or labelling or "one size fits all" approaches as currently promoted through DSM programs and efficient products. Despite the efforts deployed by the government agencies to promote energy efficiency, there is lack of information about availability of system level options, best practices, and benchmarks. Energy management in the industries, particularly in designated factories, is implemented to comply with the regulations and not viewed as a mean to sustainably improve the industry productivity and competitiveness due to the lack of the top management awareness on this missed opportunity.

Market barriers: Industry operation and production investment budgets are accounted separately. Life cycle assessment is rarely considered on the purchase of industrial equipment by the industry. This often leads to purchasing less efficient equipment, which in turn, increases operation costs. Moreover, industrial markets focus on components rather than systems. Most consulting expertise on energy efficiency available in the country focuses on technology and not on processes and systems. At times, this operation cost is 80% or more of the life cycle cost of the equipment. The absence of support from equipment suppliers and lack of cost/benefit information on system optimization is seen as a significant barrier to efficiency improvement for the industry.

There is limited commitment from the part of the management of industrial enterprises to promote industrial energy efficiency. A recent study found that the most important barrier expressed by both industries such as the textile and cement industries surveyed as well as experts interviewed is that the management is concerned about production and other matters rather than energy efficiency. Energy efficiency is not a core mission for most industries and company strategies tend to focus on output growth rather than cost management. The lack of top management commitment towards energy efficiency places EE projects very low in the priority list as far as the production is ensured. Reducing product cost by reducing energy cost was found to be the main driver for promoting energy efficiency investment in the industrial sector[11].

Financial barriers: Most industries have a budgetary disconnection between capital projects and operation expenses (energy and maintenance). Despite the financial mechanisms put in place in Thailand to stimulate energy efficiency, it is obvious that the uptake is very low and more has to be done to achieve the expected results. This situation may indicate a gap between the industries need and the incentives and financial products offered. Moreover, financial institutions or banks continue to treat energy efficiency projects as current loans with criteria which do not sufficiently take in account the particularity of this kind of projects. The small size of EE projects associated with a high transaction cost is another hurdle that impedes banks to invest massively in energy efficiency.

GEF ALTERNATIVE (THE PROPOSED PROJECT)

The objective of the project is to promote industrial EE through adoption of ISO based energy management standards and system optimization approach for improvement of energy performance of industries to make its operations more reliable and competitive. The proposed project is designed to: i) increase the awareness and reinforce Thailand's efforts on the implementation of energy management system based on ISO 50001 to urge industrial enterprises to integrate EE as part of the management cycle for the realization of continuous energy savings, and ii) incorporate industrial energy systems optimization as a mean to maximize energy savings and reduce production costs.

The project is designed with the four components to deliver outcomes from the successful achievement of outputs and implementation of the activities as followed:

[11] Ali Hasanbeigi, Christoph Menke and Peter du Pont. 2010. Barriers to energy efficiency improvement and decision-making behaviour in Thai industry. Energy Efficiency (2010) 3:33–52 DOI 10.1007/s12053-009-9056-8

COMPONENT 1: ISO COMPLIANT ENERGY MANAGEMENT SYSTEMS

The outcome from this component is to strengthen a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency, productivity and competitiveness. The TISI will lead this component in close cooperation with the DIP, DEDE and DIW to ensure the sustainability of the project activities.

Output 1.1: Training material and tools on energy management developed

The activities planned to deliver this output aim at complementing and strengthening the ongoing initiatives for energy management including ISO 50001 energy management standards for industries. The training material, and tools will be translated into Thai language, printed, and reproduced and will be based on guidelines and case studies. The energy management material and tools will allow industrial facility managers/personnel to understand the importance of energy management systems/standards and undertake energy management planning. The energy performance reporting structure will be developed to help industries track the improvement when implementing the standard. The expected activities from this output include:

- Review of existing energy management scheme and identification of capacity and training needs for enhancing energy management capacity in the industry
- Development of training material and tools publicly available for participating industries
- Development of guidelines for energy management and ISO 50001 implementation in English and Thai
- Development of energy performance reporting tools to enable benchmarking in industry sub-sectors and peer-to-peer networking.

Output 1.2: National awareness campaign launched on ISO 50001

The national awareness campaign will provide information on ISO 50001 energy management standards to industrial enterprises, services providers and equipment suppliers venting the benefits for shifting from current operations to energy management practices by adopting ISO 50001. The campaign will use promotional literature for the project and ISO 50001, press releases, and presentations to industry associations.

Output 1.3: National experts/factory personnel trained on energy management systems

The trainings will be organised in two phases. The first phase will target trainers where international experts will deliver intensive training to national staff to a level such that they can train others. At the second step, international and national experts will provide trainings and assistance to factory personnel. The preparatory activities will include the compilation of the training material by international experts, translation, identification of initial factories for the on-site training, identification of classroom facilities, and provision of accommodation for trainees.

• Intensive training for national experts

The UNIDO international team will provide training for fifty (50) national experts. These individuals will subsequently assume the role of national energy management experts, become a source of national energy management expertise, and serve as multipliers for project impacts. These curricula will be introduced to the national experts in three stages: observing the international experts teach, co-teaching with the international experts, and teaching with international experts observing and commenting on teaching techniques. UNIDO's international team will offer intensive training to national energy management experts with most of this training taking place within the first two years of the project.

The national energy management experts will be trained through a mentoring and on-the-job process to an intermediate level of expertise. They will be capable of:

- Conducting short (one-half day) workshops for factory managers on the benefits of implementing an energy management system in conformance with ISO 50001 and highlighting the technical assistance available to participating companies
- Conducting two-day training sessions for energy managers on implementation of an energy management system in conformance with ISO 50001, including information on internal auditing techniques
- Coaching facility personnel on energy management system implementation

• Energy management trainings for factory managers and personnel

At this second step, UNIDO's international team along with trained national experts will conduct additional energy management training sessions. Together, they will develop specific criteria to select relevant participants for whom they will conduct energy management training sessions:

- Half-day workshops for factory personnel, including designated energy managers, covering 500 factories across Thailand. The purpose is to encourage managers to register their key staff to participate in the subsequent full-day implementation training sessions. This workshop will present issues such as the role of ISO 50001 in improving competitiveness, EE mandates, and enhancing prospects for international trade. A guest speaker from the industry who is already engaged in energy management will also be sought for each workshop.
- 300 factories will receive two-day additional training on ISO 50001 energy management system implementation and internal auditing techniques to assist them in conforming to ISO 50001. The assumption is that, out of the 500 factory managers participating in the half-day workshops, approximately 300 will choose to commit their employees to the energy management system implementation training.

The two-day training will guide participants through the Plan-Do-Check-Act cycle as it applies to the ISO 50001 energy management system. Instruction will be given on how to establish an effective energy policy, set improvement targets and objectives, establish energy performance indicators, and identify significant energy uses and opportunities for improvement. At least half a day will be dedicated to internal auditing and integrating the ISO 50001 energy management system into existing ISO management systems such as ISO 9001 and 14001. Instruction will also be given on the value of conducting industrial systems optimisation assessments in order to identify early energy saving opportunities and build momentum for the energy management system.

Each participant of the two-day training session will be registered in the peer-to-peer network. Each participating factory will also have access to support from the national energy management experts to assist them in implementing their energy management system, resulting in operational improvement.

Output 1.4: Peer-to-Peer network between industrial enterprises created and operational

A peer-to-peer network will be created and managed by the project management unit to facilitate information exchange between the participating facilities. Enterprises taking part in the project will be encouraged to send their energy management implementation plan and the following results. This exchange of information will stimulate industries by providing them with information on a big range of energy management and systems optimization solutions and their impact on the industry energy consumption. The main activities to be conducted under Component 1 are summarized in the following table.

Table 2: Activities and outputs under the Component 1

Component 1: ISO compliant energy management systems	
Output 1.1: Training material, and tools on energy management developed **Output 1.2: National awareness campaign launched on ISO 50001** **Output 1.3: National experts/factory personnel trained on energy management systems** **Output 1.4: Peer-to-peer network between industrial enterprises created and operational**	
Activities	**Responsibility**
Review of existing energy management activities and identification of industry needs	UNIDO, international experts, and PMU, DIP, DEDE, DIW and TISI
Development of a detailed work plan incorporating schedule, role and responsibilities, and milestones	UNIDO, international experts, and **PMU**
Preparation, development, and production of training material and	UNIDO, international

tools in English and Thai	experts, and **PMU**
Production of promotional/media material to promote the ISO 50001 standard Production of articles to introduce ISO 50001 in standard newspapers, journals, and magazines Event launch of the standard ISO 50001/the launch of UNIDO's industrial EE project Organisation of seminar road shows in the country to introduce ISO 50001 to entrepreneurs/members of Thai industry associations/organizations	UNIDO, international experts, **PMU, DIW, DIP, DEDE, and TISI**
Select trainees to become national experts on energy management systems based on certain agreed criteria	**UNIDO, international experts, and PMU**
Provide logistics support for the trainings	**PMU**
Conduct trainings on energy management for national experts	PMU and international experts
Conduct trainings on energy management for factory personnel	PMU, national experts and international experts
Exchange information with industries and establish a peer-to-peer network	**PMU**

COMPONENT 2: INDUSTRIAL ENERGY SYSTEMS OPTIMIZATION

The main outcome from this component is the establishment of a cadre of energy efficiency professionals within industrial facilities as well as international experts and equipment suppliers to initiate a process to transform local markets effectively as to provide industrial systems optimization services.

Output 2.1: Training materials, software, and tools on systems optimization developed

This output consists of the development of training material, and tools to assist industrial enterprises and international experts in understanding and applying the systems optimization approach applied to targeted industrial systems (steam, compressed air, fan and pumping).

The material and tools will be translated into the Thai language, printed, and reproduced based on guidelines and case studies from other countries. The expected activities from this output include:

- Development of training material and tools publicly available for participating industries
- Development of guidelines for systems assessment and optimization in English and Thai.

Output 2.2: National experts/factory personnel trained on optimization of steam, compressed air, fan and pumping systems

This will principally consist of two-phase trainings similar to that indicated in the output 1.3. The preparatory activities involve the compilation of training material by international teams, translation, the identification of appropriate factories for the in-plant training with requisite compressor/steam/fan/pumping systems, securing approval of site visits, purchase of measurement equipment to perform the in-plant training, acquisition of technical data from host plants pertaining to the systems and components to be evaluated by the teams, identification of classroom facilities, provision of accommodation for trainees, etc.

• Intensive training for national experts in systems optimization

In the first phase, a one-to-one and a one-to-many training and implementation schemes will be achieved, in which UNIDO's team of international experts is engaged in initial capacity building to create a core of 50 highly skilled Thai experts. These individuals would subsequently assume roles as systems optimization experts, become a source of national systems optimization expertise, and serve as multipliers for project impacts. To ensure success of the

project, trainees will be rigorously selected based on technical and training capabilities and consultation with the DIP, DIW and DEDE.

Systems optimization training for 50 national experts will consist of:

- Training of 50 national systems optimization experts by the UNIDO international team in classroom and plant settings. The national experts will be trained "on-the-job" on the use of measuring instrumentation, data collection and analysis, removal of moisture in biomass to increase boilers efficiency and the preparation of investment proposals for energy system improvements which are subsequently submitted to the management of the plants hosting the training.
- Training on use of UNIDO's tools designed to assist national experts and their industrial customers in developing and documenting sustainable projects.
- Prepare national systems optimization experts to deliver training (specific to each system type) curricula.

UNIDO's international team will offer intensive training on systems optimization to participants. Most of this training will take place within the first two years of the project. The national experts will receive both classroom training and on-site interactive training involving participating industrial facilities. Following completion of initial systems optimization training courses, the international team returns to work with their trainees on plant assessment and project development skills. In addition, the international experts will prepare and observe trained national experts conducting training of local personnel in "factory training sessions".

• Factory personnel capacity building on systems optimization

At this second stage, UNIDO's international team and trained national experts will jointly conduct additional systems optimization training sessions.

- One-day trainings for 400 factory personnel across Thailand to introduce general concepts on pumping systems, fan systems, steam systems, compressed air systems optimization and removal of moisture in biomass to increase boilers efficiency. This session will be a mix of theory and practical considerations.
- 250 factory employees that have already taken part in the 1-day training sessions will receive additional 2-day training sessions in the utilization of the UNIDO's tools designed and developed under this component. These additional 2-day trainings will be customized for the participating factories.

As part of improving the efficiency steam system, the project will also focus on measures to improve and maintain biomass boiler system efficiency including efficiency of the combustion process – grate design, ash/fuel handling, control and instrumentation. Feedstock preparation will be given high priority, particularly moisture content control through drying process in those industrial facilities where biomass boilers are operated for generation of steam.

Output 2.3: Equipment vendors/suppliers trained on systems optimization

In addition to experts training, the international team will conduct training to introduce systems optimization techniques to Thailand-based equipment vendors, manufacturers' representatives, and suppliers of pumping, compressed air, fan systems and steam systems.

The purpose of this training is to prepare manufacturers, vendors, and suppliers to: (i) participate in reinforcing the systems optimization message with their customers, and (ii) assist them in identifying what will be required to reshape their market offerings to reflect a system services approach. Each training session will be a mix of theory and practical considerations. This training will target fifty (50) companies and will be taught by instructors with equipment, manufacture, or sales experience. The activities and the expected outputs of this component are summarized in the following table.

Table 3: Activities and outputs under Component 2

Component 2: Industrial energy systems optimization
Output 2.1: Training material, and tools on systems optimization developed
Output 2.2: National experts/factory personnel trained on optimization of steam, compressed air

and pumping systems **Output 2.3: Equipment vendors/suppliers trained on systems optimization**	
Activities	**Responsibility**
Development of a detailed work plan incorporating schedule, role and responsibilities, milestones, etc.	UNIDO, international experts, and PMU
Preparation, development, and production of training material and tools in English and Thai	UNIDO, international experts, and PMU
Select trainees to become national experts on energy management and systems optimization based on agreed criteria	UNIDO, international experts, PMU, DIP, DIW and DEDE
Provide logistics support for the trainings	PMU
Conduct trainings on systems optimization for national experts	PMU and international experts
Select factories and conduct trainings on systems optimization for factory personnel	PMU, national and international experts
Select equipment suppliers and conduct trainings for 50 vendors each on systems optimization of pumping, steam systems, and compressed air systems	International experts, PMU, and national experts

COMPONENT 3: ENHANCEMENT OF INDUSTRIAL EE FINANCING CAPACITY

The expected outcome from this component is the increased availability of financial and institutional support for industrial energy efficiency initiatives. As the DEDE is supporting financing of energy efficiency projects in the country through its energy efficiency revolving fund since 2002, the proposed project will make use of existing market mechanisms to promote industrial energy efficiency projects. The proposed project will target primarily on bridging the gaps in financial capacity of financial institutions/banks and build the capacity of industry to prepare more bankable energy efficiency proposals. The DEDE will lead this component of enhancement of industrial EE financing capacity through the following activities and outputs.

Output 3.1 Harmonized project evaluation criteria

The following activities will be carried out to deliver this output:

- Development of project evaluation criteria to be used by financial institutions to better rate energy efficiency and systems optimization projects. The criteria will take into account lifecycle cost of efficient technologies, best practices, and monetary savings generated by energy efficiency projects as a positive cash flow for the industry.
- Harmonization/streamlining of available criteria for evaluation of industrial EE projects.
- Preparation of guidelines to assist financial institutions in enhancing their capacity to evaluate industrial EE projects.

Output 3.2: Capacity of banks/FIs enhanced on EE projects financing

The activities foreseen to be implemented in order to achieve this output include:

- Dissemination of the developed project evaluation criteria and guidelines among the financial institutions.
- Trainings for local banks and government financial institutions to understand the main features of EE projects and better appraise project proposals submitted by the industries.

Output 3.3: Training material developed and industry managers trained on the development of financial proposals

This output will include the development of training material and tools and build the capacity of industrial facility managers to develop bankable projects. The following activities will be carried out:

- Development of training material and tools on bankable EE projects for industrial enterprises in English and Thai.
- Compilation and dissemination of information on financial incentives/schemes available for investments on energy efficiency improvements in Thailand.
- Training of factory personnel in preparation of bankable energy efficiency project proposals. The learning-by-doing approach to be used will be based on case studies and real projects from participating facilities. Some financial institutions will be invited to present their investment credit lines in industrial EE projects.

Activities to be undertaken under Component 3 and their outputs are summarized in the following table.

