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(Independent Final Evaluation of the Project GF/RAS/10/006)

**Regional Plan for the Introduction of BAT/BEP Strategies to
Industrial Source Categories of Stockholm Convention Annex C of
Article 5 in ESEA Region**



“Some countries have high children’s mortality rate and unemployment.

Government officials and entrepreneurs have stated to have a dilemma: live or live healthy!

The international task is to support them in raising general awareness that is better to “live healthy” in the interest of all community and of the environment in which we all live.

Our legacy is to leave a better world to our children.

BAT/BEP is a support simple and economic for fulfilling this task and also making the productivity of the industrial world more efficient.”

Mr. Mario Marchich

Evaluator of international technical assistance projects.

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This document has not been formally edited

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ABBREVIATIONS AND ACRONYMS USED IN THE REPORT

BAT	Best Available Technologies
BEP	Best Environmental Practices
COP	Conference of the Parties
CP	Cleaner Production
CTA	Chief Technical Advisor
ESEA	East and South East Asia
ESM	Environmentally Sound Management
EU	European Union
GEF	Global Environment Facility
M&E	Monitoring and Evaluation
MSP	Medium Size Project
NCPC	National Cleaner Production Centre
NGO	Non Governmental Organization
NIDA	National Institute of Development Administration
NIP	National Implementation Plan
NPC	National Project Coordinator
NTA	National Technical Advisor
PCDDs/PCDFs	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PIR	Project Implementation Report
PMT	Project Management Team
POPs	Persistent Organic Pollutants
PP	Pollution Prevention
PRTR.....	Pollutant release and transfer registers
PSC	Project Steering Committee
SC	Stockholm Convention
SEPA	Swedish Environmental Protection Agency.
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNDP	United Nations Development Programme
UP-POPs	Unintentionally Produced Persistent Organic Pollutants
WB	World Bank

1. EXECUTIVE SUMMARY

1.1 Background

In accordance with the relevant resolutions of the third and fourth sessions of the Conference of the Parties of the Stockholm Convention (SC) the medium-sized project “*Regional Plan for the introduction of BAT / BEP strategies to industrial source categories of the Stockholm Convention Annex C of Article 5 in the ESEA region*” was formulated as a result of the regional work plan developed by the member countries of the **East and South East Asia (ESEA) Forum on Best Available Techniques (BAT) and Best Environmental Practices (BEP)**.

The ESEA BAT/BEP Forum is the first forum established by UNIDO for developing and formulating a regional action plan on BAT/BEP addressing the obligations of the member countries in relation to the Article 5 of the Stockholm Convention on Persistent Organic Pollutants (POPs). This Article supports a programmatic approach in reducing unintentionally-produced POPs (UP-POPs).

POPs are organic chemical substances, widely distributed throughout the environment as a result of natural processes involving soil, water and air. They are toxic to both humans and wildlife. As a result of their releases to the environment over the past decades, due especially to human activities, POPs are now widely distributed over large regions (including those where POPs have never been produced) and they may be found around the entire globe. This extensive contamination of environment and living organisms includes many foodstuffs resulting in the exposure of many species, including humans, to acute and chronic toxic effects.

Formally launched on October 5, 2007 during an Inaugural Ministerial Meeting in Bangkok, Thailand, the main objective of the Forum is to create an enabling, non-legally binding framework for regional cooperation to facilitate the development, diffusion and deployment and transfer of BAT/BEP through concrete and substantial initiatives. During the same workshop, priority industrial source categories were defined by the participating countries based on their respective National Implementation Plans (NIPs). The NIPs have been promoted by the SC for the management of POPs and are part of a global interregional sustainable development strategy. These plans are dynamic documents periodically updated to address new obligations arising from the listing of new POPs.

The creation of this regional platform has enabled drafting of regional action plans that target:

- creation/strengthening of policies related to the reduction of UP-POPs
- promotion of BAT/BEP in industrial source categories,
- dioxin inventory programs and capacity building activities related to sampling,
- analysis and monitoring of UP-POPs,
- Dissemination of BAT/BEP programs to relevant industries.

The objectives of these regional action plans were encapsulated in this regional MSP approved by the GEF in June 2010.

The overall objective aims at reducing and, where feasible, eliminating UP-POPs releases, preparing a detailed plan of action enabling ESEA countries to adopt and introduce BAT/BEP strategies and enhance the relevant guidelines on BAT/BEP for priority industrial source categories listed in Part I and II, Annex C of the Convention.

It addressed specific features of the industrial sectors considering common practices in the region and related socio-economic considerations. It incorporated the sharing of regional experience gained through pollution prevention and cleaner production (PP/CP) measures.

The project has also addressed possible partnering on investments and joint ventures among countries sharing similar sector source releases of UP-POPs.

The medium-sized project has been able to introduce harmonized methodologies for the inventory of each type of source category and has established UP-POPs baseline inventories. The project has introduced a systematic tool for the industry to assimilate structured decision making through a criterion of selection and ranking of clean process design, retrofitting and operations.

The project has been successful in promoting coordination with other ongoing projects in the region, namely the BAT/BEP projects in the fossil fuel-fired utilities and industrial boilers and with the recently approved introduction of BAT/BEP in the open burning sectors.

Further, it has also created a venue for experience sharing on the results and outcomes of other BAT/BEP projects in the region.

1.2 Purpose and objectives of the project

As mentioned above, the overall objective of the regional project aims at reducing and, where feasible, eliminating unintentional POPs (UP-POPs) releases, by producing a detailed plan to enable ESEA countries to adopt and introduce BAT/BEP strategies, enhancing the relevant guidelines on BAT/BEP for priority industrial source categories listed in Part II and III, Annex C of the Stockholm Convention.

The purpose is to address specific features of industry, common practices in the region and related socio-economic considerations.

The final objective is to collectively update knowledge on technology transfer, sampling analysis, research for development and contribute to global monitoring of UP-POPs releases using a regional programmatic approach in order to avoid that each country adopts different solutions to implement BAT/BEP, depending on relevant local standards, laws and regulations as well as on local social and economic conditions. It is important that an applicable legal framework is created in the countries for the successful introduction of BAT and BEP measures.

Most countries had no specific laws for POPs and UP-POPs. Most of the participating countries had just some environmental quality standards. There were no specific laws dealing with POPs and UP POPs, in particular dioxin/furan in the air or from stack sources.

Regulations on environmental quality standards, product standards, emission standards and technology/process standards are needed, together with investments for new technologies.

Capacity building is highly needed at different levels, to establish an integrated pollution prevention and control, especially for UP-POPs, to create an enabling environment for monitoring.

The immediate objective of the project aims at establishing inventories for each type of source category and UP-POPs baseline inventories achieved by specifically designed sector studies and targeted capacity building. In addition the project has reinforced the significant linkages among

the concepts of energy efficiency, reduction of UP-POPs and other industrial emissions, addressing the requirements of the SC and of the Climate Change protocol. During the monitoring campaigns in the selected facilities, not only UP-POPs releases were targeted, but also process parameters giving information on the performance of the plant, thus allowing a proper implementation of BAT/BEP measures.

The four priority industrial source categories addressed are:

1) Fossil fuel-fired utilities and industrial boilers, 2) metallurgical industry, 3) open burning and 4) waste incineration.

1.3 Financial Resources

The project was approved by GEF in June 2010 and the implementation started in August 2010 through the financing of a GEF grant of US\$ 950,000 and a co-financing of US\$ 2,180,760 divided as follows:

- US\$ 400,000 in kind as UNIDO input
- US\$ 1,689,000 in kind and cash from the seven participating countries (Cambodia, People's Republic of China, Indonesia, Lao PDR, Mongolia, Philippines and Thailand)
- and additionally US\$ 91,760 from the Swedish Environmental Protection Agency.

The total available budget of the project is US\$ 3,130,760.

Originally the project was expected to be completed in two years on 31 August 2012, but it was extended by until March 2013. The extension was granted to organize the final Steering Committee Meeting in December 2012 and a final project workshop in Nha Trang (Vietnam) with the participation of all the National Coordinators and some Government technical staff of the participating member countries. The purpose of the workshop was to present the results of the project outputs at the end of its implementation activities. The extension also allowed the conduct of the final project evaluation exercise.

1.4 Expected Outcomes and their fulfilment

Five substantive Outcomes were foreseen to achieve the project objectives:

Outcome 1: Expansion of regional guidelines and guidance on BAT/BEP, addressing specific features of the industry in the region, common practices, including local and traditional practices and related socio-economic considerations.

The main activities under this outcome have been the preparation and adoption of regional BAT/BEP guidelines for local officials and operators. The regional guidelines and guidance will be prepared to adequately address technical issues, common practices including local and traditional practices and socio-economic considerations.

These BAT/BEP guidelines have been disseminated among the relevant stakeholders to improve the institutional capacity in understanding POPs pollution in general and UP-POPs releases from industrial sectors in particular. The Guidelines have been translated, but they have not yet been really adopted as a policy in all participating countries. Amongst the participating countries, so far, only China and Thailand have adopted the BAT/BEP guidelines and have established policies for priority industrial source categories including fossil-fuel fired utilities, metallurgical

sector and waste incineration sectors. Most of the participating countries have existing guidelines on municipal wastes management which addresses open burning.

