



# PROJECT IDENTIFICATION FORM (PIF)

**PROJECT TYPE:** Full-Size Project

**THE GEF TRUST FUND**

**Submission Date:** March 2009

**Re-submission Date:**

## PART I: PROJECT IDENTIFICATION

**GEFSEC PROJECT ID:** PROJECT DURATION: 48 months

**GEF AGENCY PROJECT ID:** XX/CMB/09/XXX

**COUNTRY:** Cambodia

**PROJECT TITLE:** Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector

**GEF AGENCY:** UNIDO

**OTHER EXECUTING PARTNER:** Cambodia Cleaner Production Centre (hosted by the Ministry of Industry, Mines & Energy (MIME))

**GEF FOCAL AREA:** Climate Change

**GEF-4 STRATEGIC PROGRAM:** CC-SP2

**NAME OF PARENT PROGRAM/UMBRELLA PROJECT:** N/A

INDICATIVE CALENDAR	
Milestones	Expected Dates
Work Program (for FSP)	June 2009
CEO Endorsement/Approval	September 2010
Agency Approval	October 2010
Implementation Start	November 2010
Mid-term Review	November 2012
Implementation Completion	November 2014

### A. PROJECT FRAMEWORK

**Project Objective:** To improve the energy efficiency of Cambodia's industrial sector, leading to reduced global environmental impact from GHG emissions and enhanced competitiveness for the industrial sector in a country with an energy deficit.

Project Components	INV, TA, STA*	Expected Outcomes	Expected Outputs	Indicative GEF Financing		Indicative Co-financing		Total (US\$)
				(US\$)	%	(US\$)	%	
1. Implementation of Industrial energy efficiency pilot projects	TA and INV	Demonstrable energy savings in participating companies through pilot projects	1. Energy efficiency projects for cumulative 45,000 TOEs** and related potential economic savings are identified by 40 enterprises participating in the Quick Scan process and appraised by project experts. 2. At least 12 pilot IEE projects for cumulative 15,000 TOEs** of energy savings over the investments duration are implemented by enterprises, from key industrial sectors, partnering in the project. 2. Results of the pilot projects are compiled in a compendium and disseminated 3. Personnel from the participating companies have been trained in industrial energy efficiency and are capable of continuing to implement new IEE projects	120,000	32	250,000	68	370,000
				480,000	19	2,000,000	81	2,480,000

			in their companies.					
2. Capacity building and development of tools for implementing industrial energy efficiency	TA	Supply of national service providers in IEE available (to match demand in component 4)	<p>1. A cadre of at least 30 national experts from relevant support institutions (the Cleaner Production Centre, technical universities / university departments, industry associations, the Ministry of Industry, Mines and Energy) and independent engineers, are equipped, though classroom and on the job training (in the Quick Scans and pilots) with the technical capacity and tools required to develop and implement energy efficiency measures in industry.</p> <p>2. These professionals are formed by the CPC into a network of service providers aimed to assist companies in implementing industrial energy efficiency.</p> <p>3. Local suppliers of relevant technologies (kilns, boilers, etc.) are also trained in IEE. Potential local suppliers are promoted, to ensure more cost-effective technology and more reliable after-sales service.</p> <p>4. Web-based guidance tool/manual on IEE developed</p>	175,000	64	100,000	36	275,000
3. Strengthening of institutional framework for industrial energy efficiency	TA	Stronger institutional framework in place to ensure long-term support for energy reduction efforts in enterprises	<p>1. Capacity building of relevant Govt. departments to promote industrial energy efficiency</p> <p>2. Companies are trained in preparation of bankable IEE project proposals</p> <p>3. Capacity building of financial institutions to assess investment proposals in IEE</p>	150,000	64	85,000	36	235,000
4. Upscaling of IIE in Cambodia	TA	<p>Increased adoption by Cambodian enterprises of energy efficient practices and technologies as an integral part of their business practices.</p> <p>The creation of a national market for</p>	<p>1. The results of the pilot projects and Quick Scans are widely disseminated in the most appropriate manner.</p> <p>2. Industry decision-makers understand their potential for energy efficiency gains and undertake energy efficiency activities.</p> <p>3. Other stakeholders understand the role they can play to promote industrial</p>	140,000	64	80,000	36	220,000