Table 4: Activities and outputs under Component 3

Component 3: Enhancement of industrial EE financing capacity	
Output 3.1: Harmonized project evaluation criteria **Output 3.2: Capacity of banks/FIs enhanced on EE projects financing** **Output 3.3: Training material developed and industry managers trained on the development of financial proposals**	
Activities	**Responsibilities**
Develop and harmonize criteria for evaluation of industrial EE projects for financial institutions	PMU, UNIDO experts, DEDE and Financial Institutions (FI)
Develop guidelines for EE projects evaluation by the financial institutions	PMU, UNIDO experts, DEDE and FI
Disseminate EE projects evaluation criteria and guidelines among financial institutions	PMU, UNIDO experts, and FI
Train and increase awareness of financial institutions and local banks to understand, promote, and invest in industrial EE projects	PMU, UNIDO experts, and FI
Compile and disseminate information on financial incentives/schemes available for investments in EE projects in Thailand	PMU
Develop training material and tools on bankable EE projects for industrial facility personnel	PMU, UNIDO experts, and FI
Train factory personnel on energy efficiency financing and bankable EE projects proposals development	PMU, UNIDO experts, and FI

COMPONENT 4: IMPLEMENTATION OF ENERGY MANAGEMENT AND SYSTEMS OPTIMIZATION PROJECTS

The expected outcome from this component is the increased adoption of energy management standards and systems optimization energy efficiency projects by industries for higher energy savings on continuous basis.

Output 4.1: Energy management systems implemented

The project will accompany industries in the process of implementing the ISO 50001 energy management standard. The energy staff representative of the industrial facilities who took part in the two-day training event will be expected to implement operational improvements as the result of establishing and implementing their energy management system. The activities will include:

- Support the implementation of operational improvement projects with assistance from national experts in 200 factories selected among the participating industrial facilities.
- Direct support to 50 industrial factories to enable them to conform to the ISO 50001 standard. The support consists of extensive on-site assistance from the national energy management experts guided by the UNIDO international experts.

It is expected that 200 factories will complete operational improvement projects and they will register for the peer-to-peer network.

Output 4.2: Documented systems optimization demonstration projects

The project will support the implementation of systems optimization projects in industrial enterprises. The activities will include the following:

- Complete 75 systems assessment by the trained Thai experts nationwide with limited support from UNIDO international experts.
- Implementation of 50 systems optimization projects. This will lead to completed systems optimization projects, which will be developed using the UNIDO tools.

As part of improving the efficiency steam system where biomass boilers are used, the project will focus on measures to improve and maintain efficiency of the combustion process. Feedstock preparation will be given high priority, particularly moisture content control through drying process in the industrial facilities.

The investment will be made by the factories using their current source of financing or the project financial partners.

This output will also lead to lessons learnt (success stories, but also failed cases) from the demonstration projects implemented in order to promote energy management standards and systems optimization in the industry sector in Thailand. The information on the project and the promoted concept will be available for both participating and non-participating industries.

Out of the 50 completed projects, 25 projects are planned to be documented as case studies. The case studies will be developed illustrating financially attractive investments in efficiency improvements for steam, pumps, fan and compressed air systems. They will document the energy and GHG emission savings directly attributable to the project. They will also be used in the subsequent factory training by the national experts.

Output 4.3: Recognition program developed and implemented

A recognition program will be developed and made available for facilities that will implement an energy management plan and report their energy savings. This activity will include the management of a peer-to-peer database and the website. Participating industries will provide their energy savings which will then be made available trough the peer-to-peer network website. Under this recognition program, industries will be awarded based on their annual savings performance. The recognition program will be implemented in close collaboration with the DIP, DIW, TISI and DEDE. Activities foreseen to be undertaken under Component 4 are presented in the following table.

Table 5: Activities and Outputs under Component 4

Component 4: Implementation of energy management and systems optimization projects	
Output 4.1 Energy management systems implemented **Output 4.2: Documented systems optimization demonstration projects** **Output 4.3: Recognition program developed and implemented**	
Activities	**Responsibility**
200 industrial enterprises implement operational improvement projects after receiving energy management trainings	Industrial enterprises, national experts
50 industrial enterprises implement activities towards conformance with ISO 50001	Industrial enterprises, PMU, international experts and, national experts
Registration of enterprises who implemented projects in the peer-to-peer networks	Industrial enterprises and PMU
75 assessments undertaken to identify systems optimization opportunities in the industrial facilities	Industrial enterprises, PMU, national experts, and

	international experts
50 industrial enterprises implement systems optimization projects	Industrial enterprises, national experts, international experts, and PMU
Set up energy performance indicators for recognizing improvement on energy efficiency in the peer-to-peer networks DIP and DEDE recognizes industries through the awards based on the energy saving performance indicators	DIP, DIW, TISI, DEDE and PMU

Target Industrial Sub-sectors

The target industrial sub-sectors were selected after discussion with the lead government counterpart, i.e. the Department of Industrial Promotion (DIP), based on the country needs and priorities in terms of enhancement of the industrial sector competitiveness. The selection criteria were based on criteria such as the sub sector impact on GHG emission mitigation, the capacity to respond to energy management opportunity, their willingness to participate and invest, their share of energy consumption and their current situation concerning energy management and system optimization, the replication factor and the importance of the sector on the national economy.

Six industry sub sectors out of nine initially identified were retained in the framework of the proposed project. They include the food products and beverages, textiles, chemicals, rubber and plastic products, non-metallic and mineral and basic metal. The targeted sub-sectors regroup 48.3% of the number of establishments in the manufacturing sector. There were about 12,600 medium and large enterprises in these sub-sectors.

EXPECTED GLOBAL ENVIRONMENTAL BENEFITS

The project interventions will lead to energy savings for the industry, which can be translated into GHG emission reductions based on the fuel/electricity used. Global benefits in terms of avoided carbon-di-oxide emissions resulting from energy savings are estimated from the project as followed:

Direct GHG reductions – Emission reductions achieved by demonstration projects that are planned and implemented as part of the project as well as energy efficiency investments leveraged as result of the project during the project's supervised implementation period.

Indirect GHG Emission Savings – Emission reductions achieved after project completion as result of the enabling environment for EE practices and investments created by the GEF project and projects implemented by the equipment vendors/suppliers after receiving technical assistance from the projects.

The industrial demonstration projects and training activities are expected to result in direct electricity and fuel savings of 83,712 MWh and 1,914,142 GJ during project period. In terms of GHG reduction, the project is expected to provide 196,757 tCO2 during this period. Indirect fuel and electricity savings are estimated to be in the order of 8,407,493 GJ and 381,878 MWh. In conclusion, the project will result in total emission reduction to the tune of **1,068,147 tCO2**: **196,757** tCO2 from direct emission savings and **871,390 tCO2** from indirect emission savings. Calculation details of these estimates are given in the annex F.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL AND/OR REGIONAL PRIORITIES/PLANS:

The proposed project is in line with the Energy Conservation Act and the National Strategic Plan on Climate Change (2008-2012) which has established 6 strategic focus areas. The second strategy aims at reducing greenhouse gas emission and promoting clean technologies in the main sectors including industrial sector.

Main national initiatives to save energy are routed in the Energy Conservation Act which provides the policy ground for energy efficiency projects and programs in Thailand. The project design takes into account these

government priorities through the consultation and identification of targeted sub-sectors with government counterparts to complement other initiatives.

The four components under the proposed project support directly the government energy efficiency programs and are in line with the government's energy regulatory and policy framework. The project will compliment the works undertaken by the DEDE and TISI on the energy management standards towards promulgating national energy management standards into ISO standards. It will also compliment the efforts of the DIP and DEDE towards improving energy efficiency of industries and thereby making industrial operations more reliable and competitive.

The national policy and regulatory framework as well as the national initiatives on which the proposed project is building to foster energy conservation are summarized below:

Energy Conservation Regulatory framework

The Government of Thailand has made substantial efforts in promoting energy conservation and renewable energy utilization. The energy conservation related laws passed in the country are summarized as follows:

Energy Conservation Promotion Act: The Energy Conservation Promotion Act, or ENCON Act, was passed in 1992 to provide a regulatory framework for energy conservation and efficiency programs and investments. The ENCON Act of 1992 was later amended and changed into the ENCON Act (no.2) of 2007. The main provisions of the Act included the creation of an Energy Conservation Promotion Fund to provide working capital, grants and subsidies to promote and facilitate energy conservation measures and select renewable energy initiatives. The ENCON Act is the primary legislation guiding Thailand's energy conservation and renewable energy policy. The Act is structured around the following pillars: energy conservation promotion fund creation, target and plan for energy conservation, energy performance standards, training programs and promotional campaign and research and development.

Designated factories and buildings: The enforcement of the ENCON Act required the publication of ministerial regulations for the implementation of the Act in the group. In this perspective, the Royal Decree on Designated Factories A.D. 1997 was adopted to institute energy management scheme in Thailand. The Decree was amended and updated by the Ministerial Regulation A.D. 2009 prescribing qualifications, responsibilities and number of persons responsible for energy management, the standards, criteria and procedures for energy management for designated factories and building (The Ministerial Regulation A.D. 2009/1 and 2009/2). The purpose of the Decree is to accelerate energy efficiency law enforcement for energy management standard in application of the ENCON Act. Under the regulations, factories and buildings with more than 1,000 kW of power demand or energy consumption of more than 20 million MJ/year have to appoint a Personnel Responsible for Energy (PRE), implement energy management, record and report annually their energy data, conduct energy audit annually, implement the recommendations.

New energy strategic plan: The Government of Thailand through the Ministry of Energy approved in May 2005, the new Energy Strategic Plan that brought measurable targets for the promotion of alternative energy and energy efficiency in major economic sectors. The plan set targets such as: reduction of the total energy consumption by 20% by 2009, reduction of oil for transportation by 25% by 2009 (with use of natural gas, gasohol and biodiesel), increase in the contribution of biodiesel to 8.5 million litres per day by 2012, reduction of energy consumption in the industrial sector of 25% by 2008, reduction of household energy consumption by 10%, with the Kick-Off of energy saving campaigns on June, 2005 and reduction of energy consumption in the public offices by 10% to 15% with immediate effect.

Strategic plan for energy efficiency promotion: In order to achieve the energy elasticity reduction, measures were established in 2003 focusing on the two major energy intensive sectors, namely, the transportation and industrial sectors. Regarding the industry sector, the energy efficiency strategy contemplates the acceleration of the industrial structure reform to enhance the competitive edge of the country as well as review the investment promotion policy, attaching greater importance to the energy aspect and economic value. Measures adopted in the industry sector include: (a) Put in place tax measures such as tax exemption and assistance for energy conservation plan development in interested industries in order to promote energy conservation in factories; (b) Speed up of: (i) the implementation and enforcement of the Minimum Energy Performance Standards (MEPS) for electrical appliances and energy-efficiency labeling for cars, (ii) the establishment of Energy Conservation Certification for factories

and (iii) the promotion of energy production systems with efficient combined use of energy, such as the co-generation system in the industrial estates and the district heating/cooling system.

Support Programs

The Government of Thailand has been fairly proactive in developing and implementing programs designed to facilitate adoption of energy efficiency and conservation measures.

Energy Conservation Fund: In accordance to the provisions contained in the ENCON Act, the Government of Thailand established the Energy Conservation Promotion Fund (ENCON Fund) which receives revenue from taxation of all petroleum products sold in Thailand. The annual fund derived from the levy on petroleum products is estimated at about THB 2 billion (USD 50 million). The ENCON Fund allocates financial resources to activities that support energy efficiency and renewable energy. The projects that are eligible to benefit from the fund include Research and Development (R&D) in EE and RE, pilot projects, research and studies, energy audits, training and education.

Energy Efficiency Revolving Fund: Early 2003, the DEDE introduced the Energy Efficiency Revolving Fund using funds sourced from the ENCON Fund to stimulate investment in energy efficiency projects and Subsidy Program for installation of different standard measures and for implementation of customized energy efficiency projects. The Revolving Fund provides loans through selected Thai Banks up to USD 1.25 million (50 million Baht) per project with fixed interest rate of less than 4% and repayment in a timeframe of 7 years.

Tax incentives: Thailand has a number of tax incentives established in 2005 by the Government of Thailand to encourage investment in energy efficiency: (i) Pilot Program for Tax Privilege for Energy Conservation was made available for both building and factory owners. This measure provides a tax deduction for 100 percent of the savings generated by an EE investment, up to a cap of THB 2 million (USD 50,000), (ii) Cost-Based Tax Incentives Program is a tax measure which allows companies to receive a 25 percent tax break for investments in projects that result in EE improvements. The tax incentives apply to the first THB 50 million (USD 1.25 million) invested, and can be spread over 5 years, (iii) Import Duty Exemption, administered by the Board of Investment, is an incentive which aims at offering an exemption on import duties for new investments in energy conservation businesses, such as high efficiency machines or equipment and renewable energy equipment and manufacturing, ESCOs, etc.

EGAT DSM Program: In 1993, Thailand initiated a demand-side management (DSM) program, through a financial support from Global Environment Facility (GEF), Australia and Japan governments, to help curb the electricity demand growth and promote more energy efficient equipment and cost-effective energy services within the country. EGAT as the national partner for the implementation of the USD 189 million DSM Program established a DSM Office (DSMO) to develop, implement and evaluate national DSM programs and measures, with an overall target of reducing peak demand by 238 MW and achieving annual cumulative energy savings of 1,427 GWh by the end of 1998. As of June 2007, the DSM implementation has achieved overwhelming success as evidenced by reduced peak demand of 1,435.2 MW and reduced energy demand of 8,148.3 GWh. Moreover, the program also achieved CO_2 emission reduction of 5.63 million tons[12].

Total Energy Management: The DIP is also running the Total Energy Management (TEM) program for SMEs since 2004 separately as part of their initiatives for improving the reliability and productivity of industrial operations. The TEM program provides assistance to the industrial enterprises to carry out energy audits and train plant personnel in general house keeping. Presently, it is implementing TEM-4 with an investment of 7.4 million Baht.

The DEDE also had Participatory Approach to Energy Conservation Program for the SMEs to improve general house keeping and the programme focused basically on typical one off energy conservation measures such as air pressure leakage, groupings of light bulbs and natural lighting, etc.

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

[12] http://www.egat.co.th/en/index.php/egat-dsm-programs

The project falls under and supports GEF-4 Climate Change Strategic Program 2: Promoting energy efficiency in the industrial sector. By addressing key existing information, capacity and market barriers for sustainable IEE in Thailand, the project will directly contribute towards promoting and increasing deployment and diffusion of energy efficient technologies and practices in industrial production and manufacturing processes (Climate Change Strategic Long-term Objective 2).

C. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES.

The project is thought to address barriers as mentioned above through technical assistance. The financing support provided by the GEF to this project is a grant to cover the incremental costs of the project for technical assistance activities. No loan or revolving-fund mechanisms are considered appropriate, and therefore grant-type funding is considered most adequate to enable successful delivery of the project outputs. The GEF resources are needed to secure expertise; human resources and services needed to remove identified barriers and encourage the financial institutions/banks to provide loans for energy efficiency investment projects. The GEF funding will leverage US$ 2.445 million from the Ministry of Industry, US$6.2 million from the Ministry of Energy and the US$8 from two banks.

D. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES

Thailand is very active in energy efficiency promotion and has developed and implemented several initiatives with the support of bilateral and multilateral donors. These initiatives have been designed and implemented in close collaboration with key national players such as the DEDE, the DIP and the DIW.

The project will create coordination with the ongoing initiatives by involving the main national agencies during the implementation of the project activities. In fact, this coordination has started during the design phase. UNIDO has initiated intensive consultation with the DIP, the DEDE, the TISI and the DIW to ensure that all assistance the country is benefiting are complementary and avoid duplication of efforts. In addition, the TISI is coordinating with the ISO body on development of ISO 50001 energy management standards through its membership in the Project Committee 242 of the ISO. All four government departments (DIP, TISI, DEDE and DIW) are key stakeholders of the Project Steering Committee of the proposed project. Some relevant initiatives in the country are outlined hereafter.

UNDP-GEF Promoting energy efficiency in commercial buildings in Thailand (PEECB):
The PEECB project is designed to promote and facilitate the widespread application of building energy efficiency technologies and practices in commercial buildings in Thailand. The country counterpart is the Department of Alternative Energy Development and Efficiency (DEDE), under Ministry of Energy. The project include awareness raising component, the establishment of a favorable policy framework encourage EE technologies and practices in commercial buildings and demonstration projects. The project is expected to start in February 2011.

GTZ Energy Efficiency in Small and Medium Sized Enterprises:
The German project on EE in small and medium sized enterprises aims at the reduction of climate affecting emissions from 5 selected industrial sectors in Thailand. The project is structured to deliver two main outcomes: (i) Improvement on energy efficiency and environmental performance in Thai SMEs with a focus on medium sized enterprises including glass manufacturing (float glass, container glass, fiber glass, and domestic glass), ferrous metal casting, aluminium casting, textile (dyeing), canned food (vegetable, and tuna), (ii) Improvement of personnel and organizational capacities of facilities responsible for implementation of relevant energy and environment policies, and consulting or training for relevant energy and environment sectors. The Thai partner is the Department of Industrial Works (DIW).

DEDE Energy Conservation Program, Phase 3 – revised (2008-2011):

The Thai Energy Conservation Program, Phase 3 (2008-2011), aims to increase energy efficiency targeting at reducing commercial energy use as at the year 2011 from 80,331 thousand tons of crude oil equivalent (ktoe) to 72,511 ktoe, i.e. to reduce non-productive energy use by 10.8% or 7,820 ktoe. The Program will be financed through

the ENCON Fund and implemented by the DEDE. The Energy Conservation Program, Phase 3, comprises the following three main sub-programs: (i) Renewable Energy Development Program, (ii) Energy Efficiency Improvement Program which includes studies, R&D and promotional activities to enhance efficient use of energy in the transportation, industrial and household sectors, capacity buildings and awareness raising activities and (iii) Strategic Management Program.

