1. Project Data

Summary project data			
GEF project ID		3732	
GEF Agency project ID		GF/RAS/10/003	
GEF Replenishment Phase		GEF-4	
Lead GEF Agency (include all for joint projects)		UNIDO	
Project name		Demonstration of BAT/BEP in fossil fuel-fired utilities and industrial boilers in response to the Stockholm Convention on POPs	
Country/Countries		Cambodia, Indonesia, Lao PDR, Mongolia, Philippines and Thailand	
Region		Asia	
Focal area		Persistent Organic Pollutants	
Operational Program or Strategic Priorities/Objectives		SP-1 - Strengthening Capacities for NIP Development and Implementation; SP-2 - Partnering in Investments for NIP Implementation; SP-3 - Partnering in the demonstration of feasible, innovative technologies and best practices for POPs reduction.	
Executing agencies involved		Ministry of Industry, Mines and Energy (Cambodia); Ministry of Environment (Indonesia); Department of Environment (Lao PDR); Ministry of Nature and Environment (Mongolia); Department of Environment and Natural Resources (Philippines) and Ministry of Natural Resources and Environment (Thailand)	
NGOs/CBOs involvement		None involved	
Private sector involvement		None involved	
CEO Endorsement (FSP) /Approval date (MSP)		May, 2010	
Effectiveness date / project start		May 2010	
Expected date of project completion (at start)		April 2014	
Actual date of project completion		June 2016	
Project Financing			
		At Endorsement (US $M)	**At Completion (US $M)**
Project Preparation Grant	GEF funding	0.4	0
	Co-financing	0.3	0
GEF Project Grant		4.0	UA
Co-financing	IA own	0.2	UA
	Government	8.9	UA
	Other multi- /bi-laterals	0	UA

	Private sector	0	UA
	NGOs/CSOs	0	UA
Total GEF funding		4.4	UA
Total Co-financing		9.4	UA
Total project funding (GEF grant(s) + co-financing)		13.8	UA
Terminal evaluation/review information			
TE completion date		November 2016	
Author of TE		Not Given	
TER completion date		April 13, 2018	
TER prepared by		Spandana Battula	
TER peer review by (if GEF IEO review)		Molly Watts Sohn	

2. Summary of Project Ratings

Criteria	Final PIR	IA Terminal Evaluation	IA Evaluation Office Review	GEF IEO Review
Project Outcomes	BLIND REVIEW	BLIND REVIEW	BLIND REVIEW	MS
Sustainability of Outcomes		BLIND REVIEW	BLIND REVIEW	ML
M&E Design		BLIND REVIEW	BLIND REVIEW	S
M&E Implementation		BLIND REVIEW	BLIND REVIEW	S
Quality of Implementation		BLIND REVIEW	BLIND REVIEW	S
Quality of Execution		BLIND REVIEW	BLIND REVIEW	S
Quality of the Terminal Evaluation Report		BLIND REVIEW	BLIND REVIEW	MS

3. Project Objectives

3.1 Global Environmental Objectives of the project:

The project's Environmental Objective is to reduce and eliminate unintentionally produced Persistent Organic Pollutants (UP-POPs) releases by capacity building at regional level to implement Best available technique/ Best environmental practice (BAT/BEP) measures in the fossil fuel-fired utility and industrial boilers source category including UP-POPs (PD pg 35).

3.2 Development Objectives of the project:

The Development Objective of the project is to increase energy efficiency and reduce UP-POPs releases by application of appropriately selected technologies and fuels in the fossil fuel-fired utility and industrial boilers source category (PF pg 35). It intended to achieve its objectives through five outcomes, and they are:

Outcome 1: Adopted guidelines and guidance on BAT/BEP addressing specific features of industry, common practices in the region and related socio-economic considerations;

Outcome 2: Pollution prevention measures (cleaner production) applied prior to introducing BAT/BEP;

Outcome 3: UP-POPs baseline inventories derived from representative industrial sources and projected at regional scale;

Outcome 4: Establishment of regional coordination of developing human resources; and

Outcome 5: Adequate capacity in sampling and analysis of UP-POPs.

3.3 Were there any **changes** in the Global Environmental Objectives, Development Objectives, or other activities during implementation?