Outcome 2: Establishment of BAT/BEP regional coordination mechanism for developing human resources, technical capabilities and networking capacities.

The ESEA BAT/BEP Forum established by UNIDO created a regional coordination mechanism that facilitated sharing of technical experiences and harmonized capacity building activities.

The existing SC and Basel Centres in the region and other relevant training institutions have been selected to provide specific training programs to government officials and technical personnel of private and public sectors. This was linked to the development of a regional information exchange and sharing scheme, university curricula on environmentally sound technologies as well as development of regional coordination for research and development. These activities were accompanied by regular awareness raising campaigns, identifying target groups according to their involvement in the industrial sector and producing information materials for each target group and for the public at large.

The capacity building activities/workshops and study tours have enabled the companies to establish new networks with technology suppliers. Government staff involved in analysis of dioxins have also benefitted from the intensive training provided by the project.

Outcome 3: Continuous reduction of UP-POPs in priority source categories using new tools and methodologies.

For this outcome, National Cleaner Production Centers (NCPCs) and existing Cleaner Production (CP) programs as well as other training institutions in the participating countries have been approached to provide technical assistance and strategies, mainly in capacity building. The activities focused on widespread dissemination of cleaner production and pollution prevention methods to the stakeholders' technicians and utility managers through a series of targeted seminars/training courses. The aim was to introduce actions for the reduction of pollution and energy saving, facilitating implementation of more effective BAT/BEP measures.

Outcome 4: Contribution of ESEA regional UP-POPs inventory to the UNEP UP-POPs global monitoring programme.

Training on designing monitoring programs determining UP-POPs releases were carried out in selected priority source categories for the determination of UP-POP releases. At the same time, establishment of a regional UP- POPs baseline inventory was initiated. Measured data provided to further revise I-TEQ emission factors in the latest version of UNEP Toolkit.

Based on the measured UP-POPs and inventory data collected, the releases in selected priority source categories will be projected at regional level. Common rules for calculating PCDD/PCDF releases have been prepared according to the regional characteristics.

These activities helped to develop a sub-regional baseline for implementing a corresponding regional action plan in order to show the global environmental benefits of the project. The purpose was to create an adequate regional capacity strengthening national and regional centres

of excellence (national and private laboratories) through training in monitoring and collecting samples, doing analysis and reporting data of UP-POPs.

Adequate capacity in monitoring and assessment, specifically in sampling, analysis, and reporting of unintentional POPs, has been established.

Outcome 5: Establishment of the project management at regional level, stakeholder partnership and monitoring and evaluation.

Participating countries have appointed national focal points that worked directly with UNIDO in implementing and monitoring project activities. National technical staff has played an important role in coordinating the activities of ongoing regional projects. Pilot facilities, university partners and other relevant stakeholders have engaged actively in the promotion of the project activities.

The project has reported its progresses to the ESEA BAT/BEP Forum Board, which meets annually to review the project activities and how to address the regional action plans drafted and agreed by the participating countries. The annual meetings have also involved the Stockholm Convention Secretariat and other relevant partners.

On the basis of the Project Implementation Report (PIR) prepared by the UNIDO project manager on 7.3.2013, the rating of the progress and achievements of the project has been determined taking into account the performance of the objectively verifiable indicators targets specified in the Logical Framework Approach included in the original project document.

1.5 Conclusions and Assessment of the Project's Quality Criteria

The assessment of the impact of a project is based on the analysis of the five major quality criteria: **1) relevance of the project and of its design, 2) effectiveness, 3) efficiency, 4) monitoring of the results 5) sustainability.**

1) Relevance is the extent to which the project's activities are consistent with the problem area identified in relation to the country's development goals and needs of counterparts and beneficiaries, including the changes that may happen over the time.

Relevance is concerned with assessing whether the project is in line with local needs and priorities, i.e. the quality of the problem analysis and the project's intervention logic with verifiable indicators of achievement.

Analysing achievements and results of the project and its needs and objectives, it can be concluded that they are in line with the needs of the region concerning the establishment of a regional coordination platform.

Translated versions of the guidelines in the local languages have been prepared and training programs on POPs issues have been conducted.

The project design is relevant to the GEF strategies. It has been formulated under the GEF 4 focal area strategy and specifically Strategic Program 1: strengthening capacities with the objective to build the capacities required in the eligible countries to implement in a sustainable

manner the action plans as reflected in their National Implementation Plans to meet their obligations to the Stockholm Convention.

Relevance of the project to the country needs. The project can be considered very relevant for the country needs by all the stakeholders. In general, the expected industrialization growth in the participating countries makes the project objectives relevant to chemicals management and environmental issues

Relevance of the project to the Stockholm Convention's obligations. The project addresses the countries' obligations regarding the SC. It also assisted in the implementation of BAT/BEP related action plans of the participating countries as reflected in their respective National Implementation plans (NIPs). The Article 5 of the SC states that each party shall develop an action plan or, where appropriate, a regional action plan to reduce the total releases of chemicals listed in Annex C, with the goal of their continuous minimization and, where feasible, ultimate elimination.

Following a detailed system audit, engineers and technicians have been trained to identify key areas for improved efficiency with good engineering practices.

Further, regional baseline reports for fossil fuel-fired utilities and industrial boilers, metallurgical, waste incineration and open burning have been drafted. Two annual workshops on BAT/BEP related topics have been held for each participating country and the regional coordination networking mechanism has been established. With the support of the ESEA Forum and the Basel Centers of Asia-Pacific and South East Asia, the project has also addressed new POPs through the drafting of an e-waste project.

Through the activities of the project, pilot universities and laboratories have been identified for cooperating and offering curricula and training on BAT/BEP for the application of pollution prevention measures.

In plant trainings in selected priority sectors have been held.

The overall project relevance can be rated as satisfactory and in line with the results expected.

The assistance of UNIDO by providing experts in BAT/BEP has been acknowledged as very helpful by the participants of all the countries involved.

2) Effectiveness is the extent to which the stated intervention objectives are met. Effectiveness is therefore linked to the assessment of the impact and on the long-term effects of the intervention.

Implicit within the criterion of effectiveness is the concept of timeliness.

The project is rated in the annual report to be on track with the work plan set. The regional coordination platform has been established and further strengthened through the activities implemented.

The impact has been evident having the project attained its objectives in a satisfactory way. The project represents a platform for information exchange and technical discussions. It has enabled capacity building in the area of BAT and BEP, particularly in the four priority sectors targeted.

The gaps on the legislations have been assessed, but the enforcement is delayed due to the scarce resources obtained.

It has to be taken into account that dioxin sampling and analysis require resources, training and capacity building. Partnerships with specialized international laboratories on dioxin analysis have been established.

The participating countries are introducing Unintentional-POPs emission standards in some priority sectors. Workshops for disseminating the information on U-POPs and BAT & BEP and for raising awareness on this issue have been held.

3) Efficiency is the extent to which the results have been obtained with the least costly resources. The relationship between inputs utilized and outputs produced, in terms of quantity, quality and timeliness.

Generally it requires comparing alternative approaches to achieve an output, to see whether the most efficient approach has been used.

The assessment of efficiency measures how economically the inputs (human, financial, technical and material resources) have been converted into outputs.

Training courses and programs on new technologies and processes have been held. Long term actions have been applied, like Cleaner Production methodology guidelines. The emissions inventory has been based on the analytical measurements made in selected facilities of the participating countries.

The project has conducted training courses for laboratory personnel on sampling methods of UP-POPs, sample preparation and analysis and, finally, the project has helped in the establishment of certified monitoring Laboratories.

Training courses for analytical needs and for certification of applied analytical methods for UP-POPs have also been organized. Further, the project has promoted training courses for certification of technical laboratory personnel, including hazardous operations.

Basing the rating on the answers to the questionnaires distributed, the interviews and the assessment reports, globally it can be assessed that the training foreseen has been arranged in an efficient and satisfactory way with the funds at the disposal of the project.

Monitoring of Results (Impact) may be positive or negative, foreseen or unforeseen, or can be also the changes and effects produced by the development intervention. Generally, the impact is the effect resulting from the application of the project inputs. It indicates the performance of the project and it is the extent to which the improved performance of the counterparts has produced a positive effect on the overall development of the country.

The results are analysed through the monitoring which is a continuous and periodic exercise that uses systematic collection of qualitative and quantitative data to keep the activities under control, helping to identify implementation issues that warrant decisions at different levels of management. This continuing implementation review function provides the main stakeholders and the management with early indications about the progress or shortcomings in the achievement of outputs and objectives.

A very positive outcome of the training offered by the project has been the international network established, thanks to the relations built among the trainees from the participating countries.

Some of the most significant results of the project have been:

- The creation of a regional coordination mechanism that has enabled sharing of experiences and provision of technical support and expertise among the participating countries.
- Successful involvement of the private sector in the project activities. The pilot facilities industries identified have made investments in adopting BAT/BEP in their respective companies.
- To date, two full-sized projects on priority sector-related to the project have been approved by the GEF.
 - “Demonstration of BAT and BEP in the Fossil Fuel-fired Utilities and Industrial Boilers in response to the Stockholm Convention on POPs”
 - “Introduction of BAT/BEP in Open Burning Activities in the ESEA region”.