UNDP-GEF Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling Project (BRESL) project:

BRESL is aimed at rapidly accelerating the adoption and implementation of energy standards and labels (ES&L) program in Asia, The project also facilitates harmonization of test procedures, standards and labels among developing countries in Asia, when appropriate.
Where BRESL promotes energy efficiency at the component level, the present project will address energy efficiency at the systems level. As both levels are important, the two projects will complement each other, leading to synergies which will further increase industrial energy efficiency.

The proposed project will provide the additional international expertise, technical best-practices and financing inputs needed to support and effectively leverage national efforts. The project will contribute to the development of the human, institutional and industry capacity, and supporting structure necessary to realize the industrial energy efficiency related goals of the Energy Conservation Act and the Strategic Plan on Climate Change.

The proposed project will liaise closely with other on-going energy efficiency initiatives to build the necessary coordination and synergy to avoid any duplication and deliver the project outputs with utmost efficiency and effectiveness. On top of this, UNIDO will also build synergy with other GEF industrial energy efficiency projects in the region to share knowledge, information and experiences for creating greater impacts.

E. Discuss the value-added of GEF involvement in the project demonstrated through incremental reasoning :

Baseline Scenario

As detailed in the Section A, there are several issues that need to be dealt in relation to reduction of the country's GHG emissions and improving industry's competitiveness through better energy performance. Particularly, the way energy is used in the industrial sector leading to increased energy demand and its related CO2 emissions. Currently, ad'hoc energy management and focus on single equipment replacement is the common practice. This is due to several barriers among which lack of technical capacity for systems optimization, energy management, lack of information and understanding of EE potential and market related barriers.

This has led to missed EE opportunities from the business-as-usual scenario applying to both existing systems and new steam, compressed air, fan and pumping systems. Present practices would dictate replacing failing or aging equipment with equipment of similar or larger capacity without first conducting a thorough assessment of actual system needs. For new systems or those undergoing a major retrofit, this missed opportunity could be even greater, since these systems, once oversized or mismatched to load requirements, are likely to remain so for the life of the equipment. Such a situation needs to be improved, particularly for manufacturing industry that produces very competitive goods with tight requirements of the buyer.

Most of industries assign energy efficiency improvement task to their technical personnel. Few industries integrate energy efficiency as part of their management cycle. Information dissemination on best practices of energy management and system optimization will remain limited if no capacity building activities and demonstration projects are implemented.

Project Alternative

In the project, it is proposed to use a combination of market push via introduction of ISO 50,001 Energy Management Standards and market pull via delivery of technical expertise on system optimization to both energy

efficiency services "buyers", such as industry managers and engineers, and energy efficiency products and services "sellers", such as equipment manufacturers, distributors, operation and maintenance contractors. The GEF supported project activities are expected to support and leverage national efforts in enhancing technical capacity to promote and sustain industrial energy efficiency, stimulate market demand for EE services and reduce GHG emissions.

The project will address issues related to awareness barriers by increasing institutional capacity and awareness as well as providing information on energy management and systems optimization to improve the knowledge of industrial enterprises, manufacturers, engineering firms and various governmental agencies. All this will provide the establishment of individual sustainability by training Thai professional on energy management systems and systems optimization and generating a new market where they will be able to use their acquired knowledge. Similarly, raising awareness on systems optimization projects and enhancing capacity in the financial sector will enable financial institutions to become more familiar with the intricacies of EE financing.

The project will develop a package of training materials and tools explaining energy management and industrial systems optimization. The planned training and other capacity building activities will be implemented in the systematic way in line with the international norms effectively leading to system level energy efficiency improvements at the industrial facilities. The project will also share international experiences and best practices from other countries where system optimization have successfully been implemented in industry.

The project will also provide assistance to campaign for the ISO 50,001 energy management standards and share successful international experiences on the implementation of energy management standards in other countries. It will build capacity of local experts and industrial enterprises to comply with the standards. With the proposed project, EE will be integrated into management systems of industrial enterprises to accelerate adoption of energy efficient best practices on continuous basis that will result into improved reliability of their operations and productivity. In addition, competitive position of industrial enterprises will be enhanced through their eventual incorporation of energy efficient operation into the ISO certification process.

Sustainability and Replicability

The establishment of an effective EE program in industry to promote energy management and systems optimization leads to a more sustainable energy future. Once established, the projects will effectively transforms the market to a higher level of energy saving services including energy management, feasibility analysis and system optimization measures implementations in industrial facilities.

Energy management and systems optimization are cross-sectoral energy savings approaches. They are applicable in all industries. The project is limited to only 500 industrial enterprises whereas the total number of companies in the targeted sub-sectors only is about 12,600. The project is designed to create an enabling environment for market transformation of more EE technologies and practices in industry through technical and financial capacity building. One of the key requirements for scaling up the project outputs is to overcome the low penetration of energy management and systems optimization in industry due to the lack of knowledge on its mechanism and its long-term benefits. This will be addressed through increased capacity and awareness of the industry, services providers, equipment suppliers as well as the development of a peer-to-peer network where industry can exchange on their projects.

The project will build on and reinforce the government initiatives for EE promotion in designated factories. The strong government commitment towards energy management will favour the sustainability and replicability.

F. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MANAGEMENT MEASURES:

Risk	Rating	Mitigation

Technology: Technical risks associated with the optimization of steam, compressed air, fan and pumping systems are very low. Considerable energy savings have been achieved in many countries through system level efficiency opportunities.	Low	To deliver the required capacity building, UNIDO will employ the services of highly skilled experts with systems specific expertise (steam, pumping, fans and compressed air), and proven training skills.
Sustainability: o Failure to achieve outcomes due to inability to scale up outputs o Failure to achieve sustainable market transformation o Unwillingness of industries to bear even minimal costs of project participation and concerns over disruption to current operation and business priorities	Medium	Through its linkage with ISO 50001, the project builds on the regular audit process, which assures that energy efficient operations become part of each participating enterprise's operating culture. The Government has already created a favourable environment with institutional framework, policy and regulations and incentives and financing mechanisms.
Institutional: Change in government priorities leading to reduced support for the UNIDO/GEF project, implementation delays, and reductions in the effectiveness of delivery of the training and demonstration programs.	Low	Thai Government is already promoting energy management standard. The TISI is part of the Project Committee 242 of ISO which has already published ISO 50001. The proposed project is very much in line with the priorities and activities of TISI, DIP, DIW and DEDE.
Financial: Following the systems optimization assessment, enterprises might not be willing to finance system optimization measures, even if cost effective high energy reduction potential exists.	Medium	Through the project financing activities, UNIDO will provide training for enterprises' key personnel, to build their capacity to better understand the value of investing without delay on systems optimization and energy management, and the long-term financial benefits it brings.

G. EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:

The proposed project that will benefit from the support of the GEF will result in the reduction in electricity and fuel consumption due to adoption of system optimization and energy management standards by industrial enterprises. The direct electricity and fuel saved from the successful implementation of the project will lead to a reduction of carbon dioxide emission (CO_2) which is estimated at 196,757 tons of CO_2 over the project lifetime. The indirect savings after project completion, resulting due to capacity development and introduction of ISO50001 is estimated at 871,390 tons of CO_2. As a result, the intervention of the GEF will lead to emissions reduction impact of 1,068,147 tons CO2 over a 10 year period. Given GEF funding of US$3,620,000 for this project, the avoided cost based on direct emissions reduction is US$ 3.4 per ton of CO_2. Therefore the cost effectiveness of the GEF contribution to this proposed project is very reasonable and acceptable.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. INSTITUTIONAL ARRANGEMENT:

UNIDO will take the responsibility to oversee the project implementation through its internal monitoring. However, the day-to-day project management will be responsibility of the Project Management Unit (PMU) located within the premises of the Ministry of Industry. The Department of Industrial Promotion (DIP) under the Ministry of Industry is the primary stakeholder in this project. The PMU is guided by the Project Steering Committee (PSC) on the implementation of the project and coordination among different government agencies and organizations. The PSC will be led by the DIP and will have key members from the Thailand Industrial Standards Institute (TISI), the Department of Industrial Works (DIW), the Department of Alternative Energy Development and Efficiency

(DEDE) and UNIDO. The UNIDO Regional Office in Bangkok and Head Quarters will moderate field activities and provide necessary support for smooth execution of the activities.

Ministry of Industry

The Ministry of Industry is responsible for the promotion and regulation of industries and industrial activities. Its main responsibilities are listed below:

- supervise and coordinate industrial business operation activities by following the guidelines of environmental preservation, safety, hygiene and energy conservation
- promote and support the capability and efficiency development of industrial business operation for sustained development
- serve as the national information center for industrial works, machines, chemical substances, hazardous substances and volatile substances
- look after the country's interests in international agreements regarding environment, safety and security.

Department of Industrial Promotion

The responsibility of the Department of Industrial Promotion (DIP) is to encourage establishment of all types of essential industries in Thailand, to increase efficiency of industries, and to promote regional industrialization. The DIP mission includes the following:

- To support industrial entrepreneur creation and entrepreneurship development
- To foster competitiveness of Thai industrial businesses
- To build and improve industrial promotion and development models
- To create and develop industrial business service provider networks.

Department of Industrial Works

The Department of Industrial works (DIW) has been implementing the government service system capability development plan by providing the organization with effective work management to the satisfaction of industrial business operators and the people and in response to the objectives and targets of the 8th National Economic and Social Development Plan under the strategy of environmental and natural resource management, social environmental development, human development promotion and support as well as the strategy of popular state development. Through its various divisions, DIW's major responsibilities are: i) to supervise and coordinate industrial business operation activities by following the guidelines of environmental preservation, safety, hygiene and energy economization, ii) to promote and support the capability and efficiency development of industrial business operation for sustained development, iii) to serve as the national information center for industrial works, machines, chemical substances, hazardous substances and volatile substances, and iv) to look after the country's interests in international agreements regarding environment, safety and security.

Thai Industrial Standards Institute

The Thai Industrial Standards Institute (TISI) has been established as a department under the Ministry of Industry since 1 January 1969 by virtue of the Industrial Product Standards Act B.E. 2511 (1968). The Thai Industrial Standards Institute (TISI) is a focal point for standardization for internationally recognized in response to meet the needs of the Thai Government, businesses and society and to strengthen capabilities for sustainable competitiveness. TISI develops both mandatory and voluntary Thai Industrial Standards (TISs) to suit the need and the growth of industry, trade and economy of the country. Standards are developed according to the government policy of consumers' protection, industrial promotion to be competitive in the international market, environmental protection and natural resources preservation.
To accomplish its responsibility, TISI has the following mission:

- National standards development and product certification
- Standardization promotion
- Cooperation with international and regional standardization organizations and foreign standards bodies
- Standards information centre

- Community product standards development and certification.

TISI participates in the development of international standards of the International Organization for Standardization (ISO). It is also a member of the Project Committee PC242 of the ISO to develop ISO 50001 energy management standards.

Department of Alternative Energy Development and Efficiency

The Department of Alternative Energy Development and Efficiency (DEDE) under the Ministry of energy is responsible for energy efficiency promotion, energy conservation regulation, energy source provision, alternative development of integrated energy uses, energy technology dissemination in systematic and continuous proceeding to adequately meet the demand from every sector at optimum cost beneficial to the country development and the people better living standard.

The Ministerial Regulation on the Organization of the Department of Alternative Energy Development and Efficiency of 2008 prescribed the duties and responsibilities of the DEDE as follows: i) promote, support and regulate energy conservation activities; ii) research, study and develop alternative energy; iii) prescribe rules, criteria and disseminate technology in relation to the generation, conversion, transmission, consumption and conservation of energy; iv) monitor and assess the outcomes of alternative energy development and energy conservation activities; v) administer the information in relation to alternative energy and energy conservation; vi) perform any other task stipulated by the laws to be the authority and duties of the DEDE, or other functions as assigned by the Ministry of Energy or the Council of Ministers.

B. PROJECT IMPLEMENTATION ARRANGEMENT:

The implementation of all the activities planned under the proposed project will be supervised by the DIP through the PSC. The DIP will coordinate overall direct project inputs from the other participating agencies and organizations according to the objectives and activities of the project. The DIP will designate one of high level officer to the project Management Unit to act as National Project Director (NPD) to guide the PMU in the implementation of the project. The PMU will be fully responsible for day to day activities of the project and will report to the UNIDO Project Manager. UNIDO will recruit the international teams responsible for delivering the tools, materials and trainings.

UNIDO and DIP in close collaboration with the TISI, the DIW and the DEDE will assume the following responsibilities:

- Identification/approval of host factories to participate in the project and facilitate training sites
- Recognition program
- Delivery of case studies, documenting the energy savings and reductions in GHG emissions directly attributable to the project

The block diagram of the project arrangement is given below:

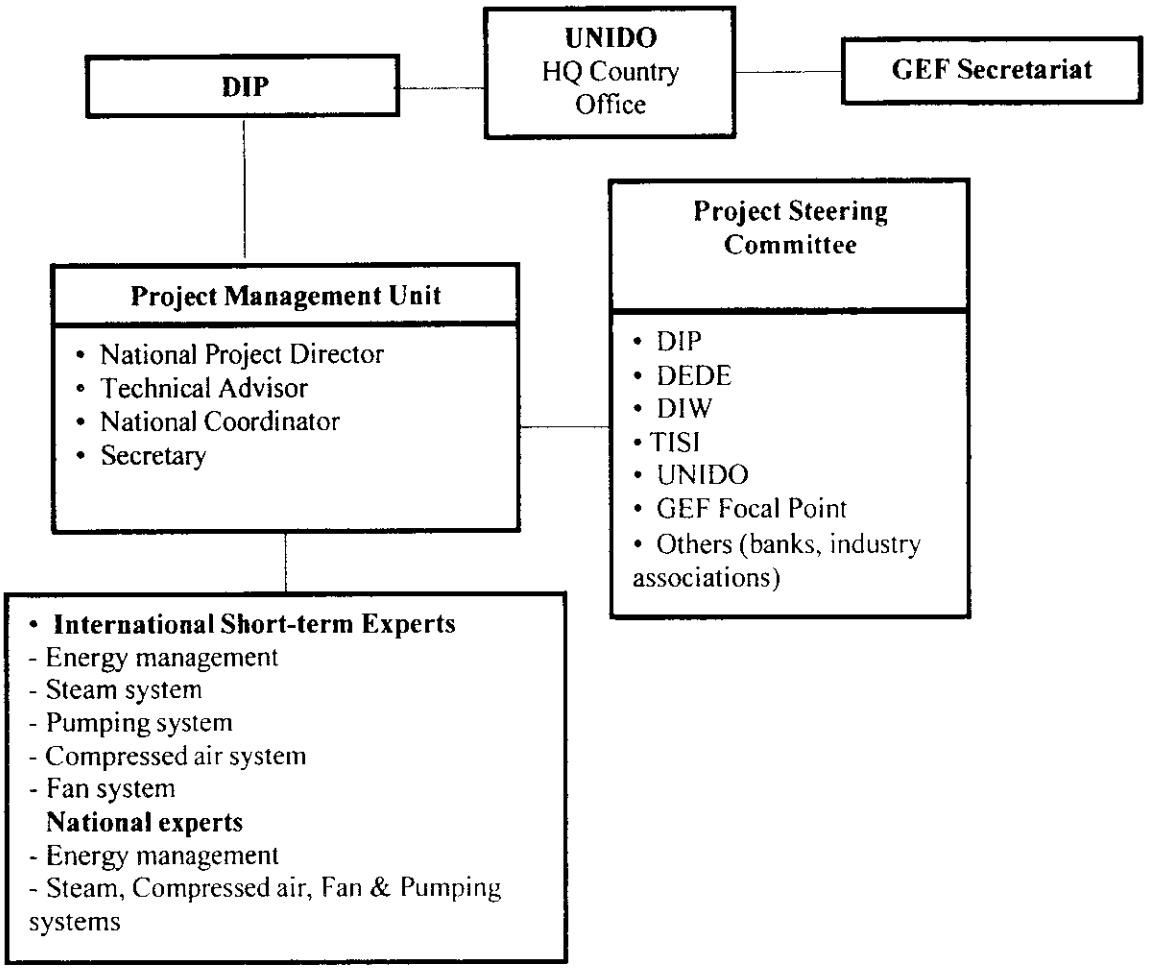

Figure 3: Core commitments and linkages

Project Steering Committee (PSC)

The Project Steering Committee (PSC) will consist of high level representatives from the DIP, DEDE, TISI, DIW, GEF focal point, representatives of financial institutions and industry associations and UNIDO. It will be chaired by the DIP. Other bilateral programs will be invited on an ad-hoc basis according to their cooperation with project implementation. The primary roles of the PSC are: (i) to provide overall guidance to the implementation of the project, (ii) to ensure good coordination among participating agencies and other organizations. The Project Steering Committee will meet every year to monitor implementation progress and confirm the work plan for the subsequent year. Minutes of meetings will be signed by UNIDO and DIP.

