UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT NUMBER	**: XX/CMB/09/X02**
PROJECT TITLE	**: "Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector"**
Starting Date	**: December 2010**
Duration	**: 4 Years**
Project Site	**: Kingdom of Cambodia**
Government	**: Ministry of Environment (MOE)**
Coordinating Agencies	**: Ministry of Industry, Mines and Energy (MIME)**
Host country counterpart	**: Ministry of Industry, Mines and Energy (MIME)** **: National Cleaner Production Office – Cambodia (NCPO-C)** **: Private sector enterprises**
Executing Agency	**: United National Industrial Development Organization (UNIDO)**
Cooperating Agency	**: Ministry of Environment (MOE)** **: Ministry of Industry, Mines and Energy (MIME)**

Project Inputs:	**US$**
- UNIDO inputs (In-kind):	**100,000**
- GEF inputs:	**1,240,000 (excluding PPG of $60,000)** **1,300,000 (including PPG)**
- Support cost on GEF contribution (10%)	**124,000**
- Counterpart inputs:	
❖ **Cambodian Government (In-kind)**	**150,000**
❖ **NCPO-Cambodia (kind/cash)**	**140,000**
❖ **Private Sector (In-kind)**	**90,000**
❖ **Private sector (Cash committed)**	**2,830,000**
- Grand Total	**4,674,000 (excluding PPG)**

Brief Description:

The ultimate goal of the project is to reduce Green House Gas (GHG) emissions and specific energy consumption (SEC) from Cambodian industry. The Objective will be achieved by demonstrating economic and environmental benefits, strengthening institutional capacity and establishing a policy and legal environment that enables and supports sustainable adoption of energy efficient technologies and management as an integral part of industries' business practices. An environment in which a cadre of well-trained and equipped experts in energy efficiency including management and system optimization assists and offer services to industrial enterprises in developing and implementing energy efficiency improvement projects.

The project will address many of the existing barriers to industrial energy efficiency (IEE), to deliver measurable results and to make an impact on how Cambodian industry manages energy through an integrated approach that combines capacity building and technical assistance interventions at the institutional, policy, market and project/investment level.

Primary target groups of the project are industries from 5 selected energy intensive industrial sectors, industry decision-markers, managers, consulting companies/engineers, energy professional, industrial equipment vendors and energy efficiency policy-making and implementing institutions.

The project will provide technical support to Ministry of Industry, Mines & Energy (MIME) to develop and help establish market oriented policy and regulatory instruments needed to support sustainable progression of Cambodian industries towards international best achievable energy performance and to stimulate the creation of a market for industrial energy efficiency (IEE) products and services. Project will also provide part financial assistance for implementation of technology options to participating units which has committed co-financing of identified techno-economical IEE measures. The project will build knowledge and in-depth technical capacity for IEE, for focusing on energy management and system optimization, between enterprises, industry and energy efficiency professional and relevant institutions. For climate change mitigation in industries, project will co-ordinate with Climate Change Department (CCD) under Ministry of Environment (MOE).

The project will also provide investments-specific technical assistance, including financial engineering studies and project financing, to support the development and implementation of a limited number of pilot IEE projects with high replication or energy saving potential in key sectors of Cambodian industries food processing, garments, rubber processing, rice processing and brick Kilns.

Approved:

	Signature:	Date:	Name and Title
On behalf of the Kingdom of Cambodia			
On behalf of UNIDO			

A. CONTEXT

A.1. Origin of Proposal

The present project has been developed as result of an official request from the Minister of Environment of Kingdom of Cambodia to UNIDO to assist in the development and implementation of a GEF Climate Change Project on industrial energy efficiency. UNIDO initiated project design and preparation work under project GF/CMB/09/002 (Identification of Energy Efficiency Needs in Cambodia) which led to the formulation and submission to the GEF of the Project Information Form (PIF) and Project Preparation Grant (PPG). After approval of the PIF and PPG the design and formulation of the project proposal has been finalized through PPG resources made available by the GEF and Implementing Agency UNIDO.

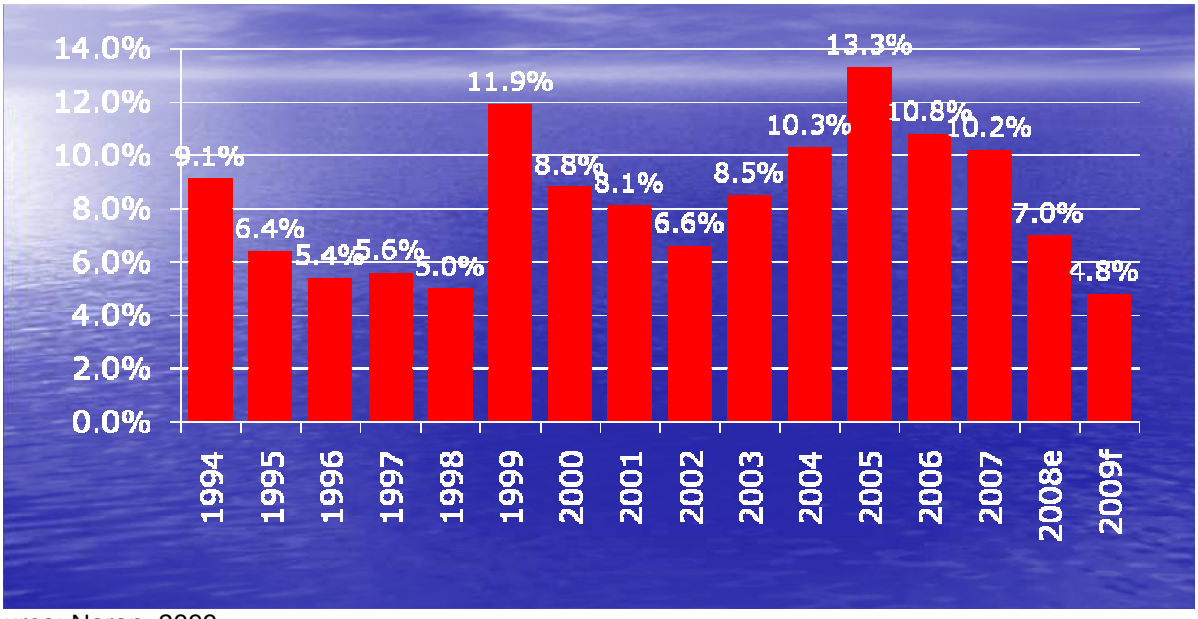
A.2. Background

Cambodia is situated in the fast growing region of south-East-Asia and classified as least developed country (LDC). After climbing to an all time record of 13.4 percent in 2005, growth of real GDP slowed to 10.4 percent in 2006 and was pegged at 9.6 percent in 2007. Mainly due to the sustained high growth poverty incidence dropped from 35% in 2004 to an estimated 31% in 2007. During the decade ending 2007, Cambodia doubled the per capita GDP to US$589 which is expected to reach to US$1,000 by 2015, possibly even earlier when oil and gas production comes on stream.

Important contributions for the strong economic performance in recent years came from steady growth in agriculture (40 percent), sustained growth of tourism receipts (10.2 percent), the continued growth in garment exports (10 percent which was effected by global recession in 2008-9) and the continued expansion of financial services (22.2 percent) and construction activities (4.3 percent).

In year 2008-2009 GDP slowed down as a result of global recession particularly in export oriented sector like garment. Economic performance trend from 1994 onwards and projected for financial year 2009 showing impact of Global Financial meltdown on Cambodian GDP is presented below in Figure -1.

Figure 1: Global Financial Crisis Impact on Cambodia GDP



Source: Naron, 2009

It is projected that Cambodia will fare much better than other countries in the region due to lack of exposure of Cambodian banks to the US sub-prime. Cambodian resources position has been favorable and was doubled during the last two and a half years only, from $1 billion in 2006 to $2 billions in 2008. It took 12 years for Cambodia gross foreign income from $100 millions in 1994 to $ 1 Billion in 2006.

Nevertheless, Cambodia is also currently facing two important albeit manageable challenges:

1. future industrial growth as well as the growth in its exports in what are becoming increasingly competitive regional and global markets: indirect impact of the global financial crisis particularly in export oriented sectors, tourism and construction sector
2. Slow progress in technology development to use alternative local sources of energy (needed because of the limited traditional energy resources in Cambodia) could well limit the country's future economic growth, and more specifically industrial outputs.

Gross Domestic Product by Sectors

Industry: The country's Industrial sector has been one of the main engines of real GDP growth, which accounted for 30 percent of GDP also saw significant growth of 12.3 percent in 2005, after an increase of 16.8 percent in 2004. Industry's growth continued to be strong though in 2007 it dropped to 7.5 percent. The key contribution came from construction and mining activities, as well as the exports of textiles and garments. The textile and garment sub sector, which accounts for nearly half of the value added of the industrial sector, grew at a slower pace. Rice sector is growing fast and Cambodia from 2009 onward is a net exporter of rice and is expected to double its production and processing in next 5 years.

Table 1: Share of GDP from Main economic sectors 1998 to 2007.

Sectors	1998 (%)	1999 (%)	2000 (%)	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)
Agriculture	47.1	43.5	37.9	36.7	34.0	34.3	32.7	30.3	29.6	28.9
Industry	17.9	19.1	23.0	23.6	25.8	26.9	27.7	28.3	29.2	30.0
Service	35.0	37.5	39.1	39.7	40.2	38.8	39.6	41.4	41.2	41.1
Total GDP	100	100	100	100	100	100	100	100	100	100

Source: NIS, 2003a; and MEF, 2007

Agriculture: Agriculture sector traditionally was dominating in Cambodian economy having 29 percent share in 2001 which is presently placed at 3rd position after service sector and industrial sector contributing 41 percent and 30 percent share of GDP respectively. The growth of agriculture sector is highly dependent on climatic conditions which keep fluctuating year to year. Rice production accounts for over 10 percent of GDP and have significant potential to improve its share by fast increasing exports and specializing in organic rice production to create more value of their product. Recently launched policy of paddy production and rice export by NSEC July 2010 and announced by Prime Minister Hun Sen to increase share of Rice production and export to 20% in country GDP (Cambodia Daily, 18th August 2010)

Service: Services sector contributes 41 percent of GDP and plays a significant role in Cambodian economy. Service sector grew 12.1 percent in 2005 and 10.0 percent in 2007, the same rate as in 2006. All the sub sectors of services have shown robust growth. The expansion of the tourism and hotel industry continued, with a growth rate of 10.2 percent. In 2007, a total of 2 million tourists visited Cambodia

A-3. Problem

Electricity: The most constraining factor to manufacturing firm development, as determined in BRC and NZIER survey (Bailey, 2009), was the cost as well as availability of electricity. Many of the owners and managers interviewed were in opinion that high cost of electricity to be a function of Government and infrastructure inefficiency. Generally business people were aware of the comparable prices paid for power in neighboring countries and at the boarder where electricity was imported to Cambodia (almost half the price paid in Phnom Penh). A significant share of the electricity used in Phnom Penh, about 95 percent in 2007, is generated from diesel power plants. There is no national grid or high voltage transmission system which leads to large losses during transmission and distribution.

Energy cost specifically electricity cost constrain business development in Cambodia is the high use of

generator electricity and the lack of electricity-intensive industry in the country. According to the World Bank, 36.2 percent of electricity in the manufacturing sector comes from the generators (World Bank 2009).Better supply lower costs and energy efficiency policy may open the door for investment in energy intensive manufacturing sectors.

Finance: Access to finance was ranked as the second most severe constraint in BRC and NZIER 2009 survey and as a minor or moderate constraint to many companies surveyed by the World Bank. To some extent these responses may have had something to do with timing. Food and beverage manufacturing firms consider access to credit a larger constraint than any other type of firm, and almost as much of a constraint as electricity costs. This is quite probably a consequence of their size and domestic origins. A number of the food and beverage firms participated in cleaner production programme were of a size where they could no longer rely on traditional, generally informal, sources of credit for expansion. Hagar Soya, for example, reported that they had been seeking a US$ 3 million loan for investing in a new plant, and was closed due to non-availability of finance. Ly Ly food Industry Co. Ltd., (participating in GEF-UNIDO project), with more than 120 staff currently also reported difficulty borrowing from informal or formal lenders due to the relatively large amounts of capital they required for investments. Garment manufacturing firms, on the other hand, were generally provided capital for operating and expansion from their parent companies. The brick and Rice millers surveyed were considerably smaller than the larger food and beverage companies surveyed. As such, finance from family and friends were reported to be enough to fund their investments.

Although bank credit has been growing rapidly in Cambodia the financial sector is still under-developed. Potential foreign investors should be aware of the difficulty involved with accessing credit domestically: demand is generally greater than supply; the cost of credit is relatively high; financial services are relatively under-developed; and it may be difficult to use land as collateral. On the other hand, Cambodian law was changed in 2007 to allow banks to use moveable and intangible assets as collateral and financial markets have been developing quickly with the presence of a number of new international banks.

Concern for Industrial Energy Efficiency: 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 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. As per IFC energy benchmarking studies in Garment sector (IFC-2009), average energy intensity is 42 GJ/ton of garment produced which is very high compared to comparable Garment sector in the region. In brick kiln as per survey conducted during PPG phase energy intensity per Kg brick fired in Cambodia is 7 MJ compared to 2-2.5 in similar kilns in other Asian countries and 1-1.2 in kiln using Vertical shaft Brick Kiln (VSBK) technology.