There were no changes to the objectives or activities during implementation.

4. GEF IEO assessment of Outcomes and Sustainability
Please refer to the GEF Terminal Evaluation Review Guidelines for detail on the criteria for ratings.

Relevance can receive either a Satisfactory or Unsatisfactory rating. For Effectiveness and Cost efficiency, a six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess. Sustainability ratings are assessed on a four-point scale: Likely=no or negligible risk; Moderately Likely=low risk; Moderately Unlikely=substantial risks; Unlikely=high risk. In assessing a Sustainability rating please note if, and to what degree, sustainability of project outcomes is threatened by financial, sociopolitical, institutional/governance, or environmental factors.

Please justify ratings in the space below each box.

4.1 **Relevance**	Rating: Satisfactory

The project is relevant to GEF's Persistent Organic Pollutants (POPs) focal area. It is consistent with POP's Strategic Program 1 on Strengthening Capacities for NIP Implementation, Strategic Program 2 on Partnering in Investments for NIP Implementation, and Strategic Program 3 on Partnering in the demonstration of feasible, innovative technologies and best practices for POPs reduction (PD pg 37). The project is also consistent with the project partners' priorities as Cambodia, Indonesia, Lao PDR, Mongolia, the Philippines and Thailand are members of the Regional BAT/BEP Forum for ESEA countries, which was adopted in Bangkok in October 2007 (CEO doc pgs 9-10). Also, all the six "participating countries are parties to the Stockholm Convention and they have all submitted their NIP. Furthermore, all the six countries identified fossil-fuel fired utility and industrial boilers as a major source of PCDD/Fs release" (TE pg 13).

4.2 **Effectiveness**	Rating: Moderately Satisfactory

The project had five main outcomes to demonstrate BAT/BEP in fossil fuel-fired utilities and industrial boilers, and it was able to develop BAT/BEP guidelines in all countries and efforts are being made to adopt elements of these guidelines into national legislation and policies. The project also implemented BAT/BEP in the demonstration facilities resulting in cleaner production and significant cost savings. However, the project faced delays in procurement and signing TOR agreements and was unable to identify financial institutions to set up mechanism for PPPs, which resulted in delays in implementation of activities. Keeping in consideration the shortcomings and achievements during implementation, the TER rates the effectives as Moderately Satisfactory. Below is a detailed analysis of the outcomes:

<u>Outcome 1: Adopted guidelines and guidance on BAT/BEP addressing specific features of industry, common practices in the region and related socioeconomic considerations</u>

The project intended to prepare and test guidelines to be used to optimize the collection and comparison of data for the inventory, the collection of data on occupational accidents and exposures to fugitive emissions related to industrial boilers. As per the TE, all the countries adapted and translated the UNEP guidelines and guidance on BAT/BEP on fossil fuel-fired utilities and industrial boilers. The guidelines were also disseminated to the relevant sectors by conducting awareness-raising and training workshops. The project also succeeded in getting the guidelines adopted in government policies, for example, the Ministry of Industry, Mines and Energy in Cambodia developed a "prakas" (ministerial regulation) related to boiler safety and was under consideration; Lao PDR amended and approved the amendments of the Environmental Protection Law to include provisions on Cleaner Production and elements of BAT / BEP, and Indonesia amended its Boiler Act to include elements of BAT/BEP and environmental provisions and these have been submitted for the approval of the Parliament (TE pgs 16-17).

Outcome 2: Pollution prevention measures (cleaner production) applied prior to introducing BAT/BEP

Under this outcome, the project intended to assess and classify boilers as well as identify abatement technologies in use in the countries based on inventory of boilers, however "for various reasons including unpreparedness to undertake such inventories and lack of resources, the inventory exercise was not completed in most of the participating countries during the preparatory phase. The inventory was in fact completed during the first phase of the project with the technical assistance of the international consultants, who developed the survey questionnaires used in the inventory" (TE pg 17). The project did manage to cover information such as type, capacity and efficiency of boiler, the type of fuel used, the existing air pollution control device at the facility and the location of the facility, and the participating countries drafted comprehensive inventory reports which was helpful per industrial sector. The project also conducted market surveys to identify appropriate technologies and boiler technology providers in the region, and drafted non-binding procurement guidelines for environmentally sound boilers (TE pg 18).

