



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Naoko Ishii
CEO and Chairperson

October 14, 2014


Dear Council Member:

UNIDO as the Implementing Agency for the project entitled: *Myanmar: Improvement of Industrial Energy Efficiency*, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNIDO procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by Council in June 2013 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNIDO satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.TheGEF.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,



for Naoko Ishii

Attachment: GEFSEC Project Review Document
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee



REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: FULL-SIZED PROJECT

TYPE OF TRUST FUND: GEF TRUST FUND

For more information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

Project Title: Improvement of Industrial Energy Efficiency in Myanmar			
Country(ies):	Myanmar	GEF Project ID: ¹	5321
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	130042
Other Executing Partner(s):	Ministry of Industry; Ministry of Environment Conservation and Forestry; Ministry of Energy.	Submission Date:	09/08/2014
		Resubmission Date:	09/25/2014
GEF Focal Area (s):	Climate Change	Project Duration(Months)	60
Name of Parent Program (if applicable):		Project Agency Fee (\$):	\$259,350
<ul style="list-style-type: none"> ➤ For SFM/REDD+ <input type="checkbox"/> ➤ For SGP <input type="checkbox"/> ➤ For PPP <input type="checkbox"/> 			

A. FOCAL AREA STRATEGY FRAMEWORK²

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
CCM-2 Promote market transformation for energy efficiency in industry and the building sector	Outcome 2.1: Appropriate policy, legal and regulatory frameworks adopted and enforced	Energy efficiency policy and regulation in place	GEF TF	400,000	1,200,000
	Outcome 2.2: Sustainable financing and delivery mechanisms established and operational	Investment mobilized	GEF TF	700,000	2,700,000
	Outcome 2.3: GHG emissions avoided	Energy savings achieved	GEF TF	1,630,000	9,900,000
Total project costs				2,730,000	13,800,000

B. PROJECT FRAMEWORK

Project Objective: To promote sustained GHG emissions reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial EE and the implementation of energy management systems, based on ISO 50001, EnMS and optimization of energy systems in industry.

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Improvement of policy and regulatory frameworks, incentive schemes, support programmes, and awareness raising	TA	1.1 Improved policy and regulatory frameworks, incentive schemes, support programmes, energy data and awareness will facilitate sustainable energy efficiency improvement in industry	1.1.1 Energy efficiency (EE) strategy developed based on experience and lessons learned from other countries; 1.1.2 Incentive schemes, e.g. tax breaks or exemptions, grant and non-grant instruments, etc. and support	GEFTF	400,000	1,000,000

¹ Project ID number will be assigned by GEFSEC.

² Refer to the [Focal Area Results Framework and LDCF/SCCF Framework](#) when completing Table A.

			programmes, e.g. consultancy services, training, etc. developed; 1.1.3 Energy consumption data by large and medium sized industry establishments collected and managed; 1.1.4 Awareness raising activities on Nationally Appropriate Mitigation Actions (NAMA) and EE conducted, including using the results of demonstration projects under Component 3.			
2. Capacity building	TA	2.1 Strengthened or built capacity of institutions, industries, consultants and equipment suppliers on energy management system, energy system optimization, and EE project financing will assist industries in the implementation of EE improvements	2.1.1 Introductory, user and expert training on energy management systems based on ISO 50001, EnMS conducted; 2.1.2 User and Expert training on energy system optimization conducted; 2.1.3 Training on EE project financing provided to industry and financial institutions.	GEFTF	700,000	2,400,000
3. Demonstrations and upscaling	INV	3.1 Demonstrated projects on energy management system, and energy system optimization in selected plants and sub-sectors and widely used case studies result in direct GHG emissions reductions and leverage the interest and belief in investment in IEE projects	3.1.1 Energy management systems implemented in 50 industrial establishments, case studies prepared; 3.1.2 At least 20 optimization projects implemented on energy systems: pump, compressed air, fan, and steam, case studies prepared.	GEFTF	1,370,000	9,600,000
4. Monitoring and Evaluation	TA	4.1 Adequate monitoring and evaluation facilitates smooth and successful project implementation	4.1.1 Regular monitoring exercises conducted, PIRs prepared; tracking tools prepared according to GEF requirements; 4.1.2 Mid-term and final project evaluation conducted.	GEFTF	125,000	300,000
Subtotal					2,595,000	13,300,000
Project management Cost (PMC) ³				GEFTF	135,000	500,000
Total project costs					2,730,000	13,800,000

³ PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Please include letters confirming cofinancing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
National Government	Ministry of Industry	In-kind	800,000
National Government	Myanmar Ministries	In-kind	1,980,000
Private Sector	Myanmar Industries	Cash	2,000,000
Private Sector	Myanmar Industries, including Myanmar Industries Association	In-kind	8,800,000
GEF Agency	UNIDO	Cash	70,000
GEF Agency	UNIDO	In-kind	150,000
Total Co-financing			13,800,000

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant Amount (a)	Agency Fee (b) ²	Total c=a+b
Total Grant Resources						

¹ In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table. Indicate fees related to this project.

E. Consultants working for technical assistance components:

Component	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
International Consultants	749,000	84,000	833,000
National/Local Consultants	594,250	195,000	789,250

F. Does the project include a “non-grant” instrument? NO

(If non-grant instruments are used, provide in Annex D an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF⁴

The incremental activities are the same as in the PIF and are organized into four components: (1) Improvement of policy and regulatory frameworks, incentive schemes, support programmes; (2) Capacity building on Energy Management Systems (EnMS), Systems Optimization (SO) and energy efficiency project financing; (3) Demonstration projects on EnMS and SO in selected plants and (4) Monitoring and evaluation.

The distribution of the GEF grant has remained the same as indicated in the PIF.

While no major changes have been made in comparison to the PIF, substantial additional information and data has been added to the document. This has been collected during the PPG phase through several national and regional workshops and seminars with the participation of all stakeholders, as well as quick assessments carried out at selected factories. Additional emphasis has been placed in the relevant parts of the document to align the project’s approach with the principles of the Inclusive and Sustainable Industrial Development declaration approved by member states at the

⁴ For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter “NA” after the respective question.

UNIDO General Conference in December 2013 in Lima, Peru that includes creating shared prosperity and safeguarding the environment, and with the newly developed guide on gender mainstreaming in energy and climate change projects of UNIDO. Finally, references to the important experience obtained from the implementation of similar projects around the world, and in particular in the ASEAN countries, have also been added to relevant sections.

A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.

Myanmar submitted its **Initial National Communication** (INC) under the UNFCCC on 5 September 2012. While this is an important initial step towards the establishment of developmental objectives, the statistical information contained in the document covers the period only up to 2005 and hence is somewhat outdated, and a comprehensive energy policy and strategy is still missing. In the INC, mitigation options of the predominant greenhouse gas (GHG), that is CO₂, in the energy sector, industrial processes and product use sectors are grouped into three categories, namely; (1) Energy conservation or efficiency improvements; (2) Replacing carbon-intensive energy sources with less carbon-intensive sources; and (3) Promoting new and renewable sources of energy.

Myanmar has also prepared and submitted on 26 December 2012, its **National Adaptation Programme of Action** (NAPA) to the UN Framework Convention on Climate Change (UNFCCC). This document contains a list and details of 32 Priority Adaptation Projects, including energy and industry-related projects, identified by Myanmar for the achievement of its objectives. As the proposed project clearly focuses on energy and industry for the reduction of GHG emissions, it is in line with the larger objective of the NAPA.

Based on the above-mentioned strategies/plans, the proposed project is in line with the national priorities of Myanmar; namely, to ensure the energy security of the country by, among others, increasing energy efficiency. This will, in turn, reduce the GHG emissions and increase the competitiveness of Myanmar's economy.

A.2 GEF focal area and/or fund(s) strategies, eligibility criteria and priorities:

The GEF-5 Climate Change Focal Area Objective 2 aims at promoting market transformation for energy efficiency in industry and the building sector. This project complies with that objective; its implementation includes improving policy and regulatory frameworks; institutional capacity building for industrial EE and demonstrating the application of industrial EnMS based on ISO 50001 and optimization of industrial energy systems in a number of firms.

A.3 The GEF Agency's comparative advantage:

The GEF Council document GEF/C.31/rev.1 recognizes the comparative advantage of UNIDO for this Strategic Program under the Intervention Type Capacity Building/Technical Assistance. The project focuses on promoting Industrial Energy Efficiency (IEE) through accelerating the adoption of energy management system standards and energy system optimization.

The UNIDO IEE programme builds on more than three decades of experience and unique expertise in the field of sustainable industrial development. Combining the provision of policy development support services and capacity-building for all market players, UNIDO aims at removing the key barriers to continuous improvement of energy efficiency in industries and ultimately transforming the market for IEE. The UNIDO IEE programme assists developing countries and emerging economies by providing policy advice, technical assistance, institutional capacity-building and market transformation support instrumental to the adoption and the implementation in industry of energy management and optimization systems.

Therefore, UNIDO is well placed to implement this project due to its experience and expertise in promoting energy management system (EnMS) standards; UNIDO has contributed significantly to the development of the ISO 50001 EnMS standard. Until now, UNIDO has developed and has been implementing similar IEE projects in about 25 countries around the world. In South-East Asia, similar projects are being implemented in Malaysia, Thailand, Indonesia, the Philippines and Vietnam, and lessons learned from project implementation in these countries have been shared during the several workshops mentioned above and properly considered in the development of this CEO Endorsement Request document.

A.4 The baseline project and the problem that it seeks to address:

Myanmar is classified as a Least Developed Country (LDC), with 25.6% of its population of 61.65 million (2013) living below the poverty line⁵. The economy, which in the past has been primarily agricultural (accounting for more than half of employment), has seen significant opening to foreign investment since the newly instated government embarked upon a reformed policy of economic openness. As a result, the economy has seen significant growth in parallel with a surge in investment. This has significantly impacted the role played by industry in the economy, as the Value Added by Industry as a percentage of GDP has almost drawn equal with agriculture in recent years (see Table 1). While improvement has been seen, Myanmar still lags behind its neighbouring dynamic economies and much work is still to be done to build economic competitiveness.

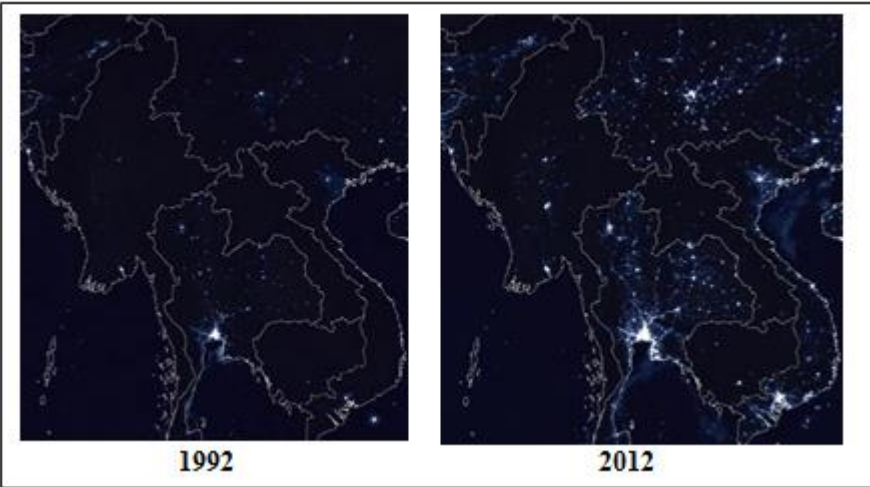


Figure 1 - Night-time lights images of Myanmar and its neighbors (1992 and 2012)

The information on electricity access and distribution of industrial enterprises fits well with the night-time lights images of Figure 1 and this information has contributed to shaping the geographical focus and target of the project. Figure 2⁸ shows the variations of the electrification rate in the States/Regions of Myanmar. Country-level electrification is quoted to be 28%, but the large differences between urban and rural areas should be considered, e.g. in Yangon, 79.5% of households and in Mandalay, 51.9% of households have access to electricity.⁹

Since the transition to a civilian government in 2011, Myanmar has begun an economic overhaul aimed at attracting foreign investment and its reintegration into the global economy. Reforms, abundant natural resources, a young labor force, and proximity to Asia's dynamic economies have attracted foreign investment in the energy sector, garment industry, information technology, and food and beverages. The private sector dominates in agriculture, light industry, and transport activities, while the government continues to control energy, heavy industry, and rice trade.

As a general measure, electric lighting at night-time can be a useful indicator of economic activity; looking at the two images of Figure 1⁶ that are separated in time by 20 years, the following conclusions can be drawn:

- Myanmar's electrification efforts and economic development have been slow and limited; much slower than its immediate neighbors (West Bengal-India, Yunnan-China, North-West Thailand and Viet Nam);
- Three regions of Myanmar, with the major cities of Yangon, Mandalay and Naypyidaw, emit 40% of the country's light at night-time, and Yangon alone accounts for 22% of it⁷

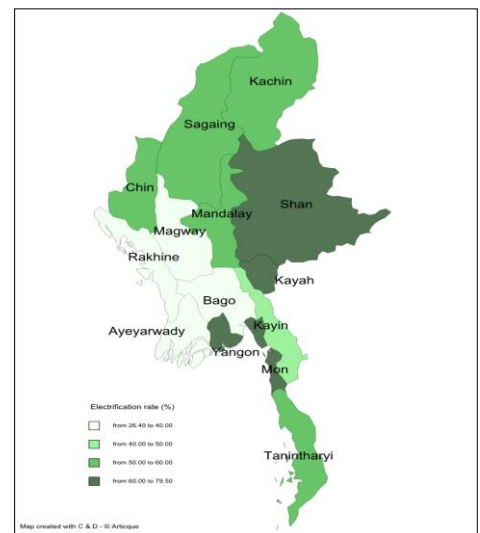


Figure 2 - Access to electricity across Myanmar, 2010

⁵ <http://www.adb.org/countries/myanmar/main>, 2010

⁶ Image and data processing by NOAA's National Geophysical Data Center. Retrieved from: <http://www.themimu.info/sites/themimu.info/files/documents/Development_of_Myanmar%27s_nightlights_1992-2012.mp4>

⁷ Satoru KUMAGAI, Souknilanh KEOLA and Toshihiro KUDO "Myanmar Economy Viewed at Night", IDE-JETRO, 2012 <<http://www.ide.go.jp/English/Publish/Download/Brc/PolicyReview/05.html>>

⁸ OECD, Multi-Dimensional Review: Myanmar, 2013. Source: UNDP, *Integrated Household Living Conditions Survey in Myanmar (2009-2010): Poverty Profile*, 2011

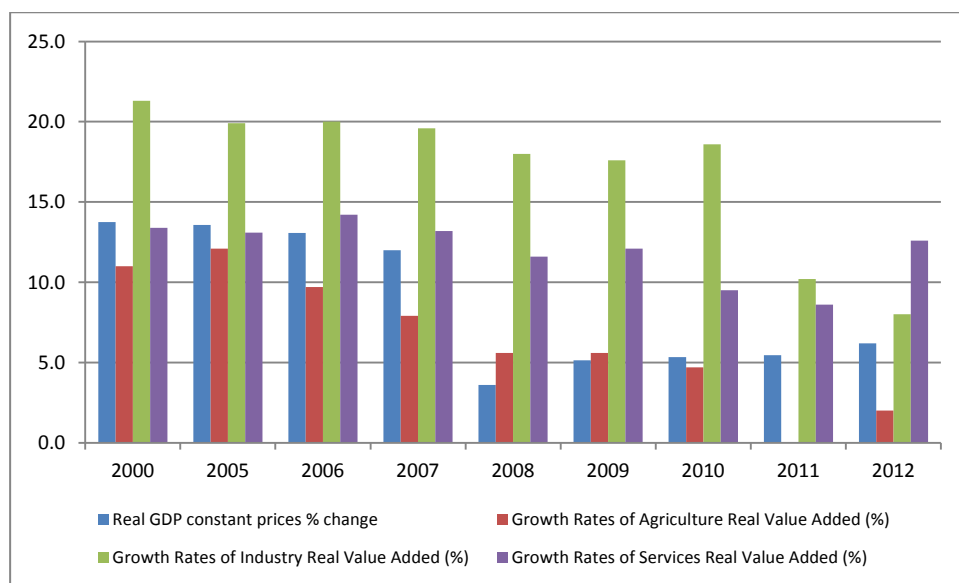
⁹ ADB, Myanmar Energy Sector Initial Assessment, 2012

The following table provides data on economic growth in Myanmar. Although, the growth rate of GDP fell behind targets, the growth rate of industry has been impressive, as illustrated by Figure 3.

Table 1 - Economic development of Myanmar, 2000-2012¹⁰

Descriptor	2000	2005	2006	2007	2008	2009	2010	2011	2012
Real GDP (current international \$, billion)	8.905	11.987	14.503	20.182	31.367	35.225	45.380	51.444	54.049
Population, million	50.130	55.392	56.505	57.641	58.799	59.981	61.187	62.417	63.672
Real GDP per capita (\$)	178	216	257	350	533	587	742	824	849
Real GDP constant prices % change	13.7	13.6	13.1	12.0	3.6	5.1	5.3	5.5	6.2
GDP at PPP (current international \$, billion)	23.002	47.593	55.555	64.022	67.797	71.906	76.761	82.678	89.233
GDP per Capita at PPP (current international \$)	459	859	983	1,111	1,153	1,199	1,255	1,325	1,401
Agriculture Value Added (% of GDP)	57.2	46.7	43.9	43.3	40.3	38.1	36.9	32.5	30.5
Industry Value Added (% of GDP)	9.7	17.5	19.2	20.4	22.7	24.5	26.5	31.3	32.1
Manufacturing Value Added (% of GDP)	7.6	12.8	14.0	14.9	16.8	18.1	19.5		
Services Value Added (% of GDP)	33.1	35.8	36.8	36.3	37.1	37.4	36.7	36.2	37.5
Growth Rates of Agriculture Real Value Added (%)	11.0	12.1	9.7	7.9	5.6	5.6	4.7	-0.7	2.0
Growth Rates of Industry Real Value Added (%)	21.3	19.9	20.0	19.6	18.0	17.6	18.6	10.2	8.0
Growth Rates of Services Real Value Added (%)	13.4	13.1	14.2	13.2	11.6	12.1	9.5	8.6	12.6

Figure 3 - Growth Rates of GDP and Economic Sectors 2000-12, %



¹⁰ **GDP data:** International Monetary Fund (IMF), World Economic Outlook Database, October 2012
Sectoral data: Asian Development Bank (ABD), Key Indicators for Asia and the Pacific 2013.

Industry

The main industries of Myanmar include: agricultural processing; wood and wood products; mineral mining (copper, tin, tungsten, iron); construction (cement, construction materials); pharmaceuticals; fertilizer; oil and natural gas production; textiles and garments; food and beverages, as well as gemstones.