As per the National communication-2 (NC-2) draft report, Manufacturing Industries consume large amounts of diesel and fuel oil and certain industries such as the garment, food processing and brick works also consumes large amounts of fuel wood that contributes to deforestation. The mitigation options proposed in NC-2 include energy efficiency reducing emissions by about 20% and technology change that can reduce emissions about 40% for some even up to 70% for instance for rice mills using rice husk gasification technology or with combined heat and power generation or co-generation using other sustainable biomass sources.

Baseline Emissions Scenario (extracted from National Communcation-2 Draft report)
The results of the analyses per sector and forecast till 2050 result in the Baseline Emissions Scenario (see Table) show an increase in total CO_2 eq. emissions from 2,712 Gg (thousand tones) in 2000 to 25,947 Gg (thousand ton) in 2050 an increase of more than 950%. The GHG emissions contribution in terms of CO2 equivalent calculated were equal to 0.2 tCO_2 per capita in 2000 compared to projected 1.3 tCO_2 in 2050.

TABLE-2: EMISSIONS IN GG CO_2 EQUIVALENTS FOR MANUFACTURING AND CONSTRUCTION INDUSTRIES

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Rice Milling	108	157	201	221	244	270	298	329	363	401	443
Brick Works	2	6	9	11	13	16	19	23	27	33	40
Garment Industries	117	115	113	113	113	113	113	113	113	113	113
Rubber Factories	18	14	11	11	11	11	11	11	11	11	11
Cement Factories	3	4	6	7	9	11	13	16	19	23	28
Other Industries	84	217	349	465	533	604	691	779	881	998	1132
Total	333	513	689	828	923	1024	1144	1270	1414	1578	1766

Source: Generated with LEAP assuming 4% increase per year after 2010 for the rice milling, brick works, cement factories and Other Industries.

As per second National Communication (SNC) report the industry (manufacturing sector) contribution in total GHG emission in 2010 is calculated as 12.2% excluding GHG contribution from electricity used by Industries purchased from grid and accounted under energy sector. The total contribution of GHG by manufacturing sector workout to be more than 20% and if biogenic CO_2 is also accounted it will be approx 30% equivalent to its share in national GDP.

TABLE-3: TOTAL EMISSIONS INCLUDING BIOGENIC CARBON DIOXIDE 2000-2050 IN GGCO_2 EQ.

Standard emissions	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
A1 Energy Industries	385	1,008	1,453	1,212	1,931	2,849	3,539	4,430	5,567	7,023	8,888
A2 Manufacturing Industries	333	513	689	828	923	1,024	1,144	1,270	1,414	1,578	1,766
A3 Transport	765	1,318	2,082	2,566	3,163	3,900	4,812	5,941	7,338	9,069	11,214
A4 Other Sectors	1,229	1,304	1,392	1,482	1,658	1,977	2,285	2,623	3,025	3,505	4,079
Sub Total	2,712	4,144	5,616	6,088	7,674	9,751	11,781	14,264	17,344	21,175	25,947
Biogenic CO2 Emissions	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
A2 Manufacturing Industries	243	999	1,663	1,935	2,138	2,366	2,643	2,950	3,314	3,743	4,253
A4 Other Sectors	10,284	9,373	8,595	7,807	6,878	6,549	6,016	6,276	6,577	6,923	7,324
Sub Total	10,527	10,372	10,258	9,742	9,016	8,915	8,659	9,227	9,890	10,667	11,577
Total	**13,239**	**14,516**	**15,874**	**15,830**	**16,690**	**18,666**	**20,440**	**23,491**	**27,234**	**31,842**	**37,524**

Source: Generated with LEAP, using default emissions and emission for biogenic CO_2

Barriers for adoption of energy efficiency

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. Nevertheless, Cambodian institutions and enterprises have so far failed, to a great extent, to respectively support and reap the benefits of such potential for efficiency improvement and subsequent energy and cost savings.Major limitation in penetration of such products and services into Cambodian industries are

a. *The lack of competent local suppliers of energy efficient technologies after-sales services, inadequate IEE policies, institutions and regulatory framework, and the lack of resources to effectively promote and support energy efficiency in industry.*

Despite good progress over the last decade in preventive approach like application of cleaner production in private sector, institutional and legal framework is still inadequate and it has not generated tangible results. Government technical capacity remains seriously constrained by lack of financial and human resources,

and expertise to implement substantive and effective policies and programs to promote and support energy efficiency in industry. In 1994, the Royal Government of Cambodia also 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. In addition, slow progress in technology development to use alternative local sources of energy (needed because of the limited traditional energy resources in Cambodia) is acting as a brake on the country's future economic growth, and more specifically its future industrial growth as well as the growth in its exports in what is becoming an increasingly competitive regional and global market. Therefore, there is an urgent need for the country to identify and develop the options available to it to satisfy the country's energy requirements using locally available resources. However, this must be done while at the same time pursuing environmental and social sustainability through application of resource efficiency having Energy efficiency as a cross cutting issue**:**

b*. lack of understanding among industry decision-makers of their economic potential for energy efficiency improvements.*

While most enterprises now are concerned for energy costs, they have limited awareness and understanding of the financial and qualitative benefits that energy management and energy efficiency can deliver. On the one hand this is consequence of lack of information about what is technically feasible and what is commercially available with regard to IEE. There are limited structured IEE dissemination and education programs. On the other hand, inadequate energy data monitoring and analysis practices and insufficient technical capacity are the causes of poor energy performance assessments and subsequent impossibility to size the potential energy and costs savings.

c. *insufficient technical capacity within enterprises and in the market to identify, develop and implement industrial energy efficiency projects and measures.*

Energy audits carried out during the PPG as well as during ongoing CP programme of UNIDO and MIME, have shown limited understanding of energy benchmarks, energy system efficiency and impact of operating conditions. For instance, units employing thermal energy for various applications have low technical awareness in generation efficiency, distribution losses and optimum operating parameters which influence energy use. Major attention is focused on production against productivity of resources.

During PPG survey and also results from ILO-IFC-GMAC Benchmarking survey in Garment sector it was noticed that even export oriented enterprises like Garment sector has limited record and reports on specific energy consumption. Therefore, at the level of planning, implementation, and performance review practices show inconsistencies and lack of systematic approach. In the majority of Cambodia enterprises specially SME sector like Rice milling, Brick kilns, small Food and beverage industries there is generally lack of awareness on economic and environmental benefits of IEE measures as well as on structured approach to managing energy.

Interviews of equipment vendors and service providers to industry as well as meetings with representatives of other international technical assistance programs to enterprises have shown that there is very limited and partial availability of expertise and services on industrial energy efficiency. As most of vendors of technology suppliers are from other countries and suppliers interviewed by the GEF UNIDO project team during the PPG phase realizes that after sale service as well as assistance in improving energy use and efficiency is often missing. The lack/non-existence of qualified industrial energy efficiency auditors and experts has been reported by all ongoing international technical assistance programs as well as identified by the Government as key barrier to improve energy efficiency in Industrial sector in Cambodia.

d. Financing and credit constraints faced by private enterprises.

One of the most important requirements to implement IEE is often to upgrade their production technology which may require substantial finance. Credit worthiness of most of SME's due to poor balance sheet coupled with high lending interest rates, have forced most of the enterprises to invest limited finance from

their own resources and preference is given on expansion of production and investment for projects like environmental management and energy efficiency gets back seat.

Based on interviews with companies as well as market studies the shortage of funds for the development and preparation of IEE projects have surfaced as probably the most critical financing barrier to the implementation of IEE projects, because once shown with detailed cost-benefit analysis some enterprises would be prepared or able to invest. As of 2009 no dedicated fund and credit line was in place for supporting the development and implementation of industrial energy efficiency projects.

A.4. Target Beneficiaries

The current project is focused on potential energy savings and GHG emission reduction in energy intensive industrial sectors a) Garment, b) Rice milling, c) Rubber refining d) Brick kilns and e) Food and Beverage (proposed during consultation workshop) sector in Cambodia. During PPG stage different scenarios of selected sector, current baseline emissions, future demand and production forecast possible areas of IEE and GHG reduction were worked out and presented as annexure-1.

The project also seeks to address many of the existing barriers as mentioned above to industrial energy efficiency (IEE), to deliver measurable results and to make an impact on how Cambodian industry manages and uses energy through an integrated approach that combines technical and financial assistance in implementation of IEE pilot projects in selected enterprises (who has committed for co-financing) substantial capacity building with technical assistance interventions at the policy, Energy efficiency standards, energy auditor accreditation and scale-up activities of IEE achievements through pilot demonstration.

In nutshell energy efficiency with low carbon alternative technologies offers the most comprehensive solution for Cambodia to achieve these twin goals of energy security and sustainable energy solutions. Primary target groups of the project are manufacturing enterprises decision-makers (managers and engineers), industrial equipment/after sale service vendors, energy professionals and service providers (both in public and private sector), and energy efficiency policy-making and implementing institutions.

B.REASONS FOR UNIDO ASSISTANCE

UNIDO is one of the Global Environmental Facility (GEF) implementing agencies having comparative advantage in the development and implementation of Industrial Energy Efficiency (IEE) projects.
UNIDO received formal request from the Ministry of Environment (MOE) of Kingdom of Cambodia to assist in the development and implementation of a GEF Climate Change project on Industrial Energy Efficiency.

UNIDO has long–standing experience in the development and implementation of industrial energy efficiency and resource efficient technologies in developing countries and emerging economies. It has strong understanding of how policy, normative, technical, market ad financial variables can effect energy efficiency in manufacturing and process industries. In recent years UNIDO has built on and strengthen such expertise by incorporating in its approach to IEE the promotion and introduction of energy management systems and standards as principal tool to integrate energy efficiency in the manufacturing sector corporate practices. UNIDO is internationally recognized as leading advocate and technical assistance provider for IEE policies, industrial energy system optimization and energy management system/standards.

C. PROJECT

C.1- Objective of Project

The ultimate goal of the GEF project is to reduce specific energy consumption of industrial production per unit of production leading to net reduction in global greenhouse gas (GHG) emissions. The goal will be achieved through contributing to establishing pilot projects, policy and normative environment that enables and supports sustainable adoption of energy efficient technologies and management as an integral part of industries' business practices; and environment in which a cadre of well-trained and equipped experts in

energy management and system optimization assists industries in developing and implementing energy efficiency improvement projects (techniques and technologies).
Demonstration of IEE benefits, Capacity building, institutional strengthening, up-scaling of implementation for IEE and Climate Change mitigation in Cambodian manufacturing sector is a major element of this project. Initially the directly involved partners will be given priority for IEE capacity building and implementation support but gradually other government agencies and the broader society will profit from increasing attention.

C.2. UNIDO Approach

The final goal of the UNIDO Industrial Energy Efficiency (IEE) Programme is to effect sustained energy management and efficiency practices in industry of developing countries and emerging economies in order to reduce the environmental pressure of economic growth while increasing productivity. UNIDO pursues such goal through projects aimed to deliver comprehensive capacity building at the institutional level, in the market and within enterprises on energy management and energy system optimization. UNIDO projects provide also technical assistance to strengthen existing institutional, policy and regulatory frameworks through the development of policy programs, legislation and normative instruments that promote and support permanent integration of energy management and efficiency practices in industry corporate culture. Depending on the national context, the implementation of demonstration projects is supported through the provision of energy efficiency investment specific technical assistance.

In its GEF industrial energy efficiency projects, UNIDO approach to promote and support IEE proposes to use a combination of measures aimed to generate a push to the market for IEE and a market pull for IEE. The push to the market is built via policy and normative interventions, including best practice IEE dissemination and recognition programs, peer-to-peer networks, sector benchmarking, fiscal incentives, target setting agreements and national energy management standards. The market pull is built via establishing Pilot projects on IEE, awareness raising and training curriculum to both prospective 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 creation of a cadre of strong national experts in the fields of energy management and energy system optimization (boilers, furnace, kilns, pumps, air compressor, motors, refrigeration and others) completes UNIDO approach by providing the link between and the response to these market push and pull.

The GEF UNIDO project for Cambodia follows such approach, it seeks to address many of the existing barriers to industrial energy efficiency (IEE), to deliver measurable results and to make an impact on how Cambodian Industry manages and uses energy through an integrated approach that combines substantial capacity building with technical assistance interventions at the policy and IEE project level.

The project consists of five technical components.

Project Component 1 (PC-1): Providing technical and part financial support for Implementation of industrial energy efficiency projects in selected sector to demonstrate financial and environmental benefits of Industrial energy efficiency including reduction in Green house gas (GHG) emissions. Compilation and publication of results from Quick scan and pilot demonstration in a compendium as tool for wider scale application

Project Component 2 (PC-2) primarily focuses on addressing building technical capacity within enterprises and in the support institution and market to identify, develop and implement industrial energy efficiency projects and continually improve energy performance. As integral part of PC2 component (capacity building) local suppliers for process technology and IEE services will be promoted to reduce cost of implementation and also network of IEE service provider will be established.

Project Component 3 (PC-3) Strengthening of institutional framework for industrial energy efficiency aims to address the capacity building of Government department responsible for IEE promotion, financial institutions to evaluate IEE proposals for financing (total costing incl. environmental and health associated costs)

Project component 4 (PC-4) Aimed at increasing adoption of energy efficiency practices and technologies by Cambodian enterprises as an integral part of their business practices. PC-4 will also work with at least 40 enterprises to identify, develop and implement IEE related projects on their own and will assist in (Quick scan) compiling a number of case studies for dissemination and scaling up.

