



REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: Medium-sized Project

TYPE OF TRUST FUND: GEF Trust Fund

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PART I: PROJECT INFORMATION

Project Title: Promotion of Energy Efficient Industrial Boiler Adoption and Operating Practices in Vietnam			
Country(ies):	Vietnam	GEF Project ID: ¹	5412
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	120263
Other Executing Partner(s):	Ministry of Industry and Trade (MOIT)	Submission Date	08-04-2014
		Resubmission Date	09-01-2014
GEF Focal Area (s):	Climate Change	Project Duration(Months)	48
Name of Parent Program (if applicable):		Project Agency Fee (\$):	168,245
		➤ 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	Outcome 2.1: Appropriate policy, legal and regulatory frameworks adopted and enforced	Output 2.1: Energy efficiency policy and regulation in place	GEF TF	901,000	2,370,000
CCM-2	Outcome 2.2: Sustainable financing and delivery mechanisms established and operational	Output 2.2: Investment mobilized Output 2.3: Energy savings achieved	GEF TF	870,000	7,912,000
Total project costs				1,771,000	10,282,000

B. PROJECT FRAMEWORK

Project Objective: To reduce energy consumption and green house gas emissions through promotion of the widespread adoption of energy efficient boilers and best operating practices in industry						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Policy and regulatory framework to support the boiler standardization system.	TA	1.1 Operationalized regulations and guidelines on an industrial boiler standardization system.	1.1.1 Developed regulations on energy performance standards for locally manufactured and imported boilers, efficiency standards for operation certificates of existing boilers and guidelines on adoption and	GEF TF	181,000	370,000

¹Project ID number will be assigned by GEFSEC.

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

			<p>enforcement of standards;</p> <p>1.1.2 Improved industrial boiler standardization system;</p> <p>1.1.3 Provided technical assistance to MOIT in the establishment of a boiler operation certification and inventory program;</p> <p>1.1.4 Guidelines on implementation of funds, loans and tax schemes to support industrial boiler efficiency improvements.</p>			
2. Awareness, training and capacity building for government agencies, boiler owners, operators, and manufacturers, and other stakeholders.	TA	<p>2.1 Increased awareness and information availability on energy efficient industrial boilers for end-users (industrial enterprises), energy consultants, energy service providers, ESCOs and industrial boiler providers;</p> <p>2.2 Improved technical capacity of government agencies, industrial boiler owners, operators, and manufacturers, service providers, and financial/banking institutions.</p>	<p>2.1.1 Provided support to the Vietnamese Government to develop a national communication strategy on boiler efficiency improvement goals for industries;</p> <p>2.1.2 Completed awareness raising and information exchange workshops on energy efficient industrial boilers and best operating practices for end-users, energy consultants, energy service companies and boiler providers/manufacturers;</p> <p>2.2.1 Provided trainings on life cycle assessment, boiler efficiency evaluation techniques, and best boiler operating and manufacturing practices accordingly</p>	GEF TF	520,000	1,080,000

			<p>for end-users, energy consultants, energy service companies/ providers, and boiler providers, operators and manufacturers in industry;</p> <p>2.2.2 Provided technical assistance to industrial boiler providers on the development of business and marketing plans for energy efficient industrial boilers;</p> <p>2.2.3 Conducted training courses for financial/banking institutions on the appraisal of energy efficient boiler investment projects.</p>			
3. Financing and implementation of energy efficient boiler adoption projects and manufacturing.	TA	3.1: Increased access to financial sources and incentives for investment projects on energy efficient boiler adoption and manufacturing;	3.1.1 Mobilized existing financial schemes and available financial sources for promotion, demonstration and replication projects on energy efficient industrial boiler adoption and manufacturing;	GEF TF	100,000	170,000
	INV	3.2: Increased adoption of energy efficient boilers by industry due to high credibility and evaluation of energy efficient boilers and best operating practices.	<p>3.2.1 Implemented 10 demonstration projects on best operating practices and 5 demonstration projects on replacement of old boilers with new energy efficient boilers;</p> <p>3.2.2 Developed a database system and dissemination of results on implemented boiler projects;</p> <p>3.2.3 Provided</p>	GEF TF	770,000	7,742,000

			technical assistance and assisted in arranging financing for implementation to 100 end-users on best operating practices and up to 30 bankable projects on new energy efficiency boiler investments.			
Monitoring and Evaluation	TA	Improved replication of boiler projects implementation.	Regular monitoring exercises conducted.	GEF TF	40,000	120,000
Subtotal					1,611,000	9,482,000
Project management Cost (PMC) ³				GEF TF	160,000	800,000
Total project costs					1,771,000	10,282,000

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	MOIT	Cash	1,205,000
National Government	MOIT	In-kind	520,000
GEF Agency	UNIDO	Cash	60,000
GEF Agency	UNIDO	In-kind	50,000
Local Government	Energy Conservation Centre in Hanoi	In-kind	200,000
Local Government	Energy Conservation Centre in HCMC	In-kind	200,000
Local Government	Energy Conservation Centre in Da Nang	In-kind	135,000
Private Sector	Vietinbank	Hard Loan	7,412,000
Private Sector	Vietnam Boiler Company	In-kind	100,000
Private Sector	Southern Vietnam Boiler Company	In-kind	100,000
Private Sector	Polytechnical Pressure Equipment Joint Stock Company	In-kind	50,000
Private Sector	Asia Polytechnic Company Limited	In-kind	100,000
Private Sector	Hoang Dao Energy Joint Stock Company	In-kind	50,000
Private Sector	Da Nang Polytechnical Thermal Engineering and Refrigeration Limited Company	In-kind	100,000
Total Co-financing			10,282,000

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

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
(select)	(select)	(select)				0
Total Grant Resources				0	0	0

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.

² Indicate fees related to this project.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
International Consultants	263,400	80,000	343,400
National/Local Consultants	264,900	460,000	724,900

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 changes to the project design between the PIF and the CEO Endorsement stage are minimal and are listed in detail below. In addition, project duration has been extended to 48 months based on interactions with local stakeholders in the PPG phase.

Component 1: Output 1.3 of the PIF has been split into 2 outputs (1.1.3 and 1.1.4) in the CEO Endorsement document in order to clearly differentiate between the two activities; technical assistance to MOIT on the establishment of the boiler operation certification and inventory program, and development of guidelines on the implementation of financial schemes.

Components and outputs at PIF stage		Components and outputs at CEO endorsement stage	
Project Component	Expected Outputs	Project Component	Expected Outputs
1. Policy and regulatory framework to support the boiler standardization system.	1.1 Developed regulations on energy performance standards for locally manufactured and imported boilers, efficiency standards for operation certificates of existing boilers and guidelines on adoption and enforcement of standards;	1. Policy and regulatory framework to support the boiler standardization system.	1.1.1 Developed regulations on energy performance standards for locally manufactured and imported boilers, efficiency standards for operation certificates of existing boilers and guidelines on adoption and enforcement of standards;
	1.2 Improved industrial boilers standardization system;		1.1.2 Improved industrial boiler standardization system;

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.

	1.3 Provided technical assistance to MOIT in the establishment of a boiler operation certification program and implementation of funds, loans and tax schemes to support industrial boiler efficiency improvements.		1.1.3 Provided technical assistance to MOIT in the establishment of a boiler operation certification and inventory program;
			1.1.4 Guidelines on implementation of funds, loans and tax schemes to support industrial boiler efficiency improvements.

Component 2: In order to more accurately describe the Output activities, Output 2.1.1 has been re-worded in the CEO Endorsement document to remove the word implementation. Thus, Output 2.1.1 will focus primarily on the development of the national communication strategy, while the actual implementation of the strategy will be supported and assisted by the activities outlined in Outputs 2.1.2 - 2.2.3.

2: Awareness, training and capacity building for government agencies, boiler owners, operators, and manufacturers, and other stakeholders.	2.1 Provided support to the Vietnamese Government to develop and implement a national communication strategy on boiler efficiency improvement goals for industries;	2. Awareness, training and capacity building for government agencies, boiler owners, operators, and other stakeholders.	2.1.1 Provided support to the Vietnamese Government to develop a national communication strategy on boiler efficiency improvement goals for industries;
	2.2 Completed awareness raising and information exchange workshops on energy efficient industrial boilers and best operating practices for end-users, energy consultants, energy service companies and boiler providers/manufacturers;		2.1.2 Completed awareness raising and information exchange workshops on energy efficient industrial boilers and best operating practices for end-users, energy consultants, energy service companies and boiler providers/manufacturers;
	2.3 Provided trainings on life cycle assessment, boiler efficiency evaluation techniques, and best boiler operating and manufacturing practices accordingly for end-users, energy consultants, energy service companies/providers, and boiler providers, operators and manufacturers in industry;		2.2.1 Provided trainings on life cycle assessment, boiler efficiency evaluation techniques, and best boiler operating and manufacturing practices accordingly for end-users, energy consultants, energy service companies/providers, and boiler providers, operators and manufacturers in industry;
	2.4 Provided technical assistance to industrial boiler providers on the development of business and marketing plans for energy efficient industrial boilers;		2.2.2 Provided technical assistance to industrial boiler providers on the development of business and marketing plans for energy efficient industrial boilers;

	2.5 Conducted training courses for financial/banking institutions on the appraisal of energy efficiency boiler investment projects.		2.2.3 Conducted training courses for financial/banking institutions on the appraisal of energy efficient boiler investment projects.
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Component 3: In the CEO Endorsement document, Output 3.1 of the PIF has been split into two separate Outputs, 3.1.1 (mobilization of existing financial schemes, etc.) and 3.2.3 (technical assistance for implementation projects) to better differentiate between activities and organize the result framework in a more logical manner. In order to reflect the movement of outputs, TA and INV funding were also modified to ensure that sufficient funding was available for the scaling up activities under Output 3.2.3, a crucial aspect of the project’s sustainability strategy.

3: Financing and implementation of energy efficient boiler adoption projects and manufacturing.	3.1. Mobilized existing financial schemes and available financial sources for promotion, demonstration and replication projects on energy efficient industrial boiler adoption and manufacturing that include providing technical assistance for implementation to 100 end-users on best operating practices and up to 30 bankable projects on new energy efficiency boiler investments.	3. Financing and implementation of energy efficient boiler adoption projects and manufacturing.	3.1.1 Mobilized existing financial schemes and available financial sources for promotion, demonstration and replication projects on energy efficient industrial boiler adoption and manufacturing;
	3.2 Implemented 10 demonstration projects on best operating practices and 5 demonstration projects on replacement of old boilers with new energy efficient boilers;		3.2.1 Implemented 10 demonstration projects on best operating practices and 5 demonstration projects on replacement of old boilers with new energy efficient boilers;
	3.3 Developed a database system and dissemination of results on implemented boiler projects.		3.2.2 Developed a database system and dissemination of results on implemented boiler projects.
			3.2.3 Provided technical assistance and assisted in arranging financing for implementation to 100 end-users on best operating practices and up to 30 bankable projects on new energy efficiency boiler investments.

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.

The proposed project is in line with the major national policies and programs on energy efficiency and conservation (EEC) and environment friendly technologies in Vietnam. In particular, the proposed project is relevant to the implementation of the Vietnam National Energy Efficiency and Conservation Program (VNEEP) Phase II, Vietnam’s

Second National Communication, and a number of government legislation related to the project's focus areas. These programs constitute the national policy framework of Vietnam within which the proposed project will operate and indicate the Government's interest in reducing greenhouse gas (GHG) emissions, promoting energy efficiency, and encouraging technology upgrading and capacity building. The proposed project's focus on inefficient industrial boilers as a means to increase energy efficiency and decrease GHG emissions is thus, in line with these national policies and priorities.

The Second National Communication (NC), released in 2010, provides a comprehensive insight into the national priorities and strategies of Vietnam. The NC identifies fifteen GHG mitigation options, many of which focus on improving the efficiency of appliances and energy producers e.g. coal stoves, electric motors, etc. The NC also notes energy efficiency as a high priority, as well as highlighting education, training, awareness raising and capacity building as vital elements of climate change mitigation. Specifically, the document refers to the need for capacity building of institutions, technology development and transfer, and financial services. Thus, the proposed project's focus on improving the energy efficiency of industrial boilers, combined with awareness raising and capacity building, is closely in line with the broader national strategy on climate change mitigation.

Relating more directly to boiler efficiency improvements, the Technology Needs Assessment (TNA) for Climate Change Mitigation (2012) has specifically highlighted the importance of "small-capacity, low-pressure steam generator technology" in Vietnam. Thus, the project's aim to introduce new, more energy efficient (EE), boiler technology to Vietnam supports this objective.

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

The proposed project fits into the GEF-5 climate change strategic Objective 2, "Promote market transformation for energy efficiency in industry and the building sector," and will contribute to a reduction of GHG emissions through the transformation of the industrial boiler market towards the increased utilization of industrial EE boilers in industries. This will be achieved through the promotion and facilitation of local EE industrial boiler manufacturing and the adoption of EE industrial boilers and best operating practices by industrial enterprises. Moreover, the adoption of EE industrial boilers and best operating practices will contribute to the improvement of energy efficiency in Vietnam's industry, with the co-benefit of reducing the GHG emissions of that sector.

A.3 The GEF Agency's comparative advantage:

UNIDO has been recognized by the Global Environment Facility (GEF) as having comparative advantage in the development and implementation of Industrial Energy Efficiency (IEE) projects. With its mandate to promote inclusive and sustainable industrial development, UNIDO has positioned itself as one of the most relevant players to assist industries of both developing countries and economies in transition. UNIDO has long-standing sector-wide experience with the technical, policy and financing aspects of efficiency improvements in manufacturing and process industries. UNIDO has implemented IEE projects with GEF funding throughout South East Asia and other regions over the last 10 years. In Vietnam, UNIDO has extensive experience in cooperation with different government agencies in the development of policies and institutional frameworks to support industrial development.

UNIDO also has a strong partnership with various industrial and enterprise associations, which will facilitate the successful implementation of the project. In addition, UNIDO is currently implementing a number of projects in Vietnam, with more under development that demonstrate its extensive experience in the implementation of energy-related projects including:

- Promoting Energy Efficiency in Industries through System Optimization and Energy Management Standards (GEF ID 3594)
- Reducing Greenhouse Gas and ODS Emissions Through Technology Transfer in Industrial Refrigeration (GEF ID 5464)

- Implementation of Eco-Industrial Park Initiative for Sustainable Industrial Zones in Vietnam (GEF ID 4766)
- Minimata Convention Initial Assessment in Vietnam (GEF ID 5870)
- Demonstration of BAT and BEP in Open Burning Activities in Response to the Stockholm Convention on POPs (GEF ID 5082)

Moreover, the expected outcomes of the project fit well into the UN Development Assistance Framework (UNDAF) for Vietnam, “Output 1.4.1: Policies, regulations and fiscal tools for green economic development, natural resources management and cleaner production are formulated and applied” – for which UNIDO is listed as an implementing UN Agency.⁵

To ensure the success of project implementation, the UNIDO team will involve various stakeholders and co-financing partners during the implementation of the project through consultation meetings, technical workshops, and contractual agreements. In addition, the UNIDO Team consisting of the UNIDO Representative in Vietnam and the Energy and Climate Change Branch of UNIDO will oversee project implementation. Furthermore, UNIDO will seek to coordinate in the field and at UNIDO Headquarters with the various branches of UNIDO such as the Environmental Management Branch, specifically the Stockholm Convention Unit, and the Business, Investment and Technology Services Branch.