		industrial energy efficiency products and services.	energy efficiency					
5. Formulation and implementation of policies, regulations and programmes to promote and support sustainable industrial energy efficiency.	TA	Establishment of policy, legal and regulatory frameworks that sustainably promote and support industrial energy efficiency.	1. Procedures for tracking and benchmarking energy consumption in industry are developed and established. 2. Development of rules allowing private generators of electricity to feed their excess generation into the local grid.	100,000	67	50,000	33	150,000
6. Project management				75,000	50	75,000	50	150,000
<b>Total project costs</b>				<b>1,240,000</b>	<b>32</b>	<b>2,640,000</b>	<b>68</b>	<b>3,880,000</b>

\* INV = Investment; TA = Technical Assistance; STA = Scientific & Technical Analysis

\*\* TOE = Tonnes of Oil Equivalent

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

Sources of Co-financing	Type of Co-financing	Amount
Project Government Contribution (MIME)	In-kind	150,000
GEF Agency (UNIDO)	In-kind Grant	100,000 140,000*
Bilateral Aid Agencies	--	0
Multilateral Agencies	--	0
Private Sector	Cash	2,250,000
NGOs	--	0
Others	--	0
<b>Total co-financing</b>		<b>2,640,000</b>

\* Funding provided by the Swiss State Secretariat for Economic Affairs

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

	Previous Project Preparation Amount*(a)	Project (b)	Total c = a + b	Agency Fee
GEF financing		1,240,000	1,240,000	124,000
Co-financing		2,640,000	2,640,000	
<b>Total</b>		<b>3,880,000</b>		<b>124,000</b>

\* Amounts being requested for the PPG are to be found in the PPG Request.

## PART II: PROJECT JUSTIFICATION

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

**The Issue:** Cambodia's industrial sector has been one of the main engines of real GDP growth in recent years. In 2005, it accounted for 30% of GDP, and its share of GDP saw a significant growth of 12.3%, after an already significant increase of 16.8% in 2004. Industry's growth has continued to be strong, although it dropped to 5.6% in 2008. The key contributions have come from construction and mining activities, as well as the exports of textiles and garments. The textile and garment sub-sector alone accounts for nearly half the value added of the industrial sector.

The energy requirements of the industrial sector to power this industrial activity is rapidly making it one of the country's more important energy consuming and CO<sub>2</sub> emitting sectors, along with the transportation sector. It is estimated that in 2007 Cambodia's industrial sector was responsible for approximately 25% of the country's total energy consumption while being responsible for more than 20% of its CO<sub>2</sub> emissions. Although industry is one of the country's biggest energy consumers, only about 2% of the national electricity generation is reported to be consumed by the industrial sector. This is because enterprises rely almost exclusively on captive power generation (on-site boilers and generators) for both their thermal and their electrical needs. Fuels used range from diesel for the generators to fuel oil, coal, and wood for the boilers. In general, enterprises use a large number of small capacity generators. Output per litre of diesel oil in these generators averages 2.6 KWh, compared to 3.5KWh internationally for small generators and close to 4 KWh in bigger generators.

Cambodia has none of the traditional energy intensive industries (cement, iron and steel, etc.). The country's most energy intensive industry is the brick-making industry, whose primary fuel is waste wood. It consumes about 100,000 tonnes, or 250,000 m<sup>3</sup>, of waste wood annually. This wood comes almost exclusively from the country's extensive rubber tree plantations, either from trees that are no longer productive and are being cleared or from the pruning of trees. Most of the country's rubber plantations are in the east of the country, along the border with Viet Nam, while the brick-making units are located in other parts of the country, primarily around Phnom Penh and other cities. The waste wood is therefore being transported by road, causing – relatively speaking – modest amounts of GHG emissions (about 1,200 tonnes CO<sub>2eq</sub>/yr). While no data are available on this for Cambodia, there is potential for the kilns to be emitting black carbon and organic carbon aerosols, generated by the incomplete combustion of the wood. The effects of these aerosols on climate change, while still uncertain, are being increasingly recognized.