Project Component 5 (PC-5) aims to address the inadequacy of existing policies, institutions and regulatory framework to effectively promote and support industrial energy efficiency and the lack of technical expertise, resources and programs that lay behind it. PC5 will also make a major contribution towards for developing tracking and benchmarking of energy consumption and establishing energy auditor accreditation programme.

Output and activities description for all 5 project components and 5 expected outcomes are presented in Table-4.

As for the project implementation arrangement, UNIDO holds the ultimate responsibility for the implementation of the project, the delivery of the planned outputs and the achievement of the expected outcomes. The project will be directly executed by UNIDO in collaboration with Climate Change Department (CCD) Ministry of Environment (MOE), National Cleaner Production Office- Cambodia (NCPO-C) and close co-operation with the Ministry of Industry, Mines and Energy (MIME).

UNIDO will be responsible for the general management and monitoring of the project, and reporting on the project performance to the GEF. UNIDO will be in charge of procuring the international expertise needed to deliver the outputs planned under the three project components. It will manage, supervise and monitor the work of the international teams and ensure that deliverables are technically sound and consistent with the requirements of the project.

As agreed with the Government of Cambodia Ministry of Industry, Mines and Energy (MIME) will have overall coordination responsibility while the National Cleaner Production Office-Cambodia hosted by MIME will be responsible for most of the substantive work to be performed during the Project execution.

A Project Management Unit (PMU) will be established within the National Cleaner Production Office-Cambodia. The PMU will consist of the National Project Manager (NPM), Project Coordinator, National climate change expert, National GHG mitigation expert, Translator, and Project Administrative Assistant (PAA). The PMU will be responsible for the day-to-day management, monitoring and evaluation of project activities as per agreed project work plan in close collaboration with part time Chief Technical Advisor (CTA) UNIDO, the Ministry of Industry, Mines and Energy (Energy Efficiency Office) and Climate Change department (CCD) of Ministry of environment. The PMU will coordinate all project activities being carried out by project national experts and partners. It will also be in charge of the organization of the various seminars and training to be carried out under Project Components 2-5. The PMU will be partly funded by the GEF budget and partly co-financed by NCPO-C. During the whole implementation period of the project UNIDO and NCPO-C will provide the PMU with the necessary management and monitoring support.

A Project Advisory Committee (PAC) will be established for periodically reviewing project implementation progress, facilitate co-ordination between project partners, provide transparency and guidance, and ensuring ownership, support and sustainability of the project results, The PAC will have a balanced representation from key ministries, public institutions, private sector, NGOs, UNIDO and other international organizations partnering in the project or having relevant ongoing programs and it will be chaired by Secretary of States of MIME co-chaired by GEF Political Focal Point of Cambodia. The final composition of the PAC will be defined during the project implementation start-up phase. The PAC is envisaged to meet twice a year.

At the beginning of project implementation a detailed working plan for the entire duration of the project will be developed by UNIDO in collaboration with the PMU, MIME, MOE and the international teams of experts. The working plan will clearly define roles and responsibilities for the execution of project activities, including monitoring and evaluation; it will set milestones for deliverables and outputs. The working plan will be used

as management and monitoring tool by PMU and UNIDO and reviewed and updated as appropriate on a biannual basis. Fig. 2 shows a diagram of the project implementation arrangement.

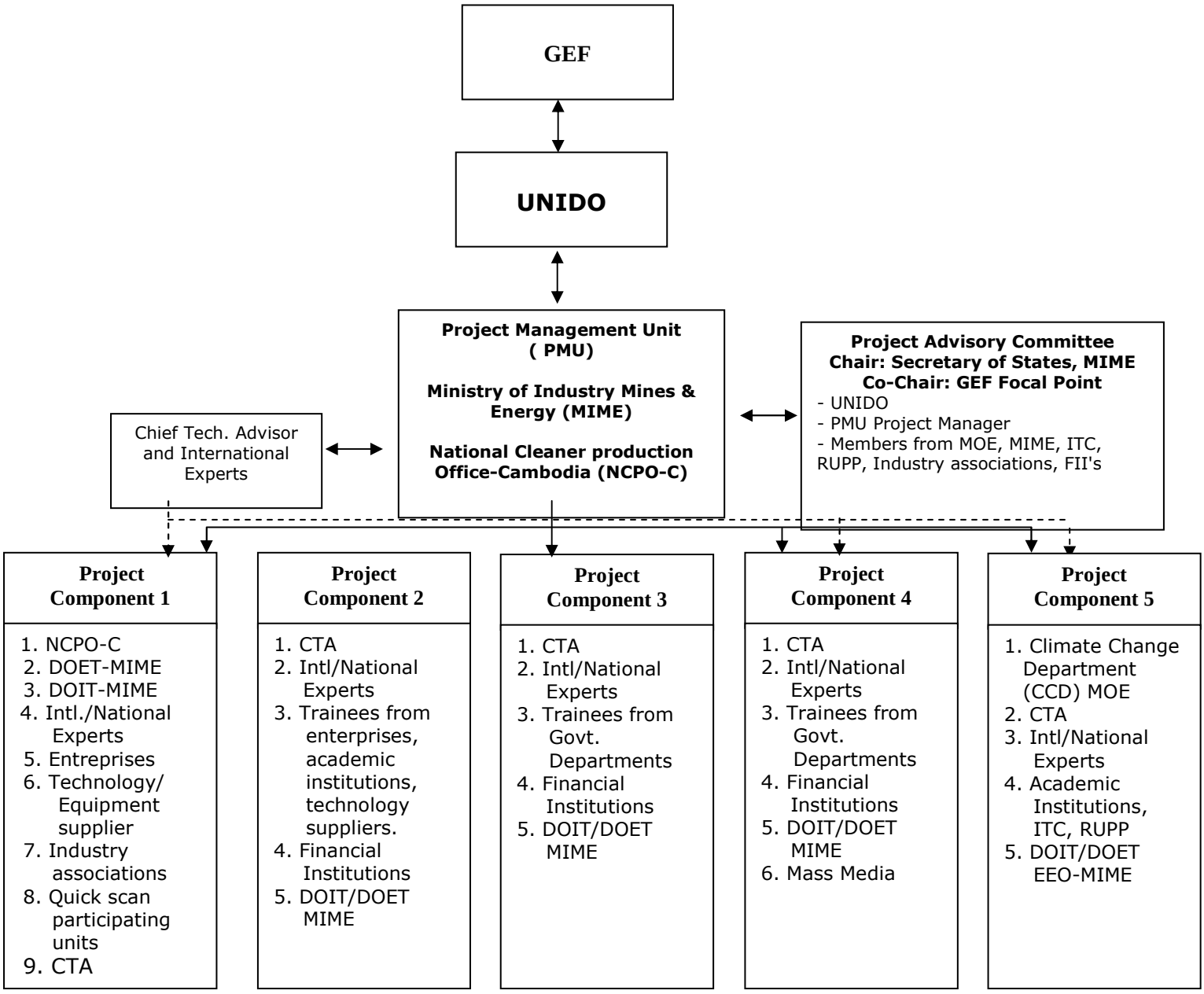


Figure-2: GEF-UNIDO Project implementation structure.

The GEF-UNIDO project will closely coordinate with other climate change related ongoing as well as planned relevant initiatives to ensure maximum synergies and overall impact of related technical assistance to Cambodia.

The GEF-UNIDO project will closely collaborate with the Climate Change Department (CCD) of Ministry of Environment (MOE), Energy Effeciency Office, Ministry of Industry, Mines and Energy (MIME) and NCPO-C. GEF-UNIDO project will also provide technical assistance to prospective sub-borrowers and participating banks for development and techno-economic due diligence of projects.

Project will synergize with Cambodian Climate Changed Alliance (CCCA) a multi-donor initiative (funded by SIDA, DANIDA, EC and UNDP) to address Climate Change and Disaster Risks reduction in Cambodia. On the one hand, it aims at creating conditions in the form of capacity development and institutional strengthening to preparing for and mitigate climate change risks, and on the other hand, to directly help vulnerable communities by enhancing their resilience to climate change and other natural hazards. The overall objective of the CCCA is that *Climate Change activities in Cambodia are nationally owned, led and aligned with Cambodia's development priorities, and are effectively coordinated and implemented.* CCCA has 3 results as the following (1) NCCC capacity to coordinate national policy making, capacity development, and outreach/advocacy efforts, and to monitor the implementation of national climate change strategy is strengthened; (2) A platform is established and in operation providing Cambodia with update knowledge and learning opportunities on climate change; and (3) Key ministries, agencies and civil society organizations have access to financial and technical resources to design, implement and monitor climate change adaptation interventions.

The GEF-UNIDO project is also seeking collaboration and discussing possible co-financing agreement with the local financial institutions/Banks.The availability of increased financing for IEE through the Rural Development Bank (RDB) for agro sector, commercial banks and the creation of Energy Service Companies (ESCOs) inherent in the forthcoming Law on Energy Efficiency will provide market conditions conducive for progressive and sustained scaling-up of industrial energy efficiency projects and performance improvements, and consequent global environmental benefits. In addition, UNIDO and its Cambodian counterparts (Ministry of Industry Mines and Energy) will continue to discuss with other donor/financing agency like NEDO, JICA Japan, IFC Cambodia, SECO (Green Credit Line) on the possibility of cash co-financing contribution to the GEF UNIDO project.

C.3. RBM code and thematic area code

EAC-CE13

C.4. Expected outcomes

The **expected outcome** of the project are :

Outcome-1: Demonstrable energy savings in participating companies through IEE pilot projects.
Outcome-2: Supply of national service providers in IEE available (to match demand in component 4).
Outcome-3: Stronger institutional framework in place to ensure long-term support for energy use reduction efforts in enterprise.
Outcome-4: Increased adoption by Cambodian enterprises of energy efficient practices and technologies as an integral part of their business practices.
Outcome-5: Establishment of policy, legal and regulatory frameworks that sustainably promote and support industrial energy efficiency.

C-5. Output and activities

The project consists of five technical components plus project management:

1- Implementation of Industrial energy efficiency pilot projects and quick scan projects.
2- Capacity building and development of tools for implementing industrial energy efficiency
3- Strengthening of institutional framework for industrial energy efficiency
4- Up-scaling of Energy efficiency implementation in Cambodia
5- Formulation and implementation of policies, regulations and programmes to promote and support sustainable industrial energy efficiency.

Table 4: below describes how the technical project components relate to the planned outputs and expected outcomes.

Project Component	Expected Outputs	Expected Outcomes
1. Implementation of Industrial energy efficiency pilot projects.	**Output 1.1.** 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. **Output 1.2.** 13 pilot IEE projects for cumulative 15,000 TOEs** of energy savings over the investments duration are implemented by enterprises, from selected 5 industrial sectors, partnering in the project. **Output 1.3.** Results of the pilot projects both in economic and environment context are compiled in a compendium for effective dissemination.	Demonstrable energy savings and related GHG emission reduction in participating companies through IEE pilot projects and quick scan participating units
2.Capacity building and development of tools for implementing industrial energy efficiency	**Output 2.1** A cadre of at least 40 national experts from relevant support institutions (NCPO-C academic institutions, industry associations, Ministry of Industry, Mines and Energy) consulting Cos. 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. **Output 2.2** These professionals are registered and empanelled as resource person in a network of service providers (RECP) aimed to assist companies in implementing industrial energy efficiency. **Output 2.3** Local suppliers of relevant technologies (kilns, boilers, etc.) are trained in IEE. Potential local suppliers are supported, to ensure more cost-effective technology and more reliable after-sales service. **Output 2.4** Web-based guidance tool/manual on IEE developed.	Supply of national service providers in Industrial Energy Efficiency & Energy Management available (to match demand created in component 4)
3. Strengthening of institutional framework for industrial energy efficiency	**Output 3.1** Capacity building of relevant Govt. Departments to promote industrial energy efficiency. **Output 3.2** Companies are trained in preparation of bankable IEE project proposals. **Output 3.3** Capacity building of financial institutions to assess investment proposals in IEE. **Output 3.4** Practical Guide for the Implementation of Energy Management in Industry in compliance ISO 50001 international standards is developed..	Stronger institutional framework and IEE tools are in place to ensure long-term support for reduction in Energy intensity and GHG emissions in manufacturing sector
4. Up-scaling of IEE in Cambodia	**Output 4.1** The results of the pilot projects and Quick Scans are widely disseminated. At least 40 IEE projects for cumulative 45,000 TOEs of energy savings are developed and implemented by industrial enterprises as result of their participation in the capacity building program and results achieved by participating pilot units in the GEF-UNIDO project. **Output 4.2** Industry decision-makers understand their potential for energy efficiency gains and undertake energy efficiency activities.	Increased adoption by Cambodian enterprises of energy efficiency practices and technologies as an integral part of their business practices.

	Output 4.3 Other stakeholders including technology /equipment suppliers will understand their role to promote industrial energy efficiency.	
5. Formulation and implementation of policies, regulations and programmes to promote and support sustainable industrial energy efficiency.	**Output 5.1** Mechanisms for mainstreaming IEE concepts and policy instruments have been created at suitable administrative levels in relevant RGOC policies and regulations. **Output 5.2** Procedures for tracking and benchmarking energy consumption in industry are developed and established. **Output 5.3.** National Energy Auditor Accreditation (NEAA) programme is establishedCertification Program is developed and established.	Establishement of policy, legal and regulatory frameworks tha promote and support sustainable industrial energy efficiency and stimulate the cretion of a national market for IEE products and services

** TOE's Tonnes of Oil equivalent

Outputs and activities

The project includes 17 outputs covering the five components and contributing outcomes (as presented in Table-1 above). The key activities for realisation of each of these outputs are given in Table-5. The Logical Framework (provided in Annex I) provides further details on the outputs and activities, including key performance indicators for Programme monitoring and evaluation, and underlying assumptions.