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

Background:

Macroeconomic picture and energy efficiency in the industrial sector

Vietnam’s economy had demonstrated steady growth since the 1990s with an average annual GDP growth of 7% between 1998 and 2008; amongst the highest in the world in the last two decades. While economic growth experienced a slight slow-down from 2008 until 2013 as a result of the world economic crisis, average annual GDP growth was still at 5.6%, higher than many other countries in the world in the same period. While maintaining a relatively high growth rate, the Vietnamese economy did suffer from a sharp drop in demand, particularly for products from the manufacturing sector, and a significant increase in food and fuel prices in the first half of 2008. While the economy recovered relatively quickly, the global financial crisis has had a lasting impact on Vietnamese manufacturers.⁶

Despite the brief economic downturn, Vietnam’s total energy consumption has also been growing at a higher than average rate of 10% per year from 2000 to 2010 (from 26.3 mtoe reaching to 48.8 mtoe) before slightly reducing to 47.9 mtoe in year 2011 and 47.9 mtoe in 2012. Industrial and residential sectors are the two main consumers, accounting for 39% and 33% of total energy consumption, respectively. National energy consumption has been increasing quickly to meet the energy demand of the growing manufacturing industry, increasing 25% per year from 2000 to 2010 (from 5.2 mtoe to 18.115 mtoe) and 1.87% between 2011 and 2012 (according to the Vietnam Energy Statistics 2012 prepared by VNEEP in 2013). This energy consumption by industry can be considered a key factor in national energy consumption growth since 2001.

Policies geared towards energy efficiency

With Vietnamese industry’s high growth rate in the last decade and its contribution to GDP, energy efficiency has become a priority issue for the government. Accordingly, the Government has put strong efforts toward the development of the legal and institutional framework on EEC. Promoting the energy efficiency of industrial boilers is one important goal of the VNEEP Phase II, as well as the government’s policies. One of the main targets of the VNEEP Phase II is to achieve 5-8% energy savings by 2015, covering the introduction of regulations and guidelines to industry for the improvement of boiler efficiency along with technical capacity building activities for energy managers and industries.

⁵See “One Plan 2012 to 2016”: <http://www.undg.org/docs/12703/Vietnam%20oneplan%202012-2016.pdf>

⁶<http://siteresources.worldbank.org/INTVIETNAM/Resources/VDR.pdf>

Vietnam started initial efforts to promote EEC in 1995 covering activities such as energy audit training and awareness raising with support from international donors. However, it became a major concern of the Government when the forecasted energy balance data showed that beyond 2015, Vietnam is expected to transform from a net energy exporting economy to a net importer. In response to this, a series of important policies and initiative programs on EEC promotion have been initiated by the Government in the last 10 years:

- Decree No. 102/2003/ND-CP on Energy Conservation and Energy Efficiency dated September 3, 2003;
- Decision No. 79/2006/QD-TTg issued by the Prime Minister on 14 April 2006– Approval of the Vietnam National Energy Efficiency and Conservation Program (VNEEP) Period 2006-2015;
- Law on EEC approved by the National Assembly on 17 June 2010 with effect from January 2011 and a long list of other regulation documents, decrees and circulars issued as guidelines for the EEC Law implementation formulated from 2010 – 2014.

Policies related to boilers

The existing inspection policies related to boilers are generally for safety reasons only, and do not focus on emissions or efficiency. These policies require that large boilers are inspected during installation, while small boilers are inspected only after installation; after this the boilers are inspected every two years, and then once a year when they are more than 12 years old.

Within the boiler sector, the MOIT has no specific labeling policy, but is currently exploring the idea of implementing an energy efficiency certification program. Standards for energy efficiency in boilers only apply to large boilers and these are generally poorly enforced. The MOIT is examining the possibility of giving awards for the most efficient boilers, but has confirmed that at this time no specific policies for boilers are envisaged. In addition to the gaps in policy for standards and labeling, there is also a need for an inventory of existing boilers, as well as for a focused policy on boiler efficiency. The Ministry of Labor, Invalids and Affairs (MOLISA) is currently involved in this effort but is focusing primarily on safety issues rather than energy efficiency properties.

There is a national standard, TCVN No. 8630:2010 on “Boiler – Energy Efficiency and Test Method Standard” applicable to *existing boilers operating in industry*. This standard provides regulations on (i) the minimum boiler energy efficiency for solid-fuel fired boilers and liquid fuel fired boiler with and without the flue gas heat recovery equipment (see Table 1 below); and (ii) the method for testing boiler energy efficiency.

Table 1: Minimum Energy Efficiency Standards for Existing Boilers

ID	Boiler Type	Solid Fuel	Liquid and Gas Fuel
1	Boiler without the flue gas heat recovery equipment	70%	75%
2	Boiler with the flue gas heat recovery equipment	75%	80%

This national standard is not yet effective in practice since there is still a lack of technical regulations on this standard’s application issued by MOIT. The reason for this is that the adoption of standards is on a voluntary basis in accordance with the Vietnamese Law on Standards and Technical Regulation.

Furthermore, according to the EEC Law, these are mandatory requirements for **designated enterprises only** (designated enterprises denote enterprises with consumption of energy higher than 1,000 tonnes of oil equivalent (TOE) annually). For small and medium scale enterprises (SMEs), these regulations are considered guidelines and while SMEs are encouraged to implement them, there are no enforced regulations on minimum efficiency ratings that are applicable to existing operating boilers. In fact, project preparation activities found that many industrial enterprises were not aware of these requirements.

The existing national standards and regulations applicable to boiler manufacturing companies and boiler operation⁷ at the size of those produced in Vietnam (small to medium) mostly deal with the safety and environmental aspects of boiler manufacturing and operation. For these sizes of boilers, there are no technical regulations on minimum energy performance standards applicable and no national standards that require any specific GHG emission limitations for industrial boilers.

Despite the existence of regulations on EEC implementation at the policy level and a national standard related to minimum boiler efficiency, there is still a lack of technical regulations/guidelines provided to industry for their compliance, as well as the lack of an institutional network able to monitor and enforce compliance with these requirements. In order to deal with this issue and improve enforcement, the Government has set up a state inspection network that includes certified inspection centres nation-wide under MOIT, MOLISA, etc. However, to date, the inspections have been focused on checking boiler manufacturing and operation in terms of safety only (such as technical design of boilers, weld safety of boiler before shipping, boiler safety after installation, etc.), while environmental aspects of boiler operation have been inspected by the Environmental Control Agency under the Ministry of Natural Resources and Environment (MONRE). No inspection or certification of boilers' energy efficiency has been done by inspection institutions and there are no official testing and certifying agencies on small and medium boiler energy performance in Vietnam. Moreover, the capacity of boiler efficiency testing of inspection institutions is very limited.

Trends related to industrial boilers

According to ASEAN energy forecasts, energy demand in the industrial sector will double over the next 15 years as a result of Vietnam's economic growth⁸. It can, therefore, be assumed that about 3,000 new boilers will be requested, in addition to the 3,000 existing boilers with a capacity range from around 1 tph to more than 300 tph, by the industrial sector in Vietnam by 2030; this increase in the number of boilers in operation, will naturally lead to an increased amount of energy consumed. Currently, locally produced inefficient coal- and oil-fired boilers are heavily represented in the market and their continued growth would lead to significant increases in GHG emissions.

Based on a survey of around 20% of operating boiler manufacturers in Vietnam⁹, boiler production in Vietnam is handled almost exclusively by small companies; these are domestic market-oriented enterprises that produce only small boilers from their own design which are generally copied from existing models, and rely heavily on imports from Korea, Japan or China for manufacturing materials. Enterprises are generally equipped with basic machinery and shop layout, and manufacturing takes place in old warehouses with few fixtures, poor worker safety measures, and no fire control systems. As a result of these basic facilities, it is often hard to implement improved manufacturing standards and the limited quality control that does take place is often insufficient.

⁷For example:

- National Standard - TCVN No. 7704:2007 on Boiler – Technical Requirement of Design, Construction, Manufacture, Installation, Operation, Maintenance. This standard provides requirements/regulations on boiler design, manufacturing, having boilers operators trained and certified, feed-water quality, inspection before shipping boilers to end users and after boiler's installation in end-use sites;
- National technical regulation – QCVN 01-2008/BLDTBXH on Safe Work of Steam Boiler and Pressure Vessel issued by MOLISA. This regulation provides all requirements on safe work on design, manufacturing, importation/exportation, trading, installation, repair and maintenance of steam boilers and pressure vessels.
- National standard – TCVN No. 8630:2010 on “Boiler – Energy Efficiency and Test Method Standard” applicable to existing boilers operating in industry. This standard provides regulations on; (i) the minimum boiler energy efficiency for solid-fuel fired boiler and liquid fuel fired boiler with and without the flue gas heat recovery equipment; and (ii) the method for testing the boiler energy efficiency.
- National standard - TCVN No. 6008-1995: Pressure Equipment – Weld Technical Requirements and Testing Method.
- National standard - TCVN No. 6413-1998 on Fixing Fire-tube Boilers – Weld Design.

⁸South East Asia Energy Outlook, 2013

http://www.iea.org/publications/freepublications/publication/SoutheastAsiaEnergyOutlook_WEO2013SpecialReport.pdf

⁹Survey was conducted by national experts in the PPG phase of the proposed project

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Discussions with stakeholders have shown that manufacturers tend to deal directly with boiler buyers, with purchasing decisions based solely on the price rather than other factors. As a result, boilers are, for the most part, sold only with the basic infrastructure (without the water treatment system and economizer or air heater) and instruments in order to reduce the cost. The necessary additional equipment, such as instruments and water treatment systems or economizers, is only introduced later as a surplus option for the buyer.

In terms of developing a market for EE boilers in Vietnam, generally the Southern Vietnam markets are the most open and adaptive due to the business culture where boiler manufacturers are more active in applying new technologies for their products.

According to calculations based on the surveys and studies conducted by the Thermal Association and the Inspection and Testing Centers (ISTCs) under MOIT in 2008, 2011 and 2012, industrial boilers (excluding boilers for power generation) consumed around 6.4 million tonnes of coal and 663 ktonnes of fuel oil in 2012, corresponding to emissions of 16.7 million tonnes of CO₂. Based on these figures, it can be forecast that industrial boilers will consume around 11.3 million tonnes of coal and 1,159 ktonnes of fuel oil by year 2018 (the project implementation period), corresponding to emissions of 29.3 million tonnes of CO₂.

Table 2 below shows the expected development of types of boilers by 2030 according to expert analysis conducted during the project preparation period.

Table 2 – Vietnam Boiler Market

Label	Value	Notes
Number of currently operating boilers:	3,000 units	Including 42 power boilers
Estimated number of operating boiler over 15 years:	6,000 units	Broad estimate based on ASEAN energy outlooks 2011 figures
Share by capacity of currently operating boilers:		
1-10 t/h	65%	Estimate 2014
10-20 t/h	30%	Estimate 2014
Share by fuel of currently operated boilers:		
Coal-fired	65-67%	
Oil fired	30-32%	
Biomass fired	1-5%	
Share by fuel of boilers estimated for 2030:		
Coal fired	50%	3,000 boilers
Oil fired	20%	1,200 boilers
Biomass fired	30%	1,800 boilers

Related to the specific fuel-types, the following is relevant for boiler operation and manufacturing in Vietnam:

- Coal-fired (anthracite) boilers are particularly popular in Vietnam due to the low cost of fuel. Many coal-fired boilers have low efficiency and the level of unburned carbon in the ash is very high;
- Oil-fired boilers are mainly used in high value production industries, as spare boilers to operate when there is a problem with the coal fired boiler, or in enterprises with limited space for coal storage;

- There are a small but increasing number of biomass fired boilers using sawdust, rice husk, milled rice husk, rice husk briquette, etc.;
- There are a very small number of boilers using electricity to produce steam with low capacity; this is mainly for the purpose of massage, in hospitals, or sometimes for ironing in small textile-garment companies;
- Very few boilers use natural gas or LPG as a fuel.

Estimates of fuel consumption trends predict the following for Vietnam¹⁰:

- Demand for solid fuels will double by 2030;
- Biomass consumption will increase due to its low cost and increasing cost of fossil fuels;
- It is likely that the increasing demand will be limited by the following factors:
 - Seasonality of fuel;
 - Logistics (transportation costs limit the distance from the site of rice mill sites to about 30 km);
 - Market price: uncertainty on price of fuel, not yet regulated by the market.

Boiler efficiencies can be expected to increase over the time period as well – given targets by MOIT (see Table 3). However, it should be noted that the ability of manufacturers is limited, and as such, the design for what they would label a “high efficiency” boiler is poor.

Table 3: Range of efficiencies of existing boiler population (according to studies conducted by MOIT and MOST)

Type of boiler	Current efficiency	Improvement potential
Oil boilers	60-80%	+ 5 -10%
Coal boilers	55-75%	+10-15%
Biomass boilers	N.A.	assumed for new boilers: 80-85%

The current boiler market is split 50/50 between Vietnamese manufacturers and foreign producers (China, EU, USA, and India). There are about 40 boiler manufacturers located mostly in big cities and industrial areas, such as Hanoi, Ho Chi Minh City (HCMC) and Da Nang. They are focused on small sizes: mostly from 1 to 5 tonnes/hour (t/h) and from 5 to 10 t/h. Large boilers (>20 t/h) are imported, while small boilers are generally manufactured in the country. The number of boiler manufacturers in Vietnam has decreased significantly since 2011, as the long-term impact of the global financial crisis in the form of continued low demand for the manufacturing sector takes its toll on boiler producers. Based on studies and surveys conducted in the PPG phase of this project, the number of boiler manufacturers has decreased from around 70 in 2011 to 40 in 2014.

Most local manufacturers are quite small; the average boiler production is between 10 and 20 boilers/year, per manufacturer. Production, however, has been increasing over recent years with average annual revenues between US\$ 500,000 and 2,000,000. Boilers are generally produced as per demand and as such, the EE boiler market is determined by the fact that demand for more efficient boilers is mostly for large boilers (greater than 10-20 t/h boilers). The average number of workers in a boiler manufacturing enterprise is 10-50.

According to manufacturers, the potential for efficiency improvements ranges from 2 to 6%, depending on the type of fuel (which will affect size and type of boiler). This range sets improvement potential higher than in developed countries, which can be explained through the lower quality of boilers as there is more room for improvement.