Outcome 3: UP-POPs baseline inventories derived from representative industrial sources and projected at regional scale

Under this outcome, the project aimed to conduct specific studies on fish residues as fuel and use of biomass fuels, and identifying fossil fuel-fired utility and industrial boilers that would be representative for establishing regional UP-POPs baseline inventory. The project did succeed in preparing the studies on fish residues for Cambodia, Laos, Philippines, and Mongolia. The TE states that, although the reports contained relevant information, it could have been substantiated with some appropriate recommendations as guidance for decision making.

To determine UP-POPs releases through baselines inventory, the project selected facilities for BAT/BEP demonstration in each participating country. As the aim was to increase the efficiency of boiler, the project fine-tuned the combustion parameters and for the other facilities either the boiler was retrofitted or a new boiler was purchased to replace the old one. Capacity was built through trainings on how to change / modify the combustion parameters in order to improve or keep combustion efficiency high. Monitoring of flue gases (PCDD/Fs, Hg, CO2 and other pollutants) was done as planned in the six countries. The TE states that "the reduction in PCDD/Fs release after intervention of the project was solely based on the saving of fuel as a result of increased efficiency and using the UNEP toolkit emission factors and not on measured monitoring data produced by the project. An annual reduction of about 0.19 gTEQ was thus observed after intervention of the project at the pilot facilities, lower than the 0.31 gTEQ planned in the

project document" (TE pg 22). However, the procurement, signing of MOUs and monitoring of the gases were demanding tasks and delayed the activities significantly.

Outcome 4: Establishment of regional coordination of developing human resources

Under this component, the project was successful in carrying out educational and awareness raising activities to develop adequate capacity. To build adequate capacity in BAT and BEP through training programs including regular curricula, the project developed curriculum of a training course on Green Boiler Technology (GBT) with emphasis on BAT/BEP, and organized regional workshop in Thailand. It also conducted training of trainers workshops in all six countries, and as per the TE, the curriculum is being offered continuously in courses run in academic institutions in all the participating countries. The project also carried out workshops on BAT / BEP for boiler operations targeting government officials and technical personnel of private and public sectors. In addition, the project also had awareness raising activities for operators of the energy sector and sectors using industrial boilers, government officials, and other relevant stakeholders, and it produced brochures, pamphlets, posters, videos and motion clips which were disseminated in all participating countries (TE pg 23).

Outcome 5: Adequate capacity in sampling and analysis of UP-POPs

This outcome was partly able to achieve its aim to build adequate regional capacity and promote technology transfer. The project identified institutions in Indonesia, Philippines, Thailand, and Mongolia, and scientists and laboratory staff from these identified institutions went for training on sampling and UP-POPs analysis to China and USA. As per the TE "The ICCT staff, interviewed during field mission, highlighted the relevance of the trainings and confirmed their appropriateness. There are indications that the countries are investing to set up the capacities for the actual sampling and monitoring of UP-POPs" (TE pg 24). However, the project was unable to identify appropriate financial institutions to set in place a proper mechanism for PPP for promotion of technology transfer (BAT/BEP) to other facilities in the participating countries.

4.3 **Efficiency**	Rating: Moderately Satisfactory

The project faced delays due to unpreparedness, and lengthy procedures for procurement. The project was not able to convince industrial partners to participate in the project for BAT/BEP implementation. Once the facilities were selected the drafting and signature of MOUs also took longer than anticipated in most cases and contributed to further delays in the implementation process. However, despite the delays, activities to deliver outputs were satisfactorily carried out. In terms of financial efficiency, the TE states the "centralized approach and the project applying UNIDO procurement / disbursement procedures ensured that funds were adequately managed and timely disbursed according to the planned project budget. However, given the scope of the work and the number of countries, the project funds were limited for the replacement of small boilers or for the adoption of BEP" (TE pg 27). Therefore, the TER gives Moderately Satisfactory rating to efficiency of the project.