Table 5: Overview of outputs, activities and responsibilities

Activities	Responsibility
Output 1.1: **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.**	
1.1.1 Organise launching seminar for GEF IEE project to elaborate Goals objectives and modus operand. 1.1.2. Finalize identification, selection and MOU with quick scan enterprises in collaboration with enterprises and sector specific industrial associations. 1.1.3. Clearly define GEF project technical assistance support and enterprises contribution. 1.1.4 Support demonstration companies with energy audit, project development and/or implementation of feasible IEE options to 40 identified quick scan company. 1.1.5 Monitoring and reporting of energy savings (net and specific) and GHG emission reduction.	UNIDO, MIME, International Expert/CTA, PMU, Industry associations, Partner enterprises
Output 1.2: **13 pilot IEE projects for cumulative 15,000 TOEs of energy savings over the investments duration are implemented by enterprises, from selected 5 industrial sectors, partnering in the project**	
1.2.1. Finalize identification, selection and MOU with selected pilot units in collaboration with industry specific associations and enterprises that have signed co-financing commitment letters 1.2.2. Clearly define GEF project technical assistance & financial support in implementation of investment specific projects and enterprises contribution (in-kind and cash). 1.2.3 Technical assistance for Energy Audits, EE potential, selection of IEE technologies, project development and/or implementation 1.2.4 Recording, Monitoring and reporting of energy savings and GHG emission reduction from IEE implementation 1.2..5 Preparation of detailed EE project report and case studies from results achieved Monitoring and reporting of energy savings (net and specific) and GHG emission reduction	UNIDO, MIME International Expert, Trainees trained under component-2, PMU, NCPO-C, Partner enterprises
Output 1.3: **Results of the pilot projects both in economic and environment context are compiled in a compendium for effective dissemination**	

Activities		Responsibility
1.3.1.	Customise indicator framework for measuring company-level IEE/EM benefits	NCPO-C, PMU, National IEE experts
1.3.2.	Compilation of results achieved in Quick scan and IEE pilot project.	
1.3.3.	Produce and disseminate plain language/local language promotion materials (success stories, fact sheets)	
1.3.4.	Compendium is populated on web site and hard copies distributed through Industry association.	
Output 2.1:	**A cadre of 40 national experts from relevant support institutions , consulting Cos. and independent engineers, are equipped, though classroom and on the job training with the technical capacity and tools required to develop and implement energy efficiency measures in industry.**	
2.1.1	Selection of professionals for IEE/EM training willing to work as IEE professionals/experts in the country.	International Expert, CTA, PMU, NCPO-C, MIME and participating institutions
2.1.2	Assess training and professional development needs Capacity & building in regards to legal, technical, organisational and other aspects of IEE/EM	
2.1.3	Plan and deliver intensive IEE training on prioritised sectors and EMS (12 training modules are envisaged during the project period) applying 6 step approach explained in Project Doc for GEF CEO Endorsement.	
2.1.4	Involvement of classroom trained professionals in IEE quick scan and Pilot projects for providing on the job training, tools and techniques to carry energy audit, training on usage of field monitoring equipments.	
2.1.5	Support demonstration companies with implementation of techno-economically feasible IEE options	
2.1.6	Develop and implement a quality management system for IEE Experts report.	
Output 2.2:	**These professionals are registered and empanelled as resource person in a network of service providers (RECP) aimed to assist companies in implementing industrial energy efficiency.**	
2.2.1	Trained professionals after successful implementation of at least 1 IEE project are enrolled in expert roster maintained by NCPO-C Cambodia.	MIME, NCPO-C, PMU
2.2.2	Trained National experts establishes a formal network to facilitate continues up-gradation of skills, marketing of their services effectively	
Output 2.3:	**Local suppliers of relevant technologies (kilns, boilers, etc.) are trained in IEE. Potential local suppliers are supported, to ensure more cost-effective technology and more reliable after-sales service.**	
2.3.1	promotion the development of local suppliers of technology in IEE applications	UNIDO, International Expert/CTA, Team, PMU, technology suppliers, MIME
2.3.2	Assist to creates a network of after-sales services, which is critical for the sustainability of Renewable energy generation and energy efficiency	
2.3.3	Encourage local suppliers to manufacture equipment locally or technology tie-ups with regional suppliers to reduce the capital investment.	
2.3.4	Study visits of local vendors to proven and established IEE technology suppliers particularly in neighbouring countries	
Output 2.4:	**Web-based guidance tool/manual on IEE developed**	
2.4.1	Dedicated portal for IEE project is managed by NCPO-C	NCPO-C, PMU)
2.4.2	Establish, Populate, operate and keep up-to-date IEE website	
2.4.3	Upload guidance manual on IEE methodology, and worksheets to assist easy collection and compilation of baseline data.	
Output 3.1**: Capacity building of relevant Govt. departments to promote industrial energy efficiency**		
3.1.1	Selection of professionals from Govt department responsible for policy formulation and enforcement of national Laws and willing to work as IEE promoter/experts in the country.	International Expert, CTA, PMU, NCPO-C, MIME and participating
3.1.2	Assess training and professional development needs of Govt staff.	

Activities		Responsibility
3.1.3	Plan and deliver intensive IEE training on EMS, IEE policies (8 training modules are envisaged during the project period)	institutions
3.1.4	Involvement of Govt staff in IEE quick scan and Pilot projects for providing on the job training to implement IEE policies.	
3.1.5	Assist government trainees with implementation of IEE policies and regulations	
3.1.6	Develop a quality management system for Govt staff.	
Output 3.2: **Companies are trained in preparation of bankable IEE project proposals**		
3.2.1	Review of existing financial instruments/access to finance by Cambodian industries.	International experts/CTA, PMU and NCPO-C
3.2.2	Development if IEE financial training package in 1st year of project.	
3.2.3	Training of professionals from manufacturing units in preparing bankable proposals.	
3.2.4	In-Company training of financial professionals/	
Output 3.3	**Capacity building of financial institutions to assess investment proposals in IEE**	
3.3.1	Selection of relevant financial institutions (public and private) for training	International expert on finance/CTA, PMU ,NCPO-C and financial institutions
3.3.2	Development if IEE financial training package suitable for financial experts to enable dynamic decision making tool for lending.	
3.3.3	Training of professionals from financial institutions/private banks in comprehensive evaluation of proposal received for financing and helping their client in preparing bankable proposals.	
Output 3.4**: Practical Guide for the Implementation of Energy Management in Industry in compliance ISO 50001 international standards is developed**		
3.4.1.	Define priority areas in need of technical guidelines for IEE/EM complying ISO 5001 standard.	PMU , CTA, NCPO-C and International Energy and Management experts.
3.4.2.	Recruit international experts and national experts for development of technical guidelines	
3.4.3.	Draft technical guidelines and translate into local language	
3.4.4.	Pilot application of technical guidelines in selected IEE Pilot/quick scan companies.	
3.4.5.	Finalise technical guidelines and seek their endorsement by RGOC/MIME	
Output 4.1: **The results of the pilot projects and Quick Scans are widely disseminated. At least 40 IEE projects (Quick Scan) for cumulative 45,000 TOEs of energy savings are developed and implemented by industrial enterprises as result of their participation in the capacity building program and results achieved by participating pilot units in the GEF-UNIDO project**		
4.1.1	Organise National level (4) and provincial level (8) seminar/workshop for creating awareness on Objective, need, benefits and approach to implement IEE.	MIME, PMU , CTA, NCPO-C, provincial dept. of industry and Energy, International experts and mass media
4.1.2	Technology need (gap analysis) and technology assessment in selected sectors for technical, financial and environmental aspects	
4.1.3	Preparation of articles for industry and other relevant magazines and /or newsletters.	
4.1.4	Production of brochures, fliers and newsletter for distribution (enterprises, municipalities, provincial offices of the Chamber of Commerce and industrial associations)	
4.1.5	Production of press releases about major IEE projects success stories.	
4.1.6	Production of video/short movie about GEF projects success stories.	
4.1.7	Support demonstration companies with energy audit, project development and/or implementation of feasible IEE options to 40 identified quick scan company.	
4.1.8	Draft national IEE/EM action plan including implementation mechanisms	

Activities		Responsibility
Output 4.2 **Industry decision-makers understand their potential for energy efficiency gains and undertake energy efficiency activities**.		
4.2.1	Organise Industrial Energy efficiency clinics (12 per year) for CEO's or Owner of manufacturing enterprises in Cambodia to explain Objective, need, benefits and approach of IEE as a marketing tool.	MIME, PMU , CTA, NCPO-C, provincial dept. of industry and Energy
4.1.2	Technology need (gap analysis) and technology assessment in selected sectors for technical, financial and environmental aspects	
4.1.3	Finalize identification and selection of IEE quick scan enterprises in collaboration with enterprises and sector specific industrial associations.	
4.1.4	Support demonstration companies with energy audit, project development and/or implementation of feasible IEE options to 40 identified quick scan company.	
4.1.5	Draft national IEE/EM action plan including implementation mechanisms	
Output 4.3 Other stakeholders including technology/equipment suppliers will understand their role to promote industrial energy efficiency		
4.3.1	Information dissemination workshops 2 each year (1/2 day) on Industrial Energy efficiency for manufacturing enterprises in Cambodia to explain benefits of IEE for their business.	MIME, PMU , CTA, NCPO-C, provincial dept. of industry and Energy, Regional and International IEE/process technology suppliers
4.3.2	Technology information and match making with technology suppliers in the region	
4.3.3	Establishment of Energy Service companies (ESCO's) in Cambodia to provide turnkey projects and services.	
Output 5.**1: Mechanisms for mainstreaming IEE concepts and policy instruments have been created at suitable administrative levels in relevant RGOC policies and regulations**		
5.1.1	Review of national commitments and corresponding strategies and action plans under UNFCCC and other relevant MEA's	MIME, CCD-MOE, PMU , CTA, NCPO-C, various line ministries and departments
5.1.2	Review applicability of Industrial Energy efficiency for achieving key national commitments under MEAs especially under UNFCCC.	
5.1.3	Development of training modules on Energy efficiency and energy management systems related policies and translate into local language	
5.1.4	Develop IEE policies for consideration of MIME responsible for energy security in the country.	
5.1.5	Deliver training to groups of selected government officials in regards to legal, technical, organisational and other aspects of IEE policies.	
5.1.6	Adaptation and translation technical guide in Khmer on how to establish/set an energy management system in compliance with ISO 50001/EN16001	
Output 5.2**: Procedures for tracking and benchmarking energy consumption in industry are developed and established**		
5.2.1	Development of a detailed working plan on monitoring, tracking and benchmarking (role and responsibilities, milestones, etc.)	MIME, PMU , CTA, NCPO-C, International experts, various line ministries and departments
5.2.2	Design of the GEF project and the national reporting structures	
5.2.3	Development of energy consumption and energy performance indicators reporting templates creation of a reporting website	
5.2.4	Operational and maintenance of the reporting structures during the GEF project implementation period	
5.2.5	Reviewed of international energy benchmarking best practices (BESS, BEE-India, Canada, Austria, Japan, Etc.) against the context of the Cambodian manufacturing industry	

Activities		Responsibility
5.2.6	Development of Cambodian energy benchmarking methodology and relevant tools such as data acquisition templates, Excel and / or other software applications for processing date and present results, narrative reporting templates, etc	
5.2.7	Produce a manual (in Khmer and English) on the energy benchmarking methodology developed, including instructions for enterprises.	
5.2.8	Identify and select the manufacturing sector in which to test the energy benchmarking methodology development, including instructions for enterprises	
Output 5.3. National Energy Auditor Accreditation (NEAA) programme is established Certification Program is developed and established		
5.3.1	Development of a detailed working/business plan for the development and establishment of the NEAA program (role and responsibilities, milestone, etc)	NCPO-C, EEO of MIME, ITC, RUPP,PMU, CTA and International experts
5.3.2	Develop policy and legal "pieces and amendments "needed for the establishment of the NEAA program	
5.3.3	Develop curriculum, content and material for the NEAA program The NEAA program will use and build on the system optimization and energy management training material developed through the Project Component 2 &3 and integrate such material looking at existing energy manager/auditor certification programs (BEE-India). Due attention will be also given to curricula and material currently used in the engineering courses (undergraduate and master level) of the Technical University of Cambodia.	

C.6 Timeline of Activities

The indicative planning of the project is displayed in Table- 6. The actual implementation of the project will be governed by annual work plans which will be prepared by the PMU and NCPO-C in collaboration with CTA and UNIDO project manager, for endorsement by the Project Advisory Committee (PAC).

C.6. Timeline of the Activities.