Assuming a steady turnover of the existing boiler population of about 10% per year (300 boilers/year), resulting from replacement of old and inefficient boilers, and a steady growth of new boiler demand (about 200 boilers/year from 2015 to 2030), a demand of (roughly) 500 boilers/year can be assumed as realistic over the next 15 years. This figure is based on broad assumptions, such as: assuming an estimated production rate of 500 new boilers per year and taking into

¹⁰South East Asia Energy Outlook, 2013
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account that the biggest manufacturer, VBC Hanoi, is producing about 250 boilers/year, the rest can be equally shared among the 40 existing manufacturers in Vietnam; thus, an average manufacturer will be asked to produce an average of 10-15 boilers/year. As export potential is currently low, it can be conservatively assumed that the foreign market will not provide for any additional boiler demand.

Additional characteristics of local manufacturers that are relevant include the following:

- **Manufacturers’ financial capability is poor:** Most boiler manufacturers have limited or no funds to invest in research and new technologies and at the same time there is limited to no support from the government for machinery renovation and research on new technologies;
- **Boiler manufacturers serve solely the domestic market:** The few manufacturers that do export overseas, do so only to neighboring countries and are generally not very organized. In contrast, other Asian competitors tend to be stronger and better organized and have become competitors in the Vietnamese market in the production of certain ranges of boilers.
- **Workshops for boiler production are quite basic:** There is limited machinery that is manually operated, quality control is not implemented or if it is, only at a basic level and workers safety is generally not implemented.
- **Efficiency enhancing equipment, such as economizers and air heaters, are provided based on customer demand and are often outsourced:** Boiler buyers, especially smaller ones, tend to make purchase decisions based solely on price, and as a result of this limited demand, boiler manufacturers do not promote EE boilers in the market.
- **Boilers are produced from manufacturers’ own designs:** These designs are generally at a basic level, and visits to factories during the PPG phase showed that design and focused software capabilities are generally poor.
- **Efficiency of produced boilers is claimed to be high but is not measured by vendors or customers:** This is indicative of the generally low concern for the manufacturing of more efficient boilers.

Baseline Emissions Scenario:

In the baseline scenario, the EE boiler market – especially amongst smaller boilers – would be slow to materialize as end-users are likely to go for existing, not so efficient, boilers. Considering that some energy management measures related to boiler operation will be undertaken in the designated enterprises as expected outcomes of the implementation of VNEEP Phase II and the EEC Law, the estimated baseline emissions levels, which include the impacts of these policies, is outlined in Table 4. These emission levels assume:

- A 10% annual growth in end-user productive energy use;
- Efficiency improvements of 10% for each EE boiler;
- Market penetration of 1.5% of additional EE boilers each year up to 18%.

Table 4: Baseline emission levels from coal and fuel oil consumption in industrial boilers until 10 years after project completion (assuming government programmes are successful)

	Baseline with VNEEP Impacts		
Year	Coal consumption (tonnes)	Fuel oil consumption (tonnes)	CO ₂ emissions (tonnes)
2014	7,767,274	727,714	19,960,398
2015	8,531,128	762,949	21,807,096
2016	9,370,079	799,887	23,829,719

2017	10,291,510	838,612	26,045,286
2018	11,303,525	879,210	28,472,475
2019	12,415,029	921,771	31,131,784
2020	13,635,798	966,390	34,045,711
2021	14,976,571	1,013,167	37,238,951
2022	16,449,141	1,062,205	40,738,606
2023	18,066,458	1,113,614	44,574,427
2024	19,873,104	1,169,295	48,853,691
2025	21,860,415	1,227,760	53,551,973
2026	24,046,456	1,289,148	58,710,728
2027	26,451,102	1,353,605	64,375,538
Total	215,037,590	14,125,327	533,336,383

In general, this estimate can be considered optimistic given the barriers facing EE boilers, especially amongst SMEs. Without the proposed project activities, the proportion of industrial enterprises adopting EE boilers and best operating practices will not increase significantly from 2015 to 2024. Vietnamese industry is thus more likely to continue with existing practices, meaning limited success in the establishment of a suitable environment for the widespread adoption of EE boilers and best operating practices by industry.

Furthermore, without GEF support to cover the incremental costs associated with the project, the manufacturing of EE boilers would most likely not occur as these costs are unlikely to be absorbed by manufacturers or financial institutions/banks.

Barriers to Energy Efficiency in the Industrial Boiler Sector

There are several barriers to the widespread adoption of EE boilers and best operating practices by industries listed below:

Policy barriers: There are limited policies and regulations for supporting EE boiler adoption and manufacturing in industry and no technical regulations on efficiency standards adoption on smaller boilers to promote EE boilers in the market. The national standard, “Boilers-Energy Efficiency and Test Method,” touches on the minimum boiler energy efficiency applicable to the existing industrial boilers, as well as providing guidance on how to test boiler energy efficiency. While this is a step in the right direction, technical regulations including mandatory requirements and enforcement capability at the local level are still lacking and as a result, industrial boilers continue to operate at a low efficiency (ranging from 55-75% for coal-fired boilers and 60-80% for oil-fired boilers).

Awareness barriers: A general lack of information on the energy savings obtained from EE boiler adoption and operating practices persists in Vietnam; end-users (industrial enterprises) are not aware of the financial and environmental benefits of EE industrial boiler adoption and operating practices and most enterprise managers are more focused on safety and stability of industrial boiler operation. There are also no technical guidelines on how to select EE boilers provided to industry and no energy efficiency rating programme (such as a labeling program) for boiler manufacturing companies and imported boilers.

In addition, industrial end-users generally lack awareness on finding information on EE boilers or where they could purchase them. This links with the demand-side barriers below that together, serve to hinder the introduction of EE boilers into the Vietnamese market.

Institutional barriers: One of the main reasons for the lack of awareness and poor policy implementation is the lack of government agencies and programmes supporting promotion and recognition of EE boilers. There are also no government agencies responsible for testing and certifying industrial boiler's energy efficiency, thus institutional coherency in this field is seriously lacking. As a result, enforcement of those policies that do exist is limited, undermining their validity and effectiveness.

Supply-side barriers: The capacity of boiler manufacturers to produce and support EE boilers is generally poor. The following characteristics of boiler manufacturing in Vietnam persist as barriers to the development of a market for EE boilers:

- There is a limited availability of technical capacity for research and development (R&D) on the improvement of energy efficiency of locally manufactured boilers;
- Boiler designs are typically the manufacturer's own design (manual copying design, no software) which is often poor;
- Technical workers are insufficiently skilled for constructing high efficiency boilers;
- Advanced technologies and materials are not present in the market, and even if available, are not readily adopted due to awareness and market barriers;
- Most manufacturers have poor investment capital capabilities;
- Poor quality control and management systems, and a lack of high-level machinery persist. As a result, the equipment required to improve boiler efficiency is generally not available; only pressure meters and an instrument to control and monitor water levels are available, while the necessary equipment for boilers is sold separately;
- Once a boiler is sold, technical support from the vendor is limited, thus deterring boiler improvement after the purchase has been made.

In addition to the technical barriers faced by boiler manufacturers, they also lack the understanding of EE boiler benefits needed to develop proper marketing strategies for the introduction of these boilers to the market. As a result, even if the technical barriers are overcome, suppliers still face problems properly communicating the benefits of their improved products to the market.

Demand-side barriers: A significant barrier to the adoption of EE boilers is the limited number of experts able to evaluate boiler efficiency for energy conservation centres, consulting companies and energy service companies (ESCOs). Without such technical knowledge, increased adoption of EE boilers will be limited as end-users cannot seek advice from a third-party as to their purchasing decisions. This lack of expertise also extends to factory/industrial enterprise workers that do not have the capacity to operate industrial boilers in an efficient manner.

In addition, due to the limited awareness mentioned above, end-users generally cannot differentiate between efficient and inefficient boilers and the related energy savings, and thus are not willing to pay a higher price for a more efficient boiler.

Financial barriers: While the Government of Vietnam has drafted a circular that indicates their willingness to provide some financial assistance to EE improvement projects in industrial enterprises, there remains a lack of government incentive policies to promote funding for EE project implementation. There is also a lack of guidelines on how industrial enterprises can access these incentives for their EE boiler adoption, as well as to manufacture EE boilers. In addition, there are no incentives given to R&D activities to improve boiler energy efficiency. Subsequently, the majority of boiler manufacturers and end-users are unaware of the schemes available for such investment, thus seriously limiting the development of an EE boiler market.

Baseline Initiatives

Since 2003, many initiatives/programmes to promote EEC, listed below, have been launched by the Government with support from many international donors. However, most of these initiatives have focused on the implementation of energy efficiency in general, such as grants provided for conducting energy audits, establishment of energy management models, adoption of EE labeling for consumer goods, etc.

Vietnam National Energy Efficiency Program (VNEEP)

To promote EEC in all economic sectors and households of Vietnam, the Government launched VNEEP Phase I aiming to reduce the total energy consumption by 3-5% during the period 2006-2010. VNEEP Phase 1 mainly focused on development of a new regulatory and institutional framework, as well as human resources for dealing, on a long term basis, with the nationwide issue of EE improvements. The major output of Phase 1 was the EEC Law promulgated in 2010 by the National Assembly along with a list of other regulatory documents, decrees and circulars issued as guidelines for the EEC Law implementation.

The EEC Law aims to act as the establishing legislation for a new wave of energy efficiency measures in Vietnam. The Law sets forth provisions on EEC usage; policies and measures to promote EEC; and rights and obligations of organizations, households and individuals in EEC. Regarding EEC in industry, the most important requirements are provided in:

- Article No.10 sets forth provisions on EEC measures and technologies to be applied in industrial enterprises;
- Article No.32 includes provisions that mandate designated production enterprises.

The successful implementation of VNEEP Phase I has resulted in cumulative energy savings of 4,900 ktoe, equaling 3.4% of total energy consumption, mainly from large enterprises in industrial sectors such as cement, steel, coal and mine exploration and electricity savings, as reported by MOIT.

VNEEP Phase II for the period 2011-2015 was launched on October 2, 2012 and is now under implementation. The Ministry of Industry and Trade (MOIT) as an executing agency closely coordinates with the Ministry of Science and Technology (MOST), the Ministry of Construction (MOC), the Ministry of Transportation (MOT) and other relevant agencies to implement the Program. The main targets of VNEEP Phase II are:

- (i) The percentage of energy savings over the total projected demand of energy consumption will be 5-8% by 2015;
- (ii) To set up the EEC Law implementation network from central to provincial levels, as well as the energy manager's network in designated facilities in accordance with the EEC Law requirements;
- (iii) To promote nationwide adoption of EE means and equipment/machinery and the gradual abolishment of low energy efficiency means and equipment through primarily supporting minimum EE equipment standards development and the roll-out of the energy efficiency labeling system for common energy-intensive appliances, office facilities, electricity transformers & motors, and vehicles;
- (iv) To enforce the compliance of EE building codes and regulations;
- (v) To promote the use of a public transportation system, as well as renewable technologies in transportation;
- (vi) 2,500 energy managers in designated facilities in accordance with the EEC Law requirements and 200 energy auditors will be certified through one comprehensive training program.

Regarding EE improvements in industrial boilers, MOIT is planning to review/improve standards related to the energy use of industrial boilers, to develop technical regulations and guidelines for the application of these standards, technical assistance to providers for the promotion of high energy efficient products and the elimination of inefficient ones. The proposed project is closely in line with the objectives of these policies and provides ample opportunity for cooperation and coordination.

The above two important pieces of legislation will form the baseline for the project's activities; supporting the project through the establishment of relevant and required legislation and providing opportunities for the inclusion of boiler

specific policies in the future. Through their contribution to the project, MOIT will be able to utilize the existing VNEEP budget to bring VNEEP in line with the objectives of the project, and take action to potentially include the policies and regulations relevant to boilers, to be identified in this project, into VNEEP Phase III.

In addition to the national initiatives for the promotion of industrial energy efficiency in Vietnam, there a number of projects implemented by international agencies, in cooperation with national executing partners, currently underway. The World Bank project, “**The Vietnam Energy Efficiency and Cleaner Production Financing Program (CPEE)**” aims at promoting greater energy efficiency, renewable energy and cleaner production methods and awareness in Vietnam. The project works with selected banks to build their sustainable energy portfolios and tailored financing products, and specifically targets enterprises looking to upgrade inefficient production systems and introduce new and clean technologies that will help them reduce their costs and raise their productivity and environmental performance through increased energy efficiencies. The proposed project will aim to utilize the capacity built and awareness raised in the banks; potentially working with banks interested to increase their sustainable energy portfolios and matching them with enterprises ready to implement boiler improvements projects under Component 3.

Also focusing on the promotion of energy efficiency in Vietnam, the Asian Development Bank (ADB)’s project, “**Supporting Implementation of the National Energy Efficiency Program**” aims to establish EE best practices in Vietnam’s industrial sector. This is to be achieved through training programs, surveys of energy consumption, and energy audits. Also implemented by the ADB, the project, “**Support for the National Target Program (NTP) on Climate Change with a Focus on Energy and Transport,**” takes a broader approach by working with ministries, provinces and cities to develop and/or institutionalize action plans for effective implementation of the NTP. While these projects help to build a baseline of improved awareness of the benefits associated with energy efficiency improvements, they fail to hone in on the specific requirements for boiler improvements in the Vietnamese market, thus leaving a gap for the proposed project to fill.

The Australian funded project, “**Vietnam Energy Efficiency Standards and Labeling Program,**” supports a partnership between the Australian Department of Climate Change and Energy Efficiency (DCCEE) and Vietnam’s MOIT, to assist Vietnam to develop and implement lighting and appliance energy efficiency standards, registration, labeling, testing, compliance and monitoring mechanisms. The Program assists the MOIT in building a robust regulatory system and will help consumers to make informed purchase decisions. The proposed project will take advantage of the already built capacity on the development of energy efficiency standards within MOIT, building on this baseline with more boiler-specific trainings and demonstrations. The fact that MOIT is already well versed on the importance of energy efficiency will reduce the amount of basic training required, allowing the project to focus more specifically on issues related to boiler improvements.

While a number of energy efficiency projects are ongoing in Vietnam, none focus exclusively on industrial boilers like the proposed project. Thus, the project will utilize the capacity built and awareness raised by the ongoing initiatives on general energy efficiency measures, while actively seeking to fill the gap in the market for energy efficient boilers. For this, GEF support is required to remove the barriers specific to the implementation of EE boilers.

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:

In order to fill the gaps in the market as discussed above, the proposed project is designed with three substantive components that address the above-discussed barriers to promoting EE boiler manufacturing, as well as its adoption by end-users. It is expected that these interventions will create an enabling environment for promoting the widespread adoption of EE boilers and best operating practices in the industrial sub-sectors of Vietnam. Until now, a targeted

approach at the development of a Vietnamese market for energy efficient boilers has not been implemented, and as a result potential savings have been missed. The proposed project's approach will facilitate the development of both end-use and supply sides of the EE industrial boiler market in Vietnam. This will be achieved through policy and regulations on a boiler standardization system that can enforce the usage of EE boilers and capacity building of local boiler manufacturers, boiler operators, end-users, energy consultants, energy service providers, ESCOs and boiler providers. This project will transform the boiler industry in Vietnam from the baseline scenario to a more efficient and improved market.