Figure 4 - Number and size of industrial enterprises registered in Industrial Zones in States and Regions of Myanmar (February 2013)

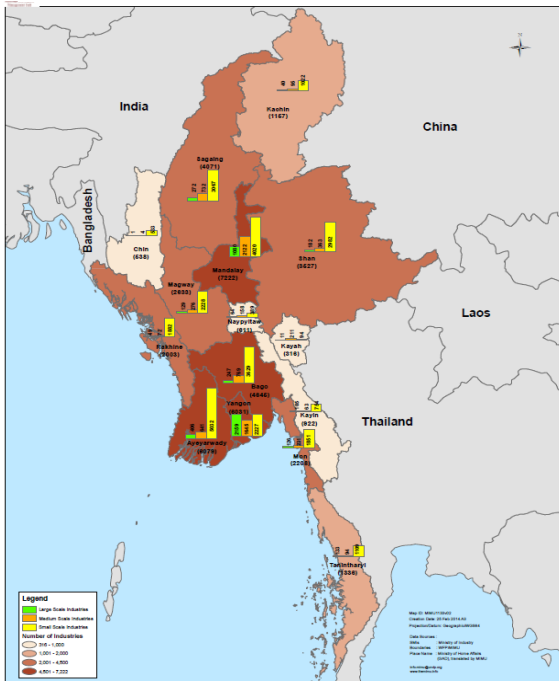


Figure 4¹¹ notes the number of registered small and medium-sized enterprises (SMEs) and their distribution across Myanmar's states and regions, while Table 2 below provides information on the size and production capacity of industrial companies operating in Myanmar. It is worth noting the link between installed power of diesel generation sets and the category; considering the inadequate power supply from the grid and frequent black-outs (explained further on in the text), many establishments in Myanmar are compelled to use off-grid power generation in the form of diesel generator sets (*gensets*). The installed power level determines the size of the diesel gensets, and hence the cost of self-produced electricity. Based on the classifications given in Table 2, the distribution of companies among the industrial subsectors is given in Annex I.

Table 2 - Categories of manufacturers by size in Myanmar¹²

Category	Investment amount, Million Kyats	Annual production capacity Million Kyats	Installed power, HP (horse power)	Number of workers
Small-sized manufacturers	up to 1	up to 2.5	over 5 HP	over 10
Medium-sized manufacturers	1-5	2.5 – 5	25-50 HP	51 to 100
Large-sized manufacturers	over 5	over 5	over 50 HP	over 100

To facilitate the development of the industrial sector, in particular for SMEs, 18 industrial zones were established across the country after 1988 (see Annex I). There are over nine thousand industries in these industrial zones, of which 46% are located in Yangon. In 2012, it was decided to establish 7 new industrial zones (of which Kayin is included in Annex I). The major industrial zones, particularly those in Yangon and Mandalay, are shown on the map of Figure 4 and how they follow the electrification pattern is shown in Figure 2.

Myanmar's energy and electricity sector

Myanmar's total primary energy supply in 2011 was 14,056 ktoe (kilotons of oil equivalent) and 13,079 ktoe excluding power plants and oil refineries (see Figure 5); distribution among sectors is given in Figure 6.¹³ In the same year, Myanmar produced 22,294 ktoe of primary energy; exported 8,633 ktoe of natural gas and imported 240 ktoe of oil products, making Myanmar a net energy exporter.

¹¹ MIMU (Myanmar Information Management Unit). Retrieved from: <http://www.themimu.info/sites/themimu.info/files/documents/SectorMap_Registered-SMIs-in-Myanmar_07Feb2014_A3.pdf>

¹² Ministry of Industry, Central Department of SME Development. Retrieved in July 2014 from <http://www.smedevelopmentcenter.gov.mm/?q=en/def_sme>

¹³ OECD-IEA, Energy balance of non-OECD countries 2013

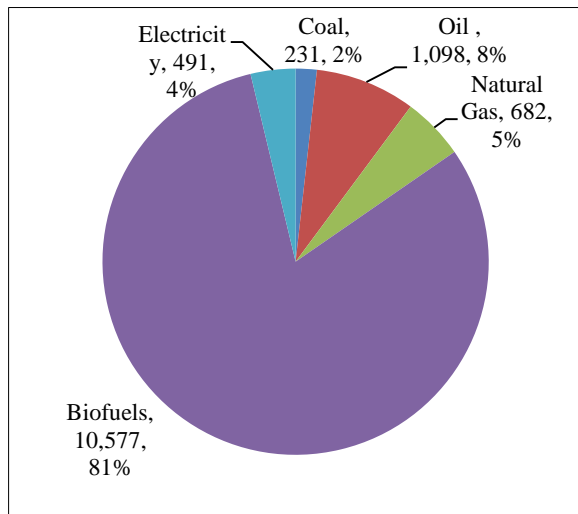


Figure 5 - Myanmar's total primary energy supply, excluding power plants and oil refineries in 2011, 1000 toe and %

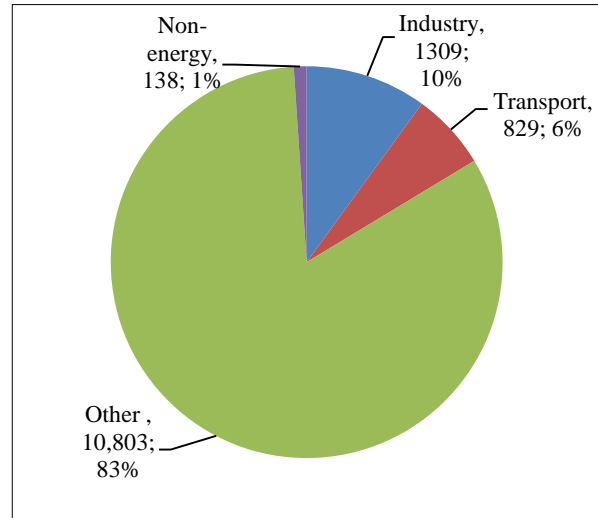


Figure 6 - Myanmar's total final consumption of energy in 2011, 1000 toe and %

Myanmar's present energy supply system faces many challenges, but offers many opportunities for energy efficiency (EE) implementation and renewable energy (RE) development. The most significant challenges are access to energy and energy security; only 28% of the population has access to electricity¹⁴ and 70% of the population lives in rural areas relying heavily on traditional biomass for its energy needs, getting more than 80% of its total primary energy supply from biomass mainly fuel wood from natural forests.¹⁵

For those who do have access to electric power, the grid supply is intermittent at best due to the seasonality of hydropower production and inadequate transmission and distribution infrastructure. The installed electricity generation capacity in Myanmar should, technically speaking, be able to cope with the peak demands presented by the peak load of 1,533 MW (see Table 3). However, the power system is crippled by:

- Very high transmission and distribution losses (21% in 2011), mainly due to poor state of transmission and distribution systems, poor load factors and extensive 'administrative losses';
- Huge unavailable capacity (up to 41% in 2012) due to: old and worn-out technologies used in gas-fired and coal-fired stations; low pressure of gas in pipelines; and hydropower stations receiving insufficient water during the dry-season (December to March).

Table 3 - Electric Power System of Myanmar¹⁶

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Electricity production (GWh)	5,068	5,425	5,609	6,016	6,164	6,399	6,622	6,964	7,543	7,327
Electricity production from hydroelectric sources (GWh)	2,111	2,075	2,408	2,997	3,325	3,619	4,071	5,256	5,105	5,151
Electricity production from hydroelectric sources (% of total)	42	38	43	50	54	57	61	75	68	70
Electricity production from natural gas sources (GWh)	2,287	2,685	2,763	2,396	2,025	1,891	1,897	1,205	1,734	1,588
Electricity production from natural gas sources (% of total)	45	49	49	40	33	30	29	17	23	22
Electric power transmission and distribution losses (% of output)	31	29	30	39	29	31	29	28	17	21
Electric power consumption (GWh)	3,484	3,849	3,910	3,664	4,355	4,439	4,701	4,993	6,290	5,771
Electric power consumption (kWh per capita)	71	78	78	73	86	87	92	97	121	110

¹⁴ ADB, 2012

¹⁵ IEA, 2011

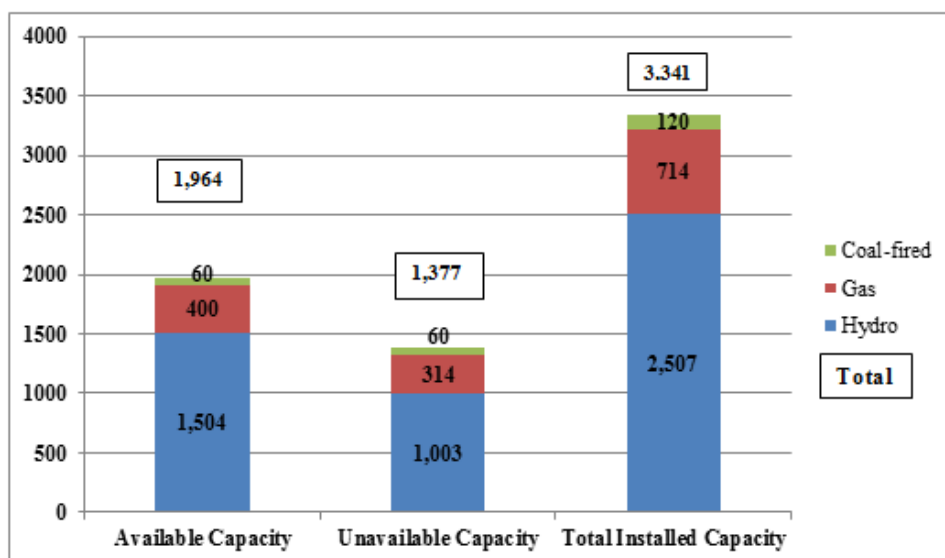
¹⁶ World Bank, World Development Indicators, Retrieved on 13 June 2014 and Ministry of Electric Power

In Yangon and Mandalay, the country's two largest cities, electricity has been distributed under a rationing system for the past eight years, i.e., for six hours a day for households and 12 hours a day for industrial zones. Table 4 and Figure 7 demonstrate the problem of ‘unmet power demand’.

Table 4 - Total installed, available and unavailable electricity generation capacity 2011, MW and %¹⁷

Generation source	Available capacity, MW	Available capacity, %	Unavailable capacity, MW	Unavailable capacity, %	Total installed capacity, MW
Hydropower	1,504	60.0	1,003	40.0	2,507
Natural Gas	400	56.0	314	44.0	714
Coal-fired	60	50.0	60	50.0	120
Total	1,964	58.8	1,377	41.2	3,341

Figure 5- Total installed, available and unavailable electricity generation capacity 2011, MW¹⁸



Institutional structure and governance of the Energy Sector and the Electric Power Sector

Since the reform process began in 2011, Myanmar’s energy structure has seen many changes. The National Energy Management Committee (NEMC) and the Energy Development Committee (EDC) were established in January 2013 under the President’s Office to strengthen coordination and planning among the energy sector’s institutions, both governmental and non-governmental (see Annex J for additional details).

NEMC is a ministerial-level committee placed under the patron of the Second Vice-President and chairmanship of the Minister of Energy. It is responsible for formulating energy policy and plans in coordination with other key energy-related ministries (see Annex J for the list of names and duties of energy-related ministries). Within the NEMC, the **Ministry of Industry (MOI)** has been assigned to coordinate all issues relating to energy efficiency and conservation. The EDC, composed primarily of deputy ministers, is broadly responsible for implementing the policies and plans of the NEMC.

The NEMC¹⁹ has prepared an **Energy Policy and Strategy Framework** with the main objectives of (i) maintaining energy independence; (ii) promoting the wider use of new and renewable sources of energy; (iii) promoting energy efficiency and conservation; and (iv) promoting household use of alternative fuels. The document is currently under

¹⁷ ADB, Myanmar Energy Sector initial assessment, 2012

¹⁸ Based on data given in Table 4.

¹⁹ Myanmar President Office, Notification No. 12/2013 dated 9 January 2013).

review by Parliament²⁰. In the current version of the Energy Policy, a directorate on energy efficiency and conservation has been proposed to be established under the MOI.

The architecture of Myanmar’s electric power system is given in Figure 8²¹.

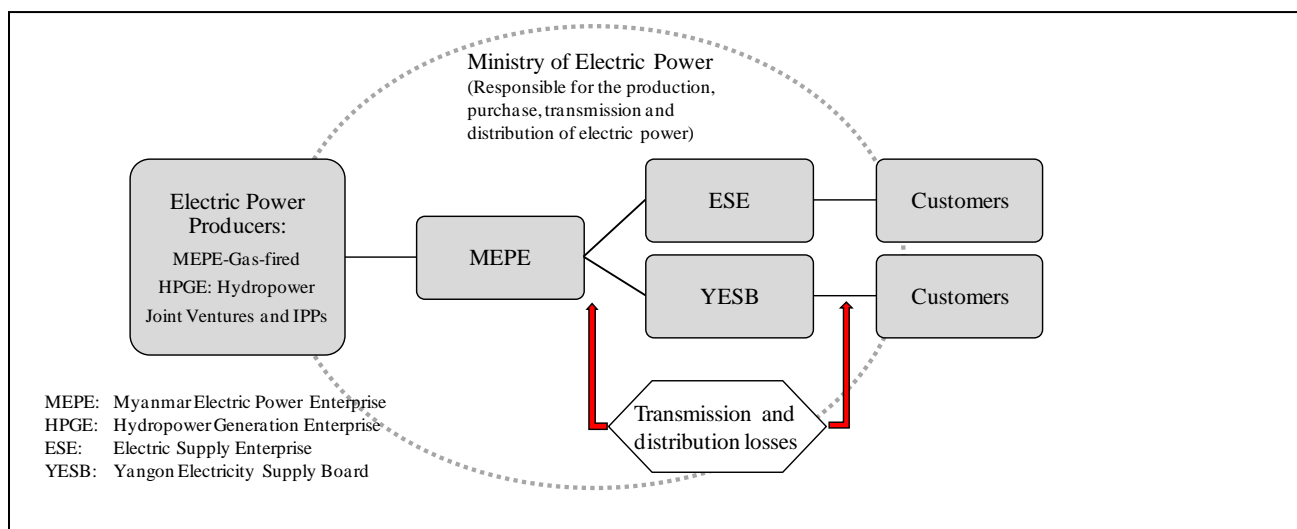


Figure 6- Myanmar’s electric power system

Baseline CO₂ Emissions in Myanmar

The development of Myanmar’s climate change policy is under the responsibility of the Environmental Conservation Department under the Ministry of Environmental Conservation and Forestry (MOECAF). Although Myanmar still lacks a national strategy and action plan for mitigating and adapting to climate change, several ministries are implementing sector-specific initiatives relevant to climate change.

The following two tables provide summary information on Myanmar’s CO₂ emissions.

Table 5 - Myanmar CO₂ emission trends 2000-2011, million tons of CO₂²²

	2000	2005	2009	2010	2011
Myanmar	9.4	10.6	7.0	8.0	8.3

Table 6 - CO₂ emissions of consuming sectors in 2011, million tons of CO₂*²³

	Total CO ₂ emissions from fuel combustion	Other energy industry own use	Manufacturing industries and construction	Transport	Other sectors
Million tonnes of CO ₂	8.3	0.7	3.3	2.3	1.9
%	100.0%	8.4%	39.8%	27.7%	22.9%

* CO₂ emissions with electricity and heat allocated to consuming sectors.

Baseline situation, projects and barriers

The country has been facing acute energy and power shortages, as detailed in the previous section. Therefore, drastic measures have been taken, such as load shedding, to deal with these shortages and yet continue to provide power. This creates immense difficulties for industrial operations, in particular for those sub-sectors which require continuous power supply. As a result of this, there is large potential to improve energy efficiency in industry. A recent report by the

²⁰ The project, during its PPG phase, has conducted several consultations with the Asian Development Bank (ADB) that assisted the Ministry of Energy (MOE) in the formulation of the Energy Policy, and with several NEMC members on issues relating to energy efficiency. Many national workshops and seminar have been organized to provide, inter-alia, inputs to the development of the Energy Policy.

²¹ Kate Rosow Chrisma, Powering Myanmar, <<http://theenergycollective.com/posts/published/user/857716>>

²² IEA, CO₂ emissions from fuel combustion, 2013 edition.

²³ IEA, CO₂ emissions from fuel combustion, 2013 edition.

Economic Research Institute for ASEAN and East Asia (ERIA)²⁴ discusses energy growth scenarios for 2010-2035; based on GDP growth of 7% per year in the period 2010-2035, total final energy demand is expected to grow by about 6.6% annually. In industry, energy is expected to grow by 6.1% per year, in line with industrial growth which has been increasing rapidly. Even if electricity output were to double every five years, it would take five years just to meet today's needs, let alone accommodate future electricity demand, estimated by the Ministry of Energy (MOE) to grow by 6-12%. Currently, the electric power grid experiences significant load shedding of up to 500 MW during the dry season²⁵; if no new generation capacity is added, load shedding will increase to between 800 MW and 1,000 MW in 2014. This will lead to industrial and commercial establishments having to rely even more heavily on self-generation using gensets.

Energy efficiency is one of the most cost effective measures to increase the availability of electricity and energy, often a kilowatt avoided (negawatt) costs less than a kilowatt generated. With respect to energy efficiency goals, Myanmar aligns itself along its ASEAN partners and aims to save 5% of total primary energy consumption by 2020, and 8% by 2030 compared to a base year, 2005.

Recently, as part of the Sustainable Industrial Development led by the Myanmar Industrial Development Committee (MIDC) large industries have been encouraged to obtain ISO 140001, Environmental Management Standards, compliance certifications. ISO 140001 is considered to be the “predecessor” of ISO 50001 on the Energy Management Standard, indicating that interest at the industry level is present.

Policy Initiatives

As a result of many decades of isolation, Myanmar lags behind other countries in the region on many indicators, economic as well as socioeconomic. To rectify this, the new Government of Myanmar, since the election in November 2010, has rolled out an impressive reform and development programme in all areas.

Primarily, the Government is paying the highest attention to poverty alleviation, economic growth and to achieving the Millennium Development Goals (MDGs). To this end, the Framework for Economic and Social Reforms (FESR) was drafted in 2012, approved by the Planning Commission in December 2012.

In the FESR, four policy priorities are identified, namely; (i) Sustained industrial development to catch up with global economies; (ii) Equitable sharing of resources, both budgetary and foreign aid, among regions and states; (iii) Effective implementation of people-centred development; and iv) Reliable and accurate gathering of statistical data. The FESR also identifies three quantitative targets to be reached by 2015, including; (a) average annual GDP growth of 7.7%; (b) industry share of GDP rising from 26% to 32%; and (c) per capita GDP growth of between 30-40% from the base year (2010).

As stated above, however, an action-oriented strategy for achieving these savings is still lacking and many daunting barriers to the widespread use of energy efficient practices and technologies remain. One of the most acute barriers is that the Government has been selling electricity below the world-market cost of generation. This has inflicted heavy budget losses and prevented investments for maintenance and new capacity installation, as well as discouraged users from saving electricity. Although the Government increased electricity tariffs on 19 March 2014, they have yet to reach a realistic level (see Table 7 below).