Activity	Year 1				Year 2				Year				Year 4			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Project Component 1- Implementation of Industrial energy efficiency pilot projects.																
Output 1.1: **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**																
1.1.1 Organise launching seminar for GEF IEE project to elaborate Goals objectives and modus operand.																
1.1.2 Finalize identification and selection of IEE quick scan enterprises in collaboration with enterprises and sector specific industrial associations.																
1.1.3 Clearly define GEF project technical assistance support and enterprises contribution																
1.1.4 Support demonstration companies with energy audit, project development and/or implementation of feasible IEE options to 40 identified quick scan company.																
1.1.5 Monitoring and reporting of energy savings (net and specific) and GHG emission reduction																
Output 1.2: **13 pilot IEE projects for cumulative 15,000 TOEs of energy savings over the investments duration are implemented by enterprises, from selected 5 industrial sectors, partnering in the project**																
1.2.1 Finalize identification and selection of IEE pilot to support in collaboration with industry specific associations and enterprises that have signed co-financing commitment letters																
1.2.2 Clearly define GEF project technical assistance & financial support in implementation of investment specific projects and enterprises contribution (in-kind and cash).																
1.2.3 Technical assistance for Energy Audits, EE potential, selection of IEE technologies, project development and/or implementation																
1.2.4 Recording, Monitoring and reporting of energy savings and GHG emission reduction from IEE implementation																
1.2.5 Preparation of detailed EE project report and case																

studies from results achieved Monitoring and reporting of energy savings (net and specific) and GHG emission reduction																
Output 1.3: **Results of the pilot projects both in economic and environment context are compiled in a compendium for effective dissemination**																
1.3.1 Customise indicator framework for measuring company-level IEE/EM benefits																
1.3.2 Compilation of results achieved in Quick scan and IEE pilot project.																
1.3.3 Produce and disseminate plain language/local language promotion materials (success stories, fact sheets)																
1.3.4 Compendium is populated on web site and hard copies distributed through Industry association.																
Project Component 2- Capacity building and development of tools for implementing industrial energy efficiency																
Output 2.1: **A cadre of 40 national experts from relevant support institutions , consulting Cos. and independent engineers, are equipped, though classroom and on the job training with the technical capacity and tools required to develop and implement energy efficiency measures in industry.**																
2.1.1 Selection of professionals for IEE/EM training willing to work as IEE professionals/experts in the country.																
2.1.2 Assess training and professional development needs Capacity & building in regards to legal, technical, organisational and other aspects of IEE/EM																
2.1.3 Plan and deliver intensive IEE training on prioritised sectors and EMS (12 training modules are envisaged during the project period) applying 6 step approach explained in Project Doc for GEF CEO endorsement.																
2.1.4Involvement of classroom trained professionals in IEE quick scan and Pilot projects for providing on the job training, tools and techniques to carry energy audit, training on usage of field monitoring equipments.																
2.1.5 Support demonstration companies with implementation of techno-economically feasible IEE options																
2.1.6 Develop and implement a quality management system for IEE Experts report.																

Activity	Year 1				Year 2				Year 3				Year 4			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Output 2.2: **These professionals are registered and empanelled as resource person in a network of service providers (RECP) aimed to assist companies in implementing industrial energy efficiency.**																
2.2.1 Trained professionals after successful implementation of at least 1 IEE project are enrolled in expert roster maintained by NCPO Cambodia.																
2.2.2 Trained National experts establishes a formal network to facilitate continues up-gradation of skills, marketing of their services effectively																
Output 2.3: **Local suppliers of relevant technologies (kilns, boilers, etc.) are trained in IEE. Potential local suppliers are supported, to ensure more cost-effective technology and more reliable after-sales service.**																
2.3.1 promotion the development of local suppliers of technology in IEE applications																
2.3.2 Assist to creates a network of after-sales services, which is critical for the sustainability of Renewable energy generation and energy efficiency																
2.3.3 Encourage local suppliers to manufacture equipment locally or technology tie-ups with regional suppliers to reduce the capital investment.																
2.3.4 Study visits of local vendors to proven and established IEE technology suppliers particularly in neighbouring countries																
Output 2.4: **Web-based guidance tool/manual on IEE developed**																
2.4.1 Dedicated portal for IEE project is managed by NCPO-C																
2.4.2 Establish, Populate, operate and keep up-to-date IEE website																
2.4.3 Upload guidance manual on IEE methodology, and worksheets to assist easy collection and compilation of baseline data.																
Project Component 3: Strengthening of institutional framework for industrial energy efficiency																
Output 3.1**: Capacity building of relevant Govt. departments to promote industrial energy efficiency**																

3.1.1 Selection of professionals from Govt department responsible for policy formulation and enforcement of national Laws and willing to work as IEE promoter/experts in the country.																
3.1.2 Assess training and professional development needs of Govt staff.																
3.1.3 Plan and deliver intensive IEE training on EMS, IEE policies (8 training modules are envisaged during the project period)																
3.1.4 Involvement of Govt staff in IEE quick scan and Pilot projects for providing on the job training to implement IEE policies.																
3.1.5 Assist government trainees with implementation of IEE policies and regulations																
3.1.6 Develop a quality management system for Govt staff.																
Output 3.2: **Companies are trained in preparation of bankable IEE project proposals**																
3.2.1 Review of existing financial instruments/access to finance by Cambodian industries.																
3.2.2 Development if IEE financial training package in 1st year of project.																
3.2.3 Training of professionals from manufacturing units in preparing bankable proposals.																
3.2.4 In-Company training of financial professionals																
Output 3.3 Capacity building of financial institutions to assess investment proposals in IEE																
3.3.1 Selection of relevant financial institutions (public and private) for training																
3.3.2 Development if IEE financial training package suitable for financial experts to enable dynamic decision making tool for lending.																
3.3.3 Training of professionals from financial institutions/private banks in comprehensive evaluation of proposal received for financing and helping their client in preparing bankable proposals.																
Output 3.4**: Practical Guide for the Implementation of Energy Management in Industry in compliance ISO 50001 international standards is developed**																
3.4.1 Define priority areas in need of technical guidelines for IEE/EM complying ISO 5001 standard.																
3.4.2 Recruit international experts and national experts for development of technical guidelines																

3.4.3 Draft technical guidelines and translate into local language																
3.4.4 Pilot application of technical guidelines in selected IEE Pilot/quick scan companies.																
3.4.5 Finalise technical guidelines and seek their endorsement by RGOC/MIME																
Project Component 4 : Up-scaling of IIE in Cambodia																
Output 4.1: **The results of the pilot projects and Quick Scans are widely disseminated. At least 40 IEE projects (Quick Scan) for cumulative 45,000 TOEs of energy savings are developed and implemented by industrial enterprises as result of their participation in the capacity building program and results achieved by participating pilot units in the GEF-UNIDO project**																
4.1.1 Organise National level (4) and provincial level (8) seminar/workshop for creating awareness on Objective, need, benefits and approach to implement IEE.																
4.1.2Technology need (gap analysis) and technology assessment in selected sectors for technical, financial and environmental aspects																
4.1.3 Preparation of articles for industry and other relevant magazines and /or newsletters.																
4.1.4 Production of brochures, fliers and newsletter for distribution (enterprises, municipalities, provincial offices of the Chamber of Commerce and industrial associations)																
4.1.5 Production of press releases about major IEE projects success stories.																
4.1.6 Production of video/short movie about GEF projects success stories.																
4.1.7 Support demonstration companies with energy audit, project development and/or implementation of feasible IEE options to 40 identified quick scan company.																
4.1.8 Draft national IEE/EM action plan including implementation mechanisms																
Output 4.2 **Industry decision-makers understand their potential for energy efficiency gains and undertake energy efficiency activities**.																
4.2.1 Organise Industrial Energy efficiency clinics (12 per year) for CEO's or Owner of manufacturing enterprises																

in Cambodia to explain Objective, need, benefits and approach of IEE as a marketing tool.																
4.2.2 Technology need (gap analysis) and technology assessment in selected sectors for technical, financial and environmental aspects																
4.2.3 Finalize identification and selection of IEE quick scan enterprises in collaboration with enterprises and sector specific industrial associations.																
4.2.4 Support demonstration companies with energy audit, project development and/or implementation of feasible IEE options to 40 identified quick scan company.																
4.2.5 Draft national IEE/EM action plan including implementation mechanisms																
Output 4.3 Other stakeholders including technology/equipment suppliers will understand their role to promote industrial energy efficiency																
4.3.1 Information dissemination workshops 2 each year (1/2 day) on Industrial Energy efficiency for manufacturing enterprises in Cambodia to explain benefits of IEE for their business.																
4.3.2 Technology information and match making with technology suppliers in the region																
4.3.3 Establishment of Energy Service companies (ESCO's) in Cambodia to provide turnkey projects and services.																
Project Component 5: Formulation and implementation of policies, regulations and programmes to promote and support sustainable industrial energy efficiency.																
***Output 5.*1: Mechanisms for mainstreaming IEE concepts and policy instruments have been created at suitable administrative levels in relevant RGOC policies and regulations**																
5.1.1 Review of national commitments and corresponding strategies and action plans under UNFCCC and other relevant MEA's																
5.1.2 Review applicability of Industrial Energy efficiency for achieving key national commitments under MEAs specially under UNFCCC.																
5.1.3 Development of training modules on Energy efficiency and energy management systems related policies and translate into local language																
5.1.4 Develop IEE policies for consideration of MIME																

responsible for energy security in the country.																
5.1.5 Deliver training to groups of selected government officials in regards to legal, technical, organisational and other aspects of IEE policies.																
5.1.6 Adaptation and translation technical guide in Khmer on how to establish/set an energy management system in compliance with ISO 50001/EN16001																
***Output 5.2*: Procedures for tracking and benchmarking energy consumption in industry are developed and established**																
5.2.1 Development of a detailed working plan on monitoring, tracking and benchmarking (role and responsibilities, milestones, etc.)																
5.2.2 Design of the GEF project and the national reporting structures																
5.2.3 Development of energy consumption and energy performance indicators reporting templates creation of a reporting website																
5.2.4 Operational and maintenance of the reporting structures during the GEF project implementation period																
5.2.5Reviewed of international energy benchmarking best practices (BESS, BEE-India, Canada, Austria, Japan, Etc.) against the context of the Cambodian manufacturing industry																
5.2.6 Development of energy benchmarking methodology and relevant tools such as data acquisition templates, Excel and / or other software																
5.2.7 Produce a manual (in Khmer and English) on the energy benchmarking methodology developed, including instructions for enterprises.																
5.2.8 Identify and select the manufacturing sector in which to test the energy benchmarking methodology development, including instructions for enterprises																
Output 5.3. National Energy Auditor Accreditation (NEAA) programme is establishedCertification Program is developed and established																
5.3.1 Development of a detailed working/business plan for the development and establishment of the NEAA program (role and responsibilities, milestone, etc)																
5.3.2 Develop policy and legal "pieces and amendments "needed for the establishment of the NEAA program																
5.3.3Develop curriculum, content and material for the NEAA program																

C. 7. Risks

Seven categories of risks related to the project and its objectives to be achieved are considered: i) Political; ii) institutional; iii) technical; iv) market; v) financial; vi) implementation; vii) sustainability.

Political risk: Low government commitment to Industrial energy efficiency and the GEF UNIDO project

Potential impact: High

Probability: Very low

The project objectives and activities are perfectly in line with national energy policies objectives and actions plans for improving industrial energy efficiency (IEE) and creating a market for IEE products and services. It has to be pointed out that the project is also perfectly in line with the political will, the RGOC revised sub-decree number 35 on the establishment of the National Committee for the Management of Climate Change (chaired by the Cambodian Prime Minister). The updated sub-degree, sub-decree number 174, was approved in October, 2009.

Institutional risk: Delay in strengthening/upgrading Energy Efficiency Office

Potential impact: Low

Probability: Medium

The Energy Efficiency Office (EEO) was established in 1997 in MIME with support from World Bank project. Due to lack of resources and trained personnel's, the office is currently in low profile and need to be strengthened to fulfill the activities in project component 4&5. However, under the potential financial support from Climate Change Trust Fund and technical support from on-going projects EEO is expected to be strengthened soon

Management: Close coordination with executing partners (MIME, NCPO-C), EEO will be provided support for professional staff and physical infrastructure. Regular communication and steering committee meetings representing policy makers and delegation of responsibility will ensure continuous active involvement of key policy/institutional counterparts. A dedicated unit will be formed by the GEF-UNIDO project and the MIME to receive training and work to the implementation of Project Component 5 activities. Once the EEO becomes operational, the project staff of the GEF UNIDO component-3 &5 will be integrated in the EEO.

Technical risk

Potential impact: High

Probability: Very Low

There are no noteworthy technical risks associated with the implementation of IEE project as it is well proven in many countries globally and to a limited extent in Cambodia by CCPP. No significant risk is envisaged with respect to policy measures and capacity building activities proposed by the UNIDO GEF project. UNIDO has already successfully completed project of this nature in Cambodia and many other countries. However, policy level intervention to Promote and develop IEE need to be addressed carefully.

Management: Execution of activities to be implemented under Project Component -1 will be carried out with the support of international experts/companies with demonstrated and successful past experience. With respect to the capacity building and enabling activities special attention will be given to further defining the existing baseline in order to develop effective tailored and well-targeted training programs and curricula.

Market risk-1: 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

Probability: Very Low
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. During the project preparation phase (support from PPG) has addressed this through intensive contact with vendors/technology suppliers in minimizing/ eliminating this risk.

Management: A tailored communication/ information strategy combined with an active dialogue and involvement of industrial associations during the whole project preparation was done. National consultation workshops ensured the desired industry/industry specific association response to the project.