The PSC will be responsible for the planning and implementation of all key project activities in-country and will ensure satisfactory performance of national experts during their training and subsequent active participation in the project. Work plans will be developed and implemented by the PMU and UNIDO in consultations with DIP, TISI, DEDE and DIW.

Project Management Unit (PMU)

UNIDO will create a Project Management Unit responsible of the overall operational management and implementation of the project activities. The PMU will manage day-to-day operations of the project, and will be based at the premises provided by the Ministry of Industry. The PMU will comprise of 2 core members: National Project Coordinator and Project Assistant. The PMU will be guided by the National Project Director nominated by the Government of Thailand through the DIP and non-resident Technical Advisor. The National Coordinator and the Project assistant will be recruited by UNIDO in close consultations with the DIP as per the UNIDO rules and

regulations. In addition, a number of national experts, subcontractors and international experts will support the PMU as needed when implementing the project activities.

The PMU will prepare quarterly progress reports to review achievement in the previous quarter, prepare financial report and develop work plan and budget for next quarter. All these documents will be sent to UNIDO for endorsement/approval. The PMU will also produce annual project reports, which must be submitted to the PSC at least two weeks before the annual meeting. At the end of the project, the PMU will produce the terminal report, which is to be submitted to the PSC at least two weeks before the final meeting.

National Project Coordinator

The National Project Coordinator (NPC) role is to ensure the successful execution and implementation of the project toward achieving project results. The NPC is accountable to the Government and UNIDO for the substantive quality of the project and for the proper use of project resources. The NPC is responsible for mobilizing all national and international project inputs in a timely manner, supporting project management and implementation, organizing project activities in accordance with the project work plan, and reporting to DIP and the UNIDO the progress and the financial status of the project.

PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The project design has not changed and the objective and expected outcomes are in line with the original PIF. However, the design has been restructured to facilitate the project implementation and outputs tracking. For example, the biomass boiler related activities have been incorporated into the steam system optimization through adequate biomass drying process. The outputs have also been reworded in a different manner to better reflect the activities to be conducted. The following table summarizes the rearrangement.

Components and Outputs at PIF stage		**Components/Outputs at CEO endorsement stage**		
Components	**Outputs**	**Components**	**Outputs**	**Remarks, if any**
1. National energy management standard and recognition programs	1. National awareness campaign conducted on the benefits of energy management and national recognition program established for industrial facilities complying with the energy management standards 2. 800 industrial plants certified as energy efficient through compliance with standards 3. Peer to peer network established to assist companies in implementing their energy management plans 4. Structure in place for reporting energy intensity improvements for any plant implementing the standard	1.ISO compliant energy management systems	1.1. Training material and tools on energy management developed 1.2. National awareness campaign launched on ISO 50001 1.3. National experts/factory personnel trained on energy management 1.4. Peer-to-peer network between industrial enterprises created and operational	Output 1.2 from the PIF has been moved to the Component 4. All projects implementation will be carried out under this Component.

Components and Outputs at PIF stage		Components/Outputs at CEO endorsement stage		
Components	**Outputs**	**Components**	**Outputs**	**Remarks, if any**
2. Tools and training on Energy Management, including industrial systems optimization, to enable industries comply with national standards and conversion of industrial boilers to biomass-firing	1. Web-based guidance tools on industrial systems developed 2. Energy management and system optimization experts offer awareness training to 500 industry representatives 3. Plant engineers trained on the use of system optimization library 4. Suppliers of energy efficient products and services trained on the system optimization	2. Industrial energy systems optimization	2.1. Training material and tools on systems optimization developed 2.2. National experts/factory personnel trained on optimization of steam, compressed air, fan and pumping systems 2.3. Equipment vendors/suppliers trained on systems optimization	Changes are made accordingly to coordinate the outputs in much structured way.
3. Financial capacity development to support energy efficiency projects in industry	1. Capacity of government institutions, local banks and financial institutions built to promote and invest in industrial energy efficiency projects 2. Industrial enterprises trained in preparation of bankable energy efficiency project proposals 3. A tailored portfolio of financial incentives (low interest loan and or loan guarantees) is facilitated to participating enterprises for investments in energy efficiency projects	3. Enhancement of industrial EE financing capacity	3.1. Harmonized EE project evaluation criteria 3.2. Trainings provided to banks/FIs on EE projects financing 3.3. Training material developed and industry managers trained on the development of financial proposals	Based on the government's existing and renewed financial incentives scheme, it is felt that there in no requirement to go after creating a new set of incentives as the DEDE have already set up loan interest loans through designated banks and other incentives to promote investments on energy efficiency. The project will, however, focus on bridging the gaps between the industry and financial institutions as indicated by low number of industries taking loans from the banks. The project will focus on improvement of financial proposal processing and development of bankable proposals. Accordingly, output 3.3 from the PIF is dropped. This is likely not to create any problems in the replication of the projects as there are willing financial institutions to

Components and Outputs at PIF stage		Components/Outputs at CEO endorsement stage		
Components	**Outputs**	**Components**	**Outputs**	**Remarks, if any**
				provide loans for energy efficiency projects under the government's energy conservation program. This program has been extended again and again and is expected to continue.
4. Industrial energy efficiency investment projects including biomass boilers	1. Plant assessments conducted in participating enterprises 2. 800 operational projects implemented to comply with the standards 3. 25 industrial enterprises assisted in assessment, development and implementation of energy efficiency projects 4. Boiler conversion projects implemented. 5. Results of system optimization projects and operational projects complying with the standards promoted and disseminated.	4. Implementation of energy management and systems optimization projects	4.1. Energy management projects implemented 4.2. Documented systems optimization demonstration projects 4.3. Recognition program developed	Biomass conversion projects are dropped out as result of discussions with the Ministry of Industry. The project will rather focus on improvement of combustion of facilities using biomass boilers. The Output 4.5 from the PIF will be covered through the network that will be developed under the Output 1.4 of the project. This network will be linked up with other networks where similar projects will be implemented in the region to share knowledge, experiences and lessons learnt. Success stories will be recorded through the case studies and will be distributed in award ceremonies as part of recognition program under the Output 4.3 of the project.

At the co-financing part, the discussions held with key stakeholders have provided a room for higher commitment and the interest of the banking sectors has been strongly raised. This has resulted in the increase in the co-financing commitment from US $12,926,000 to US $15,645,000. There were also some modifications in the GEF budget allocation to each component.

Project Components	GEF Financing		Co-financing	
	at PIF Stage (mil USD)	At CEO Endorsement Stage (mil USD)	At PIF	At CEO Endorsement
1. ISO compliant energy management systems	325,000	965,000	4,000,000	985,000
2. Industrial energy system optimization	1,890,000	1,239,500	700,000	405,000
3. Enhancement of industrial EE financial capacity	105,000	262,000	1,500,000	200,000
4. Implementation of energy management and system optimization projects	1,100,000	668,500	6,326,000	13,350,000
Project Management	200,000	360,000	400,000	685,000
Monitoring and Evaluation	0	125,000	0	20,000
Total	3,620,000	3,620,000	12,926,000	15,645,000

The changes in component-wise budget allocation are justified by the activities to be carried out in the new components and the shift of these activities from one component to another. For instance, the recognition program included in the PIF Component 1 is shifted to Component 4 in the new rearrangement. The committed co-financing from the Ministry of Energy, SME Bank and CIMB Bank are more than required investments for the energy efficiency projects. The total co-financing amount as indicated in the table is more than that indicated in the received letters.

As all implementation projects on energy management and system optimization are included under the Component 4 in the project unlike the PIF, the co-financing amount has increased drastically.

PART V: AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.

Agency Coordinator, Agency name	Signature	Date (*Month*, day, year)	Project Contact Person	Telephone	Email Address
Dmitri Piskounov, Managing Director, PTC/UNIDO			Sanjaya Shrestha	43 1 260263730	S.Shrestha@unido.org

ANNEX A: PROJECT RESULTS FRAMEWORK

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Project Objective Promote energy efficiency in the industries through introduction of ISO energy management standard incorporating industrial system optimization	• Measurable reductions in electricity and fuel consumption by industry • Calculated GHG emissions reductions	No direct and indirect electricity and fuel consumption reductions Baseline values to be determined through data collection and discussions with industry	Electricity savings: 83,712 MWh, Fuel savings of 1,914,142 GJ Emissions reduction of 196,757 tCO_2 during the project duration (to be determined after technical assessments during the project implementation)	Terminal reports Peer-to-peer network End-of-project survey	Continuous support of concerned government authorities Active support driven by industry
Component 1: ISO compliant energy management systems					
Outcome 1: Compliance to a policy instrument that encourages industrial enterprises to adopt ISO compatible energy management standards to deliver sustainable improvements in industrial energy efficiency and competitiveness					
Output 1.1: Training material and tools on energy management developed	Training material on energy management systems provided to industrial enterprises.	Continued use of generic training material on energy management in industrial facilities.	Availability of translated, comprehensive training material and tools specifically supporting the development and implementation of energy management compatible with ISO 50001.	• UNIDO experts' reports • Project progress reports	Continuous government and industry sector support and participation
Output 1.2: National awareness campaign launched on ISO 50001	National campaign provided information to industry to adopt ISO 50001.	Limited awareness campaign launched on energy management standard in the past.	Promotional literature distributed to industries to promote the adoption of ISO 50001.	• Awareness campaign report • Progress and annual reports	Sustained government support and participation

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 1.3: National experts/factory personnel trained on energy management systems	• Number of trained national experts • Number of trained factory personnel	Current/proposed training programs limited to generic aspects of energy management without comprehensive guidelines and not specifically addressing content of ISO 50001	Training on energy management in line with ISO 50001 of: • 50 national experts • 500 factory managers (out of which 300 will be trained in energy management system implementation)	Reports of UNIDO's international experts and list of attendees	Sufficient commitment to energy management on the part of national experts and factory personnel
Output 1.4: Peer-to-Peer network between industrial enterprises created and operational	Network established and used to support program recognition and present savings result from energy management.	Government database only, no formal peer-to-peer discussion platforms on energy management exist.	All participating enterprises share their implementation plan on energy management on the network and learn from others' experience and results	Annual report on web-based participating facility results	Willingness to upload their experience with energy management (EE measures and projects undertaken)
Component 2: Industrial energy systems optimization					
Outcome 2: A cadre of energy efficiency professionals created within industrial facilities as well as consultants and suppliers to initiate a process to transform local markets effectively and to provide industrial systems optimization services					
Output 2.1: Training material and tools on systems optimization developed	Training material on systems optimization provided to industrial enterprises.	Continued use of generic IEE training material focusing on energy audits and specific sectors, but generic technology replacement opportunities.	Availability of translated, comprehensive training material and tools on systems optimization	• UNIDO experts' reports • Project progress and annual reports	Continuous government support and participation
Output 2.2: National experts/factory personnel trained on optimization of steam, compressed air, fan and pumping systems	• Number of trained national experts • Number of trained factory personnel	Current/proposed training programs (both national and donor-supported) do not address systems optimization.	Training in systems optimization of: • 50 national experts • 400 factory managers	• Reports of UNIDO's international experts • List of training sessions attendees	Sufficient commitment to systems optimization on the part of national experts and factory personnel

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 2.3: Equipment vendors/suppliers trained on systems optimization	Number of trained equipment vendors/suppliers	Continued exclusive focus by vendors on the sale of individual equipment items. Least purchase price continues to be the main driver for purchasers of steam boilers, pumps, and air compressors.	Training of 50 equipment suppliers/vendors of energy-efficient products in systems optimization	• Reports of UNIDO's international experts • List of training session attendees	Sufficient commitment to systems optimization on the part of equipment suppliers
Component 3: Enhancement of industrial EE financing capacity development					
Outcome3: Increased availability of financial and institutional support for industrial energy efficiency initiatives					
Output 3.1: Harmonized EE project evaluation criteria	Evaluation criteria are harmonized within financial institutions to help them select best EE projects.	Financial institutions continue to appraise EE projects without standards and recognized criteria using current bank projects evaluation criteria.	Criteria for evaluating EE projects are developed and harmonized by main financial institutions in Thailand	• Project progress reports • UNIDO experts' reports	Sufficient commitment from financial institutions to change the way they currently evaluate EE projects
Output 3.2: Trainings provided to banks/FIs on EE projects financing	Number of financial institutions and local banks personnel trained to understand main features of EE projects and better appraise EE projects proposals.	Weak capacity of financial institutions and local banks to understand and evaluate EE projects.	Strengthened capacity of financial institutions and local banks on EE projects evaluation	• Training sessions report • Project progress reports • Attendance list	Financial institutions and local banks are committed enough to build their capacity and invest in EE projects

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 3.3: Training material developed and industry managers trained on the development of financial proposals	Training material relating to financing of energy efficiency project development are provided to industries. Number of trained facility managers/personnel in industrial energy efficiency project development.	No specific material existed to help industrial managers prepare financially sound proposals to mobilize the necessary funds from financiers and banks management. Continued use of generic methods, which do not properly consider the financial impact and opportunities of EE in facilities.	Availability of translated, comprehensive material and guidelines specifically supporting the development of financial proposals for EE projects Industrial facility managers/personnel have the capacity to analyse systems optimization and energy management projects and use energy and O&M costs reduction projects	• Project progress reports • UNIDO experts' reports • List of attendees	Sufficient commitment from facility managers to take action on project financial development
Component 4: Implementation of energy management and systems optimization projects					
Outcome 4: Demonstrable energy savings in participating factories through systems optimization and energy management standards and increased adoption of energy management standards by industry					
Output 4.1: Energy management systems implemented	• Number of factories with energy management plans implemented • Number of case studies • Number of factories registered for peer-to-peer network	Limited implementation of energy management systems in Thailand, leaving its (export) industry unprepared for potential market demand for energy-efficient production of goods for export.	• 200 factories adopted energy management plans and completed operational improvement projects • 50 factories adopted and implemented ISO 50001 • Participating factories registered with the peer-to-peer network report energy savings	• Case studies from national experts that have received training • Reports of UNIDO's international experts	• Continuous support from the National Standardization Agency and the government • Sufficient interest from industry • Successful introduction of peer-to-peer network

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 4.2: Documented systems optimization demonstration projects	• Number of completed steam, pumping, fan and compressed air systems assessments • Number of completed systems optimization projects	Absence of local examples of successful optimization of industrial steam, pumping, and compressed air systems hindering nationwide uptake of good EE practices.	• 75 systems assessments conducted of which 50 led to completed systems optimization projects • 25 case studies showing GHG emission reductions	• Case studies from national experts • Reports of UNIDO's international experts	Sufficient commitment from industrial enterprises to take action on systems optimization following systems assessment
Output 4.3: Recognition program developed and implemented	Recognition program for participating companies established based on successful achievements	Ad-hoc publicity for EE success stories from the industry.	Formal recognition of factories achieving power/fuel consumption reductions reflected in government reports	• Award ceremony highlighting successful projects • Project annual reports	Continuous government support for a recognition program

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF)

1. RESPONSE TO GEFSEC COMMENTS

The comments received from the GEF at PIF preparation and the corresponding answers are listed below.

Comments from GEFSEC

Comments	Responses
Comment 1: *8. Is the project design sound, its framework consistent sufficiently clear (in particular for the outputs)?* *The expected outputs are fairly clear and specific. More work is needed in thinking through what Component 3 will achieve and how it can be meaningfully linked to the rest of the project.*	The component 3 on financing will basically bridge the gaps that exist in the financing capacity. The project will not provide any financial incentives to the industries except providing technical assistance on energy management and system optimization. The GEF funds will be utilized much better way providing assistance on the capacity development side. The Thai government has already put in place structure to attract financial investments on energy efficiency projects thorough its established energy efficiency revolving fund. The activities under this component 3 are aimed at enhancing capacity of both industry and financial institutions/banks to understand energy efficient proposals and harmonizing evaluation criteria of the financial institutions/banks on the assessment of energy efficiency proposals. This will avoid reinventing the wheel in terms of providing different financial incentives. The project will play more meaningful role in catalyzing more investments on energy efficiency projects.
Please elaborate on the (technology) profiles of the industries to be targeted, the gaps in energy efficiency compared with advanced technologies and techniques, and how the energy management systems to be introduced can help them narrow the gaps, including upgrading of technologies and introduction good practices.	Basically, systems optimization is being promoting against current component approach. Four industrial energy systems are targeted: steam, pumping, fan and compressed air systems under the proposed project. The optimization process will lead to changes in the individual equipment/components and or changes in the operating practices to match industry's demand (whether it's pressure, temperature, speed, load) with supply. In fact, this system optimization will not save energy alone, it will improve reliability of operations and hence it improves competitiveness and profitability of industry. For instance, in pumping systems, the system approach will not only replace old motors with premium motors, but also assess the overall efficiency of the system and optimize it by matching demand requirements with associated supply. This will result to higher energy and maintenance cost savings in addition to improved reliability and operations.