Cambodia's other key industrial sectors from the point of view of energy consumption are the garments, food processing, and rubber refining sectors, which between them account for more than 80% of total industrial consumption of fossil fuels. Of these three, the most energy intensive sector is rubber refining, which uses approximately 6,000 tonnes of diesel oil and 18,000 MW of electrical energy annually. In the food processing sector, rice milling is significant, using 90,000 tonnes of diesel oil a year. In the garments sector, the washing and finishing steps use significant amounts of energy; at least 80,000 tonnes of fuel oil are used in boilers alone in this sector.

Nevertheless, higher oil prices are encouraging enterprises to switch to wood, which is adding to the already considerable pressure on Cambodia's forest resources and related biodiversity.

Cambodian industry is highly energy inefficient, with energy consumption per unit of output being higher than in many countries in the region and more than double that of the developed countries. On the basis of studies UNIDO is currently carrying out on the brick making sector in Cambodia, there is a potential for 50% savings of the wood used (or 50,000 tons annually) by replacing the traditional kilns with more modern ones and improving working practices. As for the rubber refining sector, its the energy consumption is, on an output basis, equivalent to almost double international consumption norms, while the energy consumption levels of rice processing, when compared to international norms, suggests there is a potential for 30% savings.

The significant increases in energy prices have had a significant impact on profits and production costs of Cambodian enterprises, making them well aware of the energy production cost issue. This is generating significant market potential for industrial energy efficiency (IEE) products and services, but there is currently limited penetration of such products and services into Cambodian industries. The major barriers to this penetration are:

- i) The inadequacy of existing policies, institutions and regulatory framework to effectively promote and support energy efficiency improvements in industry;
- ii) The lack of information/knowledge of and technical capacity for IEE, best practices and benchmarking among industry decision-makers;
- iii) The lack of commitment on the part of management to implement and promote IEE, which means that IEE is not a part of process internalisation but is considered an optional area;
- iv) The scale of operation of the majority of enterprises, which for the most part are small-scale family-run units;

- v) The continued use of obsolete equipment and technology;
- vi) The lack of competent local suppliers of energy efficient technologies and after-sales services;
- vii) Financing and credit constraints faced by private enterprises.

**The proposed response:** The project will address these issues through an integrated approach that combines interventions at the policy level, in the market place, and on the shop floor. The project's primary target groups will be industry's decision-makers (owners, managers, production line engineers, etc.), potential service providers, and relevant policy-making/ implementing institutions. Specifically:

- (a) The project will provide investment-related technical assistance to support the implementation of pilot industrial energy efficiency projects with high replication and/or energy savings potential, in representative units of Cambodia's key energy-using industrial sectors. More specifically, 12 such pilot projects will be supported: 3 each from the brick-making sector, the rubber-refining sector, the rice milling sector, and the garments sector (focusing on washing, dyeing and finishing). These 12 pilots will be chosen using the cleaner production methodology already in place in the country, which is a methodology that has been developed over the 15 years of UNIDO-UNEP National Cleaner Production Centre Programme<sup>1</sup>. In brief, initial "Quick Scans" will be carried out in about 40 enterprises. In these, national experts (see (b) below), trained as necessary and supported by international experts, will undertake an initial review of the potential energy efficiency projects in the unit, will determine the potential for the replication of such projects at the national level, and will also assess the commitment of the management to undertaking these projects. The 3 units from each of the targeted sectors that best fit these criteria (which will be further refined during the project preparation phase) will be chosen to undergo a more in-depth energy efficiency assessment. These will be carried out by the same teams of national experts/international experts that carried out the Quick Scans. Out of these assessments, specific projects for energy efficiency investments will be identified, elaborated, and implemented. Part of the funds for implementation will come from the enterprises themselves, part will come from GEF funds, and part will be raised through the preparation of proposals to be submitted to banks or other financing institutions. The specific types of investments envisaged will be described in more detail during project proposal preparation but on the basis of previous experience with these industries in Cambodia the following are likely candidates: cleaner technologies for energy generation (energy efficient generators), and use of waste energy from generators for producing hot water and steam; replacement of diesel oil based dryers in rubber processing with waste wood/rice husk based hot air dryers using gasifiers; modification of existing brick making kilns and move in some cases to more energy efficient vertical-shaft kilns; replacement of oil fired boilers with waste wood based or agro residue based boilers (a positive side-effect of reducing wood use by the brick making sector will be the freeing up of waste wood for use by other industries). To maximize the implementation of energy efficiency projects, those units involved in the Quick Scans but not in the pilots will be encouraged to implement the energy efficiency options identified during the Quick Scans, with the assistance where required (and at their cost) of the national experts trained by the project (see (c)).
- (b) The project will also train personnel from existing technology suppliers in Cambodia (e.g., suppliers of kilns, boilers, generators, etc.). Past experience has shown that technology suppliers can be an important source of knowledge for enterprises. In addition, for a small country like Cambodia much of the technology that is imported needs to be adapted to local scale of operations, and the energy efficiency of adapted technologies is very dependent on the manner in which it is done. In addition, the project will promote the development of local suppliers of technology where they do not exist. On the one hand, this creates a network of after-sales services, which is critical for the sustainability of energy efficiency, and on the other hand, by encouraging local suppliers to manufacture as much of the technology locally the costs of technology, which is expensive in Cambodia, can be reduced, again aiding in sustainability.
- (c) In line with UNIDO's cleaner production methodology, the project will also build knowledge and technical capacity for the implementation of industrial energy efficiency. The personnel from the enterprises involved in both the Quick Scans and the pilots will receive training. To ensure cost effective replication and upscaling, national experts from relevant support institutions such as the Institut de Technologie du Cambodge (ITT), the