Market risk-2: Industry Decision makers (top management) do not participate actively in the project

Potential impact: High

Probability: Low

The manufacturing sector in Cambodia is struggling to enhance its competitiveness in national as well as international markets. Energy intensity, high energy cost and access to finance have become areas of industry's primary attention. While the prospect of benefiting from significant energy savings and consequent production costs reduction is expected to drive and fuel industry participation in the project, there might still be the risk of not attracting the critical mass of enterprises needed for the project to make a sizeable impact. However, the level of interest, commitments and collaboration shown by enterprises during the PPG phase leads to legitimately expect strong participation.

Management: During the project preparation phase about 250 enterprises have been reached by the project through bilateral meetings, energy audits, questionnaires and a national seminar. The general response was of strong support and interest to participate in the project. An innovative mechanism like demand creation by conducting regular IEE clinics for top management will ensure the desired participation in the project.

Financial risk: Financial and credit constraints prevent enterprises from investing in IEE.

Potential impact: Medium.

Probability: Medium

Access to finance was reported to be the 2nd biggest constraint in industrial development in Cambodia by World Bank. For GEF –IEE project this could be a constraint as well, however, such constraints are expected to have low-medium impact on the project's outputs, their impact on project outcomes i.e. indirect energy savings records/reports, might be greater.

Management: Selection of suitable partner enterprises for component-1 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: Very low.
UNIDO has long-standing direct experience in the development and implementation of IEE projects and it has a strong knowledge of the key variables that determine the success and the failure of project implementation. The Climate Change Department of the Ministry of Environment and Department of energy techniques (DOET) of MIME has proven experience and successful track records in the

implementation of technical assistance projects requiring coordination of multiple Central and Local Public Authorities, non-Governmental sector and academic institutions.

Management: UNIDO will mitigate this risk through detailed development of activities plans in close cooperation with in-country project partners, stakeholders and developers. Agreed and transparent modus operandi will be defined 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: Low.

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

Management: Establishing a monitoring, tracking and benchmarking program, a national best practice dissemination program and a National Energy Auditor Certification program, the project would create the conditions to produce and sustain a policy and normative driven push for industrial energy efficiency. .

D. INPUTS

D.1 Counterpart Inputs

The Department of Industrial techniques, Ministry of Industry Mines & Energy (MIME) has consented to provide the office space for PMU and facilities for convening Project Advisory Committee (PAC) meetings , workshop, seminars, and training programme in the Ministry campus. In addition Ministry of Industry, Mines and Energy and its Energy Efficiency Office will provide fully equipped office space and part time staff for PC-5 during the entire 4.0 years of the GEF UNIDO project implementation duration. Working time of the EEO staff will be primarily allocated to the development, establishment and operations of:

- **The IEE Monitoring, Tracking and Benchmarking Program**
- **The National IEE Best Practices Information and Dissemination Program**
- **The National Energy Auditors Accreditation (NEAA) Certification**

A detailed breakdown of the in-kind contributions of the MIME is provided in its Letter of Resources Commitment towards the implementation of the project enclosed in Annex- G. It has to be noted that the relatively low money value of the overall MIME co-financing contribution is due to the low remuneration levels of Cambodian Government officials. Considering the limited human and financial resources available with the MIME Energy Efficiency Office, the commitment of 150,000 in kind is regarded as very significant and adequate (with GEF support) to ensure the delivery of required outputs for Project especially for Component 5.

National Cleaner production office Cambodia will provide its facilities like use of Energy efficiency measuring and monitoring equipments, host the training sessions of the Energy Management (EM) and IEE for private sector, institutional partners, Govt. staff and technology suppliers. NCPO-C will also provide its CP and EE experts to conduct Expert training along-with International experts. NCPO-C will also contribute in up-scaling of IEE activities and developing National Energy Auditor Certification program. NCPO-C will also co-finance activities in cash from its own resources and on-going CP programme financed by SECO and is expected to extend for phase-2. A detailed breakdown of the in-kind contribution of NCPO-C is provided in its Letter of Resources Commitment toward the implementation of the project enclosed in Annex 3.

Enterprises will provide in-kind and cash contribution. Under Project Component 1, In-kind contribution will consist of staff time during IEE pilot demonstration, enterprises participating in the IEE, EM and financial

engineering Expert training. Cash contributions will be made to implement techno-economically viable energy efficiency technologies, management operational improvements and the system optimization projects developed through the Expert training and detailed energy audits, IEE measures identification and their feasibility analysis. Under Project Component 1 in-kind and cash contributions will be made to implement 13 IEE pilot projects.

Twelve enterprises have already signed Letter of resource commitment (See Annex -G) for full participation in the IEE & other Expert Trainings as well as for the implementation of pilot IEE projects. It has to be noted that while these letters carry some obligations for the enterprises towards he project, they are not strictly legally binding. The preparation and signing of legally binding letters would have required much more resources than those available to the project preparation phase. However, these letters have been agreed at the end of a number of bilateral meetings between enterprises management and the project team in which resources commitment were negotiated on the basis of detailed presentation of what would be required to the enterprises for Training and the execution of walk-through and /or detailed energy audits. Considering the fact that these enterprises have shown strong interest in the partnering with the GEF UNIDO project, no risk is envisaged for the in-kind contributions. As for the cash contributions, an inherent risk is represented by the overall economic performance of the enterprises in 2010 and 2011. This risk had to be acknowledged in the letters in order to get enterprises' commitment and signature.
Letters of resources commitment similar to those already signed by 12 participating pilot company is not expected and asked for from 40 units agreed to participate in quick scan and all capacity building programmes under PC-2.

D.2. UNIDO

1. International Staff

Part time Chief Technical Advisor (CTA) and International Experts on process technology, energy efficiency, renewable energy technologies and management system implementation in industry.
These experts will provide the technical expertise and will be responsible for:

a. Developing training material and tools for the IEE and EM expert training and user training
b. Guiding the PMU in preparing the logistics for the IEE & EM expert training
c. Delivering the energy management expert training, including remote provision of technical advice and coaching to trainees during the development of the EM systems envisaged by the training program.
d. Delivering 12 IEE/ EM user training jointly with NCPO-C and trained national IEE experts.
e. Providing technical advice and assistance (mainly remotely) to trained IEE/EM national experts and enterprises in the implementation of IEE measures.
f. Providing the technical expertise and supervision of national EM experts for developing a Practical Guide to the implementation of energy management in industry targeted to the Cambodian context.

International Experts on industrial and energy policies

These experts will provide the technical expertise and will be responsible for:

a. Developing training material and tools for IEE Policy and mechanism for effective implementation of IEE measures.
b. Guiding the MIME, PMU, NCPO-C in energy efficiency policy formulation and sharing international EE experience with Cambodian counterparts.
c. Establishing/setting an energy management system for Cambodian industries in compliance with ISO 50001/EN16001.
d. Drafting national IEE/EM action plan including implementation mechanisms.
e. Delivering the policy related Expert Training, including mechanisms for implementation of IEE policies.
f. Developing the course curricula for NEAA certification including examination scheme for certification.

Industrial Energy Efficiency and Technology experts for the 13 IEE projects and 40 quick scans

These experts in collaboration with CTA will provide:

- Sector specific process/production technical expertise required to developing and support implementation of the target 13 pilot industrial energy efficiency and renewable energy projects to those units identified during the PPG phase and for which enterprises have made a commitment of resources.
- Technical assistance for conducting, Energy Audits, calculation of EE potential, selection of IEE technologies suitable for Cambodia, detailed project development and assistance in implementation.
- Assistance in developing Bankable proposals incorporating full costing to convince financial institutions and lenders to provide finance for IEE project implementation.

2. National Staff

Project Component 1

National short-term experts will be recruited to work with and under the guidance of the Chief Technical Advisor, international experts for process and EE technologies for PC 1 to deliver the planned outputs. These exerts will also receive training support from the project and CTA to assists and work with staff of the National Cleaner Production Office-Cambodia, PMU and participating enterprises in evaluation of technologies, implementation of identified IEE options.

National experts to be recruited under PC1 will provide the following range of expertise:

- Collecting baseline data on resource consumption and GHG generation from participating units.
- Compiling the data and compare with sectoral benchmarks to estimate potential of savings in specific energy consumption and reduced GHG emission.
- Technology scooping with international expert to select Best Economically Available Technologies (BEAT) by doing comprehensive technical, economical and environmental feasibility analysis.
- Assisting the participating companies in detailed project formulation for management approval.
- Assisting in Vendor selection and conducting financial engineering of selected IEE options.
- Supporting in making bankable proposal for selected technology options.
- Working with participating unit, technology suppliers and PMU in implementing the selected IEE projects.
- Performance evaluation of implemented IEE projects to monitor SEC and GHG savings.

Project Component 2 &3

Full time and part time national energy management (EM) and energy efficiency (EE) national experts will be recruited and trained by the GEF-UNIDO project. The national training expert will be recruited to assist CTA and international experts in:

- Intensive energy efficiency trainings modules on EM and EE to Government departments, manufacturing sector managers and engineers, professionals from IEE promoting institutions, equipment and technology suppliers selected by the project.
- Involvement of trained professionals in IEE quick scan and pilot projects demonstration for providing on the job training, tools and techniques to carry energy audit, training on usage of field monitoring equipments.
- Support demonstration companies and quick scan with in-company training to foster sustainability of IEE strategy.
- Develop training tools for quality management system for energy audit, IEE report etc.

Project Component 4

Under component 4 where project results will be used to foster multiplier effects in other industries in selected sectors and other sectors in Cambodia and even in neighboring countries.

A national EM expert will be recruited to work with and under the supervision of the CTA, international EM expert to adapt to the Cambodian context and translate technical materials in Khmer. Various guidelines, manuals viz. Practical Guides on boiler safety, operation maintenance & trouble shooting, generic energy efficiency, equipment based EE and energy management manual. National expert will also help in delivering the energy efficiency clinics to be organized every month for selected sectors and thematic issues.

National experts will coordinate with Provincial Department of Industry, Mines and Energy to facilitate conduction of IEE clinics for decision makers CEO's and company owners. Follow up of EE clinics to develop EE market in the country.

Project Component 5

Part time national experts responsible to develop and establish the national IEE monitoring & tracking programme, national climate change expert and national GHG mitigation expert to develop a detailed working plan on monitoring, tracking and benchmarking (role and responsibilities, milestones, etc., develop energy consumption and energy performance indicators, reporting templates with international expert and regular populating the website. Review international energy benchmarking best practices (BESS, BEE-India, Canada, Austria, Japan, Etc.) against the context of the Cambodian manufacturing industry. Development of Cambodian energy benchmarking methodology and relevant tools such as data acquisition templates, Excel and / or other software applications for processing date and present results, narrative reporting templates, etc. Produce a manual (in Khmer and English) on the energy benchmarking methodology developed, including instructions for enterprises. Identify and select the manufacturing sector in which to test the energy benchmarking methodology development, including instructions for enterprises, development of a detailed working/business plan for the development and establishment of the NEAA program (role and responsibilities, milestone, etc. Assistance in policy and legal "pieces and amendments "needed for the establishment of the NEAA program. Work with International expert to develop curriculum, content and material for the NEAA program.

The NEAA program will use and build on the system optimization and energy management training material developed through the Project Component 2 &3 and integrates such material looking at existing energy manager/auditor certification programs (BEE-India). Due attention will be also given to curricula and material currently used in the engineering courses (undergraduate and master level) of Institute of Technology Cambodia (ITC) and Environmental science department of Royal University of Phnom Penh (RUPP).

3. Sub-Contracts

No major subcontracts are envisaged at this stage only short national sub-contracts are envisaged to be issued for provision of services related to the PC 1 in implementing IEE technologies in participating units. Consulting companies and technology developer/ licensee viz., SME Renewable for Gasifiers, publicity firms, web-designing companies, and video production companies for PC 4 will be subcontracted as and when required.

4. Training

Two types of trainings will be delivered by the project: “Expert” training and “User” trainings. All trainings will be in-service training. Expert trainings will be delivered by international experts and Chief Technical Advisor. User trainings will be mainly delivered to national experts in process technology, energy efficiency and energy management experts. The IEE trainings for private sector, promoting institutions, technology and equipment suppliers will be jointly delivered by part time CTA, international and national experts.

For details of responsibility of capacity building in PC 2&3 refer table-2 section on outputs and activities.

5. Equipment and Supplies

Two kits of measuring instrumentation for conducting steam systems assessments will be purchased by the GEF-UNIDO project. Measuring equipment will include infrared thermometers, simple exhaust gas analyzer,

data logger and evaluation software, pressure and temperature transducers. For the duration of project implementation the two kits will be available to the national experts trained by the project at no cost. At the end of the project equipments will be transferred to the National Cleaner Production Office-Cambodia under a formal written agreement that they will take responsibility for instrumentation maintenance and for making instrumentation available to national experts enrolled in RECP network on nominal cost.

NCPO-C does not have a project vehicle and Cambodia has no public transport system, therefore private taxis used, however, for effective mobility of staff and equipment a project vehicle need to be procured. A budget of USD 30,000 has been allocated in the first year for this purpose.