4.4 **Sustainability**	Rating: Moderately Likely

The project's sociopolitical, institutional and environmental risks seem low due to strong political ownership, mainstreaming of benefits, and no negative environmental impacts, although the financial resources are not adequate. Therefore, the TER gives a Moderately Likely rating to the sustainability of the project. Below is a detailed analysis of the sustainability components.

Financial resources: The project's financial sustainability is moderately likely because "although the return on investment was very profitable, the implementation of BAT/BEP required a significant amount of initial investment from the facilities. Whilst most big enterprises would be in a position to make such initial investments, most small and medium enterprises in the participating countries cannot afford these initial financial efforts" (TE pg 28). Also the TE does not mention any financial commitments by stakeholders to continue the benefits.

Sociopolitical: The TE mentions that all "countries are fully committed to implement the SC, and in particular the authorities have shown strong support by providing adequate staffing and financial support (e.g. direct investment for setting up of laboratories having the capacity to analyze PCDD/Fs) to implement the project. Furthermore, many of the participating countries have or are implementing other POPs project" (TE pg 28). Thus, there is enough sociopolitical ownership for the project benefits to sustain.

Institutional framework and governance: The countries attempted to adapt the BAT/BEP guidelines or elements of the document into government regulations and policies. Even courses were offered on green boiler technology in academic institutions, however, there is the need to establish sustainable mechanisms (incentives, trainings) to promote BAT/BEP (TE pg 28).

Environment: As per the TE "the project is considered ecologically sustainable as it promotes the use of more efficient boilers that results in decrease of GHG and U-POPs emissions" (TE pg 28).

5. Processes and factors affecting attainment of project outcomes

5.1 Co-financing. To what extent was the reported co-financing essential to the achievement of GEF objectives? If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

The TE does not give clear information on the materialized co-financing.

5.2 Project extensions and/or delays. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

The project faced many delays due to procurement, approvals and unpreparedness before the project start. This led to a delay in completion by one year.

5.3 Country ownership. Assess the extent to which country ownership has affected project outcomes and sustainability? Describe the ways in which it affected outcomes and sustainability, highlighting the causal links:

The project had participation by government especially from the Department of Environment and Industry and Commerce. The governmental bodies were involved directly in a number of activities or assisted by providing data or information.

6. Assessment of project's Monitoring and Evaluation system

Ratings are assessed on a six point scale: Highly Satisfactory=no shortcomings in this M&E component; Satisfactory=minor shortcomings in this M&E component; Moderately Satisfactory=moderate shortcomings in this M&E component; Moderately Unsatisfactory=significant shortcomings in this M&E component; Unsatisfactory=major shortcomings in this M&E component; Highly Unsatisfactory=there were no project M&E systems.

Please justify ratings in the space below each box.

6.1 **M&E Design at entry**	Rating: Satisfactory

The project had a M&E plan which included provision for inception report, annual project reports, project implementation reviews, quarterly progress reports, technical reports, and mid-term and terminal evaluations with a budget of $ 158,800. The project also had provisions for baselines and establishing SMART indicators for impacts and related to environmental benefits (PD pgs 75-77). The TE states that the M&E plan was adequate and allowed for monitoring progress and impact at output level. The logical framework had "objectively verifiable indicators, their sources of verification and assumptions & risks for the project objectives, outcomes and outputs" and the responsible parties for each of the activities were also given in the project document (TE pg 29). However, there were issues regarding the measurement of success for some of the proposed activities which required a high technical capacity in sampling and analysis. Overall, the M&E design seems adequate and thus, the TER gives a Satisfactory rating.

6.2 **M&E Implementation**	Rating: Satisfactory

The TE states that many of M&E activities took place on time. The project held inception workshops in all the countries and reports were drafted. "These workshops were generally organized by the Ministry of Environment of the country, the host institution of the project, and attended by the major stakeholders and partners of the project such as Ministry of Education, Ministry of Industry and Commerce, academia, representative of cleaner production centers, NGOs, and private sectors" (TE pg 30). The project agencies also met regularly to discuss and monitor project progress, and the PIR reports were timely submitted. The midterm review recommendations were taken into consideration during the last phase of project implementation. However, monitoring of long-term changes did not materialize during the project. Considering the regular monitoring and evaluation implementation, the TER gives a Satisfactory rating.