Table 7 - Electricity prices in Myanmar after 19 March 2014²⁶

User	New price (after 19 March 2014), Kyats/kWh	New price (after 19 March 2014), US¢/kWh (at 964 Kyats/US\$)
Household (<100 kWh/month)	35	3.6
Household (101-200 kWh/mo.)	40	4.1
Household (>200 kWh/mo.)	50	5.2
Commercial (<500 kWh/mo.)	75	7.8
Commercial (>500 kWh/mo.)	150	15.6

²⁴ Tin Zaw Myint and Nay Aung (2013), ‘Myanmar Country Report’ in Kimura, S. (ed.), *Analysis on Energy Saving Potential in East Asia*, ERIA Research Project Report 2012-19, pp.225-242.ERIA [online]. Available at: http://www.eria.org/RPR_FY2012_No.19_Chapter_12.pdf

²⁵ ADB estimates based on MOEP information.

²⁶ Media reports and Government news

Baseline Projects

In terms of capacity building on energy-related issues, a number of seminars and workshops have been organized for the MOE and the MOI at the regional level, such as the ASEAN Energy Award Program, but little EE capacity building has taken place within Myanmar. This has meant that while the relevant ministries have a basic understanding of the benefits associated with efficiency improvements, no institutional ownership of this issue has yet been built within the country. Regional cooperation with the Department of Alternative Energy Development and Efficiency of Thailand has also taken place through the Ayeyarwaddy-Chao Phraya-Mekong Economic Cooperation Strategy on energy statistics and promotion of EE. At the national level, the MOE, MOI and the MES, has supported the construction of an energy efficient urea fertilizer plant at Kyawzwa, and efforts have been made to begin replacing privately-owned vehicles that are older than 40 years.

These government-implemented initiatives, while still at an early stage, indicate that the relevant ministries are committed to improving energy efficiency in Myanmar.²⁷ The proposed project will leverage this interest and awareness to refocus these efforts on the national stage, rather than being limited to regional efforts, and focus specifically on energy efficiency in the industrial sector where initiatives are limited.

In terms of international assistance, the **New Energy and Industrial Technology Development Organization (NEDO)** of Japan has been recognized as the most notable external partner in the EE field in Myanmar. NEDO is planning to organize energy conservation seminars, and carry out feasibility studies for energy conservation projects under the framework of a cooperation programme signed with the Ministry of National Planning. In general these projects have primarily focused on the renewable energy side of energy conservation with limited focus on energy efficiency. In recent years, however, NEDO has helped about 20 plant engineers and officials from Myanmar to receive training on energy efficiency in Japan. More recently, NEDO has also started to implement a project that promotes energy efficiency in buildings design and construction.

With the support of the ASEAN Centre for Energy (ACE), some energy audits have been carried out, and the Myanmar Engineers Society (MES) has organized a few training courses for energy managers based on the materials and methodologies developed by the AEMAS project (ASEAN Energy Management Scheme) of ACE.

All of the above activities relating to EE capacity building have faced a common constraint that there has been very little demand for the built capacity due to a lacking market, and also very little opportunity for consolidating the gained knowledge. Since 1997, about 8 regional industrial training centres have been established with support from the governments of Germany, the Republic of Korea, Japan, China, India, etc. and have provided limited training courses for industrial technical personnel. However, these training centres have been mainly focusing on training for fresh graduates and not improving the expertise of engineers already working in the market. The proposed project, in addition to delivering a very systematic training programme with proven success in a number of developing countries, will also create a market for EE services and products, as well as an EE Resource and Training Centre to continue the work of the project after its completion and ensure sustainability.

During the PPG phase of the proposed project, a number of companies and factories have been identified that have already obtained ISO 9001 and ISO 14001 compliance certificates. These companies/factories will be specifically targeted by the project to build upon the existing baseline and expertise for the implementation of and certification in ISO 5000. The Quick Assessment Reports of these companies, conducted during the PPG phase, are included in Annex K.

Focusing on the policy aspects of promoting an increased focus on energy conservation, the **Asian Development Bank (ADB)** has implemented a number of projects in Myanmar in recent years. Of relevance, the “Institutional Strengthening of National Energy Management Committee in Energy Policy and Planning” project has two main objectives; i) preparation of a 2-year long-term energy master plan; and ii) addressing of institutional arrangements and capacity development within NEMC, EDC, and other relevant ministries. As the Plan is currently under development, the proposed project will aim to coordinate with the ADB where possible on energy efficiency-related information for incorporation in the strategy.

The **World Bank** currently has five active projects in Myanmar, one of which, the “Electric Power Project,” is relevant to the proposed project. While the World Bank project has a specific focus on increasing capacity and efficiency of gas-

²⁷ “Myanmar; Energy Sector Initial Assessment.” Asian Development Bank, October 2012

fired power generation, they will also provide capacity building to the Ministry of Electric Power and the Myanmar Electric Power Enterprise. This will serve as a baseline for awareness and understanding at the institutional level upon which the proposed project can build. The proposed project has cooperated closely with the ADB and the World Bank during the PPG phase and will continue to do so in the implementation phase, particularly on the institutional capacity building for EE and EE financing. These projects indicate an increased interest in energy management and conservation in Myanmar, but also highlight the gap; there is a continued lack of focus on the benefits available through improvements in energy efficiency. This gap will be bridged by the proposed project's focus on capacity building and awareness raising, building on the baseline established by the ongoing projects in Myanmar.

Barriers

As discussed above, there are a number of barriers currently in the Myanmar market that hinder the adoption of energy efficiency measures by industry. The key barriers identified during the PPG phase of the proposed project through workshops and consultations are outlined below:

Barrier	Mitigation Actions
<p>Institutional barriers:</p> <p>There is no legal and regulatory framework for energy efficiency in Myanmar, i.e.</p> <ul style="list-style-type: none"> - Lack of a dedicated government organization at the national level in the past; - Little or no statistical data; - Myanmar lacks a consolidated plan for energy efficiency. <p>ISO50001 is not yet adopted in Myanmar and the infrastructure for accreditation and certification for ISO50001 are absent.</p>	<p>Baseline</p> <p>While MOE is the focal point for energy sector coordination, the Research and Development Center under the MOI addresses energy efficiency. Now, NEMC and EDC are taking the lead in energy development and energy efficiency. However, there is no legal and regulatory framework (e.g. standards) for energy efficiency and no dedicated organization at the national level. Consequently, Myanmar lacks a consolidated plan for energy efficiency.</p> <p>Alternative:</p> <p>UNIDO will work with counterparts in Myanmar to draw up industrial energy efficiency plans and strategies; and set up the relevant frameworks and structures.</p> <p><i>Related project outcome: 1.1</i></p> <p><i>Related project outputs: 1.1.1, 1.1.2, 1.1.3</i></p>
<p>Informational barriers:</p> <ul style="list-style-type: none"> - Lack of awareness, corporate decision making and management: - Some industries perceive EE projects to be high risk due to high capital requirements. There is often a perception that these investments do not bring commensurate financial returns when compared to the financial returns expected from other investment options. Even when technical or energy managers are convinced, top management in a company may not be aware of the potential of EE for (long-term) cost reduction. - EE is not a core interest for most companies. Company strategies often focus on output growth rather than cost management. Most enterprises have a budgetary disconnect between capital projects and operating expenses. EE projects reduce operating 	<p>Baseline:</p> <p>In general, there exists a lack of experience and information in promoting industrial energy efficiency and awareness on knowledge and methodologies for industrial energy efficiency, in particular the benefits of energy management and systems optimization. The institutional capacity and human resources in industry is limited and lack of information and data on energy consumption and benchmarking is seriously hampering energy conservation efforts. There have only been a few small programmes implemented, mainly on awareness raising, such as promoting the utilization of energy efficient appliances and the reduction of energy consumption in the transport sector:</p> <p>Alternative:</p> <ul style="list-style-type: none"> - The project will disseminate the benefits of EnMS at the senior manager/business owner level including ½ day presentations across the country. The training focuses on addressing the budgetary disconnect between capital and operating expenditure; the EnMS trainees can also assist the Myanmar authorities involved in verification and certification of standard compliance. - Capacity building to provide EE services; focused on EnMS and SO in industry and to support investments in EE technologies and operation. Trained experts can work as plant energy managers or energy management consultants to assist industry in implementation of the ISO50001 standard, whereas the trainees of SO can become technical specialists on energy SO, such as specialists on motor/fan, pumping, compressed air, steam, and process heating system optimization. - An EnMS bridges the various decision-making departments and involves management in the operational changes for increased energy

<p>expenses, but require capital for implementation. Corporate accounting practices often place capital and operating budgets under separate departments;</p> <ul style="list-style-type: none"> - Lack of familiarity with the range of EE technologies and processes, and energy conservation investment best practices, as well as under-appreciation of financial benefits from energy conservation investments are primarily responsible for the high risk perception among industrial enterprises. - Industrial energy-consuming equipment purchase decisions often focus on components, not on the systems that they operate. In addition, local suppliers of energy efficiency-related finance, equipment and expertise have limited experience and skills in marketing their products to industrial decision-makers. 	<p>efficiency.</p> <p><i>Related project outcomes:</i> 1.1, 2.1, 3.1</p> <p><i>Related project outputs:</i> 1.1.4, 2.1.3, 3.1.1, 3.1.2</p>
<p>Barriers to finance and knowledge:</p> <p>While there will be financing available for EE projects to be provided by various commercial and development banks, experience from other countries has shown that uptake has been low due to extremely high interest rates, high collateral requirements and most importantly due to the lack of good project proposals.</p>	<p>Baseline:</p> <p>Energy efficiency in industry is very low because of obsolete technologies and equipment, and outdated practices are being used. This requires gradual replacement of low efficiency equipment with higher efficiency alternatives and more efficient practices. There is a lack of adequate financing resources and capacity to develop efficiency investment projects</p> <p>Alternative:</p> <p>The project will work on establishing a link between banks and enterprises by making enterprises aware of the funding opportunities and strengthening enterprises' capacity in preparing bankable IEE investment projects and banks' capacity in evaluation and appraisal of applications for IEE investment.</p> <p><i>Related project outcome:</i> 2.1, 3.1</p> <p><i>Related outputs:</i> 3.1.1 and 3.1.2</p>

A.5. Incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

Project Alternative:

This Project Alternative section will supplement information and data that have been presented in the GEF alternative scenario of the approved PIF. With the financial support from the GEF, UNIDO will mobilize additional resources and external and local expertise to assist the country in removing the above-mentioned barriers in order to ensure sustained EE improvements in Myanmar industry. UNIDO has had significant success in the implementation of similar projects in a number of countries in South-East Asia and thus, will adopt a similar approach in the proposed project while also paying close attention to the specific context of Myanmar.

The project is designed with three inter-linked substantive components to bridge the gaps and barriers currently in the Myanmar market that are preventing the adoption of energy efficiency measures by industry. These 3 inter-linked

components will be implemented in a meaningful sequence to maximize the impact of the integral nature of the offered technical assistance on improving energy efficiency within the Myanmar industry, focusing on the implementation of EnMS compatible with the international standard ISO50001, and Energy SO. The adoption and promulgation of a national EnMS standard, along with supporting standards, compatible with ISO50001 can deliver substantial and sustainable energy savings within industry and within some entities outside industry. This international standard, published in 2011, has been found to be effective in delivering and maintaining energy savings when properly implemented. Implementation does not necessarily require capital investments, but can effectively also identify many opportunities for EE capital investment projects.

System Optimization is a method that generates energy savings through optimizing the energy systems that consume significant energy amounts within a facility. SO may save much more energy (20-30% savings are possible) than the method of replacing individual components of a system with more energy efficient ones. Therefore, the payback periods of SO projects are typically short – from a few months up to a few years – and involve commercially available products and accepted engineering practices. However, many industrial managers are unaware of both the inefficient running of the existing systems or the benefits that could be derived from optimization for more efficient operation. Short visits that UNIDO Teams carried out in Myanmar indicated that the untapped potential for SO within Myanmar industry may be substantial (see also Annex E).

Component 1: Improvement of policy and regulatory frameworks, incentive schemes, support programmes

Outcome 1.1 Improved policy and regulatory frameworks, incentive schemes, support programmes, energy data and awareness will facilitate sustainable energy efficiency improvement in industry

In addition to providing assistance for the production of the 4 Outputs under this component, the project will also assist the Government's efforts in strengthening the institutional capacity at the national level for the management of EE policy development and implementation. For example the newly established EE & Conservation Division of the MOI, relevant entities under the Ministry of Energy, or the future Directorate for EE & Conservation if it will be established as proposed by the draft Energy Policy.

Output 1.1.1 Energy efficiency strategy developed based on experience and lessons learned from other countries

In order to put into place a concrete approach to the promotion and increased adoption of energy efficiency measures in Myanmar, the proposed project will support the development of an EE strategy. This strategy will incorporate the experiences and lessons learned from other countries, with the assistance of international and national experts and consultations with the relevant stakeholders. The EE strategy will be action-oriented with clear recommendations as to approaches for gradually reducing existing energy price subsidies, as well as the potential impact of such subsidies' reduction, and the incorporation of energy efficiency policies into the existing national policy framework. This will build upon recent work on energy sector policy formulation, i.e. the Energy Policy and Strategy, prepared by NEMC with ADB support²⁸, and also recent electricity price increases by the Government as outlined in Table 7. The incorporation of lessons learned from other countries will play a key role, as well as on-the-job training and capacity building for relevant stakeholders. The EE strategy will include a comprehensive gender analysis to better understand how gender issues can be mainstreamed into energy policy in Myanmar.

The project will pay special attention to using and promoting the participatory approach for the development of the EE policy, and work closely with other external development partners, in particular with those partners that the project has already cooperated with during the PPG phase, such as the ADB and the World Bank.

Output 1.1.2 Incentive schemes, e.g. tax breaks or exemptions, grant and non-grant instruments, etc. and support programmes, e.g. consultancy services, training, etc. developed

To encourage the implementation of EnMS and invest in energy efficient measures, the proposed project will also develop incentive schemes and support programmes which have shown to be a key factor for enterprises implementing EE projects. The project will work closely with the relevant ministries and stakeholders to ensure that these schemes and programmes are in line with the national context and existing policies. Adequate recognition schemes for the implementation of ISO50001 will also be developed. For example, an annual reward system could be established to present awards to the best factories in achieving established EE targets, similar to the Prime Minister Award in Thailand

²⁸ See EE Policy Development-Inception Report by ADB in March 2014

or the IEE Open Day in Malaysia. The development of incentive schemes and support programmes will also take into consideration the potential impacts of the energy price subsidies reduction. Once the Energy Policy, currently being considered by the Parliament, is adopted (expected in the second half of 2014, or beginning 2015), concrete incentive programmes will be selected and their development will be considered a priority to facilitate the implementation of EnMS and SO measures. Similar schemes and programmes which have been implemented successfully in other countries, such as the waiving of import-taxes for EE equipment, subsidies and preferential soft loans for investment in EE, free EE consultancy services to SMEs, etc. will be taken into consideration.

Output 1.1.3 Energy consumption data by large and medium sized industry establishments collected and managed

To ensure that the policies and incentive schemes developed under Outputs 1.1.1 and 1.1.2 are effective and sustainable, extensive energy consumption data will be collected from large and medium-sized enterprises and then managed on an ongoing basis. To do so, an energy data reporting system will be developed and implemented by the project. The data collected through this system can be utilized for benchmarking of selected sub-sectors in industry, as well as for the design of support programmes and general knowledge management. While only large and medium-sized enterprises will be targeted during the project implementation period, the data collection will be expanded to additional sectors and small enterprises in the post-project period. The reporting system will be managed by a selected institution, for example the future EE Resource and Training Centre, or a suitable institution under the MOE, or the SME Development Center. The support and training to be provided to the EE Resource and Training Centre is outlined below in Component 2, Outcome 2.1. The required regulations for the use of this collected data will also be developed by the project.

Output 1.1.4 Awareness raising activities on Nationally Appropriate Mitigation Actions (NAMA) and EE conducted

Comprehensive awareness raising activities and workshops will be organized under this output to maximize participation in the capacity building activities of Component 2 and ensure the buy-in of the relevant policy-makers for the activities under Component 1. The project will aim to organize at least 15 such half-day awareness raising workshops, with 40-60 experts, managers and concerned government officials targeted to attend each event.

In addition, the awareness raising events will cover the importance of NAMAs and the Technology Needs Assessment (TNA), providing expert input where necessary, and encouraging the inclusion of energy efficiency issues/measures where required. The awareness raising activities will be targeted to specific topics, i.e. development of NAMAs, EnMS, etc., and the case studies to be developed under Component 3 will also serve as input for these awareness campaigns, ensuring the dissemination of the success stories of the project.

Component 2: Capacity Building

Outcome 2.1 Strengthened or built capacity of institutions, industries, consultants, and equipment suppliers on energy management system, energy system optimization, and EE project financing will assist industries in the implementation of EE improvements

In addition to the provision of training, using the proven “training of trainers” approach as explained hereunder, the project will pay particular attention to strengthening selected entities to continue carrying out trainings and providing consultancy support to the industries after project completion. To begin with, the project will target the Myanmar Engineering Society (MES), the EE and RE centre of MIA, and one of the 8 existing training centres that has been selected by MOI. One of the latter will be strengthened to become a national EE Resource and Training Centre to sustain the training and continue to maintain the measuring instruments, training materials, software, etc. that will be acquired for the implementation of the project. Training and knowledge building within the Centre will be provided on an ongoing basis through initial participation in the training modules and close cooperation with the project team. As the project progresses it is foreseen that the Centre will be supported by the project to organize the trainings themselves. This approach will ensure that sufficient capacity is available to ensure sustainability once the project implementation period is complete.

In order for the Centre to effectively function and serve the industries, MOI has already agreed to provide enough space for the centre, initially 80m² in the Yangon region to store the project measuring instruments and training materials and publications, as well as to organize frequent training courses. The project will also support the newly established EE & Conservation Division in its efforts to provide EE training to the industries. By training, leading, and establishing national level technical organizations as the “trainers,” the project will ensure the institutionalization and replicability of the training process. It will also be a more cost-effective approach for executing the training and the technical

organizations will thereby become a source of national energy management expertise, and serve as multipliers of project intervention.