The three substantive project components are:

Component 1: Policy and regulatory framework to support the boiler standardization system

Outcome 1.1: Operationalized regulations and guidelines on an industrial boiler standardization system

Component 1 of the project will focus on enhancing the policy and regulatory framework to institutionalize boiler standardization, certification programs, and funding schemes into the existing policy framework. It aims to address the barriers related to the policy and institutional arrangement, and lay the ground-work for addressing information and awareness barriers and market/financial barriers.

Output 1.1.1 Developed regulations on energy performance standards for locally manufactured and imported boilers, efficiency standards for operation certificates of existing boilers and guidelines on adoption and enforcement of standards

In order to develop a policy framework capable of supporting a boiler standardization system, the project will focus on working with the relevant stakeholders to facilitate the development of effective and sustainable standards/technical regulations. This will include support for the Directorate for Standards, Metrology and Quality (STAMEQ) through workshops and trainings for the improvement of minimum energy performance standards (MEPS) for locally manufactured and imported boilers, as well as training for MOIT on the development of the required regulations/guidelines for the application of MEPS by manufacturers and vendors. Once capacity has been built, the project will support MOIT with technical expertise to develop regulations to enforce mandatory testing of boiler efficiency, as well as create and implement a pilot boiler efficiency certification program.

Output 1.1.2 Improved industrial boiler standardization system

For the improvement of industrial boiler standardization in Vietnam, this output is aimed at supporting the government and respective ministries to revise the National Standard – TCVN on Boilers – Technical Requirement of Design, Construction, Manufacture, Installation, Operation, and Maintenance. Specifically, sections relating to the adoption of best available techniques (BAT; i.e. economizers, air heaters, excess air control), boiler feedwater quality, fuel quality, chemical use, and operator certificates will be targeted for improvement through the project activities. The technical assistance under Output 1.1.1 will feed into this output, with the additional skill sets utilized to develop a sustainable boiler standardization system that can be widely adopted throughout Vietnam.

Furthermore, this output will support the relevant government ministries to enforce existing emission standards and to set up technical regulations on industrial boiler emissions. Currently, the existing emission standards are not effectively enforced, thus leading to missed opportunities in emission reductions by Vietnamese industry.

Output 1.1.3 Provided technical assistance to MOIT in the establishment of a boiler operation certification and inventory program

Currently, the Energy Efficiency Labeling Programme¹¹ is limited to only a small number of industrial equipment, such as electrical transformers and motors, and focuses more on electrical appliances, office equipment and vehicles. However, while energy-intensive equipment is being used in many industrial enterprises, it is still not included under

¹¹ Decision No 51/TTg
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the Labeling Program. This output will assist MOIT and MOLISA in developing the boiler certification programme (including best operating practices) which could in turn be used for a labeling programme. At the same time, this output will carry out and support MOLISA in the development of inventories of industrial enterprises in order to prepare a boiler data base. Some data is already available through boiler inspecting agencies and MOLISA has already started the preparation of a boiler data base for safety purposes that could be augmented to include information on energy efficiency and emissions. This database should include at least the following information: owner name and address, company activity, capacity, age, manufacturer, fuel, type, and operating pressure and temperature.

The support provided to the government by the project will take the form of training workshops and technical assistance to build awareness and capacity in the relevant ministries to improve their ability to effectively establish and implement the certification program and incentive schemes for boiler improvement projects.

Output 1.1.4 Guidelines on implementation of funds, loans and tax schemes to support industrial boiler efficiency improvements

This output will consist of providing assistance, in the form of training, to the MOIT in the development of guidelines on how to implement financial incentives schemes such as grants, loans and tax benefits available for supporting projects for EE boiler adoption and manufacturing. These guidelines can be used by any agency seeking to promote/support investment in EE boilers and/or develop programmes which offer favorable financial terms for industries implementing industrial boiler efficiency improvements.

Component 1: Sustainability Strategy

In order to ensure the sustainability of the activities undertaken under Component 1, the project will work closely with the project partners to not only develop improved regulations and standardization systems, but also ensure their adoption by the government and relevant counterparts. This will be achieved through close collaboration with and support provided to MOIT to ensure that the required policies are not only developed, but also adopted into the policy framework. In addition, the guidelines on the roll-out of financial incentive schemes to be developed under Output 1.1.4 will support the sustainability of demonstration projects to be implemented under Component 3 by ensuring an ongoing flow of available financing beyond the project implementation period.

Component 2: Awareness, training and capacity building for government agencies, boiler owners, operators, and manufacturers, and other stakeholders

Outcome 2.1: Increased awareness and information availability on energy efficient industrial boilers for end-users (industrial enterprises), energy consultants, energy service providers, ESCOs and industrial boiler providers

Outcome 2.2: Improved technical capacity of government agencies, industrial boiler owners, operators, and manufacturers, service providers, and financial/banking institutions

This component aims to address the barriers related to low levels of technical capacity and knowledge of the financial and environmental benefits of adopting EE boilers and best operating practices amongst end-users, energy consultants, energy service providers, ESCOs, policy makers and vendors. This involves the establishment of a long-term platform for the exchange of information and experience sharing on EE boiler technology and service providers.

Furthermore, the component comprises a set of activities that aim to remove the technical barriers to the adoption and production of EE industrial boilers. The component will involve the provision of training to end-users, energy consultants, energy service providers, ESCOs and boiler vendors on a life cycle assessment approach, training on best operating practices for boiler operators, and enhancement of local capacity in the manufacturing of EE boilers, including consultancy services for EE boiler project development, engineering design, installation, operation and maintenance. The training programme will use the train-the-trainers approach, to be delivered by a UNIDO team of international experts, and subsequently national experts, through both classroom as well as on-site practical learning. By

training, leading, and establishing national level technical organizations, such as the Energy and Conservation Centers (ECCs), as the “trainers,” the project will ensure the institutionalization and replicability of the training process. This approach has been implemented successfully in a number of GEF-UNIDO IEE projects, and has proven successful in developing a cadre of national experts. The project will also encourage end-user awareness campaigns on the advantages of efficiency improvements by replacing/retrofitting old boilers. The awareness raising and capacity building programmes will target 3 geographic regions; Hanoi, Ho Chi Minh City and Da Nang.

Output 2.1.1 Provided support to the Vietnamese Government to develop a national communication strategy on boiler efficiency improvement goals for industries

In order to raise awareness and understanding of the opportunities associated with improved efficiency from industrial boilers, this output will support and provide training to MOIT on the development and subsequent implementation of a national communication strategy on boiler efficiency improvement goals and EE boiler adoption for industry. To ensure that this strategy has a sustainable impact on industry, the main activity will be an action plan to be operationalized with the support of the project, ideally through the activities indicated under Outputs 2.1.2 and 2.2.1 of the project. This will not only help to raise awareness, but will also give government decision-makers a roadmap upon which to base the regulations/guidelines developed until Component 1.

Output 2.1.2 Completed awareness raising and information exchange workshops on energy efficient industrial boilers and best operating practices for end-users, energy consultants, energy service companies and boiler providers/manufacturers

In order to disseminate the financial and environmental benefits of EE boilers and best operating practices, the project will organize awareness campaigns and information-exchange workshops for at least 250 factory managers and at least 50 energy consultants, energy service providers, ESCOs, policy makers and vendors. These awareness workshops will disseminate the benefits of using EE boilers, provide opportunities for knowledge sharing and networking, as well as highlighting the opportunities offered by the project to potential participants. In addition, these events can be utilized by manufacturers to raise awareness of the EE boilers available in Vietnam. A wider audience will be sought through promotion of the main benefits on the websites of the National Energy Efficient and Conservation Office (EECO) under MOIT and the ECCs of Ho Chi Minh City, Hanoi, Da Nang, etc., as well as newspapers and TV channels. Through these promotional activities, the project will aim to increase the number of energy efficiency improvement projects, encourage participation in the project’s demonstration activities and develop sustainable communication networks between the relevant stakeholders.

The workshop material will include – amongst other things – comparisons between in-efficient boilers and efficient boilers (payback calculations based on fuel types and price, maintenance costs, availability and reliability indexes), as well the environmental advantages of efficient boilers.

Output 2.2.1 Provided trainings on life cycle assessment, boiler efficiency evaluation techniques, and best boiler operating and manufacturing practices accordingly for end-users, energy consultants, energy service companies/providers, and boiler providers, operators and manufacturers in industry

This output will involve in-depth training for various stakeholders to allow for better boiler energy efficiency assessments, operation and manufacturing of EE boilers.

On the demand-side, particularly end-users, there is currently a lack of skilled workers able to operate industrial boilers efficiently, as well as to monitor boiler energy efficiency in industrial enterprises. Currently, training for boiler operation workers is mainly focused on safety procedures for operating pressurized equipment, but omits issues such as proper operation and optimized combustion of the boiler.

Most of the technologies to improve boiler efficiency (listed in Annex H) are ready and easy to implement, but still require training to understand their impact on the life-cycle and how to take full advantage of EE possibilities. Additionally, it is necessary to provide training on boiler efficiency evaluation techniques for technical staff of

industrial enterprises, as well as energy consultants in order to facilitate/promote that monitoring and evaluation of industrial boiler efficiency takes place. This output will provide detailed trainings on such issues to at least 150 energy managers and 50 energy consultants and manufacturers, to be provided by national and international consultants, as required, as well as support to end-users to measure the actual efficiency of their boilers. On the supply-side, manufacturing of high performance (for efficiency improvement) equipment requires more skill and technology than manufacturing standard efficiency improvement equipment. Support to manufacturers for improving manufacturing standards and energy efficiency will involve:

- Provision of training on efficient combustion systems, efficiency improvement equipment (economizers, air heaters, excess air control, etc.) for boiler manufacturers;
- Provision of training on the introduction of new boiler manufacturing machinery and high efficient boiler model design for boiler manufacturers;
- Provision of technical expertise to at least 6 selected local boiler manufacturers to improve their manufacturing standard, quality control system and in manufacturing of new EE boilers and improving the combustion process of biomass-fired boiler's operation.

This output will aim to provide training to at least 300 boiler operators on best operating practices, 15 boiler manufacturers through the expert capacity building program, and 10 staff from inspection centers/organizations on boiler efficiency evaluation techniques.

Output 2.2.2 Provided technical assistance to industrial boiler providers on the development of business and marketing plans for energy efficient industrial boilers

In order to support industrial boiler providers in the development of business and marketing plans, the project will provide technical assistance for improved loan applications and marketing activities to at least 15 local boiler manufacturers, with 6 receiving hands-on assistance in the development process. This will involve assisting participants in the development and implementation of business and marketing plans for improvement projects, namely improving market assessments, business plan development, and customer policies (quality and price assessment, flexibility to demand, customer delivery requirements, customer satisfaction, etc.). The 15 case studies listed in Annex J are indicative of the information that would be collected and prepared for inclusion in loan applications, as measurable business cases with favorable investment potential and payback period. This approach will ensure that boiler providers have the capacity to implement further projects beyond the project implementation period, and secure the required funding from financial institutions.

Output 2.2.3 Conducted training courses for financial/banking institutions on the appraisal of energy efficient boiler investment projects

This output will be directly linked to the financing mechanisms in Component 3 - involving the development of training materials and carrying out workshops/courses for financial and banking institutions on the appraisal of EE boiler investment projects. The aim is to enhance awareness of at least 20 representatives from the financial/banking sector on the costs and benefits of EE boiler adoption and manufacturing, as well as improve its capacity in appraising loan applications for EE boiler investment projects. This will include:

- The technical and financial aspects of energy use related to boilers;
- How a financial institution can assist industry in implementing EE boilers as part of their product offer;
- Examples of successful financing that has occurred;
- Information on government programmes which can assist banks in carrying out technical analysis and providing financing on favorable terms.

Component 2: Sustainability Strategy

The capacity building approach taken by the project, namely building the technical skill-sets of a cadre of national experts through a train-the-trainers approach, will serve to ensure that the Vietnamese boiler market enjoys sustained change beyond the 4 year project period. As the development of capacity will help to remove the current institutional,

market, and awareness barriers preventing the widespread adoption of EE boilers, the experts, operators, and manufacturers trained under this project will enjoy first-mover status as the market develops.

In order to ensure that this approach is continued beyond the project implementation period, the project will work closely with the ECCs in Hanoi, HCMC, and Da Nang, building their capacity so that they can take over the training programme after project closure. This strategy will ensure country ownership from the outset, and ensure replication and sustainability of the project outputs.

Component 3: Financing and implementation of energy efficient boiler adoption projects and manufacturing

Outcome 3.1: Increased access to financial sources and incentives for investment projects on energy efficient boiler adoption and manufacturing

This component will address the lack of access to financing for EE boiler investment projects through the utilization of existing financial sources from the VEPF, MOIT, the National Foundation for Science and Technology Development (NAFOSTED), and other local commercial banks. The component will also involve demonstration of EE boiler adoption and best operating practices including identification, energy auditing, feasibility studies, financial arrangement, installation & operation, documentation & dissemination, monitoring & verification and replication.

Output 3.1.1 Mobilized existing financial schemes and available financial sources for promotion, demonstration and replication projects on energy efficient industrial boiler adoption and manufacturing

In order to effectively mobilize financial schemes and financing sources, this output will firstly conduct a review of viable financial sources for EE boiler adoption and manufacturing projects. Based on these findings, the project would facilitate the development of a financial scheme through linkages between the Loan Guarantee Funds and available financial sources, i.e. VEPF, NAFOSTED, Vietinbank. The financial scheme will be utilized for demonstration and replication projects on EE boiler adoption and manufacturing.

Financial schemes currently available in the Vietnamese market are mostly commercial loans with some financial resources also available through the VNEEP. In light of this, the financial schemes to be targeted under this Output will primarily be financial schemes based on the commercial terms and conditions of the various financing institutions. In addition, the project will also assess enterprises to support their applications for funding under the VNEEP initiatives.

Outcome 3.2: Increased adoption of energy efficient boilers by industry due to high credibility and evaluation of energy efficient boilers and best operating practices

As a result of demonstration projects, and improved access to financing and information, it is expected that an increased number of industries will undertake efficiency improvement projects for their industrial boilers. This, in turn, will result in the adoption of best operating practices, reduced GHG emissions and improved productivity.

Output 3.2.1 Implemented 10 demonstration projects on best operating practices and 5 demonstration projects on replacement of old boilers with new energy efficient boilers

Having identified 10 demonstration sites for best operating practices and 5 for replacement boilers (see Annex I for selection criteria), the project will conduct detailed energy audits focusing on baseline assessments, identification of improvement measures and financial analysis. Based on the findings, action plans (project design, financial arrangement, technical assistance required, etc.) for demonstration projects will be developed by national experts and industrial enterprises, and projects will be implemented; a number of potential improvement approaches have already been identified in the project preparation phase (see Annex H). The implementation projects undertaken through this output will be a collaborative effort between enterprises, boiler manufacturers, national experts and financing institutions and will involve ongoing monitoring and verification to ensure best practices and lessons learned are extracted. Furthermore, these investment projects will provide an opportunity to utilize the experts having taken part in the capacity building activities under Component 2 to either be a part of the implementation or at least review the

successful results. The lessons learned from this output will then be developed into case studies that can be disseminated to interested industrial enterprises, as well as through the communication channels established under Output 2.1.2.