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<sup>1</sup> For more details, see <http://www.unido.org/index.php?id=o86205>.

Royal University of Phnom Penh (RUPP), the Phnom Penh Small and Medium-sized Industry Association (PSMIA), other relevant industry associations or groupings, the Department of Energy Techniques of the Ministry of Industry Mines and Energy (MIME), as well as the Cambodia Cleaner Production Centre (CPC), will also receive training, in the class-room but more importantly on the job, in that they will be part of the teams undertaking the Quick Scans and the more detailed assessments of the pilot. Initially, the national experts will be led by international experts with specific technical expertise in the industry sectors being considered, while in the later stages of the assessments they will take charge of the teams, supported by the international experts. In line with the size of the industrial sector in Cambodia, at least 30 such national experts will receive the training and capacity building. To ensure that these persons can continue to offer industrial energy efficiency services after project completion they will be included by the CPC into a formal network of IEE service providers. On the one hand, the CPC will be able to use them as experts in its own future project and alert them to other potential IEE projects. On the other hand, they can use the CPC as a mechanism for continuing to upgrade their IEE skills over time. To assist in this process of skills building and upgrading, the project will make available a web-based guidance tool/manual for industrial energy efficiency. This will include a decision-making tool to assist enterprises select the most appropriate technologies for their needs.

- (d) The project will also offer capacity building to the Cambodian government institutions tasked with supporting industrial energy efficiency. The Ministry of Industry, Mines and Energy (MIME) will be one of these, but the Council for the Development of Cambodia (which oversees all incoming investment projects), the Ministry of Environment, and the Ministry of Agriculture (which has oversight responsibilities for the rice processing and rubber refining) will also be involved. The project will also offer capacity building, targeted at companies, on the preparation of bankable energy efficiency projects. This capacity building will also involve personnel from local banks, to familiarize them with industrial energy efficiency.
- (e) To promote the dissemination of industrial energy efficiency, the results from the pilots will be promoted throughout the targeted industrial sectors by further campaigns by the Cleaner Production Centre as well as through other relevant mechanisms: workshops, seminars, publications, but also if viable TV and radio. An important partner for dissemination activities will be Cambodia's sector-specific associations. The message to be transmitted will focus on the proven feasibility of undertaking such projects in Cambodia, the financial savings that companies can gain from undertaking similar projects, and the sources of support (technical and financial) they can turn to. Relevant Government departments, support institutions, banks, and other stakeholders will also be targeted to receive information about the pilots, packaged in a way to be relevant to them.
- (f) The project will assist the relevant Government departments to strengthen, or if necessary develop, policies and regulations that can support Cambodian enterprises in their efforts to reach international best energy performance and to stimulate the creation of a market for IEE products and services. At a minimum, procedures for tracking and benchmarking energy consumption in industry will be developed and where relevant established through government or guidelines. Another area of policy that will be targeted, together with the Electrical Energy Authority of Cambodia, the national utility Électricité de Cambodge (EDC), and MIME, is the development of the rules allowing private generators of electricity to feed their excess generation into their local grid (this would make the investments more economically viable).