Knowledge management in Component 2 will be encouraged and managed through Basecamp, a web-based project management tool, or a similar tool, that allows international and national experts, as well as project stakeholders, to interact, ask questions, and share knowledge on an ongoing basis. This approach has been used in a number of ongoing IEE projects implemented by UNIDO in South East Asia and has proved very successful for knowledge management purposes. The Basecamp groups will continue to be managed by the EE Resource and Training Centre, after project completion. *Output 2.1.1 Introductory, user and expert training on energy management systems, based on ISO50001, EnMS conducted*

In line with the UNIDO IEE Programme, the training offered through the project will be carried out at three different levels; (i) half-day awareness training targeted at organization managers, plant owners, concerned government officials, etc.; (ii) 2-day user training targeted at plant engineers, energy managers and consultants, etc.; and (iii) expert level training targeted at energy management experts and ISO 50001 auditors. Capacity building activities will be offered to those institutions responsible for the implementation of ISO 50001 in Myanmar, for example the Standards Institute of the Ministry of Science and Technology (MOST). This output will aim to train; (i) 300 managers on awareness and implementation of EnMS; and (ii) 150 practitioners and 40 experts on the implementation of EnMS. Due attention will be made to encourage and facilitate women to participate in the various project training and gender-disaggregated data from the trainings will be collected throughout the training programme.

The UNIDO training materials will be translated into the local language of Myanmar and adjusted to the specific conditions of the country. As in the case of other ASEAN countries, the preparation of the training materials and the training delivery will be carried out in close cooperation with the AEMAS.

In particular for the expert level training, the systematic selection of the trainees at different training levels, sufficient mentoring at selected factories, and a sound exam system and recognition by appropriate authorities that have been proven to be very successful in similar IEE projects in other countries to ensure the quality of the training, will be followed. Special attention will also be given to implement measures to ensure that the trained experts can and will have enough work to assist industries to implement EnMS and SO, during and after the project.

Output 2.1.2 User and Expert training on energy system optimization conducted

Energy system optimization training will focus on the following systems; pumps, compressed air, steam, fan, motor and process heating, and will be offered at three levels; i) 2-day end user training targeted at plant engineers, energy managers and consultants, and concerned government officials, etc.; (ii) expert level training targeted at respective specialists, energy managers of large industrial establishments, and free-lance consultants, who could later on provide services to the SMEs; and (iii) half-day vendor training. At least 10 to 15 experts and 30 to 50 end-users in each of the energy systems are targeted to be trained, and 3 half-day vendors trainings on SO will be held. Due attention will be made to encourage and facilitate women to participate in the various project training and gender-disaggregated data from the trainings will be collected throughout the training programme.

The training materials for these events will be translated into the language of Myanmar, and adapted to the national context, as required. Capacity building events are foreseen to take place in areas of high industrial concentration, such as Yangon region, Mandalay Division, Yangon, Bago, Ayeyarwady, and Sagaing. Industrial sub-sectors that are particularly energy intensive will be targeted for the capacity building activities; and are likely to include steam systems in the petro-chemical, paper & pulp, textile, and food processing sub-sectors; fans in the cement, and ceramic sub-sectors; pumps in the food processing, and paper & pulp sectors; and compressed air systems in the automotive sub-sectors.

Output 2.1.3 Training on EE project financing provided to industry and financial institutions

To encourage improved access to financing for industries choosing to implement energy efficiency improvement projects, this output will provide targeted training to industry personnel and management on the development of bankable EE project proposals to improve their chances of accessing financing. In addition, capacity building of financing institutions on the appraisal of such proposals will also be undertaken. A total of 100 technical personnel will be targeted to receive training on the development of bankable EE project proposals and 30 personnel from financing institutions will receive training on the appraisal of such proposals. In order to ensure linkages between the project

components, those national experts trained under Outputs 2.1.1 and 2.1.2 and taking part in the pilot projects under Component 3 which be given preference to partake in the EE project financing trainings. This will help to ensure that the projects implemented are sustainable beyond the initial support provided by the project and are built upon solid business cases.

This approach will result in enhanced awareness of the costs and benefits associated with energy efficiency improvement projects, thus reducing the perception of risk associated with these investments. This improved access to financing for enterprises will ensure that such investments are sustainable after the project implementation period, and that scaling up activities will be successfully adopted. Again, this work will be done in close consultation with the AEMAS programme, through its focus on awareness raising for chief financial officers (CFOs) on EE investment and financing.

Component 3: Demonstrations and Up-scaling

Outcome 3.1 Demonstrated projects on energy management system, and energy system optimization in selected plants and sub-sectors and widely used case studies result in direct GHG emissions reductions and leverage the interest and belief in investment in IEE projects

In order to achieve a sustainable shift in the market towards more energy efficient approaches and operation, the project will support the implementation of improvement projects in industries, utilizing the awareness raised and capacity built under the earlier Components. To ensure a sufficient number and high quality of participating industries, the project will begin to identify potential partners at the early stages of the project, through the awareness seminars and the participating national experts in the capacity building modules. Extensive experience in other industrial energy efficiency projects in South-East Asia has shown that national experts already working in industrial facilities are the most successful at identifying and securing the commitment of candidate plants, and as a result, such candidate national experts will be given priority when vetting applications.

To ensure a high level of commitment from participating enterprises, the project will seek letters of intent/commitment from candidate plants where possible. In addition, as the industries have also been clearly informed during the PPG phase that the project can only support pilot projects up to a maximum level of 20% of investment with the rest to come from the industries or Government, industries will have a keen interest in getting the most out of the investment.

The case studies of the successful EnMS and SO implementation projects will be developed under this Component and disseminated accordingly. Through their dissemination to industry, the project will aim to raise awareness of energy efficiency in Myanmar industry, while also serving as “proof” of the business case of such improvements for management staff of other industrial enterprises. This will serve to improve the belief in investment in IEE projects as a systematic operational approach, rather than an ad-hoc approach when individual components require replacement.

Output 3.1.1 Energy management systems implemented in 50 industrial establishments, case studies prepared

In order to utilize the improved awareness, policy framework and built capacity developed under Components 1 and 2, this project will support 50 industrial enterprises to implement EnMS. Criteria that have been developed and used in similar project implemented in neighbouring countries for selecting the factories will be adjusted to the specific conditions of Myanmar. These projects will be supported by the national experts trained under Component 2, giving them the opportunity to apply the knowledge learned and work closely with the international experts in an applied setting. This approach encourages national experts to participate in the project beyond the 1-2 training workshops, and also supports the development of a market for national experts in EnMS in Myanmar, thus supporting sustainability. To this end, it is expected that the national experts will assist a number of factories beyond those directly assisted by the project under this Output and Output 3.1.2. This approach impacts the sustainability and scaling up of the project, and has been considered in the GHG calculations of the project’s impact (see Annex E).

Of the 50 implementation projects, it is expected that some 20 enterprises will work towards obtaining ISO50001 compliance certificates. The project will support these efforts to the extent possible, utilizing the expertise of the international and national experts. The results and lessons learned of these implementation projects will be disseminated to industry and stakeholders through case studies prepared under this Output. The seven companies that have undergone the quick assessment, the four plastics manufacturers recommended by the Myanmar Plastic Industries Association, and those SMEs selected by the SME Development Centre will be the first candidates for implementation of EnMS.

Output 3.1.2 At least 20 optimization projects implemented on energy systems: pump, compressed air, fan, and steam, case studies prepared

Working with the enterprises that have implemented EnMS, the project will also seek out energy systems within these enterprises to implement system optimization projects. National experts trained under Output 2.1.2 will support these projects, applying the knowledge learned and supporting enterprises to implement optimization projects in the various systems. A total of 20 such projects will be targeted and case studies of successful projects and lessons learned will be developed for dissemination and awareness raising. Factories that agree to host the on-site training will receive a variety of support from the project, for example, 2-3 factory personnel will be able to take part in the expert level training, and high-quality assessment services will be provided by the expert trainees under the mentoring of experienced international experts, as well as other required support services. For those participating factories that will be expected to agree to implement demonstration projects, further support from the project will be given; for example, technical design, assistance in equipment purchase and installation, case by case financial support of up to 20% of the incremental investment, as well as additional support from the government and other related projects.

Implementation of EE improvement projects will result in significant energy savings; Annex E provides estimates of the resulting energy savings in the companies participating in the Outputs 3.1.1 and 3.1.2 and the resulting greenhouse gas emission reduction.

Component 4: Monitoring and Evaluation

Outcome 4.1 Adequate monitoring and evaluation facilitate smooth and successful project implementation

Output 4.1.1 Regular monitoring exercises conducted, PIRs prepared; tracking tools prepared according to GEF requirements

As outlined in Section C, as well as Annex F, hereunder, the project will have an ongoing Monitoring and Evaluation mechanism in place, including ongoing measurement of energy savings and GHG emission reductions based on GEF Tracking Tool indicators, and those outlined in Annex A (project results framework). This ongoing assessment will be complemented with periodic progress reports and the annual Project Implementation Reports (PIRs). This ongoing approach to monitoring and evaluation will ensure that knowledge management is incorporated into the project approach throughout the implementation period.

Output 4.1.2 Mid-term and final project evaluations conducted

In line with GEF and UNIDO requirements, the project will have a midterm review/evaluation and independent terminal evaluation. The PMU, Project Steering Committee (PSC) and staff at UNIDO Headquarters will support these evaluations where required, providing the necessary data, expertise and assistance.

Incremental reasoning and co-financing:

In the absence of the proposed UNIDO-GEF project, the uptake of energy management based on ISO 50001 and energy SO would be very slow. The GEF project will provide assistance in the promulgation of energy policy and regulations, and building capacity of enterprises and institutions. Furthermore, it will share international experiences from other countries where energy management standards have successfully been implemented, as well as from other ASEAN countries, which are implementing similar IEE projects. The GEF project will play a catalytic role in transforming the market for industrial energy efficiency goods and services through the activities on standards and capacity building.

With regard to co-financing, at the time of preparation of this CEO Endorsement Request, one co-financing letter from MOI, commitment letters of MIA, and the Plastic Industries Association, and Letters of Intent from two industries have been obtained. As MOI has been assigned by the NEMC as the coordinator for energy efficiency and conservation, the MOI has issued a co-financing letter on behalf of the concerned ministries, institutions and industries. The co-financing by concerned authorities and institutions are mainly in the form of staff time, office space and some local expenditures relating to workshops, seminars, training courses, awareness campaigns and publications, or complimentary training courses carried out by MES, MIA and MOI, etc. These contributions will continue to be mobilized during the project implementation period and recorded for reporting purposes. Co-financing from the industries will mainly consist of investments by the factories that have implemented EnMS and SO under Component 3, and staff time and contributions for the capacity building activities under Component 2. These contributions will be mobilized along the respective implementation activities and also captured in accordance with the GEF co-financing policy, dated 30 June 2014.

Global Environment Benefits:

It is expected that the project will result in considerable global environmental benefits in terms of GHG emission reductions through a substantial reduction in fuel and electricity consumption in comparison to the business-as-usual scenario. The following table gives the direct emission reduction impact, as a result of the implementation of energy saving measures as part of their EnMS implementation in the 50 companies, and of implemented SO in 20 companies, and also the indirect emissions reductions, bottom-up and top-down. The table also shows the 'GEF effectiveness,' i.e. GEF contribution divided by the lifetime emission reduction. Details on the calculations of the emissions reduction can be found in Annex E.

The methodology utilized is the "Revised methodology for calculating GHG benefits of GEF energy efficiency projects (version 1.0)."

	Cumulative GHG reduction (tCO₂)	GEF abatement cost-effectiveness (USD/tCO₂)
Direct emission reductions (2015-2019)	193,204	14.13
Indirect emission reductions (bottom-up)	772,817	3.53
Indirect emission reduction (top-down)	4,071,254	0.67

Direct emission reduction is based only on the number of factories that will receive direct support from the project to implement EnMS (50) and SO (20) during the project implementation. However, experience from similar IEE projects implemented by UNIDO, which offer integrated technical assistance like this project, has shown that two or three times more factories than directly targeted will also implement EnMS and SO with the support of expert trainees. It is expected that in Myanmar even more factories than in the other ASEAN countries, will implement EnMS and SO, because of the very high electricity price from the gensets, and the fact that the industries have been isolated for many decades from the global economy. This is reflected in the bottom-up indirect emission reduction estimates, by applying a replication factor of four (4). During the PPG phase, a number of factories have already expressed interest to participate in the project implementation activities.

Innovativeness, sustainability and potential for scaling up:

Implementation of EnMS and SO are very new approaches for developing countries, and even more so in LDCs, and the project's strong private sector participation in the PSC will ensure the formation of a valuable public-private partnership. Considering the relatively recent political shift towards the promotion and stimulation of the private sector and investment, the development of public-private partnerships in industry will be a rather new and necessary construct. As this approach is innovative in Myanmar, the project will draw significantly on the experience gained by similar projects in five other ASEAN countries rather than "reinventing the wheel." This will minimize the incremental cost of the project, and also allow Myanmar industry to benefit from the rich experience of their neighbours.

Another innovative aspect of the project's approach is the focus on energy efficiency. Until now, energy efficiency has been seen as unimportant in comparison to the need to develop industrial sectors in an economy that has been primarily agricultural for most of its history. Given that industry is still at a nascent stage, the introduction of energy efficiency principles at such an early stage will have a significant impact on their development.

To ensure sustainability and scaling up, the project will focus on creating a vibrant and sustained local market for EE services and goods by offering integrated technical assistance packages: (i) enabling policy and regulatory framework with incentives and support programmes, (ii) intensive capacity building, (iii) demonstration and awareness raising, and (iv) improved financing for EE. In particular, the project will deliver high quality trainings on EnMS and SO with significant on-site practices under extensive coaching by experienced international and local trainers, final exams with certificates for expert level trainees, and selected institutions to be strengthened to continue the training after project completion.

It is expected that a much higher number of industries will implement EnMS and SO after project completion, as a result of improved awareness and policies and incentives to promote EnMS implementation. The industry will be able to access support from well-trained experts, and the number of experts will be increased thanks to the continued training to be provided by the strengthened institutions.

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:

Risk	Rating	Mitigation
Management priorities in the participating public and private sector organizations change over time, before and during project implementation.	Low	To mitigate this risk, extensive consultations with industrial enterprises and associations, including multiple workshops, were undertaken in the PPG phase. To concretize the commitments made by industries, commitment letters from the MOI, Ministry of SME Development and the MIA have been obtained. Furthermore, key stakeholders will be members of the PSC to ensure ongoing participation in project decision-making.
Lack of effective coordination between the various project partners.	Low	Coordination has been key in the PPG phase of the project, and a similar approach will be taken during project implementation. The PSC will provide a forum for this, as well as ad-hoc working groups for specific sub-sectors or themes that will be established where necessary to ensure ongoing coordination.
Companies have doubts on techno-economic viability. Thus, demonstration projects are delayed, limiting the opportunity to disseminate success stories and develop case studies.	Medium	Awareness raising and capacity building activities will seek to mitigate this risk by carefully explaining the benefits of such interventions to management where such decision-making is made. The additional support on the development of bankable project proposals will further support enterprises to understand the cost-benefit factors associated with the projects. Regarding the specific technologies to be implemented, these have been applied and proven in a number of developed and developing countries. To ensure that the correct and cost-effective technology choices are made by enterprises, detailed assessments of demonstration sites and consultations with international experts will be a key part of the implementation process. This approach will also help to bridge technology transfer barriers faced by Myanmar industries. The demonstration project proponents are anticipated to provide initial case studies results and thus serve as examples for other factories to replicate.
Limited number of participants interested in training and no immediate demand of services for trained experts as the growth of the market for energy efficient technology is slower than expected.	Low	The awareness raising campaign under Component 1 and the case studies to be shared with industry and stakeholders under Component 3 will aim to mitigate this risk. In addition, the project will work to develop a policy framework that supports the development of a market for the national experts of the program, thus providing additional incentives to take part in the project.
Incentive and financial support system are insufficient.	Medium	The risk of lacking incentive and financial schemes deterring investment in energy efficient measures will be mitigated through the development of a comprehensive Energy Efficiency Strategy and training for financial institutions on the benefits of such investments. In addition, the project will develop specific grant and non-grant instruments to improve access to financing for participating enterprises. Experiences from other countries will be shared, and results from the demonstration projects will be widely presented.
Climate Change Risk	Low	In order to mitigate any potential climate change risks to project demonstration/implementation sites, the project will include criteria related to such risks in the enterprise surveys, and if a risk is identified, develop a mitigation strategy before implementation begins.

A.7 Coordination with other relevant GEF financed initiatives

To ensure that the proposed project does not overlap with existing GEF-funded initiatives, consultations with other development partners have been undertaken in the PPG phase of the project. Based on these discussions, the following ongoing GEF initiatives will be coordinated with during the project implementation period.

The UNEP/GEF project, “**Development of the National Biodiversity Strategy and Action Plan (NBSAP)**,” is currently under development and will focus on development of the NBSAP, as well as its integration into relevant sectoral or cross-sectoral plans, programmes and policies. In a similar fashion the UNEP/GEF project, “**Preparation of National Adaptation Programme of Action (NAPA)**” also aims to develop climate and energy related policies in the

Myanmar policy framework. While these projects are not directly related to energy efficiency, the work of UNEP on climate-related policy development and adoption will offer synergies with the proposed project.

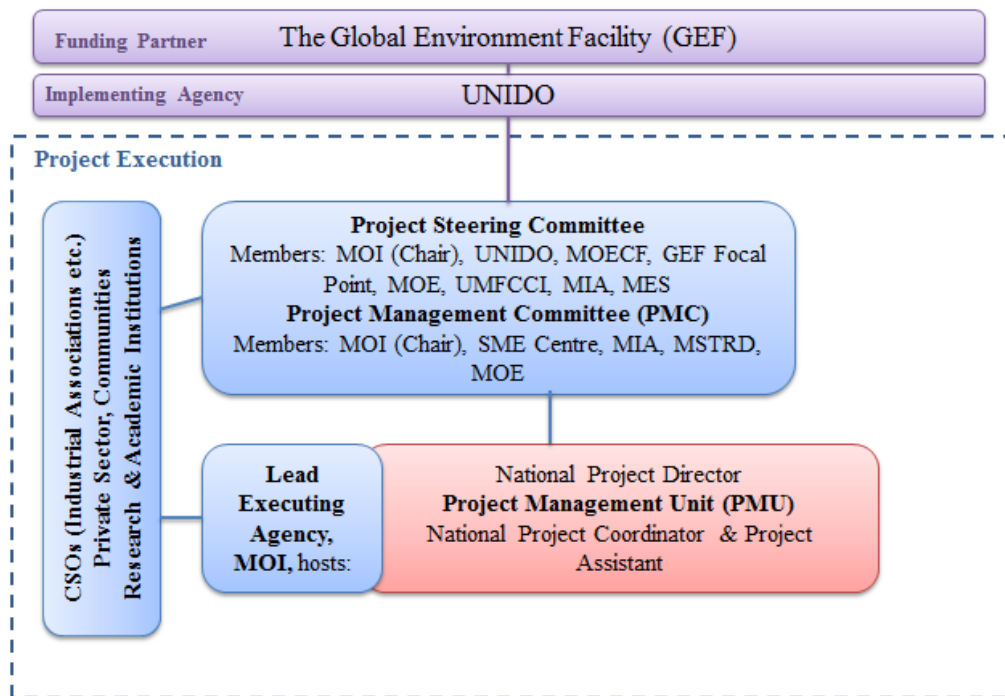
Furthermore, the UNEP/GEF project, “Adapting Community Forestry Landscapes and Associated Community Livelihoods to a Changing Climate, in Particular an Increase in the Frequency and Intensity of Extreme Weather Events,” is currently under development but will support the awareness raising activities of the project by raising general understanding of climate change and its negative impacts on communities and the economy.