Output 3.2.2 Developed a database system and dissemination of results on implemented boiler projects

In order to establish a system for continued and systematic monitoring of project results, a database for demonstration projects will be created and updated on a regular basis. This will be achieved through surveys and follow-up with demonstration sites to collect the relevant data and input it into the established system. The dissemination of results will be conducted through this database to various stakeholders, including participants of trainings and awareness workshops conducted under Components 1 and 2.

Output 3.2.3 Provided technical assistance and assisted in arranging financing for implementation to 100 end-users on best operating practices and up to 30 bankable projects on new energy efficiency boiler investments

On the industry side, the project will assist in matching financial schemes with boiler manufacturers on the development of new manufacturing processes for more efficient boilers. Additionally, the project will support 30 bankable projects for boiler replacements, as well as provide ongoing support to the national experts, energy service providers, and boiler manufacturers implementing the projects. This approach will also aim to encourage replication projects beyond the selected 30 projects based on the positive outcomes and improvements.

Alongside boiler replacements, up to 100 industries will be provided with assistance to identify and implement best operating practices. The financing for these measures will come either from internal sources or from financial actors such as the banks involved with the project.

Component 3: Sustainability Strategy

As the industrial sector is expected to grow at a rapid rate in the coming years, the continued adoption of energy efficient boilers and improvement projects offers significant potential for replication within the Vietnamese market. The project will aim to ensure this replication and sustainability by showcasing the demonstration projects in a structured manner; detailed case studies capturing the benefits will be prepared and highlighted to industries from the concerned sectors. These efforts will further contribute to an attitudinal change and a market shift towards energy efficiency.

Monitoring and Evaluation

Project implementation will be monitored and evaluated on an ongoing basis for improved replication of boiler project implementation during and after the project period. The monitoring methodology will be conducted on a periodic basis in line with the GEF, UNIDO and government requirements. A detailed description of the activities under this component is provided in Part II, Section C: Describe the Budgeted M&E Plan.

Global Environment Benefits

The project interventions will lead to energy savings, resulting in consequent GHG emission reductions; the global benefits in terms of avoided CO₂ emissions are estimated as follows:

- A. *Direct GHG reductions* – Emission reductions achieved by demonstration projects that are planned and implemented as part of the project as well as energy efficiency investments leveraged as a result of the project during the project's supervised implementation period.
- B. *Indirect GHG Emission Savings* – Emission reductions achieved after project completion (year 5 onwards) as a result of the enabling environment for EE practices and investments created by the GEF project and projects implemented by the boiler manufacturers after receiving technical assistance from the projects.

In total, the project is expected to result in direct annual energy savings of 1,955,304 gigajoules (GJ); with lifetime of investments being 10 years, this means a total 10-year reduction of 19,553,045 GJ.

In terms of GHG reductions, the project is expected to provide 183,736 tonnes CO₂eq per year as direct GHG reductions by the end of the project in 2018. With lifetime of investments being 10 years, this means a total 10-year reduction of 1,837,355 tonnes CO₂eq resulting from the project.

Detailed calculations of GHG emissions reductions can be found in Annex E.

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	Risk rating	Mitigation measures
<p>Policy and institutional risk: Change in national priorities leading to delays and reductions in the effectiveness of delivery of the project outputs.</p>	Low	<p>To mitigate this risk, the proposed project will be implemented in strong partnership with MOIT and create strong linkages between component activities and the VNEEP Phase II. This will be institutionalized through the Project Steering Committee (PSC) to ensure continued cooperation. It will also encourage dialogue between the manufacturers and end-users of boilers and the Government on an ongoing basis through established communication channels.</p>
<p>Technical risk: Risks associated with upgrading and improving efficiency of locally manufactured boilers.</p>	Low	<p>To avoid this risk, UNIDO will initially employ the services of highly skilled experts (national and international depending on requirements) with specific expertise in energy efficiency improvement of boiler operations and EE boiler designs and proven training skills from other countries. As the project progresses, the participants trained under the project can offer their acquired expertise to participating enterprises and vendors, to mitigate this risk in a sustainable manner.</p>
<p>Financial risk: Delay in financing of boiler investment projects due to lack of interest from enterprises</p>	Medium	<p>The following efforts will be made to mitigate this risk: (1) close coordination and early consultations with relevant stakeholders will be sought and maintained throughout the project to avoid information gaps and delays; (2) inclusion of financial capacity in the criteria for selecting demonstration sites to ensure that hosting companies/ investors are financially capable. The activities undertaken under Components 2 and 3 will also aim to mitigate this risk, building the awareness and capacity of investing institutions and project implementing enterprises and supporting enterprises to access financial schemes, both commercial and government.</p>
<p>Operational risk: Delay in endorsement and enforcement of new regulations, guidelines and standards on industrial boiler operation, boiler performance and manufacturing.</p>	Low	<p>Ongoing cooperation with the relevant ministries under Component 1 and through the PSC will seek to mitigate this risk. This cooperation will primarily involve working with the concerned government authority to agree on a special arrangement for the GEF project and expedite the regulations and formulation of standards, as well as building awareness of the benefit associated with the new/ improved guidelines and regulations.</p>

<p>Economic Fluctuations and Related Market risks: Industrial enterprises may not be willing to pay additional price increment on the locally manufactured EE boilers.</p>	<p>Low</p>	<p>Through the awareness raising activities and trainings on life cycle assessments for end-users, vendors and energy consultants, as well as the provision of technical assistance to local boiler manufacturers in developing a business and marketing plan on EE boiler promotion, the project will aim to cause a permanent shift in purchase decisions in the Vietnamese boiler market.</p>
<p>Climate Change risk:</p>	<p>None</p>	<p>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.</p>

A.7. Coordination with other relevant GEF financed initiatives

The project development team at MOIT and UNIDO have consulted with and involved the implementers of the relevant ongoing energy efficiency projects/programs in the country during project preparation in order to explore synergies and avoid overlaps. The relevant GEF-financed initiatives include:

The UNIDO/GEF project “**Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards in Vietnam**” (2011-2015) aims to assist industries to adopt a systems approach in improving energy efficiency at the system levels and new ISO 50001 energy management standards. Through adoption of energy management standards, energy management practices will be integrated into the management cycle and realize energy efficiency improvements on a continuous basis. The project has primarily focused on capacity building of stakeholders that include industrial enterprises, equipment suppliers, distributors, engineering/energy service companies and government planners. The targeted sectors are: food, textiles, rubber and pulp & paper and the project has trained 27 national experts in energy management and delivered capacity building to industries for the introduction of ISO 50001. Compliance with this new ISO Standard (published in June 2011) will provide the requisite incentive for continuous attention to improved end-use efficiency.

The proposed project will coordinate closely with this project in areas of overlapping focus i.e. steam system optimization. As a number of national experts have been trained in steam systems optimization under the UNIDO/GEF project, the proposed boiler project can utilize this capacity for training activities, networking, identification of demonstration sites, etc. This approach will help mitigate any risk of overlap while also being cost-effective by using existing trained resources.

The World Bank/GEF “**Clean Production and Energy Efficiency Project**” (2011-2016) is intended to strengthen the capacity of key stakeholders in the Vietnamese economy for the effective delivery of the national energy efficiency programme in key industrial sectors (such as chemical, beverage plastics and paper & pulp). The project comprises of three components: (i) Develop energy efficiency action plans for selected industrial sectors such as the formulation of energy efficiency strategies and action plans for energy intensive and high growth industrial sectors and the establishment and implementation of voluntary agreements with pilot enterprises in such sectors; (ii) Promote the development of energy service providers in order to establish a mechanism for the delivery of increased energy savings in the energy efficiency market; and (iii) Conduct the capacity building for management, monitoring and evaluation.

Where possible, the proposed project will approach relevant enterprises that have put energy efficiency action plans in place under the World Bank/GEF project to take part in the demonstration and implementation outputs of the proposed project. As the World Bank/GEF project is coming to an end in 2016, the proposed project could help to support ongoing implementation by enterprises under the boiler project, where relevant.

The UNDP/GEF Project, “**Barriers Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling (BRESL)**” (2010-2014) is aimed at removing barriers that have persistently hindered the widespread development and application of energy efficiency standards and labeling programmes in Vietnam. The project has provided technical assistance to MOIT in the establishment of the legal basis for energy efficiency standards and labels and assisting with the development of regulations for the targeted products. The BRESL project has built institutional and individual capacity to secure on-the-ground implementation of energy efficiency standards and labels and has provided information and technical assistance to local product manufacturers to help them develop EE products and realize profit opportunities from EE products. The UNDP/GEF project has been working closely with the MOIT on the policy development side of energy efficiency in Vietnam, and has built a solid base and momentum within the Ministry that the proposed project can utilize. As the UNDP/GEF project is coming to an end in 2014, the proposed project will incorporate the lessons learned of this project to avoid any overlap in policy development.

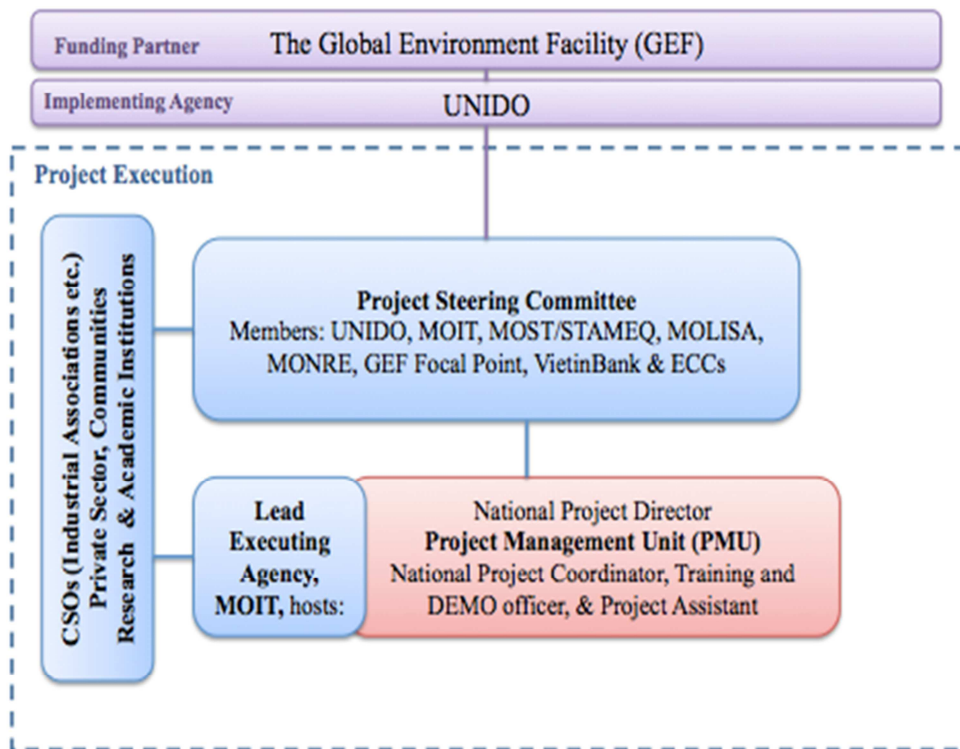
The GEF-UNIDO Regional project, “**Demonstration of BAT and BEP in fossil fuel-fired utilities and industrial boilers in response to the Stockholm Convention on POPs**” aims to promote best operating and environmental practices in boiler use at the regional level. This project, while also focusing on industrial boilers, does not cover Vietnam or the small and medium sized boilers targeted by this project proposal but will still provide ample opportunity for cooperation.

The proposed project will build upon these projects to further improve the overall efficiency of energy use at industrial enterprises. The Project Management Unit (PMU) will have regular contact with the implementers of the four projects outlined above to ensure coordination.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

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

The below diagram shows the proposed project institutional arrangement:



The primary Executing Partner of the project is the Ministry of Industry and Trade (MOIT) that will coordinate direct project inputs from other participating agencies and organizations, as well as ensuring that duplication of activities of other EE projects underway in Vietnam (both national and donor-funded) is avoided.

UNIDO is the implementing agency for the project and the MOIT will send its representative to the project as the National Project Director (NPD) to guide the PMU in the execution of the project.

Project Steering Committee (PSC)

The PSC will consist of high-level representatives from MOIT, MOST/STAMEQ, MOLISA, MONRE, the GEF Focal Point, VietinBank, ECCs and UNIDO; it will be chaired by the MOIT. The primary roles of the PSC are: (i) to provide overall guidance to the execution of the project; and (ii) to ensure good coordination among participating agencies and other organizations. The PSC will meet every year to monitor execution progress and confirm the work plan for the subsequent year; the minutes of meetings will be signed by UNIDO and MOIT.

The Committee will be responsible for the staffing, planning and execution of all key project activities in-country and will ensure satisfactory performance of national experts during their training and subsequent active participation in the project. The specific rights and responsibilities of the PSC will be outlined in the PSC Terms of Reference to be developed in the inception phase of the project in accordance with *GEF Project and Programmatic Approach Cycles, GEF/C.39/Inf. 3*.

MOIT, as the Lead Executing Partner of the project, will be contracted by UNIDO, using the GEF grant, to execute certain project activities such as awareness raising, capacity building, and the development of guidelines.

Project Management Unit (PMU) Office

UNIDO and MOIT will establish a PMU responsible for the overall operational management and execution of the project activities. The PMU will manage day-to-day operations of the project, report to the UNIDO Project Manager and will be based at the MOIT premises. The PMU will comprise of three core members: the National Project Coordinator, the Training and DEMO Officer, and Project Assistant. The PMU will be guided by the NPD nominated by MOIT, Government of Vietnam and the Technical Expert. The PMU will report to/brief the NPD about the project from time to time, as needed/required. Three team members will be recruited by UNIDO and the MOIT as per the UNIDO rules and regulations. In addition, a number of national experts, subcontractors and international experts will support the PMU as and when needed to undertake the project activities, and where required, additional contracts will also be established with national entities.