Please also explain the rationale for singling out support for biomass boilers.	Energy management systems will basically integrate energy efficiency into management cycle. The management will be fully responsible for energy affairs that will include energy policy, action plan, monitoring & verification and reviews for further actions in cyclic manners like in the implementation of ISO standards such as ISO9001 or ISO 14001. The facilities that will go for energy management systems need to look into all spheres of energy including supply, distribution, usage and recovery covering both equipment upgrade and good operating practices. This in turn, will bring higher levels of energy savings. Once energy management system is in place, the facilities will reap benefits of higher energy savings, improved operation and reliability in continuous basis making its carbon footprint much improved. In its new approach, the proposed project will not convert the industrial boilers into biomass boilers, rather it will focus on the improvement of combustion process of biomass boilers of those industrial facilities who will participate at the project implementation. The project will provide assistance in the drying of biomass materials and control of combustion of biomass boilers. leading to reducing requirement of biomass materials and energy for the operation. Moisture content and speculative pricing of biomass materials has been a big concern to many industries.
Comment 2: *14. Does the project take into account potential major risks, including the consequences of climate change and includes sufficient* *risk mitigation measures?* *Two main risks are identified: (1) failure to achieve outcomes after successful delivery of outputs; and (2) failure to achieve sustainable market transformation.* *During PPG, please discuss specific risk mitigation measures and how their implementation will be monitored.*	Detailed discussions on risks and mitigation solutions have been provided in the document (see Section G). The identified risks level is low in the case of Thailand. The country is very progressive in terms of energy efficiency with the institutional and mechanisms to promote EE in place. The project will capitalize on this existing favourable environment to strengthen the market players' capacity on energy management and promote systems optimization.

The comments received from Council Members and the corresponding answers are listed below.

Comments	Responses
Comments from France	
Comment 1: *Among the activities considered, the financial mechanisms that will support the industrial partners are crucial to ensure the sustainability of the approach and its wide impact.* *Accordingly, the project should pay special attention to the development of such mechanisms.*	Component 3 of the project will deal with financial aspects of energy efficiency projects. The project has financing partners as Ministry of Energy, SME Bank and CIMB Bank. The Ministry of Energy (through financial institutions) and CIMB Bank are providing financial loans to designated industries which will include both large and medium sized enterprises. The SME bank typically focuses only on medium and small sized enterprises. All segments of industry are covered by these financial institutions. Existing financial mechanisms are likely to continue as the government has put forward a target on reduction of energy consumption. This will help in substantial way to boost further investments on energy efficiency projects. As the number of industries taking loans for energy efficiency projects from financial institutions in the last 7 years in Thailand is comparatively low, the project will rather focus on bridging the gaps between the financial institutions and industry. To this end, the project will assist on the harmonization of evaluation criteria to help banking institutions to better assess EE projects. Moreover, industrial enterprises will be assisted in the development of financially sound and bankable projects. The project will also build on the existing financial mechanisms and institutions to increase financial transactions of EE projects.
Comment 2: *When it comes to the choice biomass boilers for demonstration project, the rational leading to that choice should be elaborated (resources in terms of biomass in Thailand, current use, potential impact on biodiversity...).*	During the PPG phase, the project intervention on biomass boilers has been reoriented to address the issue of moisture content of the biomass. The project will build the capacity within the industry to improve the combustion efficiency through proper biomass moisture control (drying). The expected result is the reduction of biomass use and energy cost savings. The biomass aspect will be included in the system optimization measures (Component 2).

Comments from Germany: *It remains unclear why an industry should adopt ISO energy management standards and whether there is a sectoral focus for the activities outlined.*	Industry is primarily concerned on reduction of production cost to improve productivity and competitiveness. This has also been supported by the survey of industries conducted during the PPG phase. Reducing energy costs through energy management systems and system optimization will certainly contribute towards achievement of goal of reduced production costs. With adoption of ISO energy management standards, energy efficiency will become a part of management cycle thus creating an organizational context to *continuously* seek opportunities for optimizing the performance of energy systems. It will require upper industry management to commit itself towards continuous energy efficiency improvements through formulation of energy policy, action plans, monitoring & verification and finally review for further actions in cyclic manner as in the case of other standards such as ISO9001 or ISO14001. The integration of energy efficiency into management cycle will lead to energy savings on continuous manner unlike present situation of implementation of energy efficiency measures on ad-hoc basis. This is the major change that will happen in industry on adoption of energy management standards resulting to direct financial benefits in lieu of continuous energy and maintenance cost savings. This is one of the important incentives that adoption of ISO energy management standards can provide to industry. Additionally, industry will gain in terms of competitiveness and productivity from reduced cost savings from energy consumption and maintenance practices. The adoption of ISO energy management standards also fits perfectly into corporate social responsibility of industry in meeting its energy efficiency or GHG emission reduction targets as part of their climate change policy. This will provide an environment friendly marketing image to industry from reduced carbon footprint. Industries, especially, export oriented ones can have maximum marketing mileage from adoption of standards to boost their sales. It is expected that large and medium sized enterprises as well as others selling into international supply chain markets, particularly those with prior ISO experience, would be the early adopters of the ISO 50001 energy management standard. While smaller plants may not seek conformity with ISO 50001 for compliance cost reasons, they will be able to apply energy management practices, acquired as a result of project participation, which should deliver energy savings and operating cost reductions. As described in the Part II Section A under the heading of target industrial sub-sector, the project will target six sub-sectors: food and beverages, textiles, chemicals, rubber and plastic, non-metallic and mineral and basic metal.

Have cost barriers been quantified? *What are the intended project interventions to overcome barriers?*	The cost barriers are more or less a secondary barrier, compared to the other barriers deemed to be more relevant to the project. In general energy efficiency measures identified through the adoption of energy management and systems optimization assessments require only moderate investment and offer short to medium term paybacks. These barriers include technical barriers, informational barriers, market barriers and financial barriers (See Part II Section A for more details on these barriers). The project is designed to address these barriers as follows: • Technical barriers: Components 1 and 2 will build the capacity of main market players to implement energy management systems and energy systems optimization in the industry. Through component 4, real cases will be implemented and documented • Informational barriers: Through Component 1, the project intends to conduct awareness campaign on energy management. • Market barriers: Components 1 and 2 intends to overcome the mindset in the industry and promote system approach for improving energy performance and reliability, life cycle cost approach in purchasing equipment/system unlike current least cost practice. The representatives from consulting companies, contractors, ESCOs, equipment suppliers and designers will also be trained on providing systems optimization based services to industry. • Financial barriers: Component 3 is dedicated to financial aspects of energy efficiency projects. The project intervention intends to introduce in the banking sector adapted tools and criteria to better evaluate EE projects and assist industries to prepare bankable projects

2. RESPONSE TO STAP COMMENTS:

STAP Scientific and Technical screening of the Project Identification Form (PIF)

Comments	Responses
Comment 1: ***Technological Interventions**: IPCC (2007), has highlighted a number of potential technological interventions for reducing GHG emission in the industry sector mainly; Energy Management system, Efficient Motor System, Boilers Furnaces, Lighting and Heating/ Ventilation/Air Conditioning and process Integration. There are a few questions regarding the technology, information and management packages.* *The scientific criteria and rationale for selecting industries is necessary since, there will be thousands types of small and medium industries. The rationale could be based on Cost-effectiveness ($/t/CO2) or CO2 emission reduction/$ of investment or CO2 intensity. There is a need to rank the industries based on a criteria of mitigation potential, cost effectiveness etc.* *What is the scientific rationale for focusing on biomass boilers (mitigation potentials or cost- effectiveness)?* *Is the focus on CO2 or CO2+other GHGs*	Three main industrial energy systems will be focussed on, namely steam, pumping and compressed air. The system optimization will be coupled with best practices in energy management. The targeted sectors are food and beverages, textiles, chemicals, rubber and plastic, non-metallic and mineral and basic metal. The target industrial sub-sectors were selected after discussion with the government counterpart, i.e. the Department of Industrial Promotion (DIP), based on the country needs and priorities in terms of enhancement of the industrial sector competitiveness. The selection criteria were based on criteria such as the sub sector impact on GHG emission mitigation, the capacity to respond to energy management opportunity, their willingness to participate and invest, their share of energy consumption and their current situation concerning energy management and system optimization, the replication factor and the importance of the sector to the national economy. The project is reoriented towards increasing boilers efficiency by improving the biomass quality through its moisture control. Biomass moisture has been identified during the project preparation phase as a major concern in those industrial enterprises that use biomass as main energy source for heat and steam applications. While no GHG emissions reduction is expected from the improvement, the project will provide some guidelines on the optimum moisture rate of biomass (drying) to enable efficient combustion, and save energy and reduce production costs. This aspect will be covered as part of steam system improvement. The project focuses on CO2 emissions reduction through fuel and electricity savings.

Comments	Responses
Comment 2: ***Innovativeness**: Thailand is a very progressive country with the large no. of interventions already in place to improve Industrial energy efficiency and with a number of national, bilateral and multilateral projects aimed at improving Industrial energy efficiency. Further Thailand already has a large no. of policies, programs and incentives to promote Industrial energy efficiency. The critical incremental innovation mentioned is to promote system level Industrial energy efficiency compared to Component level energy efficiency improvement.* *There is a need to consider the costs and benefits of system and component level interventions. IPCC (2007), concludes that polices aimed at reducing barriers to adoption of cost-effective and low –GHG emission technologies can be effective. Thus, it is suggested to consider the cost-effectiveness aspect of the "Component vs. System" efficiency improvement interventions. The financial viability of the intervention must drive the selection of technological interventions.*	The system level interventions are variable in nature. They are perceived as if they require massive investment compared to that for component level interventions. However, in some cases, with just changes in the operating practices matching demand requirements with existing supply can reap huge energy benefits with very little investment. Since the system improvements will bring in energy savings to the tune of 20 to 25% for motor based systems and 10 to 15% for steam systems whereas one can expect between 2%-5% from the component level improvements*. The payback period for the system approach can vary from a few months to a couple of years depending on the measures chosen under system optimization. Because of this higher potential benefits from the system level improvements, the project have oriented its strategy in the promotion of system optimization to complement component approach usually applied in the market. The demonstration system optimization projects aim at providing evidence of financial cost-effectiveness of systems approach for increased energy savings and GHG emissions reduction.
Comment 3: *Baseline and Control Groups: Quantitative indicators of baselines levels of energy use and GHG emissions would be desirable. Will there be any set of control group of industries to compare and estimate the energy saving potential of technological interventions. Quantitative estimation of GHG emissions in the absence GEF project is necessary.*	Component 4 of the project intends to implement demonstration project on energy management and systems optimization. The baseline energy use and GHG emissions will be determined prior to the implementation of improvement measures. This will determine the GHG emissions in the absence of the GEF intervention. Besides, the actual energy consumption after the improvement will be established using energy meters. Overall, it is expected that 50 industrial factories will implement energy management systems and systems optimization. The demonstration projects will be documented and served as control group to disseminate the energy savings potential, the profitability of the proposed approach and best practices in the industry.

Comments	Responses
Comment 4: *Methods and Monitoring: There is a need for selection and inclusion of methods for estimation and monitoring of energy savings and GHG emissions under baseline and project scenario conditions.*	The GHG emissions under both baseline and project scenario are related to the quantity of energy used to operate a particular factory and the emission factors of sources of energy. The monitoring approach of the project will be reflected in the number of energy management systems and systems optimization projects implemented. For each participating enterprise, a baseline assessment will be carried to identify the pre-project energy consumption and GHG emissions. Measurement instruments will be used to compute energy patterns in the project scenario and derive energy savings and GHG emissions reduction. The project design has taken into account this comment and ensures a proper monitoring not only at the project level, but also at the participating enterprises level.
Comment 5: *Risks: IPCC (2007), Risks associated with performance of new technologies or interventions could be considered, along with the risk associated with the financial viability of technologies.*	The technical risk associated with the project is very low, if not inexistent as the proposed approach is just system based improvement rather than current component based practice. The four systems targeted (pumping, steam, fan and compressed air) use mature and proven technologies and are commercially available in the region. Please, see the risks analysis in Section G.

*IEA report on Tracking industrial energy efficiency and CO2 emissions

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF RESOURCES

Position Titles	*$/ Person week**	*Estimated person weeks***	*Tasks to be performed*
For Project Management & M & E			
Local			
National Project Coordinator	1,650	112	Manage day to day activities of the project in line with the work plan.
Monitoring & evaluation expert	1,650	14	Provide support to the preparation of measuring impact indicators and project terminal report
International			
Technical Advisor	3,500	14	Provide advisory services and train the PMU to implement the activities as per the work plan.
Monitoring & evaluation expert	3,500	14	Preparation of measuring impact indicators at the start of the project, mid-term & final evaluations and project terminal report
For Technical Assistance			
Local			
Awareness campaign expert	1,650	32	Component 1 – National awareness campaign activities
Network expert	1,650	45	Component 1 – Setting up the peer-to-peer network
Trained experts on energy management	1,650	173	Components 1 & 4 – Deliver training on energy management to factory personnel and implement energy management in participating factories
Trained experts on system optimization	1,650	212	Components 2 & 4 – Deliver training on system optimization to factory personnel and industry demonstration projects
International			
Energy management system expert	3,500	76	Components 1 $& 4 – Develop and deliver training to national experts/factory personnel on energy management assist in the implementation of energy management projects in participating factories
System optimization experts	3,500	120	Components 2 & 4 – Deliver training to national experts/factory personnel/vendors on system optimization and assist in the implementation of system optimization projects
Financial expert	3,500	35	Component 3 – Harmonization of EE project evaluation criteria for financial institutions, development of financial training materials and Delivering of trainings to factory manager on financial project development
Justification for Travel, if any:			

* Provide dollar rate per person week. ** Total person weeks needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

The proposed project has undergone some changes compared to the original PIF document. This has been described in the Part IV. There are no concerns that might affect the project implementation. The co-financing for this project has been mobilized more than mentioned in the original PIF document. The banks have issued co-financing letters for the amounts more than required for the energy efficiency investment projects.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*GEF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To Date*	*Amount Committed*	*Uncommitted Amount**	
1. Acquisition of industry relevant background information and survey of Thai industry; Awareness raising in-country technical inception workshop; Discussions with project counterparts and other stakeholders on technical design parameters	Completed	65,000	65,000	65,000		70,000
2. Project preparation in cooperation with national energy efficiency and standards authorities; Circulation of draft document to stakeholders; In-country second workshop to finalize GEF project document.	Completed	35,000	35,000	35,000		60,000
Total		100,000	100,000	100,000	-	130,000

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

ANNEX E: CALENDAR OF EXPECTED REFLOWS

ANNEX F: ENERGY SAVINGS AND GHG CALCULATIONS:

The project will deliver a comprehensive capacity building program on energy management and systems optimization of steam, compressed air, pumping and fan systems. Project outputs include demonstration projects from which the direct energy savings are derived.

The average energy use per enterprise in the six selected sectors is calculated based on the given DEDE data on large enterprises. Assuming 60% large and 40% medium enterprises will implement the investment projects under the project, energy usage data is adjusted accordingly for the six selected sectors.

Typical energy usage of an industrial facility following adjustments in the ration 40% medium and 60% large enterprises in the given data:

Industrial sub-sectors	Typical thermal energy usage in GJ	Typical electricity usage in MWh
Food & beverage	271,817	10,150
Textiles	78,920	14,280
Chemicals	1,563,358	32,836
Plastic & rubber	101,502	14,777
Non-metallic	1,103,216	42,575
Basic metal	156,094	41,628

Assumptions (based on experts'opinion on percentage usage) used in calculating average energy used in steam, compressed air, pump and fan/drive systems in the six targeted industry sub-sectors are shown below:

Industry sub-sector	**Food & beverage**	**Textiles**	**Chemicals**	**Plastic & rubber**	**Non-metallic**	**Basic metal**
Estimated steam use (% of total fuel per factory)	53%	46%	47%	41%	2%	6%
Estimated electricity used by compressed air (% of total per factory)	8%	17%	16%	12%	4%	12%
Estimated electricity used by pump systems (% of total per factory)	8%	14%	18%	12%	3%	8%
Estimated electricity used by fan and drive systems (% of total per factory)	8%	10%	8%	6%	10%	6%

Energy usage by a typical enterprise by the sectors and by the system is estimated based on assumptions by the professional experts:

Targeted Industrial Sectors	Fuel Usage per facility	Electricity per facility	No. of facilities targeted	Estimated Steam Energy Use	Estimated Comp Air Energy Use	Estimated Pump Energy Use	Estimated Fan/Mtr Energy Use
	GJ	MWh		GJ	MWh	MWh	MWh
Food & Beverage	271,817	10,150	55	7,923,461	44,662	44,662	44,662
Textiles	78,920	14,280	45	1,633,643	109,244	89,965	64,261
Chemicals	1,563,358	32,836	30	22,043,348	157,614	177,315	78,807
Plastic & rubber	101,502	14,777	20	832,319	35,465	35,465	17,733
Non-metallic	1,103,216	42,575	30	661,930	51,090	38,317	127,725
Basic metal	156,094	41,628	20	187,313	99,906	66,604	49,953
Total			200				

Calculated (weighted) average energy used in steam, compressed air, pump and fan/drive systems for a typical enterprise in the four targeted industry sub-sectors:

Steam	166,410 GJ
Compressed Air	2,490 MWh
Pumps	2,622 MWh
Fan and Direct drive applications	1,916 MWh

Direct impacts

The project will deliver a comprehensive capacity building program on energy management and systems optimization of steam, compressed air, pumping and fan systems. Project outputs include demonstration projects from which the direct energy savings are derived. The following assumptions based on the professional experts'opinion were made:

As per the project specification, a total of 200 operational energy management improvement projects and 50 ISO 50001 implementations will take place. Additionally, a total of 16 steam system optimization, 20 compressed air system optimization, 16 pumping system optimization and 14 fan system optimization will take place during the project life.