As there is a lack of GEF projects currently focusing on energy efficiency or industry, the proposed project will not cause overlap with any ongoing GEF initiatives.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

B.1 Describe how the stakeholders will be engaged in project implementation.

The institutional arrangement foreseen for the implementation of the proposed project is outlined in the below diagram:



The Lead Executing Agency of project execution will be the MOI that will coordinate project inputs from all project stakeholders, as well as nominate the National Project Director (NPD), to act as the government representative and daily focal point for the Project Management Unit (PMU) to ensure ongoing ownership of the project and that project implementation is operationally implemented in line with Government priorities, rules and regulation. The NPD shall have adequate authority and knowledge within the Government to get the necessary support from all local project partners to perform his/her duties under the project. Currently, the Director General of the Directorate of Industry is assuming this NPD function assisted by the newly established EE & Conservation Division.

UNIDO is the implementing agency of the project.

Project Steering Committee (PSC)

To ensure ongoing coordination of the project and cohesive leadership, the PSC will consist of high level representatives from MOI, UNIDO, MOECF, the GEF Focal Point, MOE, UNFCCI, MIA and MES; the PSC will be chaired by MOI. The purpose of the PSC is to provide strategic guidance of the project while ensuring no overlap with other development projects, and to maximize the input and participation of project counterparts, as well as coordinating these inputs. The PSC will also review and approve or reject amendments to the project in accordance with the GEF Council document C. 39. The PSC will meet on a six-month basis, but can also be organized on an ad hoc basis as

required. The PMU will act as the Secretariat of the PSC, preparing and distributing the minutes of meetings to be signed by UNIDO and MOI.

Project Management Unit (PMU)

The PMU will be established by UNIDO and hosted by the lead executing agency, MOI; the PMU will report to the UNIDO Project Manager. The PMU is responsible for the day-to-day management and execution of project activities and will consist of two core staff members; the National Project Coordinator (NPC) and the Project Assistant. The NPD, nominated by MOI, will provide ongoing strategic guidance for the PMU and the PMU will be expected to report to the NPD on project progress, as required. In addition to the two core staff of the PMU, technical experts, subcontractors and international experts will support project activities where and when required.

The PMU will play a strong role in project reporting; responsible for quarterly progress reports, financial reports, and develop work plans and budgets in coordination with the PSC and UNIDO; all such reports shall be sent to UNIDO for endorsement/approval. At the end of project implementation, the PMU shall develop the Terminal Report to be submitted to the PSC at least 2 weeks before the final PSC meeting.

Other committees and working groups

During project implementation, if necessary for the improvement of the project management, additional committees and working groups, etc. will be considered, such as a Project Management Committee (PMC), and specific technical working groups, etc. The PMC will work to facilitate project management by reviewing the progress of project implementation in the period between its meetings, and making operational decisions on the key project activities for the subsequent implementation period. The PMC will consist of representatives from MOI (chaired by the NPD), SME Centre, MIA, the Myanmar Scientific and Technological Research Department (MSTRD, currently responsible for ISO standards), MOE, etc.. As in other similar projects, the PMC will meet as required, with the PMU serving as its Secretariat.

Stakeholder	Role in the project
Government Stakeholders	
Ministry of Industry (MOI)	MOI has the following roles to perform: (i) responsible for the production of consumer products and light industrial goods; and (ii) concentrates on developing heavy industry; and facilitates private industries. The organizational structure of the MOI is as follows: Directorate of Industry, Directorate of Industrial Supervision and Inspection, No. (1) Heavy Industries Enterprise, No. (2) Heavy Industries Enterprise, No. (3) Heavy Industries Enterprise, Textile Industries, Pharmaceutical and Foodstuff Industries, Paper and Home Utility Industries, and Central Research and Development Centre. The Directorate of Industry also hosts the newly established Energy Efficiency and Conservation Division. Role in the Project: MOI is the lead executing agency, and will act as the Chair of the PSC, will appoint the NPD and will chair the PMC.
Ministry of Environment Conservation and Forestry (MOECF)	MOECF is responsible for the following areas: forest conservation, biodiversity conservation, ecotourism, zoological gardens, dry-zone greening activities, time harvesting & wood processing, environmental conservation, international cooperation and surveying activities. Role in the Project: As the GEF Focal Point in Myanmar, MOECF shall be a member of the PSC.
Ministry of Energy (MOE)	MOE has the responsibility to carry out: (i) exploration and production of crude oil and national gas; (ii) refining; (iii) manufacturing of petrochemicals and transportation; and (iv) distribution of petroleum products. Role in the Project: To be responsible for and participate in the policy and regulatory frameworks component, as well as an active member of the PSC.

Ministry of Science and Technology (MOST) - Standards Institute	<p>MOST has the following objectives: (i) to carry out research and development works for national economic and social development; (ii) to utilize natural resources so as to develop the national economy, and raise the living standard of the people; (iii) to distribute the results of research and development works in industrial and agricultural sectors to enhance production; (iv) to plan and carry out human resources development so as to get specialists and professionals in science and technology; (v) to analyse and test raw materials and finished products, implement quality control and standardization of industrial products; and (vi) to coordinate research, development and use of atomic energy.</p> <p>Role in the Project: MOST – Standards Institute will be responsible for policy and implementation activities relating to ISO 50001, EnMS.</p>
Civil Society Organizations (CSOs)	
Union of Myanmar Federation of Chambers of Commerce and Industries (UMFCCI)	<p>UMFCCI is the largest not-for-profit business federation in Myanmar, representing around 11,000 Myanmar companies, 2,000 enterprises, 800 foreign companies, 200 co-operatives, and 3,000 individuals. UMFCCI aims to safeguard the interests of the private sector, cooperate with the State in economic and social activities, lead and cooperate with business associations, act as a bridge between the State and the private sector, and lead the Myanmar business community into the globalized economy.</p> <p>Role in the Project: To reach out to the business sector and ensure that the project activities are in line with their needs/requirements. UMFCCI will also be a member of the PSC.</p>
Myanmar Industries Association (MIA)	<p>MIA was formed to promote activities efficiently and effectively with the support of the Government and private agencies. It is a self-funded, non-profit organization and as such, is a private independent body representing the entire scope of trade, services and industries in the Republic of the Union of Myanmar.</p> <p>Role in the Project: To reach out to the industries and involve them in project activities; MIA will also be a member of the PSC.</p>
Myanmar Engineering Society (MES)	<p>MES aims to: (i) enable engineers and architects to participate with their utmost capability, using their expertise for the development of architecture as the base and all-round development of other sectors of economy as well; and (ii) enable engineers and architects all over the country to actively participate in harmony in the development and dissemination of engineering and architectural knowledge and in nation-building tasks.</p> <p>Role in the Project: To provide technical expertise to project activities, particularly with implementation projects; MES will also be a member of the PSC.</p>
Private Sector Entities	
Banks/Financial Institutions	<p>Bank officials will receive training from the project and will provide loans for the demonstration projects, when applicable, participating in the application of non-grant instruments.</p>
Other Stakeholders	
Gender Groups	<p>Relevant women associations and ministerial gender focal points will participate actively in project implementation, providing advice on effective gender mainstreaming and outreach to women in the industrial sectors. For instance, coordination with the Myanmar Women Entrepreneur’s Association or other such associations will be sought out during the implementation phase.</p> <p>Gender relevant issues will also be considered throughout the project execution stages, including in management arrangements, gender-sensitization training for the project team, collected of gender-disaggregated data where relevant, as well as the inclusion of a gender analysis in the annual, midterm and final reporting requirements.</p>
Indigenous Groups	<p>While the project activities in the Myanmar industrial sector are not specifically geared towards indigenous groups, efforts will be made to involve the indigenous peoples of Myanmar in the</p>

	implementation phase of the project, where relevant. For example, participation in awareness raising activities or through industrial/engineering associations. The Renewable Energy Association Myanmar has expressed their interest to participate in relevant project training, in particular those focus on benefits of EE improvement, and afterward they will help indigenous peoples in their efforts to minimize the relatively high lost from local electricity distribution. They will also benefit indirectly from the increased energy availability resulting from the project.
--	---

B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):

Economic benefits:

The improvement of energy efficiency in Myanmar industry will result in a reduction in energy demand and intensity, hence in improved competitiveness and working environment in industry. The saved energy will be available for the economy which will contribute to the reduction of investment for new energy sources, in particular in the power sector with its currently frequent black-outs. In addition, the expected energy subsidies reduction will significantly lessen the burden on the national budget. Considering the considerable growth expected in Myanmar industry, it is crucial that the importance of energy efficiency is recognized at this early stage to reduce incremental costs of adaptation and avoid potential future GHG emissions and negative environmental impacts. The implementation of EnMS and SO will inspire the notion and practice of sustained and continual management improvement which will not only result in energy savings, but also positively affect human and other resources management

Social benefits:

Based on UNIDO's extensive experience in the implementation of similar IEE projects in South-East Asia, the project will contribute to the creation of additional jobs for Myanmar and the improvement of technical skills, in particular in the IEE field, and thus income growth and improvement of living standards. The project will also result in enhanced networking between EE experts and industries within the country, as well as with other countries in ASEAN. Myanmar can actively participate in the ASEAN market for EE equipment and services once the ASEAN community is implemented from 2015 onwards.

Gender dimensions:

In terms of gender, the project will actively seek to make gender a key dimension of project execution, including a gender analysis to be implemented under Component 1 of the project. Based on this analysis, gender mainstreaming of other project outputs and activities, notably in awareness raising and capacity building, will take place. The project will pay special attention to effectively raise EE awareness and encourage women to participate in the training. To this end, the project will develop gender disaggregated indicators at the project inception phase to consistently measure the impact of the project on gender dimensions in Myanmar, for example percentage of women participating in various training, percentage of industries headed by women getting the project support, etc.

The Energy and Climate Change Branch's *Guide on Gender Mainstreaming Energy and Climate Change Projects* will be used as a framework and guide for the gender studies of the project in order to ensure that the project is in line with both UNIDO and GEF requirements. In addition, the proposed project will seek to cooperate with the ADB on their project, "Support to the Preparation and Dissemination of the Myanmar Gender Situational Analysis," for incorporation of relevant information into project implementation and monitoring activities.

B.3. Explain how cost-effectiveness is reflected in the project design:

The project focuses GEF funds on technical assistance to deliver sustained energy and CO₂ savings in the industries of Myanmar which is a LDC. The policy assistance and capacity building interventions to be delivered through the project will create sustainable impacts over the long term. The model for the project – based on policy development, technical capacity building, implementation of demonstration projects and on establishment of sustainable accessible financial mechanisms – has proven successful for UNIDO in a number of projects supported in other developing countries. The sectors and companies pre-chosen for the project are very energy inefficient and, due to the widespread use of gensets, are using very expensive self-produced electricity. Therefore, energy costs are a major concern for industry and these companies are keen to cooperate with the project.

The energy saving techniques to be employed by the project have been shown to be very effective in generating sustained savings in industries where they have already been applied. It was confirmed during the field mission/work of UNIDO teams and stakeholder meetings that the counterparts in Myanmar – both from the public and private sectors – are very supportive of the project.

The project is designed to guarantee long-term sustainable savings beyond the lifetime of the project by ensuring that policies are in place to support a step change in how energy is managed within industry, and developing a ‘push-pull’ mechanism that supports Energy Management from both sides – with trained national experts pushing their expertise into industry, and senior managers/ business owners – aware of the potential of energy management – pulling the services into their enterprises.

The cost effectiveness of the project in terms of CO₂ savings, from the direct impact only, per USD of GEF contribution, is estimated at around USD 14/tCO₂, which is reasonable in a country with conditions like Myanmar, at its very early stage of development. Furthermore, the project targets mainly medium-sized companies and has an emphasized capacity building mission that will have a much higher indirect GHG emission reduction potentials. (see Section A.5, as well as Annex E).

C. DESCRIBE THE BUDGETED M&E PLAN:

Project monitoring and evaluation (M&E) will be conducted in accordance with established UNIDO and GEF procedures. The Logical Results Framework (Annex A) provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis upon which the project's M&E Plan will be built. Implementation of the M&E Plan will be undertaken by the project team, national counterparts and UNIDO (see Annex F for more details).

According to the M&E policy of the GEF and UNIDO, follow-up studies such as Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to; (i) make available studies, reports and other documentation related to the project and; (ii) facilitate interviews with staff involved in the project activities.

Project Start

A Project Inception Workshop will be held within the first 4 months of project start involving those with assigned roles in the project organization structure. The Inception Workshop is crucial to build ownership for the project results and to plan the first year annual work plan. The Inception Workshop will address a number of key issues including:

Understand objectives, outputs, activities;

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of local stakeholders vis-a-vis the PMU. Discuss roles, functions and responsibilities within the project's decision making structures, including reporting and communication lines, and conflict resolution mechanisms. The terms of reference for project staff will be discussed again as needed;
- Based on the project results framework, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification and re-check assumptions and risks;
- Provide a detailed overview of reporting, M&E requirements; M&E work plan and budget should be agreed upon and scheduled;
- Discuss financial reporting procedures and obligations, and arrangements for annual audit;
- Plan and schedule PSC meetings; roles and responsibilities of all project organization structures should be clarified and meetings planned;
- The first PSC meeting should be held within the first 12 months of the inception workshop.

An Inception Workshop Report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

M&E Budget

UNIDO will be responsible for overall management and tracking of project milestones as well as reporting to the GEF and concerned Government authorities. The M&E procedure will consist of a) project inception, b) semi-annual

reviews, c) tracking project progress and d) independent mid-term and final evaluation. The estimated total budget for M&E is US\$425,000 (US\$125,000 from the GEF and US\$300,000 from co-financing).

Following is the table summarizing key M&E activities with the GEF budget:

M&E Activity Categories	Feeds Into	Time Frame	GEF Budget (US\$)	Co-Financing (US\$)	Responsible Parties
Measurement GEF Tracking Tool specific indicators	Project management	Continuous	50,000	170,000	PMU
Monitoring of project impact indicators (as per LogFrame)	Project management;	Continuous			
Periodic Progress Reports	Project management; PSC Meeting	Semi-annually			
Mid-term review/ evaluation	Project management; PSC	At project mid-term	30,000	60,000	UNIDO PM, PMU and independent evaluator
Independent terminal evaluation	Terminal Evaluation Review (TER) conducted and Terms of Reference for evaluation drafted by UNIDO EVA.	Project completion	45,000	70,000	Independent evaluator, PMU, UNIDO PM, and UNIDO Evaluation Group
TOTAL			125,000	300,000	

D. LEGAL CONTEXT

The Government of the Republic of the Union of Myanmar agrees to apply to the present project, mutatis mutandis, the provisions of the UNDP Standard Basic Assistance Agreement signed and put into effect on 17 September 1987.



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

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this form. For SGP, use this [OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Mr. Hla Muang Thain	DDG, Environmental Conservation Department	Ministry of Environmental Conservation and Forestry	11/12/2012

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Philippe R. Scholtès, Managing Director, Programme Development and Technical Cooperation Division (PTC) UNIDO GEF Focal Point		09/25/2014	Mr. Khac-Tiep Nguyen, Industrial Development Officer, Energy and Climate Change Branch, UNIDO 	+43-1-26026-3086	K.Nguyen@unido.org

ANNEX A: PROJECT RESULTS FRAMEWORK

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
<p>Project Objective: To promote sustained GHG emissions reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial energy efficiency and the implementation of energy management system, based on ISO 50001, EnMS and optimization of energy systems in industry.</p>	<p>Direct electricity and fuel savings over equipment lifetime (15 years; project duration and post-project lifetime);</p> <p>Economic gains, for example from energy savings, for industries and Government as a result of energy subsidies reductions;</p> <p>Number of EE jobs created and registered;</p> <p>(these two last indicators will be monitored throughout project implementation)</p>	<p>Inefficient use of energy in industry and rapid industrial growth resulting in growing amounts of emissions:</p> <p>Policy: Lack of (or insufficient) policies and strategies; low-cost pricing of grid electricity</p> <p>Energy and energy inefficiency: Insufficient grid supply hence expensive and polluting gensets back-up; lack of awareness; insufficient capacity building and training of EnMS/SO institutions and experts</p> <p>Industry: Mostly SMEs; low MVA sectors/low output; high cost of credit; difficult to finance EE investments</p>	<p>Direct electricity savings (MWh): 2015-19: 26,090 2020-39: 138,677</p> <p>Direct fuel savings (MWh): 2015-19: 114,482 2020-39: 620,540</p> <p>Grand total direct energy saving: 899,789 MWh</p>	Validated energy savings from project reports	Willingness of state, industry and financial institutions to support the programme and invest time and money in its implementation
	<p>Direct GHG emission savings over the project duration and post-project lifetime (15 years)</p> <p>Indirect bottom-up and top-down emission savings</p>		<p>Direct GHG (lifetime) emission savings (tCO₂): 2015-19: 30,242 2020-39: 162,962 Total: 193,204</p> <p>Indirect emission savings (tCO₂): 2020-39: Bottom-up: 772,817 Top-down: 4,497,899</p>		
Component 1: Improvement of policy and regulatory frameworks, incentive schemes, support programmes					
<p>Outcome 1.1 Improved policy and regulatory frameworks, incentive schemes, support</p>	Status of EnMS/ISO 50001 application	ISO 50001 not adopted as a national standard	ISO 50001 adopted as national standard	Government and government institutions	Willingness of the Government of Myanmar to promote EE and
	Status of energy efficiency strategy and regulations	No detailed policy /strategy to promote EE and EnMS in place	EE policy and accompanying strategy adopted		