The regional guidelines and guidance on BAT/BEP for the fossil fuel-fired utilities and industrial boiler sector will fully incorporate the regional experience gained through the pilot demonstration activities. Other full-sized projects addressing thermal processes in the metallurgical sector and waste incineration have been drafted and are pipelined for the next GEF cycle. The MSP has contributed largely in the assessment of the sectors.

- Capacity built in dioxin sampling and analysis has to be considered an important output of the project. The leadership of China and Vietnam in implementing the training on dioxin is seen as an effective result of the regional coordination.
- Training for technicians of relevant sectors created awareness on process improvement and emission reduction through the introduction of BAT/BEP measures. As an example, the boiler operator’s training organized was successful in introducing linkages between steam efficiency and productivity.
- Baseline studies on local and traditional practices have been produced:
 - (i) survey on boilers using biomass and used oil in the Philippines
 - (ii) Fish residue as fuel in Cambodia;
 - (iii) Lao PDR has completed a study on used oil-fired boiler and the follow up activities that are planned to apply BAT/BEP on these boilers
 - (iv) Mongolia has conducted in 2012 a study on the use of low pressure furnaces and stoves;
 - (v) A survey on the market and trends of the use of biomass in Indonesia was conducted in 2012. It resulted that there are three types of biomass, namely, palm fibre, palm kernel and biogases that are in Indonesia commonly used.
- On strengthening of policies:
 - Mongolia, Lao PDR and Cambodia have drafted their Boiler Act.
 - China has issued “Guidelines on Best Available Technologies for Pollution Prevention and Control for Medical Waste Treatment and Disposal” in January 2012. These guidelines serve as technical guidance document.
 - The BAT/BEP requirements were amended into the “Law on Environmental Impact Assessment of Mongolia” in 2012 as a prerequisite to start a BAT/BEP project.

- Thailand has issued dioxin standards for priority source categories including metallurgical, waste incinerator and crematoria.

To sum up the project has successfully attained the effects foreseen on capacity building and awareness rising on BAT/BEP activities related to the Stockholm Convention concerning the reduction of unintentional produced POPs emissions.

Sustainability is the capability of the counterpart (institution or enterprise) to maintain and further develop the outputs and outcomes produced with the support of the project and to adjust them to ensure the continuation of the benefits delivered to the target beneficiaries, when the assistance of the project has been finished.

The principle is that the projects need to be environmentally as well as financially and socially sustainable.

The project has established Project Coordination Units in each participating country and has appointed the National Coordinators.

The overall implementation progress can be rated as satisfactory with some marginal shortcomings. After three years of activities and in the absence of adequate funding (each assessment in the industry with collecting of samples and their analysis is quite expensive) it is difficult to foresee and assess what can be the future sustainability of the project.

The participating countries have translated in their national languages the guidelines prepared by the Stockholm Convention Secretariat for the awareness raising campaign.

The workshops for disseminating information on UP-POPs and on policy frameworks on BAT/BEP have been organized with the leadership of the Swedish EPA and participation of all member countries.

The main objective has been satisfactorily implemented. However, some activities such as the ones related to sampling and monitoring of UP-POPs releases in the metallurgical and waste incinerator sectors have not been fully achieved, because the initial funding was not sufficient to complete the forecasted activities and no additional grant has been received.

It has to be taken into account that the cost for each assessment in industries for taking sampling and conducting the analysis of dioxin emissions due to fossil fuel fired facilities can be estimated at around US\$ 25,000. The recently approved introduction of BAT/BEP in open burning activities will fully implement UP-POPs monitoring in open burning sources.

1.6 Recommendations

According to the above mentioned conclusions the evaluation report presents the following recommendations:

1. From the questionnaires distributed and the interviews conducted, it results that in the future it is recommended to further improve the training activities. The training should involve particularly relevant personnel and directly operational in the technical activities. This may be addressed by having pre-selection criteria for the persons to be trained.

It was also requested that the period of some trainings be expanded with one additional week. The type of sampling should also be expanded to include other sources such as ambient air.

2. It is recommended to establish standards for stack sampling. In some countries this is a necessity for the usefulness of the training.
3. It is recommended to continue the collaboration with the private sector that has proved to be very useful.
4. It is recommended that the Governments apply strong follow up actions adopting policies and enforce the necessary guidelines. The policies issued may be then used as basis/guidance for the industry to implement Best Available Techniques and adopt Best Environmental Practices. In cooperation with the government authorities, it is recommended to establish ambient air standards on persistent organic pollutants.
5. In case of further projects derived from the experience of this regional Project, it is recommended to stress the importance of the trainings and of the study tours. They have been viewed as very useful and consequently, encouraged the companies to pay attention to the environmental quality and proper management of emissions.
6. It is recommended to maintain and reinforce the networks created as result of the project. Information exchange with other companies (national and international) is very important for creating awareness and outlining the opportunities for better process efficiency.
7. The sustainability of the activities of the project should continue to be demonstrated through the inclusion of BAT/BEP in the universities curricula. Actually, this is already made in some universities of the participating countries.
8. It is recommended that in the future for similar projects, different levels of capacity building exercises are provided. In this case a proper needs assessment is very important to program and direct the actions.
9. The evaluation recommends foreseeing actions for continuing the regional cooperation for monitoring and analysis, that is very important for the countries in the region. A laboratory that can be utilized in the Region for UNIDO or government projects needs to be established.
10. In some countries regulations on dioxins are in place but analytical and technical capacities are still insufficient. The project through trainings conducted on dioxin analysis and laboratory establishment has contributed to the improvement of enforcement of the laws. However, the real fighting actions will start only when the hardware component will be in place and operational. It is, therefore, recommended that future projects foresee the establishment of certified laboratories, the delivery of appropriate equipment and trained technicians for conducting the sampling and the analysis.
11. It is recommended to the participating countries to foresee an appropriate budget to face the danger of the UP-POPs, which seems not being for them a top priority when it comes to environmental issues. While there had been sufficient budget from the management of the project concerning the implementation of the activities regarding awareness and BAT/BEP actions, the government counterparts did not contribute to the budget as expected and in proportion to the needs.



Bangkok: The Headquarters of NIDA (National Institute of Development Administration)



Vientiane: The Presidential Palace

2 PRESENTATION AND ANALYSIS OF THE PROJECT

2.1 Project description

2.1.1 Project general information

Project Title	Regional Plan for Introduction of BAT/BEP Strategies to Industrial Source Categories of Stockholm Convention Annex C of Article 5 in ESEA Region
Project's GEF ID Number	3572
Project number	GF/RAS/10/006
Counties	Regional: Cambodia, People's Republic of China, Indonesia, Lao PDR, Mongolia, Philippines and Thailand
Thematic area	GEF Stockholm Convention
Implementing Agency	UNIDO
Duration	Two years (1/9/2010 – 31/8/2012), but it was extended by four months until end 2012, to organize a final workshop.
Project site	Each of the seven participating countries
Project Approval Date	June 2010
Date of Project start	September 2010
Total Project Cost	USD \$ 3,130,760 excluding PPG and agency support costs
GEF Grant Amount	USD \$ 800,000 (including Project Preparatory Grant of \$ 50.000)
Cooperating countries	Brunei, Republic of Korea, Japan, Singapore and Vietnam
Government Co-ordinating agencies	Ministry of Industry, Mines and Energy (<i>Cambodia</i>); Ministry of Environmental Protection (<i>China</i>); Ministry of Environment (<i>Indonesia</i>); Department of Environment (<i>Lao PDR</i>); Ministry of Nature and Environment (<i>Mongolia</i>); Department of Environment and Natural Resources (<i>Philippines</i>) and Ministry of Natural Resources and Environment (<i>Thailand</i>)
GEF Grant	USD \$ 1,000,000 including PPG (Project Preparatory Grant)
UNIDO Inputs	USD \$ 400,000 (in-kind)
Counterparts Inputs: Governments of Cambodia, People's Republic of China, Indonesia, Lao PDR, Mongolia, Philippines and Thailand	US\$ 260,000 (in cash) US\$ 1,429,000 (in-kind)
Input of the Swedish Environmental Protection Agency (SwEPA)	US\$ 91,760
Support Costs (10%)	US\$ 90,000
Total Co-financing	US\$ 2,180,760
GRAND PROJECT TOTAL	US\$ 3,270,760 including PPG and agency support costs

This project has been financed by the GEF (Global Environment Facility) and implemented by UNIDO (United Nations Industrial Development Organization).

The Global Environment Facility (GEF) was established in October 1991 as a US\$ 1 billion pilot program inside the World Bank. The purpose was to assist in the protection of the global environment and to promote environmental sustainable development.

The GEF provided new and additional grants and concessional funding to cover the additional costs associated with transforming a project with national benefits into one with global environmental benefits.