7. Assessment of project implementation and execution

Quality of Implementation includes the quality of project design, as well as the quality of supervision and assistance provided by implementing agency(s) to execution agencies throughout project implementation. Quality of Execution covers the effectiveness of the executing agency(s) in performing its roles and responsibilities. In both instances, the focus is upon factors that are largely within the control of the respective implementing and executing agency(s). A six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess.

Please justify ratings in the space below each box.

7.1 **Quality of Project Implementation**	Rating: Satisfactory

The TE states that the implementing agency, UNIDO, provided supervision for annual progress reports submitted by NPMs, reports of contracted activities, ESEA FB and RSTC meetings, and field visits. The project manager undertook at least one visit in each of the six countries, and visited the candidate pilot facilities. The Technical Committee meetings were monitored by the manager, who also provided guidance and made recommendations to improve on reporting or on execution of activities. "According to feedback received during the evaluation mission, the UNIDO PM provided useful guidance to NPMs for project implementation. Regular communication took place between the PM and the NPMs, mainly via e-mail and as required via telephone. The PM was available for any queries and responded in a very timely manner, which facilitated the work of the NPMs" (TE pg 35). Therefore, the quality of project implementation seems Satisfactory.

7.2 **Quality of Project Execution**	Rating: Satisfactory

The project's execution was done satisfactorily with involvement of major stakeholders. The National Coordination Units were constituted by governmental officers (Environment and or Industry and Commerce) and representatives of demonstration facilities and were constantly updated on the project progress by the national project managers during regularly held meetings. Nationally executed activities were undertaken by national consultants contracted by UNIDO. Government agencies were directly involved, for example in the Philippines, "the Department of Environment and Natural Resources (EMB-DENR) through its regional offices assisted the international consultant in the identification of the potential pilot facilities, and in the conduct of the regional awareness-raising workshops" (TE pg 33). "In Indonesia, the Ministry of Environment (MOE) provided office space to host the project management unit, and through the NPC, who was assisted by the NPM, was responsible for coordination of project activities" (TE pg 33). Thus, the quality of project execution seems Satisfactory.

8. Assessment of Project Impacts

Note - In instances where information on any impact related topic is not provided in the terminal evaluations, the reviewer should indicate in the relevant sections below that this is indeed the case and

identify the information gaps. When providing information on topics related to impact, please cite the page number of the terminal evaluation from where the information is sourced.

8.1 Environmental Change. Describe the changes in environmental stress and environmental status that occurred by the end of the project. Include both quantitative and qualitative changes documented, sources of information for these changes, and how project activities contributed to or hindered these changes. Also include how contextual factors have contributed to or hindered these changes.

The TE states that due to the project there was an annual reduction of about 0.19 gTEQ, and a reduction of 174,784 tons of CO2.

8.2 Socioeconomic change. Describe any changes in human well-being (income, education, health, community relationships, etc.) that occurred by the end of the project. Include both quantitative and qualitative changes documented, sources of information for these changes, and how project activities contributed to or hindered these changes. Also include how contextual factors have contributed to or hindered these changes.

No socioeconomic changes are reported.

8.3 Capacity and governance changes. Describe notable changes in capacities and governance that can lead to large-scale action (both mass and legislative) bringing about positive environmental change. "Capacities" include awareness, knowledge, skills, infrastructure, and environmental monitoring systems, among others. "Governance" refers to decision-making processes, structures and systems, including access to and use of information, and thus would include laws, administrative bodies, trust-building and conflict resolution processes, information-sharing systems, etc. Indicate how project activities contributed to/ hindered these changes, as well as how contextual factors have influenced these changes.

a) Capacities: The TE does not report any changes in capacities.

b) Governance: There are no changes in governance.

8.4 Unintended impacts. Describe any impacts not targeted by the project, whether positive or negative, affecting either ecological or social aspects. Indicate the factors that contributed to these unintended impacts occurring.

The TE does not report of any unintended impacts.