**Global Environmental Benefits:** Implementation of these activities will lead to global environmental benefits delivered in the form of reduced CO<sub>2eq</sub> emissions. On the basis of data and results achieved in cleaner production demonstration projects that UNIDO has been conducting in the country over the last few years, it has been estimated that the project will be instrumental in delivering industrial thermal energy efficiency improvements in the range of 20-30% and electrical energy efficiency improvements in the range of 30-35%. These savings will translate into reduced CO<sub>2eq</sub> emissions. These initial estimates will be refined during the project document preparation phase.

In addition to these global environmental benefits, there will also be reductions the emission of air pollutants with local impact. Furthermore, a positive side-effect of reducing wood use by the brick making sector will be the freeing up of waste wood for use by households, thus helping to take some of the pressure off Cambodia's forests; the domestic sector is a very significant consumer of wood and charcoal, using it as a cooking fuel.

## **B. THE CONSISTENCY OF THE PROJECT WITH NATIONAL/REGIONAL PRIORITIES/PLANS:**

In 1994, the Royal Government of Cambodia promulgated a policy and plan on energy conservation and efficient use of renewable energy sources. Within the energy conservation part of this policy and plan, in 1997 the Ministry of Industry, Mines and Energy (MIME), with the assistance of the World Bank, created the Energy Efficiency Office. Since that time, with various development partners (World Bank, France's ADEME, ASEAN, UN-ESMAP, Japan's ECCJ, UNIDO, among others) the Energy Efficiency Office has been promoting energy efficiency, in both non-industrial sectors (the public services sector, the tourism sector) and the industrial sector (the garment sector as well as others). The Government is particularly interested in promoting higher levels of energy efficiency in the industrial sector because of the rapidly increasing weight of industry in the national GDP. This is increasing the demand for the importation of fossil fuels, the payment for which is currently an important element in the country's balance of payments and foreign exchange requirements. With respect specifically to the garments sub-sector, the Government is particularly concerned to do all that is possible to improve its competitiveness in the world markets, because it accounts for nearly half the value added of the country's industrial sector and exports the great majority of its output. In the energy field, therefore, the project is fully in line with Government priorities.

With respect to GHG emissions, the Royal Government of Cambodia strongly supported the promulgation of the Kyoto Protocol to achieve the ultimate goals of the UNFCCC and to this effect signed the Protocol in July 2002. The Government is contributing to the global efforts to achieve the objectives of the UNFCCC through several initiatives such as the preparation of the country's National Communications to the UNFCCC (first NC submitted in 2002, second NC being prepared), implementation of Clean Development Mechanism (CDM) projects (5 CDM projects approved by Cambodia, one currently under review), the creation and management of 23 protected areas, current forest protection efforts, implementation of pilot projects under Reduction of Emissions from Deforestation and Degradation (REDD), promotion of GHG emission reduction projects under voluntary markets, air pollution control measures, implementation of cleaner production and cleaner technology promotion efforts, etc.

## **C. THE CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND STRATEGIC PROGRAMS:**

The project is fully consistent with Strategic Program 2 "Promoting Energy Efficiency in the Industrial Sector", in the Climate Change Focal Area. As required in this program, the project will bring about the deployment and diffusion of energy-efficient technologies and practices in industrial production and manufacturing processes. The project will cover a wide spectrum of energy systems used by Cambodia's industries: electricity generators, furnaces, steam systems, combined heat and power systems on the energy generation side; motors, pumps, fans, compressed air, cooling towers, and refrigerating and cooling systems, on the energy consuming side.

## **D. JUSTIFICATION FOR THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES:**

The activities outlined above are best catalyzed by the use of a grant from GEF. On the one hand, it is the best tool to assist the government in creating the necessary policy framework that will stimulate the creation of a national market for industrial energy efficiency products and services, which is the key to ensuring sustainability and uptake on a national scale of energy efficiency activities by industry. It is also the best mechanism for demonstrating to industry the benefits of energy efficiency in the face of initial reluctance and scepticism. Such demonstration – together with a more supportive policy framework – can catalyze the necessary myriad of small investments that need to be made by industry if they are going to adopt energy efficient practices in a sustainable manner.