UNDP, UNEP, and the World Bank were the three initial partners implementing GEF projects. In 1994, at the Rio Earth Summit, the GEF was restructured and moved out of the World Bank system to become a permanent, separate institution.

As independent financial organization, the GEF provides grants to developing countries and countries with economies in transition for projects in selected focal areas related to biodiversity, climate change, international waters, land degradation, the ozone layer and persistent organic pollutants.

The GEF is today the largest funder of projects to improve the global environment and so far as financed more than 2,400 projects in over 165 countries.

As part of its restructuring, the GEF was entrusted to become the financial mechanism for several international conventions such as the Stockholm Convention.

The GEF subsequently was also selected to serve as financial mechanism for the Stockholm Convention on Persistent Organic Pollutants (2001) and, therefore, in this framework, is financing this project.

Becoming a party of the Stockholm Convention the participant countries demonstrate that the reduction or elimination of POPs releases in general is considered a national priority and consequently they are committing to take the appropriate actions in this sense, preparing and approving the National Implementation Plan (NIP) that is detailing the legislative, management and the technical needs for the reduction and elimination of POPs.

The project overall objective aims at establishing a BAT/BEP regional coordination mechanism and platform for reducing and, where feasible, eliminating UP-POPs releases by capacity building at regional level and for implementing BAT/BEP measures in ESEA region including UP-POPs sector monitoring. According to the Convention the sector-wide introduction of BAT/BEP should be completed by 2020.

The immediate objective of the project aims at establishing a regional coordination mechanism that will support the regional and national plans and strategies of participating countries to meet their obligation to the SC particularly the introduction and demonstration of BAT/BEP in identified priority industrial source categories. The project anchors on the ESEA BAT/BEP Forum as a platform to create a constructive and productive regional cooperation to facilitate exchange of information and sharing of experiences for exploring opportunities to reduce or eliminate the release of UP-POPs from industrial sources and common practices.

On a global basis, combustion processes are the main source of Dioxins and Furans, accounting for about 95% of the emissions into the air. According to worldwide research results, the iron and steel industry, thermal power plants, industrial boilers burning coal and waste incinerators are important emitters of dioxins and furans, polluting the air.

The project has demonstrated the effectiveness of the introduction of BAT and BEP methodologies in the selected industrial sectors and, moreover, has demonstrated that applying

these practices, there are concrete possibilities for the reduction and elimination of unintentionally produced POPs releases.

2.1.2 Organizational arrangements for implementing the project

The ESEA (East and South East Asia) BAT/BEP FORUM is a programmatic regional initiative of UNIDO for the introduction of the Best Available Techniques (BAT) and Best Environmental Practices (BEP) measures on priority sectors defined by participating countries, based on their respective National Implementation Plans (NIP) in response to their obligations to the Stockholm Convention on Persistent Organic Pollutants (POPs).

The Forum was launched on October 5, 2007 during the Inaugural Ministerial Meeting in Bangkok. The main objective of the Forum is to create an enabling, non-legally binding framework for regional cooperation to facilitate the development, diffusion and transfer of BAT/BEP through concrete and substantial initiatives. All the countries of the Forum are members of several international agreements, among which the Stockholm Convention on POPs.

The Terms of Reference of the ESEA Regional Forum on BAT and BEP stipulates that the Chairperson of the Regional Forum would be selected by the Board on rotational basis in alphabetical order. The elected chairperson shall have a term of two years and would act on behalf of the Board in policy implementation. In year 2, the Chair should start transferring tasks to the co-chair who would be the next Chair. It was foreseen that the Chair should be selected at Director-General or equivalent level.

The agenda of the Forum has been developed according the international activities to reduce and mitigate the hazards of POPs, reducing harmful effects. The priorities are indicated in the NIPs and include legislative measures, constant monitoring and assessment of implementation of the activities.

The meeting of the Forum in 2010 reviewed all 15 activity items with the respective expected outputs and progress/milestones. It was recognized the importance in the various countries of the annual training program organized on training in sampling hazardous materials, sample preparation and analysis (monitoring), developing the regional monitoring capabilities. The idea was to share the experience acquired through the expertise of the international community among the participating countries. The capacity building activities should be parallel to the demonstration projects.

The participating countries agreed to update regularly the UP-POPs inventories. In this respect it was emphasized the importance of revising the baseline data with the newly issued emission factors.

The coverage of the projects promoted was policy research, inventory programs, developing technical guidelines and pilot projects. Particularly dioxin releases in iron and steel and waste incineration sectors, has been noticed that have been significantly reduced due to technology development. Pulp and paper and waste incineration in cement kilns was also included among the priority sectors. BAT and BEP programs are introduced to reduce dioxin releases in fly ash and waste water of the iron and steel and waste incineration industries. The networking has particular relevance and is of paramount importance for the success of many activities.

The overall implementation of the project has been supported and monitored by UNIDO, who had the responsibility of the overlook of the project management.

2.2 Analysis of concept and design of the project

2.2.1 General context

The scope of project in general covers the industrial sectors listed in part II and III source categories of the Annex C of Convention in participating ESEA countries, in terms of BAT and BEP and regional BAT and BEP guidelines and guidance made available to local officials and implemented in the region, regulatory and institutional framework strengthened in implementing BAT/BEP, regional coordination mechanism established, regional application of PP/CP methodology conducted, capacity in release monitoring, assessment and inventory improved, research and development, capacity building and awareness raising addressed during project implementation.

The Conference of the Parties (COP) of Stockholm Convention on Persistent Organic Pollutants (POPs) held in May 2001, agreed to protect human health and the environment from the harmful impacts of POPs, by reducing or eliminating releases of 12 POPs chemicals and wastes. The semi-volatile character of these chemicals results in long-range environmental transport that is their adverse human health and /or environmental effects are not only confined in areas close to their release but also poses global hazards.

The strategy proposed by the National Implementation Plan (NIP) includes efficient operation of combustion technologies, thermal and chemical processes, supported by the necessary capacity building and regulatory framework consistent with best available techniques and best environmental practices (BAT/BEP) guidelines and guidance.

UP-POPs are among the POPs chemicals listed in the Stockholm Convention that have demonstrated chronic adverse effects on human health and the environment. UP-POPs are formed in a wide range of industrial processes and in incineration processes and released into the air, water sediments and solids. In addition, there is a lack of facilities and responsible entities to treat and dispose of hazardous wastes. This gap has led factories to dispose of hazardous wastes in unsafe ways, either by mixing it with non-hazardous waste and storing it on site, or just dumping or releasing it.

Most industrial hazardous waste from larger industries is either treated on-site by simple furnaces or industrial boilers, or by specialized small private enterprises, which recycle part of the wastes and use locally made and cheap combustion technology or simple burning at low temperature, giving the favorable conditions for the formation and emissions of UP-POPs and other toxic pollutants.

Priority areas identified in the NIP include the stack emission sampling and other industrial release sampling and analysis of PCDD/PCDFs, which is a prerequisite for promoting BAT/BEP projects and for evaluating BAT/BEP implementation.

Since it is likely that some industries will use incineration or co-incineration technologies for the final disposal of POPs, there is also a need to monitor stack gas emissions of these facilities to exclude the unintentional formation and releases of PCDD/PCDFs into the environment.

The introduction of BAT/BEP strategies is the key approach to reduce and eliminate UP-POPs and other pollutant releases to the environment that will also result in the measurable regional and global environmental benefits.

Article 5 of the Stockholm Convention addresses measures that the Countries shall take to reduce releases of unintentionally produced POPs listed in Part I Annex C with the goal of their continuing minimization and, where feasible, ultimate elimination. Part II of this Annex is a list of source categories that “have the potential for comparatively high formation and release of these chemicals to the environment.”

For the new sources listed in Part II, which includes any new or any substantially modified facility, the countries are required to use Best Available Techniques. This requirement is to be “phased in as soon as practicable but no later than four years after entry into force of the Convention for the Party.”

Considering this condition, all new industrial sources listed in Part II of Annex C of the Convention will be required to adopt quickly BAT/BEP measures.

2.2.2 Elements of Project Design and role of GEF

The establishment of the emissions inventory has been facing difficulties due to lack of basic knowledge in the chemistry and environmental impact of UP-POPs. Additionally the assessment of incineration technologies and the technologies of other relevant industrial facilities has severe faults indicating a lack of expertise in the respective technology sectors and in BAT/BEP.

One key issue is the lack of proper coordination existing among the various regional government agencies and private sectors on their activities related to UP-POPs.

Monitoring activities and institutional capacity buildings are major needs to ensure a good environmental management.

Lack of transfer of BAT/BEP, weak monitoring capacity, lack of scientific and technical investigations are key barriers to the implementation of the necessary prevention and control measures for reducing pollution.

A regional action plan was prepared, aiming at mobilizing and harnessing the power of private sectors, research communities and government sectors to drive sustainable development.

Key experts from public, private and research sectors of economies have been brought together to tackle relevant matters. Experiences on related matters, such as chemical safety and technologies would be shared to help the safety and well-being of the peoples in ESEA region.

Establishment of coordination mechanism with the existing Stockholm Convention, regional and sub regional centres and Basel Convention regional and coordinating centres in Asia and the Pacific for capacity building and technology transfer has been included in the design of the project.