Output	Total Occurrences	Occurrences per Project Year (assuming no savings in Year 1)				Estimated % Annual Savings	Assumed Project Life (in yrs)
		2	3	4	5		
2.1 Energy management						*Per facility*	
Operational Improvement	200	15	35	60	90	0.25 %	5
Implement ISO 50001	50	0	5	20	25	2 %	15
2.2 System optimization projects						*Per system*	
Steam	16	1	2	5	8	12 %	10
Compressed air	20	2	4	6	8	20 %	10
Fans	14	1	3	4	6	15%	10
Pumping	16	1	3	5	7	15%	10

Indirect impacts

The GEF project will provide the necessary means for replication of the demonstration projects leading to accelerated uptake of energy efficient system design, operating practice and equipment. Assumptions were then made to estimate the number of projects implement following the project's end. These numbers are based on local understanding of the market and general effect of such project as seen in other countries. Trained Energy Management Experts continue to provide services to the industrial facilities resulting in operational improvements and implementation of ISO 50,001. Trained System Optimization Experts continue to provide services to the industrial facilities resulting in assessments and system optimization projects completed. Direct and in-direct savings are calculated based on very conservative assumptions of replication of the demonstrations over the 10 year period (5 years of GEF intervention + 5 additional years) in the tables below:

1. Saving calculations from energy management projects

ENERGY MANAGEMENT						
Project Year	Direct energy savings from implementation of ISO 50001			Savings from operational energy management projects		
	# of enterprises in conformance with ISO 50001	Cum. Fuel savings (GJ)	Cum. Power savings (MWh)	# of projects	Cum. Fuel savings (GJ)	Cum. Power savings (MWh)
2	0	0	0	15	19,434	861
3	5	51,825	2,296	35	84,216	3,730
4	20	310,951	13,774	60	226,735	10,044
5	25	829,204	36,731	90	485,862	21,522
sub total	50	829,204	36,731	200	485,862	21,522
Post-project savings						
prj+1	30	1,658,407	73,461	100	874,551	38,739
prj+2	35	2,850,388	126,261	110	1,386,325	61,409
prj+3	40	4,456,970	197,427	120	1,988,793	88,096
prj+4	45	6,529,979	289,253	130	2,617,174	115,931
prj+5	50	9,121,241	404,036	140	3,167,817	140,322
At 10 yrs	250	9,121,241	404,036	800	3,167,817	140,322

Direct energy savings = Savings from implementation of ISO 50001 & operational projects during project life

Indirect energy savings = Savings from implementation of ISO 50001 and operational projects during post project period

	Fuel (GJ)	Power (MWh)
*Total direct energy savings over project life:	**1,315,065**	**58,252**
*Total indirect energy savings over post project life:	**10,973,993**	**486,106**

2. Saving calculations from system optimization projects

*Direct energy savings = energy savings from projects implemented over project life
*Indirect energy savings = energy savings from projects implemented post project life
*Indirect energy savings = energy savings from vendors implemented projects over 10 years

2.1 Saving calculations from steam systems projects

Steam Systems						
Project Year	Systems optimization projects			Projects implemented by equipment vendors		
	# of projects	Annual fuel savings (GJ)	Cum. Savings (GJ)	# of projects	Annual fuel savings (GJ)	Cum. Savings (GJ)
2	1	19,969	19,969	1	9,985	9,985
3	3	79,877	99,846	2	29,954	39,938
4	5	179,723	279,569	5	79,877	119,815
5	7	319,507	599,076	8	159,754	279,569
sub total	16		599,076	16		279,569
Post-project savings						
prj+1	10	379,415	978,491	12	199,692	479,261
prj+2	14	599,076	1,577,567	17	319,507	798,768
prj+3	19	698,922	2,276,490	23	359,446	1,158,214
prj+4	25	878,645	3,155,135	30	419,353	1,577,567
prj+5	30	1,198,152	4,353,287	35	509,215	2,086,782
At 10 yrs	114		4,353,287	133		2,086,782

*Direct energy savings from steam optimization projects over project life (GJ): **599,076**
*Indirect energy savings from steam optimization projects post project life (GJ): **3,754,211**
*Indirect energy savings from vendors implemented projects over 10 years (GJ): **2,086,782**

2.2 Saving calculations from compressed systems projects

Compressed Air Systems				
Project Year	Systems optimization projects		Projects implemented by equipment vendors	
	# of projects	Cum. Savings (MWh)	# of projects	Cum. Savings (MWh)
2	1	498	2	498
3	3	2,490	4	1,992
4	5	6,972	6	4,980
5	7	14,939	8	9,960
sub total	16	14,939	20	9,960
Post-project savings				
prj+1	10	24,401	12	15,935
prj+2	15	39,838	18	24,899
prj+3	20	57,766	25	34,610
prj+4	25	79,677	30	45,067
prj+5	30	110,054	35	57,766
At 10 yrs	116	110,054	140	57,766

*Direct power savings from compressed air projects over project life (MWh) **14,939**
*Indirect power savings from compressed air projects over post project life (MWh): **95,114**
*Indirect power savings from vendors implemented projects over 10 years (MWh): **57,766**

2.3. Saving calculations from pump systems projects

Pumping Systems				
Project Year	Systems optimization projects		Projects implemented by equipment vendors	
	# of projects	Cum. Savings (MWh)	# of projects	Cum. Savings (MWh)
2	1	339	1	170
3	2	1,357	3	848
4	3	3,392	5	2,375
5	4	6,785	7	5,089
sub total	10	6,785	16	5,089
Post-project savings				
prj+1	6	10,856	9	8,142
prj+2	8	16,962	12	12,722
prj+3	12	24,426	16	17,471
prj+4	17	34,264	20	22,390
prj+5	23	48,173	25	28,497
At 10 yrs	76	48,173	98	28,497

*Direct power savings from pumping systems over project life (MWh): **6,785**
*Indirect power savings from pumping systems over post project life (MWh): **41,388**
*Indirect power savings from vendors implemented projects over 10 years (MWh): **28,497**

2.4 Saving calculations from fan systems projects

Fan Systems				
Project Year	Systems optimization projects		Projects implemented by equipment vendors	
	# of projects	Cum. Savings (MWh)	# of projects	Cum. Savings (MWh)
2	0	0	1	144
3	1	287	3	718
4	3	1,437	4	1,868
5	4	3,736	6	3,879
sub total	8	3,736	14	3,879
prj+1	6	6,609	9	6,322
prj+2	9	11,494	12	9,914
prj+3	12	17,241	16	13,649
prj+4	17	25,000	19	17,672
prj+5	22	36,207	22	22,414
At 10 yrs	74	36,207	92	22,414

*Direct power savings from fan systems over project life (MWh): **3,736**
*Indirect power savings from fan systems over post project life (MWh) : **32,471**
*Indirect power savings from vendors implemented projects over 10 years (MWh) **22,414**

Both fuel and electricity savings are calculated as followed:

Total fuel savings = TOE savings from energy management operational improvements + TOE savings from ISO implementation + TOE savings from steam system optimization

Total electricity savings = electricity savings from energy management operational improvements + electricity savings from ISO implementation + electricity savings from optimization of compressed air system and pumping systems

Based on previous tables, total savings occurring directly from the project during its duration are:

Direct savings:

Direct fuel savings of 1,914,142 GJ resulting 154,423 CO2 tons of emissions avoided

(based on the assumption that the usage of fuel oil usage, coal and natural gas are in the ratio of 25%, 75% and 25% respectively)

Direct electricity savings: 83,712 MWh resulting 42,333 tons of CO2 emissions avoided

Total direct CO2 emissions avoided: 196,757 tons

Indirect savings:

Resulting savings from the optimization projects implemented by the vendors are added to the savings from the project's capacity building activities after the project completion till the year 10 to calculate indirect savings.

Indirect fuel savings: 16,814,986 GJ

Indirect electricity savings: 763,756 MWh

Taking attribution factor of 2, indirect savings are calculated as:

Indirect fuel savings of 8,407,493 GJ and electricity savings: 381,878 MWh

Total savings:

Total carbon emissions avoided over 10 year period:

Fuel savings of 10,321,635 GJ resulting 832,698 CO2 tons of emissions avoided

Electricity savings: 465,590 MWh resulting 235,449 tons of CO2 emissions avoided

CO2 emissions avoided: 1,068,147 tons

The project will hence offer savings of 10,321,635 GJ and 465,590 MWh during the ten year period.

Henceforth, the final estimation for this project's GHG reductions totals 1,068,147 tons of CO2 (235,449 tCO2 from electricity savings and 832,698 tCO2 from fuel savings) based on the emission factors provided by the Department of Alternative Energy Development and Efficiency (DEDE).

Emissions Factor for grid electricity	**0.5051**	**t CO2/MWh**
Emissions factor for fuel oil	**77.4**	**tCO2/TJ**
Emission factor for coal	94.6	**tCO2/TJ**
Emission factor for natural gas	56.1	**tCO2/TJ**

Annex G: Workplan

Outputs	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
COMPONENT 1: ISO compliant energy management systems							
Output 1.1: Training material and tools on energy management developed							
Output 1.2: National awareness campaign launched on ISO 50001							
Output 1.3: National experts/factory personnel trained on energy management							
Output 1.4: Peer-to-peer network between industrial enterprises created and operational							
COMPONENT 2: Industrial Energy Systems Optimization							
Output 2.1: Training material and tools on systems optimization developed							
Output 2.2: Trained national experts/factory personnel on optimization of steam, compressed air and pumping systems							
Output 2.3: Equipment vendors/suppliers trained on systems optimization							
COMPONENT 3: Industrial EE Financing Capacity Development							
Output 3.1: Harmonized EE project evaluation criteria							
Output 3.2: Capacity of banks/FIs enhanced on EE projects financing							
Output 3.3: Training material developed and industry managers trained on the development of financial proposals							
COMPONENT 4: Implementation of Energy Management and Systems Optimization Projects							

Output 4.1: Energy management systems implemented							
Output 4.2: Documented systems optimization demonstration projects							
Output 4.3: Recognition program developed and implemented							
Project Management							
Monitoring and Evaluation							

Annex H: Status of targeted industrial sub-sectors

The main export markets for products manufactured in Thailand are the United States of America (USA), Japan, the European Union and ASEAN county members. According to the 2007 Industrial Census Whole Kingdom[13], the industry sector comprises about 458,000 establishments of which 94.5% are small scale establishments and 5.7% are medium and large enterprises (about 26,100 establishments).

The Thai manufacturing industries have developed rapidly over the last decade. The country is currently known to be one of the most developed in South East Asia. The main export markets for Thai processed foods are Japan, the US and the EU. The seafood sector is the third largest in the world, after China and Norway, with 90 percent of the output being exported[14].

The overview of some manufacturing subsectors in Thailand is presented as follows.

Food industry subsector

Thailand has become one of the world's largest and most advanced producers and exporters of processed food products and beverage. The main products of the food industry subsector include sugar, condensed and raw milk, canned pineapple, frozen and canned Seafood. Currently, the Thai food processing industry comprised of approximately 10,000 food-processing companies[15].

Textile industry subsector

The textile indusry plays a vital part in the Thai economy. It is estimated that the entire process, from fiber production to garment making generates more than 1.08 million jobs in the country. During January-June 2009, export value of textile products is USD 1,585.1 million. Most raw materials are expensive because they are imported from abroad, while the cost of energy is high because of the need to operate on a 24-hour-per-day basis.

Chemical industry subsector

The chemical industry subsector of Thailand has many dealers, and various product categories. It plays an important role in overall economic system. The reasons are that chemicals are raw materials used in many industries that manufacture ready-made products. Approximately, 10% of the chemicals industry is the upper-stream and intermediate chemicals industries and the rest are the downstream chemicals industry which has the total product value more than 80%. In 2009, the total export chemical value was estimated at Baht 114,450 million. This represents a decrease of 8.14% compared with 2008 level[16].

Rubber industry subsector

In the rubber industry subsector, the country has experienced a rapid development as Thailand is the world's major exporter of natural rubber. In 2008, the total land area covered by rubber plantations amounted approximately to 2,456,600 hectare of which 90% is processed as primary rubber products such as rubber sheets, rubber bars, crepe rubber, and concentrated latex rubber. The remainder is processed into various products such as vehicle tires, gloves, rubber bands, and elastic tubing.

Plastic industry subsector

The main plastic goods manufactured in Thailand include plastic bags and sacks, film sheets, and foil. It is estimated that 70% of the plastic products made in the country are for domestic consumption while the remaining 30% are sold on the international market. Most of the plastic goods producers are small firms with large companies making up only 10% of the factories.

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[13] National Statistical Office (NSO). http://web.nso.go.th/en/census/indus07.htm

[14] Food and Agriculture Organization (FAO), 2009, *National Fishery Sector Overview* (ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_TH.pdf)

[15] Industrial Energy Efficiency Project in Thailand: Policy Analysis Report, 2010, p. 3.1

16 Industrial Energy Efficiency Project in Thailand: Policy Analysis Report, 2010, p. 3.4

Annex I: Monitoring and Evaluation Plan

1. Project Inception Phase

A project inception workshop will be conducted with the full project team, relevant government counterparts, co-financing partners, UNIDO and representation from the UNIDO Country Office (CO). The fundamental objective of this Inception Workshop (IW) will be to assist the project team in understanding and assimilating the goals and objectives of the project, as well as to finalize preparation of the project's first annual work plan on the basis of the project's logical framework (log frame). This work will include reviewing the log frame (indicators, means of verification, assumptions), imparting additional detail as needed, and completing an Annual Work Plan (AWP) for the first year of project implementation, including measurable performance indicators.

Additionally, the IW will: (i) introduce project staff to the UNIDO team which will support the project during its implementation; (ii) delineate the roles, support services, and complementary responsibilities of UNIDO staff vi-sa-vis the project team; (iii) provide a detailed overview of UNIDO reporting and monitoring & evaluation (M&E) requirements, with particular emphasis on Annual Project Implementation Reviews (PIRs), the Annual Project Report (APR), as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on UNIDO project related budgetary planning, budget reviews, and mandatory budget rephrasing.

The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines and conflict resolution mechanisms. The Terms of Reference (TOR) for project staff and decision-making structures will be discussed, as needed, in order to clarify each party's responsibilities during the project's implementation phase.

2. Monitoring

A detailed schedule of project review meetings will be developed by the Project Management Unit (PMU) in consultations with project partners and stakeholder representatives. The schedule will include: (i) Tentative time frames for Project Steering Committee (PSC) meetings and (ii) project related Monitoring and Evaluation activities.

Day to day monitoring of implementation progress will be the responsibility of the PMU based on the project's Annual Work Plan and its indicators. The PMU will inform UNIDO of any delays or difficulties faced during implementation so that appropriate support or corrective measures can be adopted in a timely and remedial fashion.

The Technical Advisor will fine-tune the progress and performance/impact indicators for the project in consultations with the PMU. Periodic monitoring of implementation progress will be undertaken by UNIDO, as appropriate through quarterly meetings with project counterparts. UNIDO, and/or UNIDO Country office will conduct periodic visits based on an agreed upon schedule. Annual monitoring will occur through the Project Steering Committee (PSC) meetings, which will take place at least once a year. The terminal review will be held in the last month of the project operation. The PMU is responsible for preparation of the Terminal Review and submit it to UNIDO.

Specific targets for first year implementation progress indicators together with their means of verification will be developed at the Inception Workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the Annual Work Plan. Targets and indicators for subsequent years will be reviewed annually as part of the internal evaluation and planning processes undertaken by the project team. Measurement of impact indicators related to global benefits will be done according to the schedules defined in the Inception Workshop. Indicators of project goal, progress and performance will be continuously monitored and evaluated throughout the whole project life.

Periodic monitoring of implementation progress will be undertaken by UNIDO, as appropriate through quarterly meetings with project counterparts, or more frequently as deemed necessary. This will allow parties to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

UNIDO, and/or UNIDO Country Office will conduct periodic visits based on an agreed upon schedule to be detailed in the project's Inception Report/Annual Work Plan to assess project progress. Other members of the PSC may also accompany these visits. A Field Visit Report will be prepared by UNIDO and circulated no less than one month after the visit to the project team and all PSC members.

Annual Monitoring will occur through the PSC meetings, which will take place at least once a year. The first such meeting will be held within twelve months of the start of full project implementation. The PMU will prepare an Annual Project Report (APR) and submit it to UNIDO at least two weeks prior to the Tripartite Review (TPR) for review and comments.