## **E. COORDINATION WITH OTHER RELATED INITIATIVES:**

Several past initiatives involving elements of industrial energy efficiency have been noted above in section B. There has also been ADB's regional programme for the Promotion of Renewable Energy, Energy Efficiency and GHG Abatement (PREGA), which included Cambodia and had elements of clean energy technology promotion. To the extent that these projects have built relevant IEE capacities, they will be used in this proposed project. The involvement of MIME in all these projects as well as in the project proposed here will help to ensure that these existing capacities are used.

The proposed project will also build on the prior experience that UNIDO and MIME have gathered, and capacities they have built, in executing the country's cleaner production programme, which has focused on assisting enterprises to increase their materials efficiency as well as their energy efficiency. With respect to energy efficiency in particular, the project activities have resulted in significant reductions of greenhouse gases due to the adoption of energy efficiency and CP options. These reductions have ranged from 10% to 60%, and have been seen in all important industrial sectors in Cambodia, showing the great potential for energy efficiency that there is in Cambodian industry.

**F. THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT, DEMONSTRATED THROUGH INCREMENTAL REASONING:**

In the absence of this proposed project, significant opportunities and potential to improve energy efficiency of Cambodian industry in the short and medium term would go unrealized. In addition, the creation of a market for energy efficiency products and services to industry would be further delayed. Although a broad policy framework is in place, as described in Section A there is still insufficient institutional and technical capacity in and resources for industrial energy efficiency. This has meant that there is inadequate support for significant efficiency improvements in industry. Deficiencies such as lack of expertise, limited knowledge of relevant international experiences and best practices, weak coordination of interventions, poor communication/ collaboration between public and private sectors will persist and negatively impact policies/programs development and implementation in terms of significantly lower energy, environmental and economic benefits achieved.

Market competition will keep pressure on industry profit margins, squeezing investments in new technologies. When combined with persistent lack of awareness and understanding on the part of industry decision-makers of the full economic and environmental benefits of energy efficiency and energy management, financial constraints will continue to drive investment decisions towards least-capital-cost low-efficiency propositions. The negative environmental and economic consequences of these sub-optimal energy-related investments would accrue over a significant period of time, i.e. the lifetime of new technologies/ capital stock.

Under the business-as-usual scenario only modest industrial energy efficiency improvements will most likely be achieved within the next 5-10 years, mainly due to simple capital/equipment stock replacement, with a significant loss of potential GHG emissions reductions.

The proposed project will provide the incremental policy, technical and financial inputs required to support and effectively leverage national efforts in GHG emission reductions. At the policy and institutional levels, the project will strengthen local expertise, knowledge and capacity in effective and sustainable industrial energy efficiency policy/programme development and implementation, and will assist in rationalizing interventions and focusing resources. For industry decision-makers, the project will provide the knowledge and tools to fully exploit the environmental and economic benefits of energy efficiency and management in their enterprises. For potential service providers, increased industry wide awareness of industrial energy benefits and potential will boost demand for their products and services, generating the pull for market creation. The cadre of experts trained in industrial energy efficiency through the project will be able to offer responses to such demand. The investment-specific technical assistance/ financing support (provided through Component 1) will facilitate the implementation of selected pilot industrial energy efficiency projects with high replication potential in the key sectors of Cambodia's manufacturing industry. This will generate Cambodian-specific demonstrated success stories to be disseminated through industrial associations and other relevant channels. This is expected to fuel the interest of industry in IEE and reduce the associated perceived investment risk.



**G. THE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE FROM BEING ACHIEVED, AND THE RISK MEASURES THAT WILL BE TAKEN:**

**Political risk:** low government commitment to industrial energy efficiency and the project. **Potential impact:** High. **Probability:** Low. The project objectives and activities are perfectly in line with national policies and objectives for improving industry's energy efficiency and creating a market for energy efficiency products and services.