Existing centres in the region include the Basel Convention Coordinating Centres for Asia and the Pacific at Tsinghua University, Beijing (China) and the Basel Convention Regional Centre for South-East Asia, Ministry of Environment, Jakarta (Indonesia).

Through the project and through collective commitment of the ESEA Forum members, it was expected that the region would be able to establish agreed methodologies and strategies for the reduction and ultimate elimination of UP-POPs releases, encourage regional investment in the selected sectors and continuously monitor the emission performance of the industrial sector of the region.

Among the activities of the project was also to establish Working Groups for each of the main identified sector priorities. Each Working Group nominated a Coordinator who would

coordinate the inter-sectional activities of the Working Groups and assign tasks/activities of the action plan to participating countries.
The Coordinators have been as follows:

Working Group	Coordinator Country
Waste incineration	China
Open burning of waste/ uncontrolled burning of landfills	Cambodia
Power generation/heating	Lao PDR
Metallurgical industry (ferrous/non-ferrous)	Thailand
Cement kiln co-incineration	Philippines
Crematoria	Thailand

During the preparation of the above mentioned projects, it emerged that the methodologies used by the countries for the PCDD/PCDF inventories differed in such an extent that the obtained data were incomparable. Therefore the need for a harmonized methodology developing PCDD/PCDF inventories was evident.

During the project preparation and design phase several gaps have been identified that needed to be addressed to ensure its successful implementation and the achievement of project objectives. Among them:

- Gap between rapid industrial development and the status of pollution prevention and control infrastructure that is lagging behind.
- Current disposal and treatment practices to eliminate POPs pose an unacceptable burden to human health and environment by generating UP-POPs.
- Establishment of the furan/dioxin emissions inventory has been facing difficulties due to lack of basic knowledge in chemistry and bio-accumulation.
- Assessment of incineration technologies and technologies of other relevant industrial facilities has severe faults indicating a lack of experience and expertise in the respective technologies in the context of BAT/BEP.
- Lack of proper coordination among the various government agencies and private sector in their activities related to UP-POPs that hampers data gathering and information exchange.
- Lack of BAT/BEP transfer, weak monitoring capacity (particularly sampling capacity), lack of scientific and technical investigations are key barriers to the implementation of the necessary control measures for reducing pollution.
- Inadequate policy and regulatory framework for control of hazardous chemicals in general and POPs in particular.
- Existing laws and regulations are too general and may be impractical in some cases, due to a lack of detailed rules to support their implementation.
- Enforcement of laws and regulations is particularly insufficient in the medium and small-scale enterprises sector.

Due to the rapid economic development, environmental pollution (including UP-POPs pollution), if not controlled, can be the major drawback by burdening environment, destroying eco-systems and threatening human health.

Therefore, it is crucially important for the regional sustainable development to reduce the impact on the environment from the different pollutants and to implement pollution prevention and control measures in industry.

In the ESEA region they are still at an early stage to adequately address all pollution release vectors such as air, water sediments and solids.

- a) Solid wastes and hazardous and chemical wastes: The UP-POPs released on solids are not always properly managed and can therefore directly contaminate land or if land filled can further impact the environment.
- b) Air pollution: The overall exposures to particulates exceed permissible levels at many urban and industrial locations. Main contributors are industrial emissions, combustion sources and the increasing numbers of vehicles that heavily impacting the air quality. The estimated total UP-POPs releases into the air have the potential to considerably increase with industrial development if appropriate measures, in particular BAT/BEP measures would not be taken. So far limited control measures on UP-POPs emissions have been adopted and there are insufficient regulations in place.
- c) Water pollution: Lack of efficient water treatment poses a major health threat. Aquatic and marine eco-systems are also threatened by the high amounts of untreated sewage and industrial wastewater generated in urban centers. Several enterprises do not have wastewater treatment system and most of the older industrial zones do not have central wastewater treatment plant. Industrial wastewater is only treated superficially and then discharged directly into surface water sources, causing heavy pollution in aquatic eco-systems.

Although water is not a major release vector for UP-POPs, it needs, however, to be addressed. This is of concern for some industries like pulp and paper, textile and leather.

The establishment of the PCDDs/PCDFs inventory has been facing difficulties due to lack of basic knowledge in the chemistry and environmental danger of UP-POPs.

Additionally the assessment of incineration technologies and the technologies of other relevant industrial facilities has severe faults, indicating a lack of expertise in the respective technology sectors and in BAT/BEP.

The weaknesses and limitations in institutional capacity relating to policy and regulations are obvious. One key issue is the lack of proper coordination among the various government agencies and private sectors on their activities related to UP-POPs.

Lack of transfer of BAT/BEP, weak monitoring capacity, lack of scientific and technical investigations are key barriers to the implementation of the necessary prevention and control measures for reducing pollution.

The GEF intervention in this project is justified by all the above mentioned reasons and by the expansion and modernization of the industry, which has gaps in the institutional capacity to effectively design and implement adequate pollution prevention and control.

The introduction of pollution management system has not kept pace with this expansion.

The absence of effective pollution prevention and control and management systems is of international concern.

The application of BAT/BEP involves the prior hazard identification and environmental impact assessment and the application of appropriate technologies to address the identified issues in their social, geographical, economic and cultural contexts. The operation of BAT/BEP facilities requires the application of regulatory controls including feasibility assessments, planning permits and environmental impact assessments.

2.3 What are POPs

The **Stockholm Convention on Persistent Organic Pollutants (POPs)** is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods and become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife.

The National Implementation Plan (NIP), requested by the Stockholm Convention, is a plan for the management of POPs and part of a national sustainable development strategy. The national implementation plan is a dynamic document to be reviewed periodically and updated to address new obligations under the Convention arising from the listing of the new POPs.

Every human in the world carries in his or her body traces of POPs, which circulate globally through a process known as the “grasshopper effect” and include chemicals which are agents that can kill people, damage the nervous and immune systems, cause cancer and reproductive disorders and interfere with normal infant and child development.

Generally there is lack of information on the use and presence of new POPs in supply chains and production processes, as well as in recycling and waste stream. Knowledge and information is important to protect human health and the environment from hazardous chemicals and wastes. POPs are carbon based organic–halogenated substances, which possess a particular combination of physical and chemical properties that once released into the environment are:

- Highly toxic for the environment, humans and wildlife;
- Persistent in the environment and resisting to biodegradation for many years;
- Accumulating in terrestrial and aquatic ecosystems;
- Widely distributed throughout the environment as a result of natural processes involving soil, water and, most notably, air;
- Accumulate in the fatty tissue of living organisms, including humans, and are also found at higher levels of concentration in the food chain through a process called bioaccumulation.

In nature, these substances affect plant and human and animal development and growth. Exposure to POPs can lead serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to diseases.

This group of pollutants initially consisted of:

- **Pesticides:** aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene;
- **Industrial chemicals:** hexachlorobenzene, polychlorinated biphenyls (PCBs);
- **By-products** (Unintentionally Produced POPs): hexachlorobenzene; polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans and PCBs.

The Stockholm Convention that was adopted in May 2001 and entered into force in 2004 requires the Governments to take measures to eliminate or reduce the release of POPs into the environment.

As a result of the releases to the environment over the past several decades due especially to human activities, POPs are now widely distributed over large regions (including those where POPs have never been used). This extensive contamination of environmental media and living

organisms includes many foodstuffs and has resulted in the sustained exposure of many species, including humans, for periods of time that span generations, resulting in both acute and chronic toxic effects.

Due to the global risks posed by the long range transport of POPs, they represent a problem that has to be dealt with not only locally but also at global levels, to eliminate the release of these chemicals.

Though not soluble in water, POPs are readily absorbed in fatty tissue, where concentrations can become magnified by up to 70,000 times the background levels.

Fish, predatory birds, mammals, and humans are high up the food chain and so absorb the greatest concentrations. When they travel, the POPs travel with them. Therefore, POPs can be found in people and animals living in regions thousands of kilometres from any major POPs source.

Some POPs are also considered to be endocrine disrupters, which, by altering the hormonal system, can damage the reproductive and immune systems of the exposed individuals.

POPs are distributed throughout the environment as a result of natural processes involving soil, water and air.



A boiler in one of the demonstration pilot enterprises.

3) Methodology of the Evaluation

3.1) Purpose and objectives of the evaluation

The tasks of this in-depth evaluation are outlined in the attached Terms of Reference (Annex I).

The purpose of a final independent in-depth evaluation is to enable the project stakeholders (Donors, Government authorities of participating member countries, national counterparts and stakeholders, beneficiaries, industries, GEF and UNIDO) to take final informed decisions on possible reorientation of the activities, through the analysis of the achievements and the shortcomings or weak aspects of the project.

The main focus of the evaluation is to assess the current project situation and to evaluate the alternative scenarios and feasibility for the future sustainability of the operations.

The evaluation process offers the opportunity to the project stakeholders to learn about the possibilities of future re-orientation of the related activities and, in case, reconsider alternative approaches. The evaluation process will provide with lessons and experiences for the eventual future re-design and implementation of similar projects aiming at building capacities for environmentally sound management.