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

A detailed list of the stakeholders and their likely engagement in the project is provided below:

Stakeholder	Role
Government Stakeholders	
Ministry of Industry and Trade (MOIT)	<p>General Role:</p> <p>MOIT is an agency of the Government, performing the function of state management of industry and commerce. With regard to energy efficiency, MOIT is responsible for defining government policies, as well as proposing legislative frameworks for EE implementation and promotion. Presently, MOIT is also</p>

Stakeholder	Role
	<p>responsible for coordinating and managing the implementation of the VNEEP, as well as some donor funded EE projects.</p> <p>Role in the Project:</p> <p>MOIT will be accountable for the Government of Vietnam in cooperation with UNIDO for ensuring: (i) the successful execution of the Project; (ii) mobilization of all resources including needed co-financing for project implementation; and (iii) the proper coordination among all related ministries, agencies, provinces and stakeholders involved in project execution. MOIT is the national execution partner and will chair the PSC Meeting for providing guidance to the PMU on project execution and correct its course, if required. It will also oversee the work done by the PMU housed within the premises of the MOIT on a regular basis.</p> <p>MOIT will be responsible for; (i) development of guidelines on accessing financial incentives for EE boiler adoption in cooperation with the Ministry of Finance (MOF); (ii) in cooperation with the STAMEQ – MOST, to develop and issue the regulations on energy performance standards for locally manufactured and imported boilers, and the regulation on energy standards for operation certificates of existing boilers; (iii) developing & providing guidance/procedures on boiler energy efficiency testing, rating and certification; and (iv) accrediting the boiler energy efficiency evaluation agencies.</p>
<p>Directorate for Standards, Metrology and Quality (STAMEQ) under the Ministry of Science and Technology (MOST)</p>	<p>General Role:</p> <p>STAMEQ is an agency under the MOST, performing the function of state management over standardization, metrology, as well as product and goods quality according to law provisions.</p> <p>Role in the Project:</p> <p>STAMEQ will be an associated execution partner participating in developing national standards on minimum energy performance for locally manufactured boilers and imported ones.</p>
<p>Ministry of Labour - Invalids and Social Affairs (MOLISA)</p>	<p>General Role:</p> <p>MOLISA is a Government Ministry performing state management functions in the following areas: employment, vocational training, wage and salary, social insurances, occupational safety, etc. The state management exercised by the Ministry covers a nationwide scope, including state management over public services applied to sectors and areas within the Ministry responsible fields.</p> <p>Role in the Project:</p> <p>MOLISA will coordinate with MOIT to establish a standardized boiler database. In addition, the project will work closely with MOLISA on gender issues, including providing policy advice on gender mainstreaming of policies to be developed/improved under Component 1 of the proposed project.</p>
<p>Ministry of Natural Resources</p>	<p>General Role:</p>

Stakeholder	Role
and Environment (MONRE)	<p>The Ministry of Natural Resources and Environment is an agency of the Government, performing state management functions in the areas of: land; water resources; mineral resources, geology; environment; meteorology, hydrology; geodesy and cartography; integrated and unified management of the sea and islands; state management of public services in the areas under its management.</p> <p>Role in the Project:</p> <p>MONRE will be responsible for reviewing emission standards and developing technical regulations related to industrial boiler flue gas.</p>
<p>Local Government Agencies:</p> <p>Department of Industry and Trade (DoIT) and Department of Labor, Invalids and Social Affairs (DOLISA)</p>	<p>General Role:</p> <p>Monitoring and checking compliance with regulations and standards on boiler operation and boiler manufacturing by users and manufacturers in provincial areas.</p> <p>Role in the Project:</p> <p>These local government agencies will participate in the project at the provincial level for effective project execution. The human resources of these local agencies are identified as important target groups participating in capacity building on boiler efficiency certifying, and safety and quality control/inspection.</p>
<p>Energy Conservation Centers (ECCs) in Hanoi, Ho Chi Minh City, and Da Nang</p>	<p>General Role:</p> <p>Providing energy efficiency services such as energy audits, energy efficiency consultancy, training and technology transfer to industrial enterprises.</p> <p>Role in the Project:</p> <p>These technical centers will participate in the project as co-financing institutions through in-kind contributions (their networks, staff, etc.) at the provincial level for effective project implementation. Once capacity and knowledge has been built within the ECCs, they will begin to take the lead in the training programme in preparation hand-over upon completion of the GEF-funded project to ensure sustainability of the projects objectives. This approach will ensure national ownership, as well as develop a long-term capacity building network at the provincial level.</p>
Associations	
<p>Associations</p> <p>Thermal Association</p> <p>Vietnam Energy Conservation Association</p>	<p>These NGOs will play an active role in disseminating information and raising awareness of different stakeholders on EE boiler benefits by using their existing networks.</p>
<p>National Foundation for Science and Technology Development (NAFOSTED) under MOST</p>	<p>NAFOSTED is a state financial institution responsible for supporting research and development activities in Vietnam. One of its missions is to promote research efforts in enterprises, with a focus on core technologies development contributing to national economic growth and competitiveness.</p>

Stakeholder	Role
	Presently, NAFOSTED is managing a loan guarantee with the capital scale of USD 1.7 million. NAFOSTED will be involved in project execution, providing loan guarantees for industrial enterprises and boiler manufacturers to access credit from financial institutions for EE boiler investments.
Private Sector Entities	
Boiler Manufacturers: <ul style="list-style-type: none"> • Vietnam Boiler Company • Polytechnical Pressure Equipment Joint Stock Company • Southern Vietnam Boiler Company (SVBC) • Asian Polytechnic Company Limited • Boiler Manufacturing Workshop of Hanoi University of Technology • Hoang Dao Energy Joint Stock Company • Da Nang Polytechnical Thermal Engineering and Refrigeration Limited Company 	These companies are manufacturing and supplying boilers and providing consultancy for new boiler installation project investment. As a result, they have been identified as the main target groups participating in training on boiler efficiency improvement and new EE boiler model designs.
Viet Nam Trade and Industrial Bank (Vietinbank)	Vietinbank is one of the largest commercial banks in Vietnam with a nationwide operating network spreading to the district level. Vietinbank will participate in the project as a co-financing institution that will provide commercial loans for investments in EE boiler adoption and manufacturing
Viet Nam Environment Protection Fund (VEPF) managed by MONRE	<p>VEPF is a state financial institution responsible for financial support for programs, projects, natural conservation and bio-diversity operations, prevention and control pollution of national inter-disciplinary and inter-region pollutions, depression and settlement of local environmental problems but having sphere of large influence. In the past, many EE&EC investment projects have been supported by the VEPF.</p> <p>VEPF will be involved in the project implementation and will potentially provide soft-loans for EE boiler adoption and EE boiler manufacturing projects.</p>
Other Stakeholders	
Gender Dimensions; MOLISA and associations such as NCFAW	<p>Both gender groups will actively participate in the implementation and execution of the project activities. This will be in the form of service providers, consultants, industry employees, boiler manufacturers and civil society representatives. As these groups were already actively involved in the project development phase of the project, collaborative relations already exist.</p> <p>To ensure gender mainstreaming of the project activities, especially the policy, regulation, and standard support under Component 1, the project will seek the advice of the National Committee for the Advancement of Women (NCFAW), an interdisciplinary organization that assists the Prime Minister in researching and</p>

Stakeholder	Role
	coordinating interdisciplinary issues relating to the advancement of women in Vietnam. As mentioned above, the project will also work with MOLISA on the policy aspects of gender mainstreaming.

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):

The project is expected to bring socioeconomic benefits related to improved competitiveness in industry through reduced energy consumption and a safer working environment in boiler manufacturers. The implementation of demonstration projects and the associated training and capacity building offered to various stakeholders will improve their skills and ability to implement EE measures for a variety of industries. Thus, while it is difficult to estimate the actual number of jobs created through any energy efficiency project activities, it can be assumed that national experts and boiler operators will significantly develop their skill-sets, thus increasing their value addition to the market.

Implementation of energy efficiency projects is expected to bring about reductions in GHG emissions of the industries involved and can potentially decrease soot, carbon monoxide, and other noxious emissions which are bound to improve the working environment and reduce health related risks, especially for labor working in the areas where the boilers are located. These companies will also improve competitiveness while at the same time improving their productivity.

Due to the reality of the situation that the majority of the project’s beneficiaries will be men working in industrial boiler operation areas, gender aspects are not foreseen in all project components. In order to incorporate gender mainstreaming into the project where relevant and applicable, a gender analysis as part of the capacity assessments of the project will be conducted at the beginning of the project. Suitable gender related activities will be identified and subsequently incorporated into project interventions afterwards. A gender balance will be considered while selecting experts and consultants for training and capacity building activities. Similarly, participating industries with women entrepreneurs will also be selected on priority basis. Finally, efforts will also be made to include gender focal points from relevant ministries in the PSC meetings where possible. MOLISA will play a key role in these activities at the policy and ministerial levels.

To the extent possible, many expected results have already included gender-disaggregated indicators and targets. To establish these indicators, an analysis of gender distribution in the target sectors based on government documents was conducted, but was not fruitful with such data generally limited. In light of this, spot-checks were conducted during the PPG phase in order to determine gender representation in the target enterprises, and based on these, the gender disaggregated targets were established.

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.

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

As part of the project outputs, the implementation of the following is foreseen:

- 15 demonstration projects followed by scaling up to;
- 100 industries implementing best practice for boiler EE; and
- 30 industries replacing their boilers with either more efficient boilers or those based on biomass.

The annual direct project emission reductions from these projects are 183,736 tonnes CO₂/year and over a period of 10 years, the emission reduction is estimated at 1,837,355 tonnes CO₂. Additionally, indirect emissions reductions of between 6.1 and 8.8 million tonnes of CO₂ are expected as a result of the project.

Given a total GEF grant of 1,997,600 (including Agency Fees and the PPG), this results in a marginal cost per tonne of CO₂ for the GEF of USD 1.086. The reasons for this are:

- The measures to improve EE which involve best operating practices are relatively low cost and result in large savings of coal energy or fuel oil energy used – which are both high in emissions;
- The improvement of EE via new boilers, which either use the same fuel or involve switching to biomass, are also very cost-effective and produce large emissions reductions on a per unit basis.

Alternative options for promoting and supporting the market were considered but not chosen due to being less cost-effective and/or not necessarily addressing all of the barriers. These were as follows:

General approach	Notes on cost-effectiveness of the approach and why it was not chosen
Technical assistance facility linked to ESCOs.	This approach is interesting and is a part of the project's plans. The project will also work with the end-users (industry) and suppliers (boiler manufacturers).
Technical assistance facility linked only to end-users or only to suppliers.	This approach would not holistically address the barriers on the supply, demand, and regulatory sides of boiler manufacturing and usage in Vietnam.
Direct subsidies for interventions.	This approach is unlikely to be as sustainable as a combined supply and demand approach focused mainly on capacity building and technical expertise transfer. There may be some direct subsidies from the Government, but many of the interventions are financially justifiable without a subsidy.

Innovative aspects

The project promotes innovation in the industrial boiler sector of Vietnam. It works both on the supply side (boiler manufacturers) and demand side (industrial users of boiler technology) to improve efficiency through:

- The use of best practices involving innovative technological and management improvements to existing boilers to improve efficiency.
- The assistance in development of business plans for manufacturing and sale of more efficient boilers.
- The encouragement of replacing inefficient boilers with efficient boilers as well as fuel switching to sustainable sources (biomass) instead of fossil fuels (fuel oil and coal).

Sustainability

The sustainability of the project will be insured through a number of mechanisms as outlined in Section I.A.5 above:

Component 1 will ensure sustainability by developing improved regulations and standardized systems while also developing guidelines on the roll-out of financial incentive schemes. These activities will result in a more conducive regulatory and financial framework for EE in boilers beyond the project's lifetime.

Component 2 will ensure sustainability by building capacity – including technical skills and awareness – amongst national experts via a train-the-trainers approach. The project will work closely with ECCs in Hanoi, HCMC, and Da Nang to build their capacity so that they can take over the training programme after project closure.

Component 3 will ensure sustainability by showcasing demonstration projects and distributing detailed case studies that demonstrate the benefits of the interventions. By demonstrating the effectiveness of the interventions, this will help to lead to a market pull of demand for EE interventions.

Potential for scaling up

As noted in Section II.A.4 above, about 3,000 new boilers will be requested in addition to the 3,000 existing boilers with a capacity range from around 1 tph to more than 300 tph, by the industrial sector in Vietnam by 2030. The project will address EE measures in ~145 boilers. This will leave a significant amount of space within the market for scaling up. The scaling up will occur via setting up an appropriate regulatory framework, cooperation with financial institutions which will provide a market push for financing for EE investments, capacity building amongst industrial energy experts that can consult for other companies, and working with boiler manufacturers to improve their business plans for efficient boilers.

As a result of these project activities, it can be expected that (i) on the demand side, the commercial sector will increasingly seek more energy efficient boilers and implement better operating practices to improve efficiency of existing boilers and (ii) on the supply side, energy consultants, boiler manufacturers and banks, etc. will be better able to supply the commercial sector with appropriate advice, products, and finance to meet their needs for improved energy efficiency in boilers.

C. DESCRIBE THE BUDGETED M&E PLAN:

Monitoring and evaluation (M&E) will include reports summarizing the overall progress and that of individual investment pilot projects that receive financing. These reports will be available for official use for the project's indicative M&E plan.

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.

An M&E framework will be used to assess the project's impact on GHG emissions reduction in the industrial sector in Vietnam. To facilitate reporting of progress and impacts to the GEF Secretariat and UNIDO, there will be two main processes:

i) Internal tracking: the Project Management Team will collect market level data from official sources, private sector stakeholders, and partner government officials and agencies at regular intervals throughout the project's implementation period. This includes the monitoring of performance indicators in the Project Results Framework and the use of a GHG accounting methodology. This will culminate in the Terminal Report to be submitted to the PSC two weeks before the final meeting.

Participating stakeholders in the project such as the industries implementing EE boiler technology and best operating practices will be required to provide information on energy savings and other benefits achieved under the project as part of the agreements to be signed. The PMU will be responsible for the preparation of regular progress reports with the full support of, and in agreement with, the participating companies, municipalities and other beneficiaries.

ii) Final Evaluation - The GEF Monitoring and Evaluation Policy (2010, page 1) has two overarching objectives:

- Promote accountability for the achievement of GEF objectives through the assessment of results, effectiveness, processes, and performance of the partners involved in GEF activities. GEF results will be monitored and evaluated for their contribution to global environmental benefits; and

- Promote learning, feedback, and knowledge sharing on results and lessons learned between the GEF and its partners, as a basis for decision making on policies, strategies, program management, projects, and programs; and to improve performance.

The Final Evaluation will examine the project’s performance with respect to the planning and adaptive management requirements of both UNIDO and the GEF (*The GEF Monitoring and Evaluation Policy 2010*). UNIDO uses a Results Based Management approach, captured in the Project Results Framework (Annex A), which includes performance indicators, targets and timelines. In addition to the reporting on the internal tracking of performance indicators, review and evaluation will focus on the following principal dimensions which are in agreement with the general guidelines of the *GEF Monitoring and Evaluation Policy 2010*¹²:

- **Relevance** – the extent to which the activity is suited to local and national environmental priorities and policies and to global environmental benefits to which the GEF is dedicated; this analysis includes an assessment of changes in relevance over time.
- **Effectiveness** – the extent to which an objective has been achieved or how likely it is to be achieved.
- **Efficiency** – the extent to which results have been delivered with the least costly resources possible.
- **Results** – in GEF terms, results include direct project outputs, short- to medium-term outcomes, and progress toward longer-term impact including global environmental benefits, replication effects, and other local effects.
- **Sustainability** – the likely ability of an intervention to continue to deliver benefits for an extended period of time after completion; projects need to be environmentally as well as financially and socially sustainable.

The monitoring and evaluation will be financed with US\$40,000 budgeted from the GEF grant and US\$120,000 from co-financing. This will include US\$30,000 from the GEF grant for contracting external evaluation contractors who must adhere to the internationally recognized professional standards that are applied to GEF project reviews and evaluations, as set out in the GEF Evaluation Principles and Criteria and Minimum Requirements, (*the GEF Monitoring and Evaluation Policy 2010*, page 27). Other costs associated with data collection will be included in the staff costs for team members in the day-to-day execution of their tasks and not tracked separately.