**Technical risk:** There is no technical risk associated with the project as IEE is well proven in many countries globally and in limited cases in Cambodia. No significant risk is envisaged with respect to the delivery of capacity building for IEE in Cambodia. UNIDO has already successfully completed projects of this nature in Cambodia and in many other countries. However, policy level interventions to promote and develop IEE will need to be addressed carefully. **Risk management:** Regular communication, close coordination, and delegation of responsibility will ensure continuous active involvement of policy/institutional counterparts.

**Market risk:** Current market demand and supply of IEE services are poor and availability of hardware and software locally is poor and depends mostly on neighbouring countries. **Potential impact:** High. **Risk Management:** The project builds on existing market relationship between users and suppliers of technology and know-how by expanding these markets. Industrial customers trained through the project will request more frequently and place a higher value on IEE services from their vendors, consultants and suppliers. The project preparation phase will play a major role in minimizing/ eliminating this risk. A tailored communication/ information strategy combined with an active dialogue and involvement of industrial associations during the whole project preparation and duration should ensure the desired industry response to the project.

**Financial risk:** Financial/credit constraints prevent industries from investing in energy efficiency. **Potential impact:** Low-Medium. **Probability:** Medium. While such constraints are expected to have low impact on the project's outputs, their impact on project outcomes could be greater. **Risk Management:** Selection of suitable partner enterprises will offer an instrument to minimize the impact on project outputs. As for project outcomes, since significant gains in energy efficiency can be achieved at no or very limited costs, financial risk can be mitigated by ensuring that least-capital cost is not the sole appraisal criterion in enterprises' energy-related investment decisions. Market and industry experience in other developing countries shows that for several types of energy consuming equipment the premium price paid for higher energy efficiency is paid back in less than 1 year, well within the timeframe of commercial lending.

**Implementation risk:** **Potential impact:** Medium. **Probability:** Low. UNIDO has significant experience in developing and implementing industrial energy efficiency projects, and it has a good knowledge of the key variables that determine the success and the failure of project implementation. **Risk Management:** UNIDO will mitigate this risk through detailed development of activities plans in close cooperation with in-country project partners, stakeholders and developers. A thorough stakeholder consultation process will be conducted in the context of finalizing the scope of the project during the PPG phase. Agreed and transparent modus operandi will be designed before the start of the project implementation.

**Sustainability risk:** failure to achieve project outcomes and objective after successful delivery of outputs. **Potential impact:** High **Probability:** Medium. By making industries, suppliers and EE experts fully aware of the economic potential for EE improvements in manufacturing sector, and equipping them with capacity and tools to realize and reap the benefits of such potential, the project would generate a self-reinforcing market pull for EE in industry. In addition, the policy-making outputs of the project would create the conditions to produce and sustain a policy-driven push for IEE. Such balanced and flexible policy-push and market-pull being created by and through the delivery of project outputs is expected to ensure the attainment of the project outcomes and their sustainability.

**H. THE EXPECTED COST-EFFECTIVENESS OF THE PROJECT:**

The project takes a comprehensive approach to address many of the barriers that are preventing the Cambodian manufacturing sector from achieving the full economic potential from energy efficiency improvements. The strategy of the project to achieve high cost-effectiveness is based on integrating the principles of cleaner production and energy efficiency.

The project itself, the tools, and training provided are the means for energy savings in the country. The CO<sub>2</sub> reductions can be estimated from the individual energy efficiency projects elaborated during the pilots and Quick Scans and subsequently the cost per ton per year calculated. This methodology can estimate the \$/ton of CO<sub>2</sub> on a yearly basis and therefore provides an outlook on future cost-effectiveness of the project.

**I. UNIDO’S COMPARATIVE ADVANTAGE:**

The project fits squarely into the GEF Strategic Program Strategic Program 2: Promoting Energy Efficiency in the Industrial Sector. GEF Council document GEF/C.31/rev.1 gives UNIDO comparative advantage for this Strategic Program under the intervention type Capacity building/Technical assistance.

**PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT AND UNIDO**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT ON BEHALF OF THE GOVERNMENT:**

Lonh Heal Technical Director General Ministry of Environment	Date: April 10 2009
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**B. GEF AGENCY CERTIFICATION**

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

Agency Coordinator, Agency name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Dmitri Piskounov Managing Director Programme Development and Technical Cooperation Division UNIDO			Heinz Leuenberger	+43-1- 26026-5611	H.Leuenberger@unido.org