According to the GEF document (Eval. Doc. 1 2006), evaluation has the following objectives:

- a). Promote accountability for the achievement of GEF objectives through the assessment of results, effectiveness, processes and performance of the partners involved in the activities. GEF results are monitored and evaluated for their contribution to global environmental benefits.
- b). Promote learning, feedback, and knowledge sharing on results and lessons learned among the GEF and its partners, as a basis for decision-making on policies, strategies, program management, and projects, and to improve knowledge and performance.

The above explains the concept and role of evaluation within GEF defining its framework. On evaluation issues, specifically it establishes requirements for how GEF activities should be evaluated in line with international principles and standards for monitoring and evaluation.

The purpose of the evaluation is to enable Governments, counterparts, GEF, UNIDO and other stakeholders to:

- a) Verify prospects for development impact and sustainability, providing an analysis of the attainment of global environmental objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators. The assessment includes examination of the relevance of the objectives according to project evaluation parameters.
- b) Examine project relevance, effectiveness, efficiency and sustainability by drawing conclusions and recommendations in relation to future activities.
- c) Draw lessons of applicability for replication of the experience gained in this project.

The evaluation is trying to determine, as objectively as possible, relevance, efficiency, effectiveness, impact and sustainability of the project particularly regarding:

- The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs global priorities and partners' policies.
- Whether there has been any development in the Capacity building of managerial and technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases?
- The relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions.
- Was the project concept in line with the development priorities and plans of the countries (ownership)? Was the project formulated with participation of national counterpart and/or target beneficiaries?
- How has been applied the concept of the project to reduce and eliminate releases from "unintentional production" and coordinate its activities with the national strategies for environmental protection, industrial sustainable development and cleaner production?
- Is the project's design adequate to address the problems? Was a participatory project identification process applied in selecting problem areas and national counterparts?
- The chosen strategies and target groups concerning Capacity Building of managerial and technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases, correctly chosen or should they being promoted with different strategies or should other target categories have been selected?
- The extent to which the project has been consistent with the policy framework.
- The extent to which the objectives correctly address the identified problems.
- The extent to which the nature of the problems originally identified has been faced;
- The quality of stakeholders and target groups and of institutional capacity issues;
- The quality of the strategic options, of the implementation strategy and of management and coordination arrangements;
- Whether the project reached the goals set in project document and in the work plan?
- Whether the resources provided (expertise, training) have been of good quality?
- Whether the project established enhanced efficiency in reducing, avoiding and eliminating UP-POPs releases and reducing releases of other pollutants by coordinating the implementation of the Stockholm Convention action plans with BAT/BEP activities in the industry at regional scale, reviewing and improving national policies?
- How the project established enhanced capacity building for monitoring procedures for UP-POP chemicals as prerequisite for implementing BAT/BEP?
- To what degree the elements of capacity building of technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases have been effective?
- How have been spread the awareness of risks and the Stockholm Convention at the level of environment related organizations and enterprises owners?
- How good was the quality of the capacity building provided by the project?

At impact level the evaluation will make an analysis of the following aspects:

- Extents to which project's objectives have been achieved, in particular the overall objective.
- Whether the effects of the project:

- a) Have been facilitated or constrained by external factors.
- b) Have produced any unexpected impacts and how have these affected the overall impact.
- c) Have been facilitated or constrained by the project management, by co-ordination arrangements or by the participation of relevant stakeholders.
- To what degree do the companies implement the Capacity Building of their managerial and technical personnel in applying BAT/BEP in priority industrial source categories to reduce UP-POPs release?
- The enhanced capability for establishment of adequate monitoring infrastructure for UP-POP chemicals as key prerequisites for implementing BAT/BEP and other obligations of the SC?
- How has the project influenced the implementation of related national legislations?
- Which are the weaknesses or the strengths? What is the quality of the management system?

The primary purpose of any independent evaluation is:

- Assessing the achievements against the objectives and the expected results.
- Identifying factors that have facilitated the achievements of the projects objectives or in case the factors that hindered the fulfilment of these objectives.
- Determining which lessons can be learned from the existing experience, in order to improve the activities in a further phase, with particular regard to the capacity of the structures supported to become self-sustainable.

The analysis will be based on the following:

1. A desk review of project documents including:
 - (a) The original project document, monitoring reports (such as progress and financial reports to UNIDO and GEF annual Project Implementation Review reports), output reports and relevant correspondence.
 - (b) Notes of the Steering Group meetings.
 - (c) Other project-related material produced by the project.
2. Interviews with project management and project partners.

The above mentioned activities should be complemented by the project with information on training, capacity building, policy advice, etc.

- ❖ The Project Progress Reports, which provide a valuable tool regarding self-appraisal of implementing parties of the results obtained and of the difficulties encountered.
- ❖ Meetings with the UNIDO Project Manager, the National Project Coordinators, the national counterparts and the staff of national institutions.
- ❖ Meetings with national counterpart institutions and high-ranking officials.

The issues have been analysed in an impartial and objective way, which should be helpful to the responsible authorities and project staff to improve their performance.

The issues have been discussed at a final meeting in Vienna with the Project Manager.

The report attempts to give a comprehensive image of the activities, analyzing the issues in a way, which should be helpful for the responsible authorities to decide how to orient similar activities in the future.

3.2) Composition and timetable of the mission

Observations and findings in this report and the views and opinions expressed, do not necessarily reflect the views of the involved Governments, UNIDO or the management of the project.

The job a description of the evaluator is contained in Annex V.

This evaluation has been carried out solely by an international evaluator since an international expert was not identified.

The author of this report has been: **Mr. Mario Marchich**, international consultant, specialized in evaluation of international technical assistance cooperation projects.

An expert of another UNIDO project, Ms. **Ms. Leah Texon** Consultant in Environmental Science and Engineering, has assisted and supported in her technical capacity during the interviews and the visits made in Thailand and Cambodia.

Further, also the project manager **Ms. Carmela Centeno**, accompanied and supported, as resource person, the evaluator in his work during these visits and the desk review in Vienna.

The evaluation was carried out in the period October – December 2013 and consisted of the inception phase, the field mission phase (Visits to Thailand, Cambodia and Lao PDR in October – November 2013) and the final reporting phase. The Agenda of the mission is in Annex II.

Data and evidence were collected based on a participatory mixed-methods approach which included: (i) desk review of reports and documents, (ii) interviews with project staff and stakeholders during the field visit (iii) analysis of the answers to the questionnaires distributed to all relevant persons of the seven participant countries. The questionnaires are included in the Annex IV.

The results of these discussions during the interviews and the comments made by the participants have been taken into account in the report.

The list of the places visited and of the persons interviewed in the framework of this evaluation is in Annex III.



Cambodia: A boiler heating with wood in one of the demonstration companies.

4. Assessment of the activities and findings

4.1 Context and relevance of the project

An assessment concerning the impact of a project has to analyze five major criteria: relevance of the project and its design, effectiveness, efficiency, monitoring of results and sustainability.

Relevance is concerned with assessing whether the project is in line with local needs and priorities, i.e. the quality of the problem analysis and the project's intervention logic with verifiable indicators of achievement.

Analysing achievements and results of the project and its needs and objectives, it can be concluded that they are in line with the needs of the region concerning the establishment of a regional coordination platform.

Translated versions of the guidelines in the local languages have been prepared and training programs on POPs issues have been conducted.

The needs and the objectives of this regional project are in line with the needs of the region concerning the establishment of a regional coordination platform.

The project has been consistent with the policy and programme framework within which the project is placed, in particular the National Implementation Plan, national development and sector policies. In light of the above, the project has been supported by the governments to receive the necessary inputs for BAT/BEP implementation.

The respective NIPs have highlighted the weaknesses of the present hazardous waste management practices and the need for institutional and regulatory development, capacity building and diffusion of the public awareness in the area of POPs.

Further, the establishment of a regional platform (ESEA BAT/BEP Forum) has been very useful for the implementation of the project activities.

This regional project for capacity building of BAT/BEP strategies has been instrumental in the development of other projects of similar nature, such as for instance the Boiler project in the same area.

The project design is relevant to the GEF strategies. The project has been formulated under the GEF 4 focal area strategy and specifically Strategic Program 1: strengthening capacities with the objective to build the capacities required in eligible countries to implement in a sustainable and effective manner, the action plans as reflected in their National Implementation Plans to meet their obligations to the Stockholm Convention.

Relevance of the project to the country needs. The project can be considered very relevant for the country needs by all the stakeholders. In general, the expected industrialization growth in the participating countries makes the project objectives relevant to chemicals management and environmental issues.

The project has been relevant towards the Stockholm Convention's obligations and UNIDO's mandate for promoting sustainable industrialization.

The project addresses the countries' obligations regarding the SC. The Article 5 of the SC states that each party shall develop an action plan or, where appropriate, a regional action plan to reduce the total releases of chemicals listed in Annex C, with the goal of their continuous minimization and, where feasible, ultimate elimination.

For instance, following a detailed system audit, engineers and technicians have been trained to identify key areas for improved efficiency with good engineering practices.