A PMU will be established in MOIT for the project and will hold responsibility for continuous monitoring of project activities execution, performance and tracking of progress towards milestones. UNIDO will be responsible for overall implementation and tracking overall project milestones and progress towards the achievement of the set project outputs; the UNIDO project manager will be responsible for narrative reporting to the GEF. The following table presents the budgeted monitoring and evaluation plan of this project. The M&E Plan is detailed in the Annex F.

Indicative Monitoring and Evaluation plan

Type of M&E activity	Engaged Parties	GEF Grant (US\$)	Co-Financing (US\$)	Time frame
Project inception workshop	PMU, UNIDO, consultants		20,000	Within first two months of Project start up, with reports immediately following Inception Workshop
Measurement of Means of Verification for Project Progress and Performance	UNIDO, M&E experts	10,000	10,000	Start verification of projects annually and at the project end

¹²The GEF (2010) Monitoring and Evaluation Policy. p.27. Available from: http://www.thegef.org/gef/sites/thegef.org/files/documents/ME_Policy_2010.pdf. Accessed: January 2013.

Follow up with industries implementing EE boiler measures	UNIDO, boiler experts		20,000	Ongoing
Semi-Annual project progress reports	PMU		10,000	Every six months
Promotional Materials	PMU		10,000	As required
Project Terminal Report	UNIDO, PMU		10,000	At end of project implementation
Project Final Evaluation	External consultants	30,000	40,000	Within 6 months of completion of project implementation
TOTAL indicative cost		40,000	120,000	

D. LEGAL CONTEXT:

The Government of the Socialist Republic of Vietnam agrees to apply to the present project, mutatis mutandis, the provisions of the UNDP Standard Basic Assistance Agreement signed and put into effect on 21 March 1978.

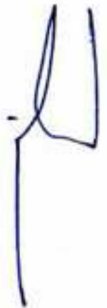

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

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)
Dr. Van Tai Nguyen	GEF Operational Focal Point, Director General	MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT	02/25/2013

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
Philippe R. Scholtès, Managing Director, Programme Development and Technical Cooperation Division (PTC), UNIDO GEF Focal Point		09/01/2014	Sanjaya Shrestha, Industrial Development Officer, Energy and Climate Change Branch, UNIDO 	(43-1) 26026-3730	S.Shrestha@unido.org

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
<p>Project Objective: To reduce energy consumption and reduce greenhouse gas emissions through promoting the widespread adoption of energy efficiency boilers and best operation practices in industry</p>	<ul style="list-style-type: none"> Annual direct energy savings, GJ and GHG reductions 		<p>Direct energy savings: 1,955,304 GJ per year; Direct GHG reductions: 183,736 tonnes of CO₂eq per year.</p>	<ul style="list-style-type: none"> Project final report Survey reports of energy consumption & reductions for each implemented project 	<p>Continuous support of government bodies; Willingness of industrial enterprises and boiler manufacturers to transform the industry to EE boiler technologies.</p>
Component 1: Policy and regulatory framework to support the boiler standardization					
<p>Outcome 1.1: Operationalized regulations and guidelines on an industrial boiler standardization system.</p>	<p>Number of standards on industrial boiler standardization endorsed by stakeholders;</p>	0	1	Official documents	<p>National authorities are willing to adopt specific regulations; Interest by stakeholders to adopt EE boilers exists and can be maintained.</p>
	<p>Number of regulations/guidelines on industrial boiler standardization endorsed by stakeholders.</p>	0	1	Official documents	
<p>Output 1.1.1 Developed regulations on energy performance standards for locally manufactured and imported boilers, efficiency standards for operation certificates of existing boilers and guidelines on adoption and enforcement of standards.</p>	<p>Number of standards improved for minimum energy performance of industrial boilers;</p>	0	1	Minimum energy performance standard document	<p>Active involvement of agencies such as MOIT, MOLISA, STAMEQ and MONRE and ECCs with support from UNIDO.</p>
	<p>Number of technical regulations/guidelines on minimum energy performance standard application developed.</p>	0	1	Regulation/guideline document	

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
Output 1.1.2 Improved industrial boiler standardization.	Number of Vietnam Standards (TCVN) on Boiler – Technical Requirement of Design, Construction, Manufacture, Installation, Operation& Maintenance revised.	0–Standard exists but still lacking requirement on boiler efficiency improvement techniques	1	Revised standard on boiler technical requirements for boiler efficiency improvement techniques	
Output 1.1.3 Provided technical assistance to MOIT in the establishment of a boiler operation certification and inventory program.	Number of boiler efficiency certificate programs developed;	0	1	Document on boiler operation certification program	
	Number of databases on industrial boilers covering energy information.	0–Database for safety purposes only is already under development	1	Industrial boiler database	
Output 1.1.4 Guidelines on implementation of funds, loans and tax schemes to support industrial boiler efficiency improvements.	Number of guidelines on financial incentive access and funding sources.	0	1	Document on signed guidelines	
Component 2: Awareness, training and capacity building for government agencies, boiler owners, operators, and manufacturers, and other stakeholders					
Outcome 2.1: Increased awareness and information availability on energy efficient industrial boilers for end-users	Number of participants that increased their awareness and information availability on EE industrial boilers;	0	150	Evaluation reports Website of organizations and companies	Availability and willingness of experts to receive training; Willingness of

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
(industrial enterprises), energy consultants, energy service providers, ESCOs and industrial boiler providers; Outcome 2.2: Improved technical capacity of government agencies, industrial boiler owners, operators, and manufacturers, service providers, and financial/banking institutions.	Number of national communication strategies on EE boiler improvement goals endorsed by stakeholder.	0	1	Project progress reports	companies and vendors to receive expert training.
2.1.1 Provided support to the Vietnamese Government to develop a national communication strategy on boiler efficiency improvement goals for industries.	Number of national communication strategies on EE boiler improvement goals and its implementation plan;	0	1	Document on approved communication strategy and its implementation plan	Continued government supports to promote EE&EC activities.
	Number of MOIT's and ECC's events related to dissemination of EE boiler improvement information.	0	8	Event reports	
2.1.2 Completed awareness raising, promotion and information exchange workshops on energy efficient industrial boilers and best operating practices for end-users, energy consultants, energy service companies and boiler providers/manufacturers.	Number of factory managers attending the awareness raising workshops on EE industrial boiler promotion;	0	250 (target of 5% women participants)	Workshop proceedings, including the list of participants	Willingness of end-users to adopt EE boilers and the best operating practices.
	Number of energy consultants and representatives from energy service companies and boiler providers/manufacturers and traders attending the awareness raising workshops;	0	50 (target of 5% women participants)	Workshop proceeding including the list of participants	
	Number of articles, news and	0	15	Hard copies of promotional	

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
	promotion publications posted in websites of EECO, ECCs and disseminated to industries;			materials, news and articles	
	Number of TV programs on EE boiler promotion.	0	4	CD of TV programs	
2.2.1 Provided trainings on life cycle assessment, boiler efficiency evaluation techniques, and best boiler operating and manufacturing practices accordingly for end-users, energy consultants, energy service companies/providers, and boiler providers, operators and manufacturers in industry.	Number of energy managers from industries attending the life cycle assessment and boiler efficiency evaluation techniques training courses;	0	150 (target of 5% women participants)	Training reports, including the list of participants	
	Number of energy consultants from energy service companies/providers and boiler manufacturers attending the life cycle assessment and boiler efficiency evaluation techniques;	0	50 (target of 5% women participants)	Training reports, including the list of participants	
	Number of boiler operators from industries attending trainings on best operating practices of boilers;	0	300	Training reports, including the list of participants	
	Number of local boiler manufacturers participating in the project capacity building program;	0	15	Training reports, including the list of participants	Willingness of local boiler manufacturers to improve their boiler quality and boiler efficiency
	Number of staff from inspection centers/organizations attending the boiler efficiency evaluation techniques trainings.	0	10	Training reports, including the list of participants	
2.2.2 Provided technical assistance to industrial boiler providers on the development of business and marketing plans	Number of local boiler manufacturers/providers sending their staff to attend the training on the development of business and	0	15	Training reports, including the list of participants	Willingness of local boiler manufacturers to improve their EE

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
for energy efficient industrial boilers.	marketing plans;				boiler market.
	Number of local boiler manufacturers/providers assisted in the development of business and marketing plans for EE boiler promotion.	0	6	Assessment reports	
2.2.3 Conducted training courses for financial/banking institutions on the appraisal of energy efficient boiler investment projects.	Number of training materials on EE boiler investment projects appraisal;	0	1	Document on training materials	
	Number of participants from financial/banking institutions attending the training on EE boiler investment project appraisal.	0	20	Training reports, including the list of participants	
Component 3: Financing and implementation of energy efficient industrial boiler adoption and manufacturing projects					
Outcome 3.1 Increased access to financial sources and incentives for investment projects on energy efficient boiler adoption and manufacturing; Outcome 3.2 Increased adoption of energy efficient boilers by industry due to high credibility and evaluation of energy efficient boilers and best operating practices.	Number of financial arrangement schemes supporting EE boiler adoption and manufacturing;	0	1	Document on financial arrangement schemes Evaluation reports	Availability and willingness of participants to attend workshops; Willingness of companies and vendors to receive training.
	Number of EE boiler implementation projects undertaken.	0	100 on best operating practices; 30 on new EE boilers.	Website of organizations and companies Project progress reports	
3.1.1 Mobilized existing financial schemes and available financial sources for promotion, demonstration and replication projects on energy efficient	Number of studies on viable financial sources for EE boiler adoption and manufacturing.	0	1	Study report on viable financial source	Sufficient financial sources available for EE boiler adoption and manufacturing;

Project Narrative	Indicator	Baseline	Target	Sources of Verification	Assumptions/Risks
industrial boiler adoption and manufacturing.					Boiler end-users aware of benefits of EE boiler adoption.
3.2.1 Implemented 10 demonstration projects on best operating practices and 5 demonstration projects on replacement of old boilers with new energy efficient boilers.	Number of bankable feasibility studies of selected demonstration sites;	0	5	Bankable feasibility study reports	Sufficient support of end users and boiler manufactures to ensure successful demonstration of EE and biomass boiler technology.
	Number of demonstration projects implemented for boiler replacement and monitored;	0	5 on replacement of old boilers with new ones; 10 on best operating practices.	Project implementation reports and verification reports	
	Number of successful case studies developed.	0	5	Documents on successful case studies	
3.2.2 Developed a database system and dissemination of results on implemented boiler projects.	Number of database systems developed and operated.	0	1	Software on database	
3.2.3 Provided technical assistance and assisted in arranging financing for implementation to 100 end-users on best operating practices and up to 30 bankable projects on new energy efficiency boiler investments.	Number of Best Operating Practices projects implemented;	0	100	Project reports Interviews with implementing companies	
	Number of boiler replacement projects implemented	0	30		

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).

No comments were received from the GEF Council Members or the STAP.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS¹³

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

PPG Grant Approved at PIF: \$53,292			
<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	10,000	10,000	0
Stakeholder Consultation and Commitment Confirmation	10,000	5,000	5,000
Detailed Project Design and Calculations of GHG Emission Savings	33,292	26,211	7,081
Total	53,292	41,211	12,081

The balance of US\$ 12,081 from the PPG phase will be used for the preparation activities of the implementation phase of the project.

¹³ 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: ENERGY SAVINGS AND GHG CALCULATIONS

The project interventions will lead to energy savings, resulting in consequent GHG emission reductions resulting from the setting up of financing mechanisms for energy efficiency. This is to be undertaken within Component 3 of the project “Financing and implementation of EE boiler adoption projects and manufacturing” with a total estimated investment over the project period of USD 7,400,000.

The global benefits in terms of avoided CO₂ emissions are estimated as follows:

Direct GHG reductions

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

In total, the project is expected to result in:

- Direct annual energy savings of 1,955,304 GJ in the last year of the project (2018).
- A total 10-year reduction of 19,553,045 GJ (assuming a 10-year lifetime of investments).
- Annual reductions of 183,736 tonnes CO₂eq per year as direct GHG reductions in the last year of the project (2018)
- A total 10-year reduction of 1,837,355 tonnes CO₂eq as direct GHG reductions.

The energy savings and GHG emissions calculations are based on energy savings estimates from an analysis of a number of boiler facilities within industries in Vietnam. These were investigated over the course of project preparation. The methodology utilized is the "Revised methodology for calculating GHG benefits of GEF energy efficiency projects (version 1.0)"¹⁴ – using the Financial Instrument Module.

These calculations are based on the following key parameters:

#	Parameter	Unit	Value	Source
A	Emission factor of anthracite	tCO ₂ /GJ	0.0983	GEF GHG Reduction worksheet
B	Emission factor of Fuel Oil/Diesel	tCO ₂ /GJ	0.0774	GEF GHG Reduction worksheet
C	Weighted average Reduction of anthracite consumption per USD 1,000 of investment	GJ per USD 1,000	171.88	Based on total potential investment and energy savings in coal-fired boilers (see calculations below)
D	Weighted reduction of Fuel Oil consumption per USD 1000 of investment	GJ per USD 1,000	60.86	Based on total potential investment and energy savings in oil-fired boilers (see calculations below)
E	% of investment in EE measures to reduce coal consumption	%	81.3%	Based on the total potential investment for the coal-fired boilers versus total potential investment
F	% of investment in EE measures to reduce fuel oil	%	18.7%	Based on the total potential investment for the oil-fired boilers versus total potential

¹⁴ www.stapgef.org/revised-methodology-for-calculating-greenhouse-gas-benefits-of-gef-energy-efficiency-projects-version-1-0/

				investment
G	Fraction of investments/ projects likely to occur in BAU	%	10%	This is the default level in the GEF methodology.
H	Lifetime of investments	Years	10	This is the appropriate timeframe for industrial EE investments.
I	Total investments for Component 3	USD	USD 7,412,000 million	All from cofinancing

STEP 1: DISAGGREGATING THE POTENTIAL ENERGY SAVINGS MEASURES ACCORDING TO TYPE OF ENERGY SAVED

In order to find the potential for energy efficiency savings, an analysis has been undertaken for various types of boilers according to their fuel source, their capacity (kg of steam/hour), and the nature of the intervention (i.e. best operating practices, replacement with more efficient boilers with the same fuel, and replacement with EE boilers). The potential interventions were disaggregated according to the type of energy to be saved.