Table- 6: Project budget (in USD)

Budget Line	Brief Description	Year 1		Year 2		Year 3		Year 4		Project Total	
		US$	W/M	US$	W/M	US$	W/M	US$	W/M	US$	W/M
11-00 international experts	Chief * Technical Advisor	54,000	3	54,000	3	36,000	2	54,000	3	198,000	11
	Expert inputs to policy , Energy management & EE technologies	35,000	2.3	25,000	1.7	21,000	1.4	25,000	1.7	106,000	7.1
15-00 project travel	CTA and national staff project staff	15,000		15,000		15,000		12,000		57,000	
17-00 national staff	Project Manager, national climate change expert, national GHG mitigation expert. administrative assistant, driver and short term National experts	25,000	12	25,000	12	25,000	12	25,000	12	100,000	48
21-00 subcontract	Implementation of pilot projects	69,000		57,000		57,000		57,000		240,000	
33-00	Training & awareness workshops	30,000		24,000		24,000		24,000		102,000	
34-00 group training	Experts and local technology suppliers	15,000		15,000						30,000	
45-00 equipment and supplies	Project car, office equipment, field/analytical equipment, financial support for pilot projects	230,000		100,000		20,000				350,000	
51-00	Printing, communication, translation, insurance, social security	19,000		14,000		14,000		10,000		57,000	
82-00	M&E							14,000		14,000	
	Subtotal	*$508,000*	*17.3*	*$329,000*	*16.7*	*$212,000*	*15.4*	*$207,000*	*16.7*	*$1,240,000*	54.5
									Programme Support Costs (10%)	**$ 124,000**	
									Total	**$ 1,364,000**	

*CTA will spent average 3 months per calendar year

CP-EE experts, full time staff, junior staff to manage website and technical Translation/Interpreter will be financed by NCPO-C as their contribution. A total amount of 28,000 US $ is budgeted for project evaluation where $14,000 will be from GEF budget and $14,000 will be contribution of UNIDO and NCPO-C.

F. MONITORING & EVALUATION

Project monitoring and evaluation (M&E) will be carried out in accordance with established UNIDO and GEF guidance and procedures.

The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by: i) tracking and reviewing project activities execution and actual accomplishments; ii) providing visibility into progress as the project proceeds so that the implementation team can take early corrective action if performance deviates significantly from original plans; and iii) adjust and update project strategy and implementation plan to reflect possible changes on the ground, results achieved and corrective actions taken.

A detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by UNIDO in collaboration with the Project management Unit (PMU) and project partners (MIME and MOE) at the beginning of project implementation and then periodically updated.

By making reference to the impact and performance indicators defined in the Project Results Framework, the monitoring plan will track, report on and review project activities and accomplishments in relation to:

a. Energy savings and GHG emission reductions directly generated by the GEF-UNIDO project. These will include also type and the number of energy efficiency projects developed and implemented and energy intensity of enterprises participating in the project.
b. Energy savings and GHG emission reductions in-directly generated by the GEF-UNIDO project. These will include also type and the number of energy efficiency projects developed and implemented and, wherever feasible, energy intensity of enterprise.
c. Energy efficiency investments generated by the GEF-UNDIO project, directly and indirectly
d. Development of policy programs and normative instruments aimed to promote and support industrial energy efficiency.
e. Level of awareness and technical capacity for industrial energy efficiency and energy management within relevant institutions, in the market and within enterprises.

The National Project Manager, national climate change expert and national GHG mitigation expert in collaboration with CTA will be responsible for continuous monitoring of project activities execution, performance and track progress towards milestones. However, tracking and monitoring project performance with respect to direct and in-direct energy savings and GHG emission reduction, and related information, will be integral part of the activities to be executed for establishing and industrial energy efficiency Monitoring, Tracking and Benchmarking Program under Project Component 5.

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 be responsible for narrative reporting to the GEF.

A final external evaluation will be carried out after successful completion of the project.

G. PRIOR OBLIGATIONS AND PREREQUISITIES

No prior obligations and prerequisites apply to the project.

I. ANNEXES

Annex 1: Logical Framework
Annex 2: Estimate of energy savings and GHG emission reductions (separate file)
Annex 3: Letter of Co-financing (separate file)

ANNEX A: PROJECT RESULTS LOGICAL FRAMEWORK

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
Goal	To reduce specific energy intensity and related emissions of greenhouse gases generated by Cambodian manufacturing sector	1. Incremental CO2eq emission reduction (tons of CO2eq) 2. Specific energy consumption (energy use per ton/unit of output) for selected manufacturing sectors	1 Specific energy consumption (SEC) for 5 manufacturing sub-sectors in the focus of the GEF-UNIDO project 2. SEC referred to output quantities currently not available for many sub-sector. 3. To be defined in Year 1 of project implementation under PC-1	Cumulative reduction of SEC by more than 20% over the period 2012-2023 Cumulative reduction of GHG from pilot projects more than 50% over the project period	1. Annual reports of NCPO-C and EEO 2. End of project Survey/evaluation report 3. Final project evaluation report	1. Cambodian Governments remain committed in the medium and long-term to improve national energy security and effectively enforce the environmental laws. 2. Energy costs reduction becomes a first priority for industry.
Objective of the project	To Improve Energy Efficiency of Cambodian Industrial Sector leading to reduced global environmental impact from GHG missions and enhanced competitiveness for the industrial sector in a country with an energy deficit.	1. Incremental direct CO2eq emission reductions (tons of CO2eq) 2. Incremental indirect CO2eq emission reductions (tons of CO2eq) 3. Specific energy consumption/energy intensity of selected sectors.	1. No direct CO2eq emission reductions in selected sectors 2. No indirect CO2eq emission reductions in selected sectors 3. No SEC and related GHG generation for selected sector exists.	1. Direct emission reductions: 260,000 tons CO2eq over period 2012-2023 2. Indirect emission reductions: 250,000 tons CO2eq over period 2012-2023 3. SEC average annual reduction of 2-3% (aggregate average)over period 2012-2023	1. Monitoring, tracking and benchmarking program established by the project with MIME and NCPO-C 2. End of project Survey 3. Final evaluation	1. Sustained and solid Government support to the project. 2. Industry drive for energy costs reduction and enhanced energy efficiency grows progressively stronger and widens. 3. Various international IEE technical cooperation programs achieve good synergy and leverage of respective complementarities
Outcome 1	Demonstrable energy savings in participating companies through IEE pilot projects	1. Number of IEE pilot and quick scan projects are selected with co-financing commitments 2. Anticipated savings in SEC and GHG emissions are estimated 3. Case study compiled document is published	1. No/ very few investment related IEE projects are in place (TA related projects are not considered) 2. No information on SEC, energy benchmarking and energy saving	1. To develop and standardise energy audit reporting format, worksheets and tools to be used by IEE projects 2. Energy performance benchmark and saving potential of SEC and GHG emissions reduction.	1. Energy Efficiency office and NCPO-C Annual Report 2. End of project Survey 3. Final evaluation 4. Annual reports of participating	1. Sustained Government support to agreed project activities. A2. Participating companies can arrange to get requisite finance for IEE implementation.

			potential is available.	3.compendium of case studies from Pilot projects	companies.	
Project Component 1: Implementation of Industrial energy efficiency Pilot project						
Output 1.1	.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.	1. Number of quick scan IEE projects are implemented with direct support from the GEF project 2. Energy savings (TOEs) achieved annually as well as over the project lifetime	Most companies, particularly in selected sectors, have major potential for techno-economical EE improvements but not the resources (human and/or financial) to develop and implement such projects.	1. 40 IEE projects quick scan implemented with direct support from the GEF project 2. Cumulative 45,000 TOEs of energy savings over the EE investments lifetime	1. Environmental, financial and/or sustainability reports of Companies partnering in the IEE projects. 2. Energy Efficiency office (MIME) & NCPO-C annual report 3. Project report 4.IndependentFinal evaluation of project	1. Companies partnering with the GEF - UNIDO project improve their economic and environmental performance. 2. Companies partnering with the GEF UNIDO project fulfill their co-financing commitments (verbal in case of quick scan)
Output 1.2	13 pilot IEE projects for cumulative 15,000 TOEs** of energy savings over the investments duration are implemented by enterprises, from selected 5 industrial sectors, partnering in the project.	1. Number of pilot projects are implemented with direct support from the GEF-UNIDO project 2. Energy savings (TOEs) achieved annually as well as over the project lifetime	Most companies, particularly in selected sectors, have major potential for techno-economical EE improvements but not the resources (human and/or financial) to develop and implement such projects.	1.13 IEE pilot projects implemented with direct support (technical and part financial) from the GEF-UNIDO project 2. Cumulative15,000 TOEs of energy savings over the EE investments lifetime	1. Environmental, financial reports of Companies partnering in the IEE projects. . 2. Energy Efficiency office (MIME) & NCPO-C 3. Project progress report 4. Final project evaluation report	1. Companies partnering with the GEF - UNIDO project improve their economic and environmental performance. 2. Companies partnering with the GEF - UNIDO project fulfill their co-financing commitments
Output 1.3	Results of the pilot projects both in economic and environment context are compiled in a compendium for effective	compendium of case studies/success stories is published in English and local language	No such information/ document is available in Cambodia on IEE for manufacturing sector	Compendium is printed by end of 3rd year when most of IEE projects are implemented.	1. Energy Efficiency office (MIME) & NCPO-C 2. Project progress report	1. Participating Industries particularly quick scan participating unit are ready to publish and share the results with others.

	dissemination				3. Final project evaluation report	
Outcome 2	Supply of National service providers in IEE are available (to match demand in component-4)	1. Number of IEE and energy management (EM) experts in the country. 2. Formal set up of IEE expert network in the country 3.Increased availability of hardware/technology and after sale services in the country 4. Web page on the project populated with relevant information and manual is in place.	1. No IEE /EM specific national experts in place and most of projects are implemented with assistance of foreign experts 2. Limited or no IEE service is provided by equipment/technology suppliers. 3. No ICT based tool is available on IEE?EM in the country	1. 40 National Energy efficiency experts capable o delivering quality services are available 2. National IEE network is established. 3. Local supplier of technology is capable to providing IEE services to their clients as well as after sale service.	1. Annual reports of NCPO-C and EEO 2. End of project Survey 2. Final evaluation	1. Sustained Government support to agreed project activities. 2. Energy efficiency consultants, industrial equipment supplier and vendors, and other relevant entities recognize the economic potential of the IEE market in Cambodia
Project Component 2: Capacity building and development of tools for implementing industrial Energy efficiency						
Output 2.1	A cadre of at least 40 national experts from relevant support institutions (NCPO-C academic institutions, industry associations, Ministry of Industry, Mines and Energy) consulting Cos. 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	1. Number of energy management system experts in the Cambodian market 2. . . . Number of energy efficiency experts in the Cambodian market 3. Number of energy system/equipment optimization experts in the Cambodia market 3. Number of IEE seminars and trainings delivered	1. No/rare energy management system experts in the Cambodian market 2. No industrial Energy efficiency system optimization experts in the Cambodian market only few engineering companies provide partial services 3. IEE seminars and trainings bound to be delivered by international experts	1. 40 Industrial EE/ energy management system experts trained 2. 20-25 seminars and trainings for enterprises managers and engineers delivered by EM and IEE national experts trained by the GEF project	1. Project progress report 2. End of project Survey 3. Final evaluation	1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency 2. Industry drive for energy costs reduction is and will remain strong 3. Energy efficiency consultants, industrial equipment supplier and vendors, and other relevant entities recognize the economic potential of the IEE market in Cambodia

	efficiency measures in industry. .					
Output 2.2	IEE trained professionals are registered and empanelled as resource person in a network of service providers (RECP) aimed to assist companies in implementing industrial energy efficiency	Network facility with specific area of specialization of experts is available Network is meeting regularly to exchange/share IEE developments/concerns.	No such network in Cambodia exists and client has no access to IEE experts	A registry of IEE experts is available with EEO and NCPO-C. A formal network of IEE experts is in place	1. IEE program website 2. Project report 3. Final evaluation	1. Energy efficiency experts recognize the business potential of the IEE in Cambodia and also in neighboring countries
Output 2.3	Local suppliers of relevant technologies (kilns, boilers, etc.) are also trained in IEE. Potential local suppliers are supported, to ensure more cost-effective technology and more reliable after-sales service.	1. Number of local suppliers trained for providing IEE services 2. Number of suppliers assisted in collaboration /agents of foreign technology suppliers. 3. Number of private firms providing energy management system	Few equipment supplier/technology providers are equipped to provide IEE /EM services in Cambodia No enterprise has expertise and facilities of after sale service in Cambodia.	1. At least 10 equipment and technology suppliers in Cambodia are trained in IEE tools and techniques. 2. Technical tie-up/sole selling agent of Energy efficient equipments from neighboring countries. 3. 10 companies implement at least 10 energy management or IEE project each year	1. Project progress report 2. Annual reports of Companies participating in the project 3.Number of IEE technical tie-ups in the country 4. Total investment done during project period.	1. Vendors/suppliers partnering in the expert capacity building program with the GEF project improve their business performance and adequate finance for implementation of IEE project is available.
Output 2.4	Web based guidance tool/manual on IEE developed.	Dedicated web page for IEE is in place and populated for training material, information and links with relevant web sites.	No such ICT based instrument exists on IEE in Cambodia. Information on IEE experts/technology suppliers do not exist	GEF –IEE project web site with relevant information is continuously updated. EM/IEE manual relevant to Cambodian industries is available	Number of hits on the website and links to other websites. Khmer and English version IEE manual	No specific assumption and risk for this output.