Further, regional baseline reports for fossil fuel-fired utilities and industrial boilers, metallurgical, waste incineration and open burning have been drafted. Two annual workshops on BAT/BEP related topics have been held for each participating country and the regional coordination networking mechanism has been established. With the support of the ESEA Forum and the Basel Centers of Asia-Pacific and South East Asia, the project has also addressed new POPs through the drafting of an e-waste project.

Through the activities of the project, pilot universities and laboratories have been identified for cooperating and offering curricula and training on BAT/BEP for the application of pollution prevention measures.

In plant trainings in selected priority sectors have been held.

The assistance of UNIDO by providing experts in BAT/BEP has been acknowledged as very helpful by the participants of all the countries involved.

Since UNIDO's mandate is to support to support and promote the implementation of the Stockholm Convention regarding sustainable industrialization, with special attention to the chemical polluting substances the project is well in line with the UNIDO's mandate and can benefit from the organization's comparative advantage as the GEF implementing agency in this sector.

Concerning sustainable industrialization the project and its subsequent derived projects, has helped in identifying key areas for improved efficiency and advice on good engineering practices. The benefits of a Steam Management System include reduction in utility charges and maintenance costs; Lower fuel cost with improved energy efficiency, i.e. energy efficiency; lower emissions and an efficient steam system, with respect for the environment.

The key areas targeted for savings are:

- Steam distribution and improved installation
- Improve pipe insulation
- Isolation / removal of unused piping
- Steam trap monitoring
- Pipe work modification
- Repair of steam leaks
- Steam generation

Steam is one of the prime carriers of heat for process industries, from food and dairy through to biotechnology and pharmaceuticals. It is used for process heating, sterilization of products and equipment, and for the humidification of air.

The quality requirements of foodstuffs and medicines have improved dramatically in recent times. In the past, normal factories or plant steam (with harmful boiler, pipe scale and corrosion particles) was acceptable, but many production processes today demand cleaner grade of steam.

The energy costs typically account for over 50% of the operating expenditure, being generation of steam one of the largest components.

The project has supported in preparing regional baseline reports for metallurgical, waste incineration and open burning, as a result some policies have been drafted. Two annual workshops on BAT/BEP related topics have been held for each participating country and the regional coordination networking mechanism has been established. With the support of the ESEA Forum and the Basel Centers of China it has been drafted a regional e-waste project.

Pilot universities and laboratories have been identified for cooperating and offering curricula and training on BAT/BEP for the application of pollution prevention measures.

Some in plant trainings in the selected priority sectors have been held through the National Cleaning Production centers created by UNIDO.

In response to the SC, chemicals strategy objective of GEF 5, aiming at phasing out and reducing POPs releases and following the NIP priorities, investments are expected to be supported by the GEF that addresses implementation of BAT/BEP for release reduction of unintentionally produced POPs, including from industrial sources and open-burning.

The project has contributed to mitigate human health problems in the area, especially:

1. Creating awareness among public and private sectors and other relevant stakeholders exposed to POPs.
2. Contributing to capacity building for the introduction of BAT/BEP strategies
3. Putting in place a common regional legislative and policy framework.
4. Improving the capacity to enforce the legislation, although still only partially and with several weaknesses
5. The awareness of danger of POPs has increased among the communities and industries dealing with them, although still not very diffused among the normal population. Unfortunately there is lack of interest from the side of the private sector.
6. Finally, through the demonstration activities has generated ex-post benefits in terms of capacity, policy and legislation.

The following institutions have participated in this regional project: Ministry of Environment (Cambodia), Foreign Economic Cooperation Office of the Ministry of Environment protection (China), Ministry of Natural resources and Environment (Lao PDR), Ministry of Nature and Environment and Tourism (Mongolia), Department of Environment and natural resources (Philippines) and Department of Agricultural Extension and Ministry of Agriculture (Thailand), Vietnam Environment Administration, Ministry of Natural Resources and Environment (Vietnam).

In line with the GEF focal area strategy, the project, based on the lessons learned from demonstration activities, has contributed in strengthening regulatory measures and institutional capacities, addressing environmentally sound waste management, particularly concerning municipal waste and agricultural residues priorities.

To conclude, based on the assessment of project relevance to national priorities and policies, priorities related to relevant international conventions and to the GEF's strategic priorities and objectives, the **overall project relevance can be rated as SATISFACTORY and in line with the results expected.**

4.2 Project Design

Assessment of the project design is an analytical tool indicating the conditions and the assumptions for developing a programme in support to the expressed needs of the counterparts and of the beneficiaries.

It evaluates the project's adequateness to address the problems. The GEF-supported projects are required to have a clear thematically focused development objective, attainment of which can be determined by a set of verifiable indicators. The projects are expected to be prepared in a participatory manner and with contributions of national stakeholder and/or beneficiaries (ownership).

Ownership is not only participation in the design, but also includes allocation of resources (staff, office, in-kind contributions, financial contributions), and interaction between the project implementing partners, shared decision making and transparency of planning and funding.

Ownership is the participation of the stakeholders who have an interest in a development process in the planning and implementation of the project designed for their benefit.

It answers to the question “who is the development for and who should be involved” if the development process has the prospect of producing sustainable results

The project final objective is to collectively update knowledge on technology transfer, sampling analysis, research for development and contribute to global monitoring of UP-POPs releases using a regional programmatic approach in order to avoid that each country adopts different solutions to implement BAT/BEP, depending on relevant local standards, laws and regulations as well as on local social and economic conditions.

The project is considered by beneficiaries and stakeholders as well designed with indicators that are SMART (specific, measurable, attainable, relevant and time-bound).

The project document addresses adequately the legal and institutional capacities of the countries involved and has benefitted of the UNIDO’s technical expertise and monitoring.

Five substantive Outcomes were foreseen to achieve the project objectives:

Outcome 1: Expansion of regional guidelines and guidance on BAT/BEP, addressing specific features of the industry in the region, common practices, including local and traditional practices and related socio-economic considerations.

Outcome 2: Establishment of BAT/BEP regional coordination mechanisms for developing human resources, technical capabilities and networking capacities.

Outcome 3: Continuous reduction of UP-POPs in priority source categories using new tools and methodologies.

Outcome 4: Contribution of ESEA regional UP-POPs inventory to the UNEP UP-POPs global monitoring program, to apply pollution prevention measures and improve release monitoring.

Outcome 5: Establishment of the project management at regional level, stakeholder partnership and monitoring and evaluation.

4.3 Effectiveness of the project

The effectiveness in a project is the extent to which the outputs of the project are used to achieve the foreseen purposes. In other words, it is the extent to which the intervention objectives are met. Effectiveness is therefore linked to the assessment of the long-term effects of the intervention.

Implicit within the criterion of effectiveness is the concept of timeliness.

The project is rated in the annual report to be on track with the work plan set. The regional coordination platform has been established and further strengthened through the activities implemented.

The impact has been evident, having the project attained its objectives in a satisfactory way. The project represents a platform for information exchange and technical discussions.

It has enabled capacity building in the area of BAT and BEP, particularly in the four priority sectors targeted.

The gaps on the legislations have been assessed, but the enforcement is delayed due to scarce resources obtained, taking into account that dioxin sampling and analysis require resources, training and capacity building. Partnerships with specialized international laboratories on dioxin analysis have been established, although they are not yet enough for the needs of the region.

The participating countries are introducing Unintentional-POPs emission standards in the priority sectors.

Workshops for disseminating the information on U-POPs and BAT & BEP and rising awareness on this issue have been held.

As far effectiveness is concerned, the foreseen objectives have been met in a satisfactory way.

The planned outputs have been produced and the BAT/BEP guidelines have had concrete results on the efficiency of the capacity building, contributing to the outcomes for achieving the project objectives.

Some regulatory and enforcement capacities are in place and legislative and policy frameworks have been established or are under consideration in all the countries concerned. Generally the awareness among governmental authorities has been raised, strengthening the governments' capacities, including chemicals management. However, the capacity to enforce the regulations and the legislation still need to be improved.

The project has created awareness but still a lot has to be done to phasing out POPs and reduce the human and environmental exposure to them.


It can be noted a certain level of satisfaction among the project stakeholders, mainly with the national authorities and universities, regarding the results of the project implementation.

As far as the industries concerned in the entire region, only few of them have been reached within the project implementation. Thanks to the project the stakeholders have raised awareness and capacity of technical personnel with professional competencies in applying BAT/BEP to reduce UP-POPs emissions in the priority industrial sectors.

There are some positive changes occurred as a result of the activities of the project and some new technical solutions or innovative approaches have been identified. They could be further utilized nationally or internationally with good replication possibilities.

The introduction of BAT/BEP strategies is the key approach to reduce and eliminate UP-POPs and other pollutant releases to the environment and will also result in concrete measurable regional and global environmental benefits. National technical capabilities have been strengthened learning how to measure dioxin and furans in stack gas samples, using sampling methods and chemical analysis to trace levels of dioxins in these samples.