Table 5: Potential for energy and GHG savings through EE measures and fuel switching in the boilers examined

Type of intervention	Type of fuel reduced	No. of participating boilers (#)	Average cost of investment per boiler	Total investment cost (USD)	Expected energy savings (GJ)	Total annual energy saving per 1,000 USD (GJ)	Total annual CO2 reduction per 1,000 USD (tonnes CO2)	% of investment	Weighted average energy savings per 1,000 USD	Weighted average CO2 reductions per 1,000 USD
Demonstration projects										
Improve the coal-fired boiler efficiency	Anthracite	9	24,090	216,810	50,171	231.41	22.7	2.9%	6.77	0.67
Replace inefficient coal-fired boiler with a new EE coal-fired boiler	Anthracite	1	95,238	95,238	27,835	292.27	28.7	1.3%	3.76	0.37
Replace coal-fired boiler with biomass-fired boiler	Anthracite	1	571,429	571,429	144,778	253.36	24.9	7.7%	19.54	1.92
Total for coal-fired boilers - Demo projects		11		883,476				12%	30.06	2.95
Improve the oil-fired boiler efficiency	Fuel Oil	1	7,143	7,143	2,175	304.52	23.6	0.1%	0.29	0.02
Replace inefficient fuel oil-fired boiler with a new EE fuel oil-fired boiler	Fuel Oil	1	142,857	142,857	5,587	39.11	3.0	1.9%	0.75	0.06
Replace oil-fired boiler with biomass-fired boiler	Fuel Oil	2	136,905	273,810	30,520	111.47	8.6	3.7%	4.12	0.32
Total for fuel oil-fired boilers - Demo projects		4		423,810				6%	5.17	0.40
Replication projects										
1.1 Improve the coal-fired boiler efficiency	Anthracite	70	41,810	2,926,667	705,136	240.9	23.7	39.5%	95.15	9.35
2.1 Replace inefficient coal-fired boiler with a new EE coal-fired boiler	Anthracite	15	126,381	1,895,714	78,326	41.3	4.1	25.6%	10.57	1.04

Type of intervention	Type of fuel reduced	No. of participating boilers (#)	Average cost of investment per boiler	Total investment cost (USD)	Expected energy savings (GJ)	Total annual energy saving per 1,000 USD (GJ)	Total annual CO2 reduction per 1,000 USD (tonnes CO2)	% of investment	Weighted average energy savings per 1,000 USD	Weighted average CO2 reductions per 1,000 USD
3.1. Replace coal-fired boiler with biomass-fired boiler	Anthracite	3	105,556	316,667	267,540	844.9	83.1	4.3%	36.10	3.55
Total for coal-fired boilers - Replication projects		88		5,139,048				69.3%	141.81	13.94
1.2 Improve the oil-fired boiler efficiency	Fuel Oil	30	12,238	367,143	126,730	345.2	26.7	5.0%	17.10	1.32
2.2 Replace inefficient fuel oil-fired boiler with a new EE fuel oil-fired boiler	Fuel Oil	6	47,222	283,333	15,544	54.9	4.2	3.8%	2.10	0.16
3.2 Replace fuel oil-fired boiler with biomass-fired boiler	Fuel Oil	6	52,381	314,286	270,460	860.6	66.6	4.2%	36.49	2.82
Total for fuel oil-fired boilers - Replication projects		42		964,762				13.0%	55.69	4.31
Total for coal-fired boilers		99		6,022,524				81.3%	171.88	16.90
Total for fuel oil-fired boilers		46		1,388,571				18.7%	60.86	4.71
Total		145	51,111.00	7,411,095				100.0%	233	22

STEP 2: FINDING THE WEIGHTED AVERAGE OF ENERGY CONSUMPTION PER FUEL TYPE PER USD 1,000

In order to utilize the GEF GHG reduction tool for a number of energy sources, it is necessary to come to a weighted average of the amount of each energy source saved per USD 1,000 total invested.

This was done as follows:

#	Parameter	Unit	Value	Source
A	Total potential investment for coal savings	USD	6,022,524	See Table 5 above.
B	Total potential investment for fuel oil savings	USD	1,388,571	See Table 5 above.
C	Total potential investment in the sample analyzed	USD	7,411,095	A + B
D	% of investment in EE measures to reduce coal usage	%	81.3%	A / C
E	% of investment in EE measures to reduce fuel oil	%	18.7%	B / C
F	Weighted average Reduction per USD 1,000 for coal	GJ per USD 1,000	171.88	Based on the sum of the weighted averages of 1.1, 2.1, and 3.1 in Table 5 above.
G	Weighted average Reduction per USD 1,000 for fuel oil	GJ per USD 1,000	60.86	Based on the sum of the weighted averages of 1.2, 2.2, and 3.2 in Table 5 above.

STEP 3: UTILIZING THE GEFS REVISED METHODOLOGY FOR CALCULATING GHG BENEFITS OF GEF ENERGY EFFICIENCY PROJECTS TO CALCULATE ENERGY AND GHG REDUCTIONS

The key parameters, as described above, along with a schedule for investments, were input into the GHG calculations tool as follows:

Table 6: Investment, energy savings, and emissions reductions for Component 3 – Financing and implementation of energy efficient boiler adoption projects and manufacturing

		2014	2015	2016	2017	2018
PROGRAMME	Investment in Year (\$1,000)		0	1,850	3,700	1,850
BASELINE	Investment in Year (\$1,000)	0	0	185	370	185
NET	Direct Cumulative Investment in Place (\$1,000)	0.0	0.0	1,665.0	4,995.0	6,660.0

DIRECT SAVINGS	Incremental Annual Electricity Savings (MWh)	0	0	0	0	0
	Incremental Annual Residual Oil Savings (GJ)	0	0	101,327	303,980	405,306
	Incremental Annual Coal Anthracite Savings (GJ)	0	0	387,500	1,162,499	1,549,998

The total expected direct emissions reductions are then calculated by the GHG tool as follows:

Table 7: Total direct emissions reductions expected

All Components	Cumulative			Annual			
	Total	2014-2018	2019-2033	2014	2018	2025	2035
Direct Electricity Savings (MWh)	0	0	0	0	0	0	0
Direct Residual Oil Savings (GJ)	4,053,062	810,612	3,242,450	0	405,306	405,306	0
Direct Coal Anthracite Savings (GJ)	15,499,983	3,099,997	12,399,986	0	1,549,998	1,549,998	0
N/A	0	0	0	0	0	0	0
Direct Total Energy Savings (GJ)	19,553,045	3,910,609	15,642,436	0	1,955,304	1,955,304	0
Direct GHG Emission Savings (tCO ₂)	1,837,355	367,471	1,469,884	0	183,736	183,736	0

Indirect GHG emissions reductions estimates

Indirect Bottom-Up Emissions Reductions Estimates

This project is designed to ensure sustainability and replication of energy efficiency improvements beyond the project cycle. It will do so by:

1. Establishing standards and a certification programme for the efficiency of the boilers;
2. Developing guidelines on the implementation of funds, loans, and tax schemes to support efficient boilers;
3. Supporting and carrying out awareness raising and capacity building activities for end-users, energy consultants, energy service companies and boiler providers/manufacturers;
4. Providing technical assistance to industrial boiler providers on the development of business and marketing plans for EE industrial boilers.

Due to these activities within the project, the “Number of Replications Post-project as Spillover” was given as 3 for Component 3, resulting in the following bottom-up emissions reductions from the GHG reduction tool:

Table 8: Indirect bottom-up GHG savings calculation

Component	Year of indirect savings	Total	Unit
INDIRECT BOTTOM-UP SAVINGS: COMPONENT 3	2019-2033	6,124,518	tCO ₂

Indirect Top-Down Emissions Reduction Estimate

In order to calculate the Indirect-Top-Down emissions reduction estimate, it has been estimated that 500 new boilers will be delivered to the market per year over the 10-year period following project implementation (see the baseline analysis in Section A.4).

Using this as the estimate for the financial market over a 10-year period, the following table shows how the indirect top-down reductions estimate is 8,834,310 ton CO₂.

Table 9: Indirect Top-down emissions reduction estimate calculations

Label	Unit	Value	Source/Assumptions	
A	Total # of boilers expected to be produced per year up to 2028	# of boilers/year	500	Analysis within the PPG
B	# of post-project years	Years	10	Years 2018 to 2028
C	# of boilers expected to be on the market in 2028	# of boilers	5,000	A x B (assumes phase out of all existing boilers within this time period)
D	Total estimated penetration rate of EE boilers	%	40%	Assumed based on combination of VNEEP and the project
E	Estimated number of EE and biomass boilers by 2028 with the project	# of boilers	2,000	C x D
F	Average cost of investments per boiler	USD	51,111	Based on average of Table 5
G	Total potential market for finance	USD	102,222,003	F x E
H	Emissions reduction per USD 1,000	Tonnes CO ₂ per USD 1,000	21.6	Based on Table 5
I	Total potential market for emissions reduction	Tonnes CO ₂ per year	2,208,577	G x H / 1000
J	Total 10-year potential market for emissions reductions	Tonnes CO ₂	22,085,775	I x 10

K	Estimated causality factor	%	40%	Modest causality factor - as also described in the PIF
L	Total top-down emissions reduction estimate	Tonnes CO2	8,834,310	J x K

ANNEX F: MONITORING AND EVALUATION PLAN

1. Monitoring

Project Inception Phase

A project inception workshop will be conducted during the project inception phase to kick-off the project at the national level. The workshop will include the full project team, national government counterparts, co-financing partners, and key industry stakeholders. The fundamental objective of the workshop will be to introduce the project at the national level. An inception workshop report, featuring proceedings from the workshop including stakeholder insights and opinions will be prepared soon after completing the workshop.

In addition to the inception workshop, several activities will be conducted in this period to ensure all preparatory work has been completed. These will be included in an inception report and will include:

- Introductions of PMU staff and the UNIDO teams;
- Review of the logical framework and minor revisions, if deemed necessary;
- Delineation of specific responsibilities and finalization of the scope of work for PMU experts;
- Finalization of monitoring, evaluation and reporting requirements;
- Finalization of all M&E modalities, including time-frames, meeting schedules, procedures and processes;
- Development and scheduling of consulting packages in line with proposed activities and budgets;
- Formation of the PSC and finalization of detailed first year annual plan;
- Measurement of impact indicators and scheduling future activities for impact monitoring.

Once activities begin, the PMU will be responsible for project monitoring on a day-to-day basis. Periodic monitoring of implementation progress will be undertaken by UNIDO, as appropriate through meetings with project counterparts. UNIDO, and/or the UNIDO Country/Regional office will conduct periodic visits based on an agreed upon schedule and monitoring will occur through the PSC meetings, which will take place once a year. The terminal review will be held in the last month of the project operation, for which the PMU is responsible and will submit to UNIDO. The PMU, in conjunction with the PSC members, will be responsible for the preparation and submission of the following reports that form part of the monitoring process.

1.1 Project Implementation Review (PIR)

The PIR is an annual monitoring process mandated by the GEF. It is an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from the ongoing project. Once the project has been under implementation for a year, the project team at UNIDO HQ is responsible for completing the PIR. The PIR should then be discussed at the PSC so that the result is a PIR that has been agreed upon by project staff, the executing agency, and UNIDO.

1.2 Semi-Annual Progress Reports

Short reports outlining main updates in project progress would be provided quarterly to UNIDO by the PMU.

1.3 Periodic Thematic Reports

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

1.4 Technical Reports

These reports will be prepared by the national and international consultants/consulting organizations to be engaged during the project. As part of the Inception Report, the PMU would prepare a draft report list, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the Project, and tentative due dates. This list will be on the basis of consulting packages that will be defined at project start.

1.5 Project Publications

The PMU will determine if Technical Reports merit formal publication, and will also (in consultation with UNIDO, the government and other relevant stakeholder groups) plan and produce these publications in a consistent and recognizable format. These publications may be scientific or informational texts on the activities and achievements of the project in the form of journal articles, multimedia publications, or other forms of distribution. Publications can be based on Technical Reports, or may be summaries or compilations of a series of Technical Reports and other research. In addition, promotional materials such as case studies and video footage, will be prepared by the PMU, as required. These reports will be coordinated and developed by the PMU with the assistance and input of international and national experts, project counterparts and UNIDO.

1.6 Terminal Review (TR)

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

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

2. Evaluation:

The project will be subjected to at least one evaluation as follows:

2.1 Final evaluation:

An independent final evaluation will take place six months prior to project closure, and will focus on the effectiveness, efficiency, and timeliness of project implementation, highlight issues requiring decisions and actions, and present initial lessons learned on project design, implementation and management. The final evaluation will also review impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this evaluation will be prepared by the UNIDO Evaluation Group.

In addition, according to the Monitoring and Evaluation 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 will be 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.

ANNEX G: PROJECT TIMELINE

Expected Outputs	Activities	Time -Frame															
		Y1				Y2				Y3				Y4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1: Policy and regulatory framework to support the boiler standardization system.																	
Outcome 1.1: Operationalized regulations and guidelines on an industrial boiler standardization system.																	
1.1.1 Developed regulations on energy performance standards for locally manufactured and imported boilers, efficiency standards for operation certificates of existing boilers and guidelines on adoption and enforcement of standards;																	
1.1.2 Improved industrial boiler standardization system;																	
1.1.3 Provided technical assistance to MOIT in the establishment of a boiler operation certification and inventory program;																	
1.1.4 Guidelines on implementation of funds, loans and tax schemes to support industrial boiler efficiency improvements.																	
Component 2. Awareness, training and capacity building for government agencies, boiler owners, operators, and manufacturers, and other stakeholders.																	
Outcome 2.1: Increased awareness and information availability on energy efficient industrial boilers for end-users (industrial enterprises), energy consultants, energy service providers, ESCOs and industrial boiler providers;																	
Outcome 2.2: Improved technical capacity of government agencies, industrial boiler owners, operators, and manufacturers, service providers, and financial/banking institutions.																	
2.1.1 Provided support to the Vietnamese Government to develop a national communication strategy on boiler efficiency improvement goals for industries;																	
2.1.2 Completed awareness raising and information exchange workshops on energy efficient industrial boilers and best operating practices for end-users, energy consultants, energy service companies and boiler providers/ manufacturers;																	
2.2.1 Provided trainings on life cycle assessment, boiler efficiency evaluation techniques, and best boiler operating and manufacturing practices accordingly for end-users, energy consultants, energy service companies/ providers, and boiler providers, operators and manufacturers in industry;																	

Expected Outputs	Activities	Time -Frame															
		Y1				Y2				Y3				Y4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.2.2	Provided technical assistance to industrial boiler providers on the development of business and marketing plans for energy efficient industrial boilers;																
2.2.3	Conducted training courses for financial/banking institutions on the appraisal of energy efficient boiler investment projects.																
Component 3. Financing and implementation of energy efficient boiler adoption projects and manufacturing																	
Outcome 3.1: Increased access to financial sources and incentives for investment projects on energy efficient boiler adoption and manufacturing.																	
3.1.1	Mobilized existing financial schemes and available financial sources for promotion, demonstration and replication projects on energy efficient industrial boiler adoption and manufacturing																
Outcome 3.2: Increased adoption of energy efficient boilers by industry due to high credibility and evaluation of energy efficient boilers and best operating practices.																	
3.2.1	Implemented 10 demonstration projects on best operating practices and 5 demonstration projects on replacement of old boilers with new energy efficient boilers;																
3.2.2	Developed a database system and dissemination of results on implemented boiler projects.																
3.2.3	Provided technical assistance and assisted in arranging financing for implementation to 100 end-users on best operating practices and up to 30 bankable projects on new energy efficiency boiler investments.																
	Project program and its activities monitored and evaluated on a periodic basis in line with the GEF, UNIDO and government requirements.																
	Project implementation management																