Project Monitoring Reporting

The PMU in conjunction with the PSC members will be responsible for the preparation and submission of the following reports that form part of the monitoring process. Items 2.1 through 2.4 are mandatory and are specifically related to monitoring, while items 2.5 through 2.6 have a broader function and the frequency and nature is to be defined throughout implementation.

2.1 Inception Report (IR)
A Project Inception Report will be prepared immediately following the Inception Workshop. It will include a detailed First Year / Annual Work Plan divided into quarterly time-frames detailing the activities and progress indicators that will guide implementation during the project's first year. This Work Plan will include the dates of specific field visits, support missions from UNIDO and or UNIDO consultants, as well as timeframes for meetings of the project's decision-making structures. The report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the Annual Work Plan, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted time-frame. When finalized, the report will be circulated to project counterparts who will be given a period of one calendar month in which to respond with comments or queries. Prior to this circulation of the IR, UNIDO will review the document.

2.2 Annual Project Report (APR)
The APR is a UNIDO requirement and part of UNIDO central oversight, monitoring, and project management. It is a self-assessment report by project management to UNIDO, as well as a key input to the PSC. The APR will be prepared on an annual basis prior to the PSC to reflect progress achieved in meeting the project's Annual Work Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work.

The format of the APR is flexible but should include the following:

- Analysis of project performance over the reporting period, including outputs produced and information on the status of the outcome.
- Constraints experienced in the progress towards results and the reasons for these
- Expenditure reports
- Lessons learned
- Recommendations to address key problems in lack of progress, if applicable.

2.2 Project Implementation Review (PIR)
The PIR is an annual monitoring process mandated by the GEF. It is an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing project. Once the project has been under implementation for a year, a PIR must be completed by the project team. The PIR can be prepared any time during the year (June-July) and ideally immediately prior to the PSC. The PIR should then be discussed at the PSC so that the result would be a PIR that has been agreed upon by project staff, the executing agency, and UNIDO.

2.3 Quarterly Progress Reports
Short reports outlining main updates in project progress should be provided quarterly to UNIDO by the project team.

2.4 Periodic Thematic Reports
As and when called for by UNIDO, the PMU will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the PMU in written form by UNIDO and will clearly state the issue or activities that need to be reported on. These reports will be used as a form of lessons learned exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered.

2.5 Technical Reports
Technical Reports are detailed documents covering specific areas of analysis within the overall project. As part of the Inception Report, the PMU should prepare a draft Reports List, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the Project, and tentative due dates. Where necessary this Reports List will be revised and updated, and included in subsequent APRs. Technical Reports may also be prepared by external consultants and should be comprehensive, specialized analyses of clearly defined areas of research within the framework of the project and its sites. These technical reports will represent, as appropriate, the project's substantive contribution to specific areas, and will be used in efforts to disseminate relevant information and best practices at local, national and international levels.

2.6 Project Publication
Project Publications will form a key method of crystallizing and disseminating the results and achievements of the Project. These publications may be scientific or informational texts on the activities and achievements of the Project in the form of journal articles, multimedia publications, or other forms of distribution. Publications can be based on Technical Reports, or may be summaries or compilations of a series of Technical Reports and other research. The PMU will determine if Technical Reports merit formal publication, and will also (in consultation with UNIDO, the government and other relevant stakeholder groups) plan and produce these Publications in a consistent and recognizable format.

3. Terminal Review (TR)
The terminal review will be held in the last month of project operation. The PMU is responsible for the preparation of the Terminal Review and submitting it to UNIDO. It shall be prepared in draft at least two months in advance of the TR in order to allow review, and will serve as the basis for discussions in the TR. The terminal review considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as the vehicle through which lessons learned can be captured to feed into other projects under implementation or formulation.

The PMU based on the Terminal Review will prepare the Project Terminal Report (PTR). This comprehensive report will summarize all activities, achievements and outputs of the project, lessons learned, objectives met (or not met), and structures and systems implemented. The PTR will be the definitive statement of the project's activities during its lifetime. It will also layout recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's activities.

4. Evaluation
The project will be subjected to at least two evaluations as follows:

Mid-term evaluation: A mid-term evaluation will be undertaken at the end of the first year of project implementation. The Mid-Term Evaluation will measure progress made towards the achievement of outcomes and will identify corrections if needed. The evaluation will focus on the effectiveness, efficiency, and timeliness of project implementation; highlight issues requiring decisions and actions; and present initial lessons learned on project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the second half of the project's term. The organization, terms of reference, and

timing of the mid-term evaluation will be decided after consultations between the project partners. The Terms of Reference for this Mid-term evaluation will be prepared by UNIDO.

Final evaluation: An independent final evaluation will take place three months prior to the terminal tripartite review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also review impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this evaluation will be prepared by the UNIDO.

Annex J: Co-fmancing letters

No. 0407/ 2046

Ministry of Industry
Rama 6 Road, Bangkok 10400
Thailand
Tel 0 2202 3200 Fax 0 2354 3209

25 June B.E. 2553 (2010)

Dear Mr. Piskounov,

Subject : Co-Financing for the GEF/UNIDO Project – Industrial Energy Efficiency in Thailand

We are pleased to inform you that the Ministry of Industry is a government agency aiming to promote the industry to be competitive in the global market by development of enterprises in terms of environmentally friendly concern with social responsibility. We also promote industrial efficiency in order to enhance the competitive position of industrial companies.

In this connection, we warmly welcome and support the above project on Industrial Energy Efficiency in Thailand. This project fits into our goal of supporting energy efficiency and conservation projects. Our contribution will be realised through capacity building of Thai stakeholders in adoption of ISO 50001 and implementation of system optimization project from UNIDO during the course of this project. Please be informed that the amount of Bht78,443,424 in-kind and in cash contribution from the Ministry of Industry under the supervision of the Department of Industrial Promotion (DIP) and Thai Industrial Standard Institute (TISI) (equivalent to US$ 2,445,000 at today exchange rate) will be made available for this project.

We reiterate our support to the above GEF/UNIDO project.

Yours sincerely,

Witoon Simachokedee
Permanent Secretary for Industry

cc: Ms. Ayumi Fujino

Mr. Dmitri Piskounov
Managing Director
Programme Development and Technical Cooperation Division
UNIDO, PO Box 300
1400- Vienna
Austria

(COPY)

No. 0504/ ๖๕๑๕

Department of Alternative Energy Development
and Efficiency (DEDE)
17 Kasatsuek Bridge, Rama I Road
Pathumwan, Bangkok 10330, Thailand
Tel: + 66 2223 1149, Fax: + 66 2223 1149

๒๕ June B.E. 2553 (2010)

Dear Mr. Dmitri Piskounov,

Subject: Co-financing for the GEF/UNIDO project - Industrial Energy Efficiency in Thailand

The Department of Alternative Energy Development and Efficiency (DEDE) is under the Ministry of Energy of Thailand. It is aimed to support and promote the clean energy production and consumption that is consistent with the situation of each area at cost effective and sustainable. Develop the clean technology commercially for both domestic consumption and export, including creating the co-operation network that leads Thailand to an energy knowledge base society.

The DEDE warmly welcomes and supports the project on Industrial Energy Efficiency in Thailand. This project fits into our goal of supporting energy efficiency and conservation projects. Currently, we are implement several measures programs that can provide financial assistance in forms of soft loan, co-financing and tax incentives with the budgets over 30 million USD for any energy-efficiency and renewable energy projects. Therefore, firms that are participating and adopting system optimization approach can request for financing.

Yours sincerely,

Krairit Nilkuha
Director-General, DEDE

Mr. Dmitri Piskounov, Managing Director
Programme Development and Technical Cooperation Division
UNIDO
PO Box 300, 1400- Vienna, Austria

CC: Ms. Ayumi Fujino, Representative and Head
UNIDO Regional Office in Thailand
57 Phrasumen Road, Banglamphoo
Pranakorn Bangkok, Thailand

CIMB THAI
ซีไอเอ็มบี ไทย

CIMB Thai. OFP 418 /2010

5 August 2010

To: Mr. Dmitri Piskounov,
Managing Director,
Programme Development and Technical Cooperation Division
UNIDO
PO Box 300
1400- Vienna
Austria

RE: Financing support for the UNIDO/GEF project of Industrial Energy Efficiency in Thailand

Dear Sirs,

In response to your request for financing support on the United Nations Industrial Development Organization (UNIDO)/the Global Environment Facility (GEF) project of Industrial Energy Efficiency (the "Project"), we, CIMB Thai Bank Public Company Limited, would like to inform you that we wish to participate in financing support for the Project in the amount of up to THB 165,000,000 and we are now considering to provide "CIMB THAI Clean Energy Loan" , a special credit facility for supporting the Project (the "Facility"), to the prospective customer (the "Customer") provided that the terms and conditions of the Facility are subject to our credit approval and the execution of definitive documentation of the Facility between the Customer and us.

Should you have any questions, please feel free to contact Khun Chirawut Chiyawat Tel 0-2638-8269 E-mail chirawut.c@cimbthai.com.

Yours Sincerely,

(Mr. Subhak Siwaraksa)

President & Chief Executive Officer

ธนาคาร ซีไอเอ็มบี ไทย จำกัด (มหาชน) เลขที่ 44 ถนนสาทรใต้ แขวงลุมพินี เขตปทุมวัน กรุงเทพมหานคร 10330
โทรศัพท์ 0 2638 8000 0 2626 7000 โทรสาร 0 2633 9026 ทะเบียนเลขที่ 0107537002338

CIMB Thai Bank Public Company Limited 44 Langsuan Road Lumpini Patumwan Bangkok 10330
Tel 0 2638 8000 0 2626 7000 Fax 0 2633 9026 www.cimbthai.com Pcl. Register No. 0107537002338

ธนาคารพัฒนาวิสาหกิจ
ขนาดกลางและขนาดย่อมแห่งประเทศไทย
SME AND MEDIUM ENTERPRISE DEVELOPMENT BANK OF THAILAND

SME Bank2045/2010

27 April , 2010

Mr. Dmitri Piskounov,
Managing Director,
Programme Development and Technical Cooperation Division
UNIDO
PO Box 300
1400- Vienna
Austria

RE : Co-financing for the GEF/UNIDO project - Industrial Energy Efficiency in Thailand

SME Bank is under direct supervisor of Ministry of Finance and Ministry of Industry. The bank shall conduct business activities that will develop, promote, assist and support the establishment of expansion of medium and small enterprises by granting loans, providing security guarantees, making joint investments, providing consultation and advice or other necessary services. The bank is responsible for promoting sustainable development of SMEs with good governance, efficient operation, and good financial discipline. It also provides financial services that respond to SME needs.

SME bank warmly welcomes and supports the above project on Industrial Energy Efficiency in Thailand. This project fits into our goal of supporting energy efficiency and conservation projects. SME Bank's contribution will be realised through providing project financing to industrial facilities which that will implement energy management system and system optimization projects after receiving trainings from UNIDO during the course of this project. 100,000,000 THB loans (equivalent to 3,094,251 US$ at today exchange rate) will be made available for projects conforming to the SME Bank financial criterion and conditions.

We reiterate our support to the above GEF/UNIDO project.

Sincerely yours

Soros Sakornvisava
President
SME Development bank of Thailand

Copy to:
Ms. Ayumi Fujino,
Representative and Head,
UNIDO Regional Office in Thailand,
57 Phrasumen Road, Banglamphoo, Pranakorn
Bangkok, Thailand

UNIDO PRODOC / GEF CEO Summary
Thailand

A.1. ORIGIN OF THE PROJECT/PROPOSAL
PART II: Project Justification, A. State the issue

A.2. THE BACKGROUND
PART II: Project Justification, A. State the issue

A.3. THE PROBLEM
PART II: Project Justification, A. State the issue
PART II: Project Justification, B. Consistency of Project with national/regional priorities/plans
PART II: Project Justification, F. Value added of GEF project.

A.4. TARGET BENEFICIARIES
PART II: Project Justification, A. State the issue

A.5. POLICIES, STRATEGIES AND PLANS IN PLACE
PART II: Project Justification, A. State the issue
PART II: Project Justification, B. Consistency of Project with national/regional priorities/plans
PART II: Project Justification, C. Consistency with GEF Strategies.
PART II: Project Justification, F. Value added of GEF project.

B. REASONS FOR UNIDO ASSISTANCE
UNIDO is one of the Global Environment Facility (GEF) implementing agencies having comparative advantage in the development and implementation of Industrial Energy Efficiency (IEE) projects.

C. THE PROJECT
C.1. OBJECTIVE OF THE PROJECT
PART I: Project Information, A. The Project Framework
Annex A: Project Results Framework
PART II: Project Justification, A. State the issue

C.2. THE UNIDO APPROACH
PART II: Project Justification, A. State the issue
PART II: Project Justification, B. Consistency of Project with national/regional priorities/plans
PART II: Project Justification, C. Consistency with GEF Strategies
PART II: Project Justification, E. Coordination with other related initiatives
PART III: Institutional coordination and support, B. Project implementation arrangement.
Annex F: Outputs and Activities.

C.3. RBM CODE AND THEMATIC AREA CODE
DE12, EAE

C.4. EXPECTED OUTCOMES
PART I: Project Information, A. The Project Framework
PART II: Project Justification, A. State the issue
Annex A: Project Results Framework.

C.5. OUTPUT AND ACTIVITIES
Annex F: Outputs and Activities.
PART I: Project Information, A. The Project Framework
Annex A: Project Results Framework
PART II: Project Justification, A. State the issue
Annex G: Detailed tentative plans for a number of outputs.

C.6. TIMELINE OF THE ACTIVITIES
PART I: H. Budget and M & E plan
PART III: Institutional coordination and support, B: Project implementation.
Annex G: Work plan

C.7. RISKS
PART II: Project Justification, G. Risks and risk management measures
Annex A: Project Results Framework

D. INPUTS
D.1. COUNTERPART INPUTS
PART I: Project Information, E. Consultants working for technical assistance components
PART I: Project Information, F. Project management budget/costs
PART III: Institutional coordination and support, B. Project implementation

D.2. UNIDO INPUTS
PART I: Project Information, E. Consultants working for technical assistance components
PART I: Project Information, F. Project management budget/costs
PART II: Project Justification, A. State the issue

E. BUDGET
PART I: Project Information, A. The Project Framework
PART I: Project Information, B. Sources of co-financing
PART I: Project Information, C. Financing Plan Summary for the Project
PART I: Project Information, D. GEF Resources requested by Agencies
PART I: Project Information, E. Consultants working for technical assistance components
PART I: Project Information, F. Project management budget/costs
PART I: Project Information, H. Describe the budgeted M&E Plan

UNIDO Budget

1100	International Experts	$923,000.0
1300	Project Administrative Assistant	$60,000.0
1500	Travel	$434,000.0
1700	National Short-Term Experts	$1,007,000.0
2100	Subcontracts	$384,000.0
3100	Study tour	$70,000.0
3300	In-Service Trainings	$421,000.0
4500	Equipment	$180,000.0
5100	Sundries	$141,000.0
	Grand total	**$3,620,000.0**

F. MONITORING & EVALUATION
PART II: Project Justification, G. Risks and risk management measures
Annex A: Project Results Framework
UNIDO standard project monitoring and evaluation practices will apply. UNIDO is working towards the GEF fiduciary standards and has recently introduced IPSAS.

G. PRIOR OBLIGATIONS AND PREREQUISITES
There are no prior obligations and prerequisites.

I. LEGAL CONTEXT

The project document shall be the instrument referred to the Standard Basic Agreement between the **Government of Thailand and UNIDO**. The project objectives shall be in line with the objectives of the Policies of the **Government of Thailand**.

The following types of revisions may be made to the Project Document with the signature of the Project Manager, provided he or she is assured that the other signatories of the Project Document have no objection to the changes as followed:

Revision in, or addition of, any of the annexed of the Project Document; and

Revisions that do not involve significant changes in the immediate components, objectives, outputs, outcomes or activities of the project, but are caused by rearrangement of the inputs already agreed to or cost increases due to inflation.

Draft

Ref. No. /

Ministry of Industry
Rama 6 Road, Rajthewee
Bangkok 10400

B.E. 2554 (2011)

Dear Mr. Chua,

Re: Endorsement of UNIDO/GEF "Industrial Energy Efficiency"

Pursuant to your letter Ref. No. L/051/2011 dated 14 February 2011, we are pleased to cooperate with the UNIDO on the Project entitled," Thailand CF: Industrial Energy Efficiency" under a non-legally binding partnership.

In this connection, please be informed that the Ministry of Industry (MOI) has assigned the Department of Industrial Promotion (DIP) to be the executing agency of this project. Kindly coordinate with the DIP for any further details of this project accordingly.