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
programmes, energy data and awareness will facilitate sustainable energy efficiency improvement in industry.	Status of accreditation and certification schemes	No proper accreditation and certification available	Accreditation and certification scheme in place		EnMS as a priority for industry
	MRV (measurement-reporting-verification) methodology status	No MRV methodology in place	1 MRV methodology in place		
	National award scheme(s)	No widely acclaimed recognition of EE/EnMS achievements	1 national award scheme in place		
1.1.1 Energy efficiency (EE) strategy developed based on experience and lessons learned from other countries;	Status of EE strategy	Policy makers not aware of the best practices of other countries. Until now, policy makers have not received much training on EnMS and standards	1 EE strategy developed (for industry)	Adopted laws, decrees, directives	Government and its agencies are supportive of the project
1.1.2 Incentive schemes, e.g. tax breaks or exemptions, grant and non-grant instruments, etc. and support programmes, e.g. consultancy services, training, etc.	Number of schemes and support programmes proposed or in place	No clear incentive schemes and support programmes	1 set of schemes and support programmes developed	Adopted schemes and programmes	
1.1.3 Energy consumption data by large and medium sized industry establishments collected and managed;	Availability and quantity, quality and reliability of industrial energy data	Very poor or unavailable data on industrial energy	1 data bank: industrial energy data collected, compiled, analysed and presented in a retrievable format	Databank website, documentation	Full cooperation of government agencies and industry
1.1.4 Awareness raising activities on Nationally Appropriate Mitigation Actions (NAMA) and EE conducted.	Number and type of awareness training programmes carried out targeted at experts, managers and concerned government officials	Lack of awareness on NAMA and associated EE projects EnMS	At least 15 half day awareness training workshops, with about 40 to 60 participants each (at least 20% are women) carried out targeted at experts, managers and concerned government officials; national and regional awareness raising activities conducted, project website fully operational. 20 case studies prepared and widely distributed and used.	Interviews with participants post project	Participants available, government and industry support the activity

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Component 2: Capacity building					
Outcome 2.1 Strengthened or built capacity of institutions, industries, consultants and equipment suppliers on energy management system, energy system optimization, and EE project financing will assist industries in the implementation of EE improvements.	Number of awareness training programmes on EE carried out targeted at organization managers, plant owners, concerned government officials	Lack of awareness on EnMS, SO and EE project financing of organization managers, plant owners and concerned government officials	At least 15 half day awareness training workshops carried out targeted at organization managers, plant owners, concerned government officials	Interviews with participants post project	Participants available, government and industry support the activity
	Number and type of expert level training programmes on EnMS based on ISO 50001	No training available on EnMS	At least 2 rounds of expert level training on EnMS with adequate numbers of 2-day users training courses carried out	Interviews with participants post project	Participants available, government and industry support the activity
	Number and type of SO training	No SO training available	At least 1 round of expert training carried out for each of the selected energy systems with adequate numbers of 2-day user training courses conducted.	Interviews with participants post project	Participants available, government and industry support the activity
2.1.1. Introductory, user and expert training on energy management systems (EnMS), based on ISO 50001, conducted;	Availability of EnMS training material available in English and local language	EnMS Training material is not available in the local language	1 set of EnMS Training material available in English and translated into the local language	Project website and training material documentation	Translation and publication services arranged
	Number of managers trained on awareness and implementation of EnMS	No managers trained on awareness and implementation of EnMS to ISO50001	300 managers trained on awareness and implementation of EnMS	Interviews with trainees post project	Local managers available and interested in training
	Number of professional user/practitioners trained on implementation of EnMS	No user/ practitioners trained in EnMS implementation to ISO50001	150 practitioners (at least 15% are women) trained on implementation of EnMS	Interviews with trainees post project	Local personnel available and interested in training
	Number of experts trained on implementation of EnMS	No experts trained on implementation of EnMS to ISO 50001	At least 40 Experts (at least 10% are women) trained on implementation of EnMS	Interviews with companies post project	Local experts available and interested in training
2.1.2. User and Expert training on energy system optimizations (SO) conducted;	Availability of SO training material available in Myanmar language	SO training material is not available in Myanmar language	1 set of SO training material available in Myanmar language	Project website and training material documentation	Translation and publication services arranged

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
	Number of users/practitioners trained SO in industry	No users/practitioners trained SO in industry	30-50 users/practitioners trained SO for each of the selected energy systems in industry	Interviews with trainees post project	Local user practitioners available and interested in training
	Number of local experts trained on SO in industry	No local experts trained on SO	10-15 local experts trained on SO for each of the selected energy systems in industry	Interviews with trainees post project	Local experts available and interested in training
	Number of energy system equipment vendors that received half-day vendor training on SO	No energy system equipment vendors trained on SO	Energy system equipment vendors receive 3 half-day vendor trainings on SO	Interviews with trainees post project	Local vendors available and interested in training
2.1.3. Training on EE project financing provided to industry and financial institutions.	Number of technical personnel of industry and managers trained on the development of bankable EE project proposals to improve their chances of accessing financing	No technical personnel of industry and managers trained on the development of bankable EE project proposals to improve their chances of accessing financing	100 (at least 25% are women) technical personnel of industry and managers trained on the development of bankable EE project proposals to improve their chances of accessing financing	Interviews with trainees post project	Local technical personnel of industry and managers available and interested in training
	Number of personnel of financing institutions trained on the appraisal of EE project proposals	Financing institutions lack the capacity to appraise EE project proposals of industry	At least 30 personnel of financing institutions trained on the appraisal of EE project proposals	Interviews with trainees post project	Local personnel of financing institutions available and interested in training
Component 3: Demonstrations and Upscaling					
Outcome 3.1 Demonstrated projects on energy management system, and energy system optimization in selected plants and sub-sectors and widely used case studies result in direct GHG emissions reductions	Number of companies with EnMS and resulting energy savings	As of yet, no EnMS projects implemented; no case studies prepared and hence no investments recorded for EE; subsequently no associated energy savings and direct GHG emission reductions reported.	EnMS implemented in 50 companies, resulting in lifetime energy savings of 403,263 MWh and direct emission reduction of 89,292 tCO ₂	Interviews with project participants, documentation of MRV process, records of the government agencies	Willingness of industry to invest time and resources to implement EnMS to ISO50001, government support and determination

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
and leverage the interest and belief in investment in IEE projects.	Number of companies with SO carried out and resulting energy savings	As of yet, no SO projects implemented; no case studies prepared and hence no investments recorded for EE; subsequently no associated energy savings and direct GHG emission reductions reported.	SO implemented in 20 companies, resulting in lifetime energy savings of 496,525 MWh and direct GHG emission reduction of 103,913 tCO ₂	Interviews with project participants, documentation of MRV process, records of the government agencies	Willingness of industry to invest time and resources to implement EnSO, government support and determination
3.1.1. Energy management systems implemented in 50 industrial establishments, case studies prepared;	Number of EnMS projects implemented in selected industrial establishments	At present there is no implementation of EnMS projects to ISO 50001 (and EnMS) and no certification in Myanmar	50 projects on EnMS implemented in selected industrial establishments		
3.1.2. At least 20 optimization projects implemented on energy systems: pump, compressed air, fan, and steam, case studies prepared.	Number of SO projects implemented in selected industrial establishments	Up to now, no SO projects in Myanmar	20 projects on SO implemented in selected industrial establishments	Interviews with project participants Documentation of MRV process	Willingness of industry to invest time and resources to implement SO

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

1. GEF Secretariat Review at PIF Stage

Question Number	Secretariat comment	Response by UNIDO to Comments regarding the CEO Endorsement Stage
<p>8. Are global environmental benefits adequately identified, and the applied methodology and assumptions for the description of the incremental/additional reasoning sound and appropriate?</p>	<p>MY 3/11/2013: Not really good, but OK at the PIF stage.</p> <p>The applied methodology and assumptions for the incremental/additional reasoning are not described or presented in a sound and appropriate manner. However, it is understandable that the Agency can hardly identify global environment benefits adequately at the project PIF stage. It is suggested that the Agency describe applied methodology and assumptions for the project incremental reasoning after the PPG or at the CEO endorsement stage.</p> <p>MY 4/11/2013: Cleared. The Agency agreed to describe the applied methodologies and assumptions in more detail for this project in the CEO endorsement document.</p>	<p>In line with the comments from the GEF Secretariat, the methodology and assumptions upon which the incremental reasoning is based, have been included in Annex E.</p>
<p>12. Is the project consistent and properly coordinated with other related initiatives in the country or in the region?</p>	<p>MY 3/11/2013: Please describe further. For example, the World Bank announced a \$165 million zero-interest loan on energy access and infrastructure. Will the loans address issues of relevance for energy efficiency? If so, how will initiatives be coordinated?</p> <p>Also, please summarize UNIDO's experiences and presence in Myanmar, particularly in the field of energy. Please indicate the scale of the existing interventions, and how they are being coordinated with other related initiatives in the country.</p> <p>MY 4/11/2013: The questions are answered. The Agency agreed to do more coordination and consultation with other relevant GEF financed activities and other initiatives in the country during the PPG phase.</p>	<p>In order to maximize coordination, a number of workshops were organized during the PPG phase, with representatives from a number of development agencies invited. These workshops, targeting representatives of development agencies, are listed below; In particular, the ADB and the World Bank have sent their relevant representatives to deliver presentations at the workshops.</p> <p>Stakeholders Workshop - November 2013:</p> <ul style="list-style-type: none"> - Japan International Cooperation Agency (JICA) - World Bank - Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) - Asian Development Bank (ADB) - European Union - Embassies of China, Switzerland, and Israel <p>IEE National Workshop – February 2014</p> <ul style="list-style-type: none"> - United Nations Development Programme (UNDP) - World Bank - Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) - Asian Development Bank (ADB) - USAID - European Union - Japan International Cooperation Agency (JICA) - Korea International Cooperation Agency (KOICA) - United National Environment Programme (UNEP) - United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) - Embassies of Italy, Switzerland, Norway and Japan
<p>16. Is the GEF funding and co-financing per</p>	<p>MY 3/11/2013: Not really good at this time.</p>	<p>Consultations were held with the MOI and MOE during the PPG phase regards co-financing contributions in cash, in</p>

<p>component appropriate and adequate to achieve the expected outcomes and outputs?</p>	<p>The project co-financing is mostly "in-kind." We understand that it is not likely that the government will put a large amount of co-financing in cash for the project, but it would be better if the government put some cash amount as co-financing. It will facilitate raising the targeted \$2 million grant from industries and external development partners.</p> <p>MY 4/11/2013: Issues are addressed. The Agency confirmed to make efforts during the PPG phase to obtain agreement and commitment of the government for cash contribution. The GEF will review this issue in CEO endorsement.</p>	<p>addition to in-kind. As per requirements in Myanmar, any indication of cash contribution to an international organization has to be approved by the Parliament. Therefore, MOI has confirmed that it will actively work together with the project and other relevant development partners to have incentive schemes developed and approved by the Government to encourage industries to implement EE measures. The industries have also been clearly informed during the PPG phase that the project can only support pilot projects up to a maximum level of 20% of investment; the rest must come from the industries and the Government.</p> <p>In addition, MOI has already very actively encouraged industries during the PPG phase, for example in obtaining Letters of Intent from industries and associations. In addition, MOI has already spent cash to renovate the project office spaces, and will spend more to renovate spaces in the Yangon region for the project equipment storage and training classes.</p> <p>An agreement was reached that the Ministries would contribute in-kind financing but would fully support the project in leveraging cash contributions from Myanmar Industries. This cooperation has already proved itself fruitful in obtaining letters of interest from industries and associations during the PPG phase.</p>
<p>25. Items to consider at CEO endorsement/ approval.</p>	<p>MY 4/11/2013:</p> <p>The Agency needs to describe the applied methodologies and assumptions in more detail for this project in the CEO endorsement document.</p> <p>There is a need for more coordination and consultation with other relevant GEF financed activities and other initiatives in the country during the PPG phase, to be described in the CEO endorsement document.</p> <p>Regarding the co-financing issue in Box 16, the Agency confirmed to make efforts during the PPG phase to obtain agreement and commitment of the government for cash contribution. The GEF will review this issue in CEO endorsement.</p> <p>Please address knowledge management (KM) and consider adding/integrating KM elements into component 4.</p>	<p>Comments regarding incremental reasoning, consultations with ongoing initiatives and co-financing have been addressed above.</p> <p>Knowledge management within the project will primarily be channelled through Basecamp, a web-based project management tool that allows international and national experts, as well as project stakeholders to interact, ask questions, and share knowledge on an ongoing basis. This approach has been used in a number of GEF-UNIDO IEE projects and has proved very useful.</p> <p>In addition, the energy data reporting system to be developed under Output 1.1.3 will also support knowledge management, as well as the case studies to be prepared under Component 3.</p> <p>Finally, the PIRs to be developed under Output 4.1.1 will serve as knowledge management from the project implementation and execution agencies to ensure that the project acknowledges and incorporates the lessons learned and areas for improvement on an annual basis.</p>

2. STAP Comments

STAP Comments	UNIDO Response
<p>1. A "typical" UNIDO project supporting industrial EE through capacity building, support for policy and regulatory reform, ISO 50001 and Energy management system. Clearly presented with a logical and very readable text. Myanmar can learn fast on energy efficiency measures from other country experiences, especially aiming to reduce electricity demand in industry. Domestic energy use nor transport uses are included. This GEF project role is to help with</p>	

<p>policy development, capacity building, implementing energy management case studies, and conducting MRV.</p>	
<p>2. A sensible project with private sector funding sought (in-kind?) for two thirds of the total (\$8.8M of \$13.8M). Not clear how funding from private sector can be "in-kind" and could be explained?</p>	<p>Private sector in-kind contributions, namely from Myanmar industries and industry associations, will be in the form of:</p> <ol style="list-style-type: none"> 1. Their participation in the various training courses; 2. Expenditures relating to their implementation of EnMS and SO after either their own staff receive training or support from external expert trainees, including investment in the implementation of 20 demonstration projects, as well as expenditures of the 20 business entities that will obtain ISO 50001 compliance certification, etc. <p>It is expected that some of the participating factories will get loans from banks or the other financing schemes developed under Component 1, facilitated in particular by the training under Output 2.1.3. For example, all training materials that have been developed by UNIDO and will be tailored to this project, will feature a number of sections on financial analysis based on the actual situation and conditions of the country, in order to show the cost benefits in all assessment reports. .</p>
<p>3. The project addresses major legal, regulatory, capacity building, and indirectly through regulatory work, financial barriers. Acknowledging the country has a very low baseline in industrial EE, after setting up the legal, regulatory and institutional framework, the second most important bottleneck will be a lack of financing and appropriate business models supporting transfer of EE technologies. Recognizing the limited project resources available, STAP, recommends that project proponents assess technology transfer barriers; provide recommendations for legal, institutional and policy reform as well as for business models; and propose financial incentives and public-private partnership modalities conducive for the successful transfer of EE technologies for industries.</p>	<p>Recognizing the importance of financing barriers in Myanmar, the project has made reference to this in Section A.4 and will target project activities under Component 1 to mitigate them.</p> <p>Furthermore, since the country has a very low EE baseline, the focus of the project on the implementation of EnMS and energy system optimization, with significant and effective awareness raising, will result in continual improvements in energy management in a large number of energy end-users. It is expected that energy savings will firstly be made based on a large number of continual improvements in operation and maintenance, rather than in large one-off investments.</p>
<p>4. Based on other country experiences, successful energy management programmes in industry need support from the chief executive and an energy manager appointed, part-time in smaller organisations, to continually drive the programme and gain support from all staff, some of whom can see no benefit in changing their ways. How the project will secure such support and build respective capacity?</p>	<p>Awareness raising activities under Component 1 and introductory trainings on EnMS under Component 2 will target management-level representatives from factories. This is necessary to ensure the effective buy-in of industries participating in the implementation activities, and the time dedication of participants taking part in the User- and Expert-level trainings.</p>
<p>5. Reviewing the present subsidies on fossil fuels with the aim to replace them is paramount if energy efficiency programs are to be successful. Project proponents are recommended to consider appropriate support for continuing elimination of fossil fuel subsidies.</p>	<p>The existing government subsidies have been identified as a barrier to the implementation and adoption of energy efficient practices in Myanmar industries. The Energy Efficiency Strategy to be developed under Output 1.1.1 will incorporate recommendations for the gradual elimination of fossil fuel subsidies.</p>
<p>6. The training packages are a good option but they are fairly short time periods (half a day and 2 days) given the complexity of the topics to get the key messages across. From experience, such short courses need follow-ups with the attendees on their own business premises after a few weeks to reinforce the messages.</p>	<p>As many capacity building programmes on EnMS and SO have been implemented by UNIDO successfully in a number of countries, particularly in SE Asia, a similar approach will be taken. The training programme is based on a systematic, phased approach that begins with half-day Awareness/Introductory workshops, followed by 2 to 3-day User training and finally by Expert-level training packages that include at least 6 months working in a group of 2 to 4 expert trainees at a host factory with ongoing mentoring support from international and national experts. This will be complemented by ongoing interaction with other peer groups via Basecamp, e-mail and their sub-sequent missions to the country. In addition, the best expert trainees will be recruited to act as national experts to continue to support other peer expert trainees and User trainees. Once the expert trainees pass the final exams, they will receive certificates and will be encouraged to</p>

	<p>apply the taught knowledge at factories throughout the project implementation period.</p> <p>National ownership of the training programme will also be considered a priority for the project and will be emphasized throughout project execution. This will be achieved through the development and training of the EE Resource and Training Centre that will help ensure that the Myanmar authorities have the capacity to continue the training programme beyond the project completion date.</p>
<p>7. The STAP/GEF tool for calculating GHG emissions from energy efficiency projects should be utilized. This part of the proposal was the weakest. Component 4 on monitoring and evaluation is not described in section 3. The more detailed assessment of energy savings will no doubt consider CO2 evaluations as well as the possible impacts of the rebound effect and have to be completed during project preparation.</p>	<p>In line with the STAP's comment and the request from the GEF SEC, the Revised Methodology for Calculating GHG Benefits of GEF Energy Efficiency project (Version 1.0) has been used as guidance to calculate the foreseen environmental benefits of the project (pls. refer to Annex E) . In addition, a description of Component 4 has been included in Section A.5. of the project document.</p>

3. Comments at GEF Council Approval

USA's Comments	UNIDO Response
<p>1. The United States is supportive of efforts to increase energy efficiency, and believes that examination of current energy subsidies and encouragement of their removal is particularly important.</p>	<p>Specific activities have been defined and indicated in the CEO Endorsement Request to address this very important issue. In particular, the project will work together with relevant development partners, such as the World Bank and ADB on this issue.</p>

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS²⁹

A. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: \$100,000			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF/NPIF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
Baseline Assessment	50,000	35,000	15,000
Stakeholder Consultation and Commitment Confirmation	30,000	15,000	15,000
Detailed Project Design and Calculations of GHG Emission Savings	20,000	14,023	5,977
Total	<u>100,000</u>	<u>64,023</u>	<u>35,977</u>

²⁹ If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up)

N/A

ANNEX E: CALCULATION OF GRID EMISSION FACTOR OF MYANMAR³⁰

E.1 Grid emission factor, Myanmar

Grid emission factor for Myanmar is mentioned in several sources, including:

- The publication www.ecometrica.com/assets/Electricity-specific-emission-factors-for-grid-electricity.pdf, gives a factor of 0.3491
- List of Grid Emission Factors, <http://pub.iges.or.jp/modules/envirolib/view.php?docid=2136> >; 0.7134
- CDM Registry: Project 7731: Dapein (1) Hydropower Project in Union of Myanmar < <http://cdm.unfccc.int/Projects/DB/JCI1350363892.83/view>>; 0.7134
- IEA, CO₂ emissions from fuel combustion, Highlights, 2013 edition:

Table E.1 CO₂ emissions per kWh from electricity generation

Grams CO₂ / kilowatt hour

	2000	2004	2005	2006	2007	2008	2009	2010	2011
Myanmar	457	436	395	374	357	308	199	262	255

CO₂ emissions from fossil fuels consumed for electricity generation, in both electricity-only and combined heat and power plants, divided by output of electricity generated from all fossil and non-fossil sources. Both main activity producers and auto-producers have been included in the calculation.