Outcome-3	Stronger institutional framework in place to ensure long-term support for energy reduction efforts in enterprises	1. List of institutional participants trained to promote industrial energy efficiency 2. No. of experts trained in preparation of bankable IEE proposals 3. No of financial institutions participated in financial engg. raining 4. Guide for the Implementation of IEE & Energy Management in compliance ISO 50001 international standards is developed.	1. No institutional framework exists to promote IEE at implementation level. 2. Access to finance is problem due to lack of knowledge in preparing bankable proposals 3. Financial institutions evaluates the project on conventional basis rather than incl. all factor incl environment, safety and liability in mind. 4 No IEE Guidance manual exists	1. At least 200 participants from Govt. and regulatory agencies are trained in IEE. 2. 100 personnel from Industry are trained in financial engineering (bankable proposals) 3. Guideline on IEE/EM/operation and maintenance of Boiler is available 4. At-least 20 companies get access to finance through GEF project.	1. Project progress report 2. Annual reports of project implementing partners 3.Number of IEE projects selected for financing 4. Total investment done during project period	1. Sustained Government support to agreed project 2. Industry drive for energy costs reduction is and will remain strong 3. Energy efficiency promoters, financial institutions recognize the need and economic & Environmental saving potential of the IEE market in Cambodia
Project Component 3: Strengthening of institutional framework for industrial Energy efficiency						
Output 3.1	Capacity building of relevant Govt. departments to promote industrial energy efficiency	1. Number of training programme conducted on IEE 2. No. of Govt. staff trained in IEE /EM implementation support.	No such organized capacity building programme exists in Cambodia. Few seminars on Rural electrification, renewable energy are conducted by foreign experts	1. 12 Intensive Capacity building programme is conducted during project period. 2. 200 participants trained to promote industrial energy efficiency	1. Project progress report 2. Annual reports of project implementing partners 3. Final evaluation	1. Government interest & support to build capacity for IEE promotion 2. Policy level intervention in IEE is done by RGOC 3. Energy efficiency promoters recognize the need benefits of IEE in Cambodia
Output 3.2	Companies are trained in preparation of bankable IEE project proposals	1.Number of training programme conducted on IEE financial engineering 2. No. of experts trained in preparation of bankable IEE proposals	No facility on financial engineering and technology assessment exist in Cambodia	1.2 training programme conducted in year-1 and 1 each in subsequent years. 2. At least 100 personnel from Cambodian manufacturing industries are trained in preparing bankable proposal. 3. 30 proposal for IEE financing are prepared and considered for financing	1. Annual reports of project implementing partners 2. End of project report 3. Final project evaluation	1. Industry drive for energy costs reduction is and will remain strong 3. Energy efficiency promoters, financial institutions recognize the need and benefits of the IEE market in Cambodia
Output 3.3	Capacity building of financial institutions to assess investment	1.Number of training programme conducted for FII's in Cambodia	No organized training on total costing including environmental and	1.4 training programme conducted during project period	1. Annual reports of project implementing partners	1. FII's recognize IEE as a business opportunity for their lending operations. 2. Industry drive for energy costs reduction is and will remain strong

	proposals in IEE	2. No. of experts trained in comprehensive technology evaluation to facilitate financing.	social liability in technology assessment for FII's exist in Cambodia	2. At least 60 personnel from FII's are trained in assessing IEE project for financing 3. 50 proposal for IEE financing are received and considered for financing	2. End of project report 3. Final project evaluation 4. Annual reports of participating FII's	3. RGOC support industrial development bank/FII's through dedicated fund allocation for IEE.
Output 3.4	Practical Guide for the Implementation of Energy Management in Industry in compliance ISO 50001 international standards is developed.	Tools available for supporting energy efficiency in industry	No tools are and will be most likely available during and immediately after the GEF project implementation period	1. An Energy Management System Implementation Guide in compliance with EN 16001/ ISO 50001 standards is produced in English and Khmer language	1. IEE Best Practices dissemination program website 2. Project report 3. Final evaluation	A1. Sustained Government support to agreed project activities for the National Energy Efficiency office MIME
Outcome-4	Stronger institutional framework in place to ensure long-term support for energy reduction efforts in enterprises	1. Number of Awareness programmes conducted on IEE benefits 2. Number of energy efficiency projects implemented annually 3. Number of EN16001 or ISO 50001 certified companies 4. Number of IEE service contracts stipulated by Energy Management and Energy efficiency experts and technology suppliers trained by the GEF project	1. Not available. Numbers to be estimated during 1stYear of project impl. through Survey results and further data collection 2. So far no EN16001 or ISO 50001 certified companies 3. In past most IEE related projects are developed and implemented using foreign experts 4. Technology suppliers are not competent to provide IEE services to their clients	1. 100% increase of annual number of implemented projects between 2010 and 2023 2. 24 awareness prog. Covering 5 selected sectors are conducted during project period. 3. At least fifteen companies get certified to EN16001 or ISO 50001 by 2015 4. More than 500 IEE services contracts stipulated by national experts/suppliers/vendors trained by the GEF project with Cambodian enterprises between 2013 - 2023	1. Energy Efficiency office EEO and NCPO-C Annual Report 2. Industry associations annual reports 3. End of project Survey 4. Cambodian standard authority or certification bodies	A1. Energy prices remain high in the medium and long-term A2. Industry drive for energy costs reduction and enhanced energy efficiency grows progressively stronger A3. In the medium EN 16001 and ISO 50001 certification becomes tool and/or requirement for export oriented enterprises and for market access
Project Component 4: Up-scaling of Industrial Energy efficiency In Cambodia						
Output 4.1	The results of the pilot projects and Quick Scans are widely disseminated. At least 40IEE projects for	1. Number of energy management system experts in the Cambodian market 2. Number of energy efficiency experts in the	1. No energy management system experts in the Cambodia market 2. No industrial steam system optimization experts in the	1. 20 energy management system experts trained 2. 20 steam systems optimization experts trained	1. Project progress report 2. End of project Survey 3. Final evaluation	A1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency A2. Industry drive for energy costs reduction is and will remain strong A3. Energy efficiency consultants, industrial equipment supplier and

	cumulative 45,000 TOEs of energy savings are developed and implemented by industrial enterprises as result of their participation in the capacity building program and results achieved by participating pilot units of the project.	Cambodia market 3. Number of IEE seminars and trainings delivered	Cambodia market but few engineering companies provide partial services 3. IEE seminars and trainings bound to be delivered by international experts	3. 20-25 seminars and trainings for enterprises managers and engineers delivered by EM and SSO national experts trained by the GEF project		vendors, and other relevant entities recognize the economic potential of the IEE market in Cambodia
Output 4.2	Industry decision-makers understand their potential for energy efficiency gains and undertake energy efficiency activities.	1. Number of CEOs/owner attended IEE clinics. 2. Number of companies participating in the project seminars 3. Number of companies personnel participating in the project trainings	1. No marketing tool for IEE like IEE clinic exists so far. Few trainings on EE/Boiler safety for manufacturing and commercial enterprises are planned for 2010 by National Cleaner production office Cambodia.	1. 500 CEOs attend the 24 CP Clinics organized sector-wise/thematic 2. 400 companies participating in the project seminars and workshops 3. 200 enterprises staff attend project energy management and IEE training seminars/workshops	1. Project progress report and NCPO-C annual report. 2. List of participants in IEE Clinics, training and seminars 3. Final evaluation report	1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency 2. Costs reduction remains a first priority for companies' top management.
Output 4.3	Other stakeholders including technology/equipment suppliers will understand their role to promote industrial energy efficiency	1. Number of technology & equipment suppliers participating in the project seminars/training 2. Number of contracts received by suppliers through GEF projects	No training/capacity building done for of technology & equipment suppliers on IEE Hardly suppliers get contract for EM/IEE in Cambodia	1. 50 suppliers/vendors participating in the project seminars and workshops 2. 20 contract related to IEE implementation is bagged by supplier trained by project.	1. Project progress report and NCPO - C annual report. 2. Balance sheet/annual report of suppliers. 2. End of project report 3. Final project evaluation	A1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency A2. Costs reduction remains a first priority for companies' top management.
Outcome-5	Establishment of policy, legal and regulatory frameworks that sustainably promote and support industrial energy efficiency	1.Number of IEE policy, EM programs developed and put in operation 2. Adoption of regulatory measures to support IEE	1. No IEE/EM specific policy program is in place 2. No specific regulation to support IEE /EM is in place	1.At least 3 national IEE policy programs operate and develop smoothly: 2. IEE Monitoring, Tracking and Benchmarking (MTB) Program; IEE Best Practice Dissemination	1. Policy/ Government Act/decree on IEE. 2. Boiler Safety act & Operation & Maintenance guideline	A1. Sustained Government support to agreed project activities.

		implementation and market transformation		Program; 3. National Energy Auditor Accreditation Certification Program operational	3.NEAA Course developed and certifying agency in place	
Project Component 5: Formulation and implementation of policies, regulations and programmes to promote and support sustainable industrial energy efficiency.						
Output 5.1	Mechanisms for mainstreaming IEE concepts and policy instruments have been created at suitable administrative levels in relevant RGOC policies and regulations	1.Increased role for IEE in , energy , industry and environmental policies at national levels 2. IEE opportunities are recognised and utilised for achieving UNFCCC commitments.	1. No policy exist to promote and encourage implementation of IEE by Cambodian manufacturing sector 2. Role IEE in climate change mitigation from Cambodian industry is not well recognized	1. Policy document on Industrial energy efficiency is prepared for RGOC action. 2. Tools and instruments to calculate GHG reduction from IEE projects are in place	1.Annual report of NCPO-C, EEO 2.Independent final project evaluation 3.Publication of relevant policies, strategies and guidelines by RGOC	Uptake of IEE by enterprises and other organisations is constrained by lack of government incentive
Output 5.2	Procedures for tracking and benchmarking energy consumption in industry are developed and established	1. Increased role for IEE in other energy related policies of RGOC. 2.Structures, tools and methodologies to monitor, tracking and benchmarking energy consumption and efficiency in industry	So far IEE has no significant role in Energy Policy in Cambodia. No structures, tools and methodologies are in place	1. Reporting structure is put in place 2. Reporting templates are developed and used 3. Website is created 4. Benchmarking methodology is developed and tested	1. Energy Efficiency office, MIME and NCPO-C Annual Report 2. Internet/Web 3. Project reports 4. Final evaluation	A1. Sustained Government support to agreed project activities.
Output 5.3	National Energy Auditor Accreditation (NEAA) programme is established	National accreditation body in place. List of professional certification programs accredited by national relevant body	No national Industrial Energy Manager Certification Program is in place and will be in place in the near future	1. National NEAA program is developed and offered to IEE/EM experts.	1. National accreditation institution 2. Continual education/ professional certifying institutions	1. Energy Efficiency will mainstream in law and Energy audit will be made mandatory. 2. In the medium and long term industry's demand for qualified IEE experts and their services increases

List of Abbreviations

ADEME	Department of Alternative Energy Development and Efficiency
ASEAN	Association of Southeast Asian Nations
BEAT	Best Economically Available Technologies
BEE	Bureau of Energy Efficiency
BESS	Benchmarking and Energy management Schemes in SMEs
BL	Budget Line
BRC and NZIER	Bangkok Research Center and New Zealand Institute of Economic Research
CCCA	Cambodian Climate Changed Alliance
CCD	Climate Change Department
CEO	Chief Executive Officer
CP	Cleaner Production
CP-EE	Cleaner Production- Energy Efficiency
CTA	Chief Technical Advisor
DOET	Department of Energy techniques
DOIT	Department of Industrial Technique
EAC	Electricity Authority of Cambodia
EC	European Commission
ECCJ	Energy Conservation Center Japan
EEO	Energy Efficiency Office
EM	Energy Management
EMS	Energy Management System
EQ	Equivalent
ESCOs	Energy Service Companies
GDP	Gross Domestic Product
FII's	Financial Institutions
GEF	Global Environmental Facility
GJ	Gigajoule
GHG	Green House Gas
IEE	Industrial Energy Efficiency
IFC	International Finance Corporation
ISO	International Standard Organization
ITC	Institute of Technology of Cambodia
LDC	Least Developed Country
LEAP	Long-range Energy Alternative Planning System
MEAs	Multilateral Environmental Agreement
M&E	Monitoring and Evaluation
MIME	Ministry of Industry, Mines and Energy
MOE	Ministry of Environment
MTB	Monitoring, Tracking and Benchmarking
NCPO-C	National Cleaner Production Office -Cambodia
NC	National Communication
NEAA	National Energy Auditor Accreditation
NEDO	Industrial Technology Development Organization
NPM	National Project Manager
PAC	Project Advisory Committee

PC	Project Component
PIF	Project Identification Form
PAA	Project Administrative Assistant
PPG	Project Preparation Grant
PMU	Project Management Unit
RDB	Rural Development Bank
REAP	Renewable Electricity Action Plan
RECP	Resource Efficient and Cleaner Production
RGOC	Royal Government of Cambodia
RUPP	Royal University of Phnom Penh
SEC	Specific Energy Consumption
SECO	State Secretariat for Economic Affairs
SIDA	Swedish International Development Cooperation Agency
SMEs	Small and Medium Enterprises
SNC	Second National Communication
SSO	Steam System Optimization
TOEs	Tonnes of Oil Equivalent
UNDP	United Nation Development Programme
UNIDO	United National Industrial Development Programme
UN-ESMAP Programme	United Nations and Energy Sector Management Assistance
UNFCCC	United Nation Framework on Climate Change Convention
US	United States
VSBK	Vertical Shaft Brick Kiln
WB	World Bank

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