With best regards,

Yours sincerely,

(Witoon Simachokedee)
Permanent Secretary for Industry

Mr. Chin-Pen Chua
Representative and Director of Regional Office in Thailand
United Nations Industrial Development Organization
5th Floor, Department of Industrial Works Building
57 Phrasumen Road, Banglampoo, Pranakorn
Bangkok 10200

สำนักพัฒนาอุตสาหกรรมเป้าหมาย
รับที่ ๒๖๗๕
วันที่ ๒๐ ธค ๕๔
เวลา

กรมส่งเสริมอุตสาหกรรม
รับที่ 6195
วันที่ 19 S.A. 2554
เวลา

ที่ กต ๐๘๐๕/๑๐๐๗

กระทรวงการต่างประเทศ
ถนนศรีอยุธยา กทม. ๑๐๔๐๐

๑๔ ธันวาคม ๒๕๕๔

เรื่อง โครงการความร่วมมือทางวิชาการด้านการเพิ่มประสิทธิภาพการใช้พลังงานสำหรับ SMEs ภายใต้โครงการ Industrial Energy Efficiency: IEE

เรียน อธิบดีกรมส่งเสริมอุตสาหกรรม

อ้างถึง ๑. หนังสือกรมส่งเสริมอุตสาหกรรม ที่ อก ๐๔๒๑/๑๑๗๐ ลงวันที่ ๑๒ กรกฎาคม ๒๕๕๔
๒. หนังสือกรมส่งเสริมอุตสาหกรรม ที่ อก ๐๔๒๑/๑๙๑๖ ลงวันที่ ๒๓ พฤศจิกายน ๒๕๕๔

ตามหนังสือที่อ้างถึง ขอให้กรมสนธิสัญญาและกฎหมายให้ความเห็นเกี่ยวกับร่างหนังสือตอบรับองค์การพัฒนาอุตสาหกรรมแห่งสหประชาชาติ (UNIDO) เรื่องการเข้าร่วมดำเนินโครงการความร่วมมือทางวิชาการด้านการเพิ่มประสิทธิภาพการใช้พลังงานสำหรับ SMEs ภายใต้โครงการ Industrial Energy Efficiency: IEE โดยเฉพาะในประเด็นที่เกี่ยวข้องกับมาตรา ๑๙๐ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย พ.ศ. ๒๕๕๐ ความละเอียดแจ้งแล้ว นั้น

กรมสนธิสัญญาและกฎหมายพิจารณาแล้ว ขอเรียนความเห็น ดังนี้

๑. หนังสือ UNIDO ที่ L/051/2011 ลงวันที่ ๑๔ กุมภาพันธ์ ค.ศ. ๒๐๑๑ ถึงกระทรวงอุตสาหกรรม แจ้งข้อเสนอการดำเนินโครงการ "Thailand: CF: Industrial Energy Efficiency" ซึ่งได้รับความช่วยเหลือทางการเงินจากกองทุนสิ่งแวดล้อมโลก (Global Environment Facility - GEF) ประกอบกับร่างหนังสือของกระทรวงอุตสาหกรรมตอบรับการเข้าร่วมดำเนินโครงการดังกล่าวกับ UNIDO ไม่เป็นสนธิสัญญาตามกฎหมายระหว่างประเทศและไม่เป็นหนังสือสัญญาตามมาตรา ๑๙๐ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย พ.ศ. ๒๕๕๐ เนื่องจากร่างหนังสือตอบรับของกระทรวงอุตสาหกรรมได้ระบุไว้อย่างชัดเจนว่า การเข้าร่วมดำเนินโครงการนี้เป็นการเข้าร่วมที่ไม่มีผลผูกพันทางกฎหมาย

๒. อย่างไรก็ตาม โดยที่พระราชกฤษฎีกาว่าด้วยการเสนอเรื่องและการประชุมคณะรัฐมนตรี พ.ศ. ๒๕๔๘ กำหนดไว้ในมาตรา ๔ (๗) ว่า เรื่องที่เกี่ยวกับความสัมพันธ์ระหว่างประเทศหรือที่เกี่ยวกับองค์การระหว่างประเทศที่มีผลผูกพันรัฐบาลไทยให้เสนอต่อคณะรัฐมนตรี ดังนั้น กระทรวงอุตสาหกรรมจึงอาจพิจารณาดำเนินการเสนอหนังสือของ UNIDO พร้อมเอกสารโครงการ (Project Document) และร่างหนังสือตอบรับฯ ให้คณะรัฐมนตรีพิจารณาตามนัยของพระราชกฤษฎีกาดังกล่าวก่อนที่จะดำเนินการในส่วนที่เกี่ยวข้องต่อไป

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ

(นายธัชชยุติ ภักดี)
รองอธิบดีกรมสนธิสัญญาและกฎหมาย
รักษาราชการแทนอธิบดีกรมสนธิสัญญาและกฎหมาย

กรมสนธิสัญญาและกฎหมาย
กองสนธิสัญญา
โทร. ๐ ๒๒๐๓ ๕๐๐๐ ต่อ ๑๐๐๐๕
โทรสาร ๐ ๒๖๔๓ ๕๐๒๐

เรียน สพป. ภาค
เพื่อโปรดทราบ

(นายเพทาย ล่อใจ)
นักทรัพยากรบุคคลชำนาญการพิเศษ
รักษาราชการแทนผู้อำนวยการสำนักบริหารกลาง
...ธ.ค. 2554

...นพัฒนานวัตกรรมอุตสาหกรรม
☑ เพื่อทราบ
☐ เพื่อโปรดพิจารณาดำเนินการต่อไป

(นายวุฒิชัย ทางรอด)
ผู้อำนวยการสำนักพัฒนาอุตสาหกรรมเป้าหมาย
20 S.A. 2554

เรียน ผู้อำนวยการส่วน...
เพื่อทราบและดำเนินการ

(นายสามารถ โพธิ์เจริญ)
ผู้อำนวยการส่วน...

คู่ฉบับ

ที่ อก ๐๔๒๑/๑๙๑๖

กรมส่งเสริมอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพฯ ๑๐๔๐๐

๒๗ พฤศจิกายน ๒๕๕๔

เรื่อง โครงการความร่วมมือทางวิชาการด้านการเพิ่มประสิทธิภาพการใช้พลังงานสำหรับ SMEs ภายใต้โครงการ Industrial Energy Efficiency : IEE

เรียน อธิบดีกรมสนธิสัญญาและกฎหมาย

อ้างถึง หนังสือกรมส่งเสริมอุตสาหกรรมที่ อก ๐๔๒๑/๑๑๗๐ ลงวันที่ ๑๒ กรกฎาคม ๒๕๕๔

สิ่งที่ส่งมาด้วย "ร่าง" หนังสือตอบรับการดำเนินโครงการ Industrial Energy Efficiency : IEE

ตามหนังสือที่อ้างถึง กรมส่งเสริมอุตสาหกรรมขอหารือขั้นตอน แนวทางการปฏิบัติและผู้มีอำนาจลงนามในข้อเสนอเข้าร่วมโครงการ Industrial Energy Efficiency : IEE ความละเอียดแจ้งแล้ว นั้น

กรมส่งเสริมอุตสาหกรรม ในฐานะหน่วยงานประสานโครงการฯ ยินดีให้ความร่วมมือกับองค์การพัฒนาอุตสาหกรรมแห่งสหประชาชาติ (UNIDO) ดำเนินโครงการ Industrial Energy Efficiency : IEE โดยไม่มีเจตนาให้มีผลผูกพันตามกฎหมาย เนื่องจากพิจารณาแล้วเห็นว่า UNIDO เป็นหน่วยงานบริหารโครงการของกองทุนสิ่งแวดล้อมโลกซึ่งต้องดำเนินการโครงการฯ ให้บรรลุวัตถุประสงค์และเป้าหมายที่กำหนดตามที่ได้รับมอบหมาย

ด้วยเหตุนี้ กรมส่งเสริมอุตสาหกรรม จึงขอเสนอ "ร่าง" หนังสือตอบรับการเข้าร่วมดำเนินโครงการฯ ดังสิ่งที่ส่งมาด้วย เพื่อขอความอนุเคราะห์กรมสนธิสัญญาและกฎหมายพิจารณาว่ามีประเด็นที่เกี่ยวข้องกับ มาตรา ๑๙๐ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย พ.ศ. ๒๕๕๐ หรือไม่ และมีขั้นตอนในการดำเนินการต่อไปอย่างไร

จึงเรียนมาเพื่อโปรดพิจารณา ผลการพิจารณาเป็นประการใดโปรดแจ้งให้กรมส่งเสริมอุตสาหกรรมทราบด้วย จักขอบคุณยิ่ง

ขอแสดงความนับถือ

(นายพสุ โลหารชุน)
อธิบดีกรมส่งเสริมอุตสาหกรรม

สำนักพัฒนาอุตสาหกรรมเป้าหมาย
ส่วนพัฒนาการใช้พลังงานและสิ่งแวดล้อม
โทรศัพท์ ๐ ๒๓๖๗ ๘๑๗๔
โทรสาร ๐ ๒๓๘๑ ๕๕๗๑

ผู้ตรวจ
ผู้ทาน
ผู้พิมพ์ ๒๙ พ.ย. ๕๔
ผู้ร่าง

Draft

Ref. No. /

Ministry of Industry
Rama 6 Road, Rajthewee
Bangkok 10400

B.E. 2554 (2011)

Dear Mr. Chua,

Re: Endorsement of UNIDO/GEF "Industrial Energy Efficiency"

Pursuant to your letter Ref. No. L/051/2011 dated 14 February 2011, we are pleased to cooperate with the UNIDO on the Project entitled," Thailand CF: Industrial Energy Efficiency" under a non-legally binding partnership.

In this connection, please be informed that the Ministry of Industry (MOI) has assigned the Department of Industrial Promotion (DIP) to be the executing agency of this project. Kindly coordinate with the DIP for any further details of this project accordingly.

With best regards,

Yours sincerely,

(Witoon Simachokedee)
Permanent Secretary for Industry

Mr. Chin-Pen Chua
Representative and Director of Regional Office in Thailand
United Nations Industrial Development Organization
5th Floor, Department of Industrial Works Building
57 Phrasumen Road, Banglampoo, Pranakorn
Bangkok 10200

คู่ฉบับ

ที่ อก ๐๔๒๑/ ๑๑๗๐

กรมส่งเสริมอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพฯ ๑๐๔๐๐

๑๒ กรกฎาคม ๒๕๕๔

เรื่อง โครงการความร่วมมือทางวิชาการด้านการเพิ่มประสิทธิภาพการใช้พลังงานสำหรับ SMEs ภายใต้โครงการ Industrial Energy Efficiency : IEE

เรียน อธิบดีกรมสนธิสัญญาและกฎหมาย

สิ่งที่ส่งมาด้วย ๑. หนังสือกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม ที่ ๐๒๐๔/๑๖๐๔ ลงวันที่ ๒๑ กรกฎาคม ๒๕๕๑
๒. หนังสือ UNIDO ที่ Ref.#L/051/2011 ลงวันที่ ๑๔ กุมภาพันธ์ ๒๕๕๔

ด้วยกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อมในฐานะหน่วยงานประสานงานกลางกับกองทุนสิ่งแวดล้อมโลกในประเทศไทย (GEF Operational Focal Point) ได้รับรองโครงการความร่วมมือทางวิชาการด้านการเพิ่มประสิทธิภาพการใช้พลังงานสำหรับ SMEs ภายใต้โครงการ Industrial Energy Efficiency : IEE ซึ่งเป็นโครงการที่กระทรวงอุตสาหกรรม โดยกรมส่งเสริมอุตสาหกรรม และสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม ร่วมกับกรมพัฒนาพลังงานทดแทนและอนุรักษ์พลังงาน กระทรวงพลังงาน และองค์การพัฒนาอุตสาหกรรมแห่งสหประชาชาติ (UNIDO) ร่วมจัดทำขึ้นโดยมีวัตถุประสงค์เพื่อการสร้างแนวทางปฏิบัติเกี่ยวกับมาตรฐานระบบการจัดการพลังงาน (Energy Management Standard System) ในโรงงานอุตสาหกรรมของประเทศให้ได้รับข้อมูลข่าวสารสถานการณ์และการพัฒนามาตรฐานระบบการจัดการพลังงานเพื่อเป็นแนวทางปฏิบัติร่วมกัน มีความเข้าใจ และตระหนักถึงความสำคัญของมาตรฐานระบบการจัดการพลังงานที่จำเป็นสำหรับการเพิ่มประสิทธิภาพการใช้พลังงานของโรงงานอุตสาหกรรม รวมทั้งลดต้นทุนค่าใช้จ่ายที่เกิดขึ้นในกระบวนการผลิต ในการนี้กรมส่งเสริมอุตสาหกรรมในฐานะหน่วยประสานงานโครงการฯ ได้ร่วมกับ UNIDO จัดทำร่างข้อเสนอโครงการ IEE ฉบับสมบูรณ์ (The project document) เสนอให้ GEF พิจารณา ซึ่ง UNIDO ได้แจ้งกรมส่งเสริมอุตสาหกรรมว่า GEF ได้พิจารณาให้การสนับสนุนข้อเสนอโครงการ IEE ดังกล่าว เป็นระยะเวลา ๕ ปี ในรูปเงินสด (In cash) ๓.๖๒๐ ล้านเหรียญดอลลาร์สหรัฐอเมริกา โดยกระทรวงอุตสาหกรรม กระทรวงพลังงาน และธนาคารพาณิชย์ สนับสนุนงบประมาณที่อยู่ในรูปเงินสด (In cash) และไม่อยู่ในรูปของเงินสด (In kind) เป็นจำนวนเงิน ๑๕.๖๔๕ ล้านเหรียญสหรัฐอเมริกา และในขั้นตอนต่อไปจะมีการพิจาณาลงนามในข้อเสนอโครงการดังกล่าว ดังมีรายละเอียดตามสิ่งที่ส่งมาด้วย

กรมส่งเสริมอุตสาหกรรมพิจารณาแล้ว ขอหารือขั้นตอน แนวทางปฏิบัติ และผู้มีอำนาจลงนามในข้อเสนอโครงการของการเข้าร่วมโครงการ IEE ว่ามีระเบียบ วิธีปฏิบัติและขั้นตอนการดำเนินการที่ถูกต้องอย่างไร เพื่อให้การดำเนินโครงการเป็นไปด้วยความเรียบร้อย

จึงเรียนมาเพื่อ.....

จึงเรียนมาเพื่อโปรดพิจารณา ผลการพิจารณาเป็นประการใดโปรดแจ้งให้กรมส่งเสริมอุตสาหกรรม ทราบด้วย จักขอบคุณยิ่ง

ขอแสดงความนับถือ

(นายพสุ โลหารชุน)
อธิบดีกรมส่งเสริมอุตสาหกรรม

สำนักพัฒนาอุตสาหกรรมเป้าหมาย
ส่วนพัฒนาการใช้พลังงานและสิ่งแวดล้อม
โทรศัพท์ ๐ ๒๓๖๗ ๘๑๗๔
โทรสาร ๐ ๒๓๘๑ ๗๗๕๑

ผู้ตรวจ.....
ผู้ทาน.....
ผู้พิมพ์ 22 พ.ย 54
ผู้ร่าง.....

No. 0204/ 1604

Ministry of Natural Resources
and Environment
92 Soi Phahon Yothin 7
Phahon Yothin Road
Bangkok 10400 Thailand
Tel: 66 2 265 6139
Fax: 66 2 265 6192

21 July B.E. 2551 (2008)

Dear Mr. Piskounov,

Subject: Reconfirmation of the project "Industrial Energy Efficiency"

Kindly refer to our letter dated October 12, 2007 confirming the endorsement of the Transforming Industrial Efficiency Markets. Please be informed that the said project has been changed to be the Industrial Energy Efficiency (IEE) with the same details and budget. In my capacity as GEF Operational Focal Point for the Kingdom of Thailand, I would like to reconfirm that the Industrial Energy Efficiency project proposal (a) is in accordance with the national priorities and the commitments made by the Kingdom of Thailand under the relevant global environmental conventions and (b) has been discussed with relevant stakeholders, including the global environmental convention focal points, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the preparation of the above project proposal with the support of UNIDO. If approved, the proposal will be prepared and implemented by the Ministry of Industry of the Kingdom of Thailand. Further, I request UNIDO to provide a copy of the project document for comments before it is submitted to the GEF Secretariat for CEO endorsement.

I understand that the total GEF financing being requested for this project is US$ 4,092,000 which includes US$ 100,000 for project preparation (PPG) and US$ 3,620,000 for

/ implementation...

Mr. Dmitri I. Piskounov
Managing Director
Programme Development and Technical Cooperation Division (PTC)
United Nations Industrial Development Organization (UNIDO)
Vienna International Centre
PO Box 300
1400 Vienna, Austria
Tel: +43(1)26026-0
Fax: +43(1)2692669

cc : Ms. Monique Barbut
GEF CEO

Mr. Kasemsun Chinnavaso
Secretary-General, ONEP
Climate Change Focal Point

ECC → Mr. Williams

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implementation (FSP) as well as US$ 372,000 (10% of the FSP and PPG amount) of fee to UNIDO for project cycle management services associated with this project.

I consent to the utilization of the following indicative allocations available to the Kingdom of Thailand in GEF-4 under the GEF Resource Allocation Framework to cover the GEF project preparation and implementation as well as the associated Agency fees for this project.

Climate Change : US$ 4,092,000

Please be assured of our ongoing cooperation.

Yours sincerely,

(Mr. Saksit Tridech)
Permanent Secretary
Ministry of Natural Resources and Environment