Obviously, there is a difference in assessing grid emission factors for Myanmar. The first two references are based on hydropower development in Kachin State, which feeds mainly into the South China grid and an imaginary Myanmar Power grid, solely fed by hydropower stations. On the other hand, the IEA calculations seem to cover natural gas use, but not coal-fired generation and the use of diesel gensets.

Therefore, a new calculation is presented here. The analysis is based on electricity production and sources of power generation, as available on the IEA website (2011 data). CO₂ emission factors are taken from IPCC (2006).

Table E.2 Calculation emission factor for industrial electricity demand

Myanmar National Grid	Gas	Coal	Hydro	Total	
Net power production	1,588	560	5,151	7,327	GWh
Share in generation	21.7%	7.6%	70%		
Fuel used (units; GJ o ton)	22,922,000	290,000			GJ; ton
Emissions per unit of fuel	0.056	1.509			Based on IPCC (2006)
GHG emissions	1,285,924	437,638			tCO ₂
Grid-fuel emission factor	0.81	0.78	-	0.235	tCO ₂ /MWh
Diesel-based generation					
Diesel genset	0.808	tCO ₂ /MWh			
Diesel efficiency	33%				
CO ₂ factor	0.0741	tCO ₂ /GJ			
Emissions for electricity					
Grid utilization factor	80%				
Genset factor	20%				
Overall emission factor	0.350				

The grid factor is estimated at 0.235 tCO₂/MWh. However, industrial firms in Myanmar use gensets to supplement electricity from the grid. Considering that MOEP reports load shedding that may reach up to 20% and UNIDO Teams observed genset utilization ratios between 17-25%, the overall electricity emission factor for the project is calculated by using 80% grid and 20% genset utilization. This gives an overall emission factor from electricity (for industry) **at 0.35**

³⁰ The Excel spreadsheet upon which these conclusions are based are attached as a separate document: ANNEX E_UNIDO MMR GEF EE Tool

tCO₂/MWh, which corresponds with the value given in the Ecometrica report, mentioned at the beginning of this section.

E.2 Data from energy audits and assessments

Data in Myanmar on energy consumption at company or subsector level are very limited. A few audits have been carried out by the PROMEEC project and during the PPG phase:

1) Some audits were made under PROMEEC project of ASEAN during 2004-2009:

Table E.3 Audits in large enterprises³¹

Company	Sector	Energy Balance				Comments
		Electricity		Other		
		kWh	%	kWh	%	
Mayangone Textile	Textile	243,700	19	1,017,509	81	Crude oil for boiler
Myanmar Ceramic	Cement	36,625,000	6	629,000,000	94	Natural Gas for kiln heating
Thanlyin Refinery	Petroleum refining	19,000,000	4	450,000,000	96	Natural Gas (refinery produces its own electricity from NG)
Mann Thanbayakan Refinery	Petroleum refining	22,792,000	7	300,833,000	93	AG+ HFG+ HFO (AG:Associated Gas; HFG: Off Gas from CDU and Coker; HFO:Coker Gas Oil)
Myanmar Automobile Factory (1)	Automobile parts	No numerical data				

2) A few quickscans were carried out by UNIDO Teams in February 2014 in the Yangon Area and are summarized below:

Table E.4 Audits in medium-sized enterprises³²

No.	Company	Sector	Energy Balance						Comments
			Electricity kWh	Electricity %	GenSet kWh	GenSet %	Other fuel (kWh)	Other %	
1	Shwe Sae Taw (999) Trading Company	Food Processing	91,968	31.8	89,331	30.9	107,560	37.2	diesel-fired boiler
2	FAME Pharmaceuticals	Pharmaceuticals	592,320	71.6	104,527	12.6	129,895	15.7	solar
3	United Wood Industries	Wood Industries	1,008,000	83.7	196,800	16.3		NA	Woodchip-fired boiler
4	Sakura Garment	Garment	313,104	61.9	192,672	38.1			all electric
5	Golden Myint Manufacturing	Shoes	115,933	80.0	28,983	20.0			all electric
6	PMG Distillery	Distillery	960,122	6.2	1,496,711	9.7	13,040,000	84.1	rice husk-fired boiler
7	UPG Paint	Paint							no numerical info

E.3 Estimates of direct and indirect bottom-up emissions

The overall methodology in estimating greenhouse gas emission reduction as an impact of the project's intervention is given in the GEF Manual³³. In addition, the STAP of the GEF has recently provided a guide³⁴ to estimate the benefits of

³¹ Retrieved from < <http://www.asiaeec-col.eccj.or.jp/cooperation/index.html> > in June 2014

³² Quickscan Reports of UNIDO Team, February 2014 (attached)

³³ *Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects*, GEF/C.33/Inf.18 (2008)

emissions reduction for energy efficiency projects, providing a manual and a number of calculation and methodology models, including modules on 1) standards and labeling; 2) building codes; 3) demonstration and diffusion, and 4) financial instruments. The module applicable in the case of this project is the module on ‘demonstration and diffusion’.

The direct emission reduction is related to the implementation of a) EnMS in 50 companies and subsequent b) SO measures in a subset of 20 companies. Given the lack of data on energy consumption and savings potential in individual companies in Myanmar, an ‘educated guess’ is made on the average potential savings of electricity and fuel use in the companies participating in Outputs 3.1.1 and 3.1.2, taking into account the energy audit data given in section E.2 above, as well as based on experiences of UNIDO in similar projects. The base set of data is given below:

Table E.5³⁵

Base input data		
Share in energy consumption	Electr	Fuels
- SME	33%	67%
- Large	10%	90.0%
Efficiency gain		
Energy management (output 3.1)	7.5%	7.5%
Systems optimization (output 3.2)	10.0%	12.5%

Energy consumption (MWh/yr)		Companies	Electr savings (MWh/yr)	Fuel savings (MWh/yr)
Average	Total			
Energy management				
SME				
900	7,200	8	178	362
1,800	16,200	9	401	814
3,000	30,000	10	743	1,508
4,200	42,000	10	1,040	2,111
5,400	54,000	10	1,337	2,714
Large				
66,000	198,000	3	1,485	13,365
TOTAL	347,400	50	5,183	20,872
Average			104	417
Systems optimization				
SME				
900	900	1	30	75
1,800	3,600	2	119	302
3,000	12,000	4	396	1,005
4,200	21,000	5	693	1,759
5,400	32,400	6	1,069	2,714
Large				
66,000	198,000	2	1,980	22,275
TOTAL	267,900	20	4,287	28,129
Average			214	1,406

It is assumed that the lifetime of the EnMS and SO measures is 15 years, which falls within the period of analysis, which is taken as 15 years after the end of the project (2015-2019; 2020-2034).

The emission factors for electricity and fuels is based on the analysis in section E.2 of this Annex, and using the mix of various fuels by industry, as available based on data available at IEA website (2011) and IPCC emission factors (2006).

The following table explains the calculations and summarizes the emission factors (in tCO₂ per MWh) for electricity (grid and gensets) and fuels for industry:

³⁴ *Calculating GHG Benefits of the GEF Energy Efficiency Projects, Version 1.0*, Scientific and Technical Advisory Panel (STAP; 2013)

³⁵ These EE gain factors have been determined based on the results of the 7 quick assessments during the PPG phase, and the experience from a number of similar UNIDO projects on energy management and systems optimization around the world, in particular from those countries in the region, such as Thailand, Vietnam, the Philippines, Indonesia and Malaysia.

Table E.6 Emission factors of electricity and fuel use in industry

	MWh (2011)		Emission factor
- Grid electricity	2,011,990	80%	0.235
- Gensets	402,398	20%	0.808
Electricity	2,414,388		0.350
- Coal	2,541,879	21%	0.355
- Diesel/oil	1,322,491	11%	0.266
- Nat gas	4,246,611	35%	0.202
- Biomass	3,881,312	32%	
Fuels	11,992,292	100%	0.184

By combining the data of Table E.5 on average electricity and fuel savings per company, total number of companies participating in EnMS implementation (Output 3.1.1) and SO (Output 3.1.2) with the appropriate emission factors of Table E.6, the annual and cumulative emission reduction can be estimated. It is assumed that the lifetime of the energy saving interventions in 15 years. Also, savings in grid electricity consumption at the company level must be converted into electricity savings at the power plant's gate by taking into account the transmission and distribution losses (T&D) of the grid, which are an estimated 20% (source: MOEP). Assuming that the share of grid electricity in overall electricity consumption is 80% (see Table E.2), this implies that the electricity T&D factor is 16%.

The results of the GHG emission reduction calculation is provided in the table below:

Table E.7 Estimates of direct and indirect (cumulative) CO₂ emission reduction impacts:

	No. Of companies	Electricity Fuels		Total	Cumulative	
					Energy (MWh)	GHG (tCO ₂)
Grid T&D losses		20%				
Electricity (grid and genset) T&D losses		16%				
Total energy savings (MWh/yr)		10,984	49,001	59,986		
- Energy management	50	6,012	20,872	26,884	403,263	89,292
- Systems optimization	20	4,973	28,129	33,102	496,525	103,913
Emission factors		0.3499	0.1844			
Annual GHG emission reduction		3,843	9,037	12,880		
Lifetime (yrs)	15	57,645	135,559	193,204		
Direct lifetime emission reduction (tCO₂)				193,204	899,789	193,204
Replication factor	4					
Indirect (bottom-up) reduction (tCO₂)				772,817	3,599,155	772,817.2

The indirect emission reductions are a consequence of the expected replication of the energy management implementation and systems optimization after the project's end. A 'replication factor' (RF=4) is assumed here, given the fact that the proposed measures are generally low-cost and, once convinced of their viability, should encourage management of other companies to replicate. The enhanced EE policy and regulatory frameworks, the established support and incentive programmes, and raised awareness will stimulate other factories to implement EnMS and SO. Experience from other similar IEE projects implemented by UNIDO, which offer integrated technical assistance like this project, has shown that two or three times more the number of factories will also implement EnMS and SO with support to be provided by the expert trainees. It is expected that in Myanmar even more factories than in the other ASEAN countries will implement EnMS and SO, because of the very high electricity price from the gensets.

E.4 Top-down indirect emission reduction estimates

The second approach to estimating indirect emission reductions (in the post-project period of influence, 2020-2034) starts with estimating the overall market potential. For this we have used as a basis:

3. The two scenarios that are presented in the Myanmar Country Report' in Kimura, S. (ed.), Analysis on Energy Saving Potential in East Asia (2012-19, pp.225-242.ERIA),for the industrial energy demand growth rates in the Business-as-usual (6.1%) and the Alternative scenario (5.57% per year), assuming that a reduction in energy demand of 9% can be reached in 2029 compared with the base year 2015
4. Fuel and electricity consumption data as given in Table E.6, based on IEA (2011) data;
5. The market potential (reduction 2015-2029) is corrected downward by using a causality factor (CF). This provides an estimate of how much of this market potential can be attributed to the GEF intervention. Here CF=3; implying that the GEF contribution will be substantial, although some indirect emission reduction can be attributed to other local development and non-GEF interventions

Table E.8 Calculation of top-down indirect emission reductions

2011 consumption data (MWh)															
	Electricity	Fuels	TOTAL	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Energy (MWh/yr)	2,011,990	13,211,680	15,223,670												
BaU Emissions (tCO2/yr)	703,915	2,436,610	3,140,525	3,332,097	3,535,355	3,751,011	3,979,823	4,222,592	4,480,171	4,753,461	5,043,422	5,351,071	5,677,486	6,023,813	
Alt Emissions (TCO2/yr)				3,332,097	3,517,850	3,713,958	3,920,998	4,139,580	4,370,347	4,613,979	4,871,193	5,142,745	5,429,435	5,732,107	
Reduction potential															
Reduction up to 2034			6,785.42	ktCO2	17,505	37,054	58,825	83,012	109,823	139,482	172,229	208,326	248,051	291,706	
CF	60%		4,071.25	ktCO2											

2026	2027	2028	2029	2030	2031	2032	2033	2034
6,391,265	6,781,133	7,194,782	7,633,663	8,099,317	8,593,375	9,117,571	9,673,743	10,263,841
6,051,652	6,389,011	6,745,176	7,121,197	7,518,179	7,937,291	8,379,768	8,846,911	9,340,095
339,613	392,122	449,605	512,467	581,138	656,084	737,803	826,832	923,746

E.5 STAP tool, Version 1.0; Calculating GHG Benefits of the GEF EE Projects (2013) – Excel Spreadsheets are attached

Step 1: Enter Basic Project Information

Project Information

Project Information

Project Title	Improvement of Industrial Energy Efficiency in Myanmar	
GEF ID Number	5321	
Country	Myanmar	
Region	EAP	
GEF Agency	UNIDO	
Date of Submission of GHG Accounting		
Contact Name	Khac Tiep NGUYEN	
First Year of Project	2015	
Year of Project Close	2019	
GEF Grant Amount (\$)	\$2,730,000	
Co-financing Amount (\$)	\$13,800,000	

General Parameters

	Default	User-Specified
Length of Analysis Period (Years After Project Close)	20	15
First Post-project Year		2020
Last Post-project Year		2034
Maximum Technology / Measure Lifetime (Years)	20	15

Notes

Fuels and Emission Factors

	Default	User-Specified
Electricity (grid+genset) T&D Loss Rate (%)	10%	16%
Electricity (grid+genset) emissions (tCO2/MWh)	N/A	0.3499
Fuel mix, Myanmar (tCO2/GJ)	0.1844	0.1844

Notes

2011, Source MOEP
2011, UNIDO calculations
2011, UNIDO calculations

Step 2: List Activity Components and Select Quantification Module

Activity Component	Sector/Subsector	Logframe Output	Module/Intervention Type
Energy Management System implementation	Industrial	Output 3.1: Energy management system based on ISO 50001, EnMS implemented in 50 industrial establishments, case studies prepared;	Demonstration & Diffusion
System Optimization	Industrial	Output 3.2: At least 20 optimization projects implemented energy systems: pump, compressed air, fan, and steam, case studies prepared.	Demonstration & Diffusion

Step 3: Model Activity Components

Demonstration/Diffusion Module

Project Information

Project Title	Improvement of Industrial Energy Efficiency in Myanmar	
Country	Myanmar	
Contact Name	Khac Tiep NGUYEN	
First Year of Project	2015	
Last Year of Project	2019	

Results: Demonstration/Diffusion Activity Components

	Cumulative			Annual			
	Total	2015-2019	2020-2034	2015	2019	2025	2035
Plant's gate electricity savings (MWh)	164,767	26,090	138,677	601	10,984	10,984	0
Fuel savings (MWh)	735,022	114,482	620,540	2,087	49,001	49,001	0
N/A	0	0	0	0	0	0	0
N/A	0	0	0	0	0	0	0
Direct Total Energy Savings (MWh)	899,789	140,572	759,217	2,688	59,986	59,986	0
Direct GHG Emission Savings (tCO2)	193,204	30,242	162,963	595	12,880	12,880	0
Direct Post-project GHG Emission Savings (tCO2)							
Indirect Bottom-up Emission Savings (tCO2)	772,817		772,817				

Output 3.1: Energy management system implementation

Component Specifications	Default	User-Specified	Per Unit	Notes
Annual Electricity Savings (MWh)		104	Number of companies, EnMS implemented	Average, see Annex for details
Annual Fuel Savings (MWh)		417		Average, see Annex for details

Useful Lifetime of Investment	15	15		

Baseline Assumptions	Default	User-Specified	Notes
Percent of Activities Implemented in the Baseline	10%	0%	So far (June 2014) there are no ISO50001 certified companies in Myanmar

Indirect Bottom-up Estimate	Default	User-Specified	Notes
Number of companies, EnMS implemented During Project Period		50	
Number of Replications Post-project as Spillover		4	In the project, capacity building will be carried out
Total		200	

Output 3.2: System optimization

Component Specifications	Default	User-Specified	Per Unit	Notes
Annual Electricity Savings (MWh)		214	Number of companies SO implemented	Average, see Annex for details
Annual fuel savings (MWh)		1,406		Average, see Annex for details

Useful Lifetime of Investment	15	15		

Baseline Assumptions	Default	User-Specified	Notes
Percent of Activities Implemented in the Baseline	10%	0%	No professional set-up to carry-out SO in Myanmar

Indirect Bottom-up Estimate	Default	User-Specified	Notes
Number of companies SO implemented Implemented During Project Period		20	
Number of Replications Post-project as Spillover	GEES CE	4	In the project, capacity building will be carried out
Total		80	

4

Output

PROGR
BASELI
NET
DIRECT

TOTAL

INDIRE

Output

PROGR
BASELI
NET
DIRECT

TOTAL

INDIRE

Step 4: Calculate Indirect Top-Down Impacts

	<i>User-Specified</i>	<i>Notes</i>
Total Market Potential (tCO ₂)	6,785	
Causality factor	60%	
Indirect Top-Down Emission Reductions (tCO ₂)	4,071	

Step 5: Review the Results

Overall Results

All Components	Cumulative			Annual			
	Total	2015-2019	2020-2034	2015	2019	2025	2035
Plant's gate electricity savings (MWh)	164,767	26,090	138,677	601	10,984	10,984	0
Fuel savings (MWh)	735,022	114,482	620,540	2,087	49,001	49,001	0
N/A	0	0	0	0	0	0	0
N/A	0	0	0	0	0	0	0
Direct Total Energy Savings (MWh)	899,789	140,572	759,217	2,688	59,986	59,986	0
Direct GHG Emission Savings (tCO ₂)	193,204	30,242	162,963	595	12,880	12,880	0
Direct Post-project GHG Emission Savings (tCO ₂)							
Indirect Bottom-up Emission Savings (tCO ₂)	772,817		772,817				
Indirect Top-down Emission Savings (tCO ₂)	4,071,254		4,071,254				

ANNEX F: MONITORING AND EVALUATION PLAN

F.1 Project start

A Project Inception Workshop will be held within the first four months of project start with those with assigned roles in the project organization structure. The Inception Workshop is crucial for building ownership for the project results and for planning the first year annual work plan. The Inception Workshop should address a number of key issues including:

- Understand objectives & other outputs and activities;
- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNIDO and of the project stakeholders vis-à-vis the Project Management Unit. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting, communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed;
- Based on the project results framework and the relevant GEF Tracking Tools, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks;
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements; the M&E work plan and budget should be agreed upon and scheduled;
- Discuss financial reporting procedures and obligations, and arrangements for annual audit;
- Plan and schedule Project Steering Committee meetings; roles and responsibilities of all project organization structures should be clarified and meetings planned. The first PSC meeting should be held within the first 12 months following the inception workshop.

The Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided upon during the meeting.

F.2 Semi-annual reviews

Will consist of:

- Summary of progress made during the most recent six-month period;
- Based on the initial risk analysis submitted, the risk log shall be regularly updated, where needed. Risks become critical when the impact and probability are high;

F.3 Annual review

Annual Project Review/Project Implementation Reports (APR/PIR): These key reports are prepared to monitor progress made since project start and in particular for the previous reporting period. The APR/PIR includes UNIDO/GEF requirements and includes, but is not limited to, reporting on the following:

- Progress made toward project objective and outcomes - each with indicators, baseline data and end-of-project targets (cumulative);
- Project outputs delivered per project outcome (annual);
- Lessons learned/good practices;
- AWP and other expenditure reports;
- Risk and adaptive management;

UNIDO will conduct visits to project sites based on the agreed upon schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the PSC may also join these visits.

F.4 Mid-term of project cycle

The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation. The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-

term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the Project Management Team and the management response and the evaluation will be uploaded to the UNIDO Evaluation Group website.

F.5 End of project

An independent Final Evaluation will take place three months prior to the final PSC meeting and will be undertaken in accordance with UNIDO and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNIDO Evaluation Group. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response. The GEF Focal Point will be involved in this Final Evaluation.

ANNEX G: GEF BUDGET BREAKDOWN

1. GEF Budget breakdown

1.1 Project personnel

Position / title	Estimated person-weeks	Total \$
Total National Consultants	879	594,250
Total International Consultants	214	749,000
Total Project Personnel	1,093	1,343,250

1.1.1 National consultants

1.1.1.1 Project Management Unit (PMU)

Position / title	\$ per person-week	Estimated person-weeks	Total \$	Tasks
National Project Manager	750	260	195,000	Under the supervision of the UNIDO Project Manager, the National Project Manager is responsible for day-to-day management and co-ordination; budgeting; forward planning; liaising with project participants and stakeholders; preparation and presentation of project status reports to the Project Steering Committee; preparing subcontractors terms of reference and contracts; supervision of contracts; and project execution of all tasks identified under the project specified in the Project Document.
Project Assistant (national staff)	500	260	130,000	Under the supervision of the National Project Manager, the Project Assistant will produce the required statements as needed, keeps checks and balances in place to ensure proper use of finances under various budget lines and headings and report the financial progress; and will be responsible for administrative and secretarial matters, and assist processing and reporting project incomes and expenditures.
Subtotal PMU		520	325,000	

1.1.1.2 Other national consultants

Position / title	\$ per person-week	Estimated person-weeks	Total \$	Tasks
EnMS and training experts	750	150	112,500	To assist in the creation of a EnMS programme and implementation of EnMS in industrial companies and to support accreditation of EnMS in selected companies; Monitor, report and organize trainings and guidance to the local stakeholders on EnMS and energy management; Capturing of lessons learned and best practices and their dissemination; To organize and conduct workshops on the above-mentioned topics. Outputs 2.1.1 and 3.1.1
System optimization and training experts	750	150	112,500	To provide support to the design of system optimization demo projects and provide trainings on system optimization (steam, pumping, motor/fan, and compressed air systems; industrial processes); Monitor, report and organize trainings and guidance to the local stakeholders on systems optimization; Capturing of lessons learned and best practices and their dissemination; To organize and conduct workshops on the before-mentioned topics, including for suppliers. Outputs 2.1.2 and 3.1.2

Position / title	\$ per person - week	Estimated person-weeks	Total \$	Tasks
Financing experts	750	59	44,250	Provide advice to financial institutions on the techno-economic evaluation of EE project proposals; Assist projects in preparation of financial proposals and business plans for demo projects; Provide corresponding trainings. Outputs 2.1.3; 3.1.1 and 3.1.2
Subtotal		359	269,250	

	Estimated person-weeks	Total \$
PMU	520	325,000
National Consultants	359	269,250
Total National Consultants	879	594,250

1.1.2 International Consultants

Position / title	\$ per person-week	Estimated person-weeks	Total \$	Tasks
Industrial energy efficiency policy experts	3,500	12	42,000	To work with counterparts to formulate industrial energy efficiency policy recommendations Outputs 1.1.1 and 1.1.2
Data collection, database creation and management experts	3,500	12	42,000	Strengthen existing databases on energy and industry in counterpart organizations and design energy benchmarking database; Analyze data on energy and industrial production and technology figures received from various industries; To train local teams on MRV structure; energy data collection and strengthen/establish existing/new databases on energy and industry in counterpart organizations. Outputs 1.1.1 and 1.1.2
Communication and industry	3,500	8	28,000	Develop a plan for media and outreach programs as per the annual work-plan of the project; Develop the workshop material from the inputs of the area specialists; Develop outreach material and outreach programs to disseminate the project objectives and programs; Document results. Outputs 1.1.1 and 1.1.2
EnMS and training experts	3,500	60	210,000	To assist in the creation of a EnMS programme and implementation of EnMS in industrial companies and to support accreditation of EnMS in selected companies; Monitor, report and organize trainings and guidance to the local stakeholders on EnMS and energy management; Capturing of lessons learned and best practices and their dissemination; To organize and conduct workshops on the before-mentioned topics. Outputs 2.1.1 and 3.1.1
System optimization and training experts	3,500	110	385,000	To provide support to the design of system optimization demo projects and provide trainings on system optimization (steam, pumping, motor/fan, and compressed air systems; industrial processes); Monitor, report and organize trainings and guidance to the local stakeholders on systems optimization; Capturing of lessons learned and best practices and their dissemination; To organize and conduct workshops on the before-mentioned topics, including for suppliers. Outputs 2.1.2 and 3.1.2
Financing experts	3,500	12	42,000	Provide advice to financial institutions on the techno-economic evaluation of EE project proposals; Assist projects in preparation of financial proposals and business plans for demo projects; Provide corresponding trainings. Outputs 2.1.3; 3.1.1 and 3.1.2
Subtotal		214	749,000	

1.2 National subcontracts

Subcontract	Total \$	Description of the subcontract
Energy databases and energy reporting subcontracts	4,400	Strengthen existing databases on energy and industry at counterpart organizations and industry; Strengthen and/or design energy database, including application of required software and training of counterpart organization. Analyze data on energy and industrial production and technology figures received from various industries and future energy targets. To work with counterparts to produce industrial energy policy recommendation, based on energy targets Outputs 1.1.1 and 1.1.2
Communication and publication; website design and maintenance	25,000	Develop a plan for a media and outreach program as per the annual work-plan of the project; Develop the workshop material from the inputs of the area specialists; Develop outreach material and an outreach program to disseminate the project objectives and programs; Strengthen information dissemination capability of PMO; Advise on the design of new and/or improvement of existing newsletters on EE topics; Design project newsletter; Establish and develop the project web-site and create ways to keep it updated and relevant to the targeted customers and project partners. Outputs 1.1.1 and 1.1.2
ISO EnMS and training	25,000	To assist in the creation of a EnMS programme and implementation of EnMS in industrial companies and to support accreditation of EnMS in selected companies; Monitor, report and organize trainings and guidance to the local stakeholders on EnMS and energy management; Capturing of lessons learned and best practices and their dissemination; To organize and conduct workshops on the before-mentioned topics; Strengthen counterpart organizations on EnMS; If required, organize network(s) to provide advice and information on EnMS management and systems optimization. Outputs 2.1.1 and 3.1.1
System optimization and training	25,000	To provide support to the design of system optimization demo projects and provide trainings on system optimization (steam, pumping, motor/fan, and compressed air systems; industrial processes); Monitor, report and organize trainings and guidance to the local stakeholders on systems optimization; Capturing of lessons learned and best practices and their dissemination; To organize and conduct workshops on the above-mentioned topics, including for suppliers. Outputs 2.1.2 and 3.1.2
EnMS implementations	170,000	To support the EnMS implementation in 50 industrial establishments
SO implementations	420,000	To support the SO implementation in 20 industrial establishments
Subtotal National Subcontracts	669,400	

2. GEF Budget breakdown according to outputs of the project – please see attached spreadsheets.

ANNEX H: ACTIVITY TIMING

Outcome	Output	Key Activities	Year 1				Year 2				Year 3				Year 4				Year 5				
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Outcome 1.1: Improved policy and regulatory frameworks, incentive schemes, support programmes, energy data and awareness will facilitate sustainable energy efficiency improvement in industry	Output 1.1.1 EE strategy developed based on experience and lessons learned from other countries;	Review of on-going activities on EE strategy in Myanmar and experiences from other countries																					
		Organizing stakeholder workshops																					
		Drafting of strategy																					
	Output 1.1.2 Incentive schemes, e.g. tax breaks or exemptions, grant and non-grant instruments, etc. and support programmes, e.g. consultancy services, training, etc. developed;	Review of existing schemes and gap analysis conducted																					
		Recommendations for the development of incentive schemes and support programmes prepared and consolidated																					
		Long-term agreements and follow-up																					
	Output 1.1.3 Energy consumption data by large and medium sized industry establishments collected and managed;	Systematic collection, compilation, analysis and dissemination of industrial energy data																					
	Output 1.1.4 Awareness raising activities on Nationally Appropriate Mitigations Actions (NAMA) and EE conducted.	Awareness activities, discussion rounds and stakeholder meetings																					
		Training of policy makers																					
	Outcome 2.1: Strengthened or built	Output 2.1.1 Introductory, user and expert training on	Adaptation of EnMS training materials and translation into																				

Outcome	Output	Key Activities	Year 1				Year 2				Year 3				Year 4				Year 5					
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
capacity of institutions, industries, consultants and equipment suppliers on energy management system, energy system optimization, and EE project financing will assist industries in the implementation of EE improvements	energy management systems based on ISO 50001, EnMS conducted;	Myanmar language																						
		Provide capacity building to training facility																						
		(40) national experts in EnMS implementation to ISO50001 standard trained by UNIDO Team (some of them will get also training of trainers)																						
		Awareness program: Half- to one-day EnMS introductory training delivered to 300 senior managers / business owners																						
		(150) energy managers trained in how to implement EnMS in their businesses, EnMS User-level																						
	Output 2.1.2: User and expert training on energy system optimizations conducted;	Adaptation of SO training materials and translation into Myanmar language																						
		(20) national experts in systems optimization trained by UNIDO team																						
		Basic training of 200 factory personnel on system optimization																						
		Training of vendors/suppliers of equipment for industrial processes																						

Outcome	Output	Key Activities	Year 1				Year 2				Year 3				Year 4				Year 5				
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
		on system optimization																					
		Follow-up training of factory personnel on implementation of systems optimization																					
	Output 2.1.3 Training on EE project financing provided to industry and financial institutions.	Preparation of training material																					
		Training of managers from government, industry and financial institutions on EE project financing																					
Outcome 3.1: Demonstrated projects on energy management system, and energy system optimization in selected plants and sub-sectors and widely used case studies will result in direct GHG emissions reductions and leverage the interest and belief in investment in IEE projects.	Output 3.1.1 Energy management system based on ISO 50001, EnMS implemented in 50 industrial establishments, case studies prepared;	(50) companies selected																					
		(15) companies supported during each 12 month period																					
		Case studies prepared																					
	Output 3.1.2 At least 20 optimization projects implemented energy systems: pump, compressed air, fan, and steam, case studies prepared.	(20) companies selected																					

ANNEX I: ADDITIONAL MYANMAR SECTORAL INFORMATION

Distribution of companies among industrial subsectors 2013³⁶

Sector	Large	Medium	Small	Total	Percentage
Food and beverages	2,369	4,110	20,976	27,455	63.5%
Construction materials	510	650	2,117	3,277	7.6%
Clothing and wearing apparel	341	380	1,001	1,722	4.0%
Metal and mineral	315	381	1,204	1,900	4.4%
Personal goods	375	410	330	1,115	2.5%
Industrial raw materials	159	240	282	681	1.6%
Printing and publishing	60	117	183	360	0.8%
Household products	144	79	97	320	0.7%
Transport vehicles	194	40	33	267	0.6%
Industrial tools and equipment	15	49	66	130	0.3%
Agricultural machinery	9	25	37	71	0.2%
Electrical equipment	43	15	12	70	0.2%
Others	264	791	4,799	5,854	13.5%
Total	4,808	7,287	31,137	43,232	100.0%
Percentage	11.10%	16.90%	72.00%	100.00%	

List of registered SMEs in Industrial Zones of Myanmar (as of February 2013)³⁷

No	Division	Name of Industrial Zone	Number of Enterprise				Number of workers
			Large	Medium	Small	Total	
1	Mandalay	Mandalay	403	311	654	1,368	15,933
2		Myin Chan	53	176	83	312	1,876
3		Meikhtila	24	115	151	290	1,880
4	Yangon	East of Yangon					
		(a) South Dagon (1)	111	30		141	6,673
		(b) South Dagon (2)	153	289	38	480	5,812
		(c) South Dagon (3)	25	116	109	250	1,548
		(d) New Dagon	116	9		125	6,635
		(e) New Dagon (East)	103	24	4	131	3,573
		(f) North Okkalapa	41	23	10	74	2,450
		(g) Shwe Pauk Kan	68	98	8	174	6,392
		(h) South Okkalapa	19	50	20	89	850
		(i) Thar Kay Ta	35	12	18	65	2,400
		(j) North Dagon	40	28	4	72	1,060
5		West of Yangon	119	269	389	777	9,047
6		South of Yangon	91	134	565	790	3,991
7		North of Yangon					
		(a) Hlaing Thar Yar	546	96	2	644	36,304
		(b) Shwe Pyi Thar	226	42	43	311	19,094

³⁶ OECD, Development Pathways, Multi-dimensional review of Myanmar, Volume 1. Initial Assessment, 2013.

³⁷ Department of Industrial Supervision and Inspection, the Ministry of Industry

		(c) Mingalardone	64			64	13,678
		(d) Myaung Da Kar	28			28	444
8	Ayarwaddy	Myaung Mya	45	34	211	290	1,846
9		Hinthata	10	51	310	371	1,454
10		Pathein	33	100	248	381	2,635
11	Sagaing	Monywa	69	164	356	589	2,913
12		Kalay	2	4	33	39	155
13	Bago	Pyay	30	73	82	185	729
14	Magwe	Yaenan Chaung	6	20	59	85	511
15		Pakhoteku	32	79	117	228	1,078
16	Mon	Mawlamyine	35	105	21	161	1,031
17	Shan	Taungyi	47	64	386	497	2,696
18	Tanintharyi	Myeik	20	4	4	28	1,083
19	Kayin	Pharan	32	16		48	839
		Total	2,626	2,536	3,925	9,087	156,610
		Percentage	28.9	27.91	43.19	100.00	

Note: The above table includes the 18 industrial zones established in 1988 (see pg. 7), as well as the Kayin industrial zone established in 2012.

ANNEX J: MINISTERIAL STRUCTURE

National Energy Management Committee and its members

The National Energy Management Committee (NEMC) was established in January 2013, under Notification 12/2013, with the mandate to formulate the National Energy Policy, assist in the development of the electricity and energy sector, as well as coordinate with the Privatization Commission and the Myanmar Investment Commission. The NEMC consists of the following members, and is supported by the Energy Development Committee (EDC):

6. Ministry of Industry (MOI) – Energy Efficiency and Conservation Coordinator
7. Ministry of Energy (MOE)
8. Ministry of Electric Power (MOEP)
9. Ministry of Agriculture and Irrigation (MOAI)
10. Ministry of Environmental Conservation and Forestry (MOECAF)
11. Ministry of Mines (MOM)
12. Ministry of Science and Technology (MOST)
13. Ministry of National Planning and Economic Development (MNPED)
14. Myanmar Engineering Society
15. Renewable Energy Association of Myanmar

Relevant Ministries Duties and Coverage

Seven ministries in Myanmar are responsible for energy matters, with the MOE as the focal point for overall energy policy and coordination. The MOI is the designated Ministry for energy efficiency in Myanmar, and thus a key partner for the project. The role of the various government ministries and organizations regarding energy is summarized in the below table.

Energy-related ministries and their duties

	Sector/activity	Organization	Duties and coverage
1	Oil and gas	Ministry of Energy (MOE)	The MOE is principally responsible for the oil and gas sector. It has oversight of three state-owned enterprises: - Myanmar Oil and Gas Enterprise (MOGE) is responsible for oil and gas exploration and production, and domestic gas transmission. - Myanmar Petroleum Products Enterprise (MPPE): It is responsible for retail and wholesale distribution of petroleum products. - Myanmar Petrochemical Enterprise (MPE): It operates three refineries, five urea fertilizer plants and a number of other processing plants.
2	Electric Power	Ministry of Electric Power (MOEP)	MOEP is responsible for hydropower, thermal power, and transmission and distribution. - Myanmar Electric Power Enterprise (MEPE) is responsible for the transmission network, gas-fired power plants, wind turbines and small-hydro - Hydro Power Generation Enterprise (HPGE) is responsible for the hydro and coal-fired generation - Yangon City Electricity Supply Board (YESB) is responsible for the supply of electricity to consumers in Yangon - Electric Supply Enterprise (ESE), is responsible for the supply of electricity to consumers in the rest of Myanmar
3	Energy Efficiency	Ministry of Industry (MOI)	MOI is responsible for energy efficiency and off-grid rural energy access (it contains the Rural Energy Supporting Development Committee), as well as approving electrical connections for businesses and industries

	Sector/activity	Organization	Duties and coverage
			(this may change with the approval of the new Electricity Law).
4	Coal	Ministry of Mines (MOM)	MOM is responsible for coal production.
5	Nuclear	Ministry of Science and Technology (MOST)	MOST is responsible for nuclear energy developments.
6	Biomass and fuel-wood	Ministry of Environmental Conservation and Forestry (MOECAF) Ministry of Agriculture and Irrigation (MOAI)	MOECAF is responsible for fuel wood, climate change, and environmental standards and safeguard requirements (but not social ones.) MOAI is responsible for bio-fuels and micro-hydropower for irrigation purposes.
7	Renewable Energy	Ministry of Science and Technology (MOST)	MOST is responsible for research and development related to renewable energy technologies.

ANNEX K: QUICK ASSESSMENT REPORTS AND LETTERS OF INTENT BY INDUSTRIES

The following documents can be found in attachment, Annex K

Quick Scan Energy Reports:

1. FAME Pharmaceuticals Industry Co. Ltd.
2. Golden Myint Manufacturing
3. Peace Myanmar Group Co. Ltd. PMG Distillery
4. Sakura Garment Factory
5. Shwe Sae Taw (999) Trade Company (Food Processing Factory)
6. United Wood Industries Co. Ltd.
7. United Paints Group Co. Ltd (UPG)

Letters of Intent:

1. FAME Pharmaceuticals Industry Co. Ltd.
2. Ngwe Sae Taw (999) Co. Ltd.
3. United Paints Group Co. Ltd (UPG)