8.5 Adoption of GEF initiatives at scale. Identify any initiatives (e.g. technologies, approaches, financing instruments, implementing bodies, legal frameworks, information systems) that have been mainstreamed, replicated and/or scaled up by government and other stakeholders by project end. Include the extent to which this broader adoption has taken place, e.g. if plans and resources have been established but no actual adoption has taken place, or if market change and large-scale environmental benefits have begun to occur. Indicate how project activities and other contextual factors contributed to these taking place. If broader adoption has not taken place as expected, indicate which factors (both project-related and contextual) have hindered this from happening.

The TE does not mention adoption of GEF initiatives at scale.

9. Lessons and recommendations

9.1 Briefly describe the key lessons, good practices, or approaches mentioned in the terminal evaluation report that could have application for other GEF projects.

The TE provides three lessons learnt from the project (TE pgs 42-43)

1) The implementation of this regional project involving six countries was very challenging and required more time and better planning to meet deadlines. One important lesson that emerged is that the design should be kept simple. For the same set of objectives, the design should consider to have smaller number of components meaning less administrative burden and more flexibility resulting in a better and more successful implementation process;
2) It was difficult to convince the industrial sector, more specifically power plants, to participate in the project due to possible disruption to plant operations, or concerns related to the public perception regarding monitoring activities or results at the power plant. However, by adopting the appropriate approach and in demonstrating that they would not only benefit economically (in terms of cost savings) but also in terms of more simple management, more safety for workers, better relationships with the government and the public was an effective way in convincing industrial partners to participate in project and adopt BAT/BEP for cleaner production; and
3) Measurement of PCDD/F at the stack of industrial boilers and power plants proved to be challenging in the project. In general, the concentration of PCDD/F measured at the power plants was lower than expected, in some cases much lower than the levels measured at BAT compliant plants in developed countries. Although, appropriate laboratories have been selected to carry out the sampling and analysis, and the process having been supervised by the competent international experts, a lesson that can be learned is that the measurement of PCDD/F is a challenging exercise, and due consideration must be given to risk associated with the capability and proven experience of the laboratories in undertaking such assignment.

9.2 Briefly describe the recommendations given in the terminal evaluation.

The TE gave following recommendations (TE pgs 41-42):

1) Successful show cases of BAP/BEP implementation in demonstration facilities should be summarized, documented and disseminated across the countries of the region and to other regions;
2) UNIDO should collate technical documents and reports, standardize their editing and content, peer review, and make the document available to relevant stakeholders including the GEF, the Stockholm Convention Secretariat, parties and other relevant agencies or institutions;
3) Future projects involving industrial partners should be identified during preparatory phase to ensure a quick start of project execution and avoid delays;
4) For projects that require the clearance of custom procedures, it is recommended to establish early official communication with customs by national counterparts to avoid delays in project execution;
5) It is recommended (to governments) that an adequate financial mechanism be set up in the countries to facilitate / encourage the promotion of BAP/BEP in other small and medium enterprises; and

6) For continued relevance and impact of the project, the relevant authorities of the countries should disseminate the BAT/BEP guidelines to the relevant sectors and, as far as possible and feasible, ensure that facilities adopt them.

10. Quality of the Terminal Evaluation Report

A six point rating scale is used for each sub-criteria and overall rating of the terminal evaluation report (Highly Satisfactory to Highly Unsatisfactory)

Criteria	**GEF IEO comments**	Rating
To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives?	The TE provides detailed analysis of outcomes but lacks information of the impacts of the project.	**MS**
To what extent is the report internally consistent, the evidence presented complete and convincing, and ratings well substantiated?	The report is internally consistent, and provides evidence.	**S**
To what extent does the report properly assess project sustainability and/or project exit strategy?	The report gives substantiated information on sustainability, but does not have an exit strategy.	**MS**
To what extent are the lessons learned supported by the evidence presented and are they comprehensive?	The lessons learnt are sufficient and well supported by evidence.	**S**
Does the report include the actual project costs (total and per activity) and actual co-financing used?	The report does not give co-financing information.	**MU**
Assess the quality of the report's evaluation of project M&E systems:	The report gives adequate assessment of M&E design and implementation of the project.	**S**
Overall TE Rating		**MS**

11. Note any additional sources of information used in the preparation of the terminal evaluation report (excluding PIRs, TEs, and PADs).

The TER has not used any other sources.