4.4 Assessment of project effectiveness per project outputs

Component 1	Expansion of BAT/BEP guidelines
Outcome 1	Expansion of regional guidelines and guidance on BAT/BEP, by addressing specific features of the industry in the region, common practices, including local and traditional practices and related socio-economic considerations
Problems faced	<p>Gaps on legislation assessed but full enactment is delayed due to resources required (e.g. dioxin sampling and analysis resources and capacity). Cost associated with dioxin analysis may not provide adequate data to establish baseline inventories; UNEP Dioxin Toolkit is still used for baseline dioxin quantification.</p>  <p>Cambodia. A textile pilot demonstration company</p>

	Activities expected to be realized	Achievements foreseen /indicators for accomplishing the activities expected	Status of actions accomplished. What has been done	Rating
	<p>1.1.1 Translate into local languages (if necessary) BAT/BEP guidelines and guidance documents prepared by the SC Secretariat and disseminate to relevant stakeholders.</p> <p>1.1.2 Carry out in-depth assessment of industry and practices in the region using harmonized methodology taking into consideration specific features of the industry, local and traditional practices and related Socio-economic considerations.</p> <p>1.1.3 Conduct a regional inventory of identified Industrial priority source categories of pollution and coordination with other BAT/BEP initiatives in the ESEA region.</p> <p>1.1.4 Expand BAT/BEP guidelines incorporating results of the regional assessment and Inventory of priority source categories.</p> <p>1.1.5 Adopt the draft regional guidelines and guidance and disseminate them to relevant stakeholders.</p>	<p>Translated BAT/BEP guidelines and guidance documents prepared by SC Secretariat</p> <p>-----</p> <p>Assessment of industry and practices in the region.</p> <p>-----</p> <p>Regional baseline reports on selected source categories</p> <p>Regional BAT/BEP guidelines addressing industrial sources and common practices</p> <p>Workshops for disseminating information on UP-POPs</p> <p>-----</p> <p>Awareness raising campaign materials produced in local language</p> <p>-----</p> <p>Training programs performed on POPs and UP-POPs issues in the region</p> <p>Workshops held on regulatory and policy frameworks on BAT/BEP based on needs of countries</p>	<p>China, Thailand and Mongolia have published versions of the BAT/BEP guidelines in their local languages.</p> <p>Lao PDR, Cambodia translated the fossil-fuel fired utilities and the industrial boiler guidelines. English version acceptable in the Philippines</p> <p>Regional baseline reports for: fossil fuel-fired utilities, industrial boilers, metallurgical, waste incineration and open burning drafted.</p> <p>Inventory done for fossil fuel-fired utilities and results shared with participating countries.</p> <p>Two annual workshops on BAT/BEP related topics held in each country.</p> <p>Awareness raising materials done in local languages</p> <p>Training programs on POPs issues conducted through Spirax Sarco (US world known co. providing services and solutions for control and efficient use of steam, air and other industrial fluids for industrial users) and NCPC Lao and Cambodia</p>	<p>Satisfactory</p> <p>Satisfactory</p> <p>Satisfactory</p> <p>Moderate satisfactory because the guidelines of SC were not expanded to the countries</p>

Output 1.2

Institutional capacity enhanced to adequately address regional issues of UP-POPs releases of priority source categories



Cambodia: An industrial boiler

	Activities expected to be realized	Achievements foreseen/ indicators for accomplishing the activities expected	Status of actions accomplished. What has been done	Rating
	1.2.1: Carry out targeted awareness raising campaigns for specific target groups such as government policy makers and enforcement officers, community leaders, managers of industrial estates, managers of owned industries, owners of private industries and educational institutions.	<p>Workshop for disseminating information on UP-POPs</p> <p>Awareness raising campaign materials in local Language</p> <p>Training programs and trainees on POPs and UP-POPs issues in the region</p> <p>Workshops on regulatory and policy frameworks on BAT/BEP</p>	<p>Reports on sensitization workshops and awareness campaigns. At least two national workshops held in each participating countries.</p> <p>Cambodia – general awareness raising and one special training for boiler operators</p>	Satisfactory
	1.2.2: Conduct regulatory and policy framework workshops on BAT/BEP to strengthen the recognition and understanding importance of an applicable regulatory framework by regulators and authorities	<p>In Lao and Cambodia were organized two workshops on Appropriate Legal Framework for the Introduction of BAT/BEP, sponsored by UNIDO and Swedish Environmental Protection Agency (SwEPA)</p>	<p>China held two Tech. Advisory group meetings with relevant stakeholders within project framework</p> <p>Indonesia – general awareness raising and meetings with industries</p> <p>Mongolia targeted industries and custom officers meetings</p> <p>Lao PDR – general awareness raising and special meetings with industries on used oil</p> <p>Philippines – general</p>	Satisfactory

		<p>1.2.3: Enhance existing institutional capacity in priority source categories through targeted training programs on POPs and UP-POPs issues in the region.</p>	<p>In Singapore (3 days workshop accomplished on April 2012 for 20 persons from the ESEA pilot industries on Fossil fuel fired utilities. (Spirax Sarco participation)</p> <p>Dioxin analysis training conducted with Tsinghua University in Beijing for one week on May 2012 with participation of 18 persons.</p>	<p>Thailand – targeted workshops on dioxin analysis and BAT/BEP curricula in universities</p> <p>Training made on: Steam Audits, Boilers operations, Boilers best practices and safety regulations. Participation of around 50 persons in each workshop.</p>	<p>Satisfactory</p> <p>Satisfactory</p>
Comments on Component 1	<p>The project has helped the growing of the regional cooperation Forum as a platform for information exchange and technical discussions. It enabled in the interested countries capacity building on the area of BAT/BEP especially <u>for the four priority sectors</u>: Fossil fuel-fired utilities and industrial boilers, metallurgical industry, open burning and waste incineration.</p>				
Component 2	Established BAT/BEP regional coordination mechanism				
OUTCOME 2	Establishment of BAT/BEP regional coordination mechanism for developing human resources, technical capabilities and networking capacities				
Problems faced with activities conducted	<p>Proper identification of specialized institutions and of appropriated counterparts for the delivery of the training.</p> <p>Selecting and train the national technicians in sampling, samples processing, analysis of results and in interpreting and applying these results for the occupational health and safety connected with the handling of POPs chemicals.</p> <p>Difficulty of implementing common activities and regulations due to the barrier of different languages.</p>				
OUTPUT 2.1	<i>Capacity building carried out through training seminars and in-plant assessment of selected sectors as part of regional coordination mechanism</i>				

	Activities expected to be realized	Achievements foreseen/indicators for accomplishing activities expected	Status of actions accomplished	Rating
	<p>2.1.1: Carry out capacity building through training seminars and in-plant assessment of BAT/BEP in selected sectors (including materials, energy and chemicals inputs, control and optimisation of process parameters, retrofitting and upgrading, equipment rating, cost calculation, etc.)</p> <p>2.1.2: Establish coordination mechanism with existing SC and Basel Centres in the region for capacity building and technology transfer.</p> <p>2.1.3: Establish linkages with other multi- and bilateral agencies efforts on laboratory inter calibration programs</p> <p>2.1.4: Training seminars in and review of the use of substitute or modified materials, products and processes in the relevant priority source categories</p>	<p>Training courses and programs on in-plant assessments</p> <p>Training courses and programs on new technologies and Processes</p> <p>In-plant training materials</p> <p>Established terms of Cooperation with Stockholm Convention and Basel Centres</p>	<p>7 In-plant assessment done for fossil fuel-fired utilities (2 in Thailand and 5 in each of other countries except China)</p> <p>4 for industrial boilers (2 in Thailand, 1 Cambodia, 1 Laos)</p> <p>3 for Power Plants (Philippines, Indonesia, Mongolia)</p> <p>4 for metallurgical industry (Vietnam, Lao, China, Mongolia)</p> <p>On average 15 participants each assessment</p> <p>-----</p> <p>Training on materials preparation and collection selection of waste and on Retrofitting for improvement of boilers.</p> <p>The trainers were from industrialized countries</p> <p>-----</p> <p>Coordination with SC and Basel Centres of China and Indonesia</p> <p>Adopted terms of cooperation among the countries</p>	<p>Satisfactory</p> <p>Satisfactory</p> <p>Satisfactory</p> <p>Satisfactory</p>

			<p>Linkages with Vietnam Dioxin Laboratory and Wadsworth Centre in New York</p> <p>Training seminars done for the fossil fuel-fired utilities</p>	
OU TPU T 2.2	<i>Adequate capabilities and skills of experts in the region for the introduction of regional BAT/BEP guidelines and guidance established</i>			
	Activities expected to be realized	Achievements foreseen /indicators for accomplishing the activities expected	Status of actions accomplished	Rating
	<p>2.2.1: Establish institutional networking among regional and national research institutions, international specialized technology centres, industrial sector institutions, chamber of commerce and industries, industrial associations and global environment NGOs and foundations</p> <p>2.2.2: Establish a technical steering committee for each selected industrial sector to create regional networks for collecting, compiling and disseminating relevant environmental and socio-economic information</p> <p>2.2.3: Develop a regional information exchange and sharing scheme</p>	<p>The terms of Cooperation with specialized institutions to address training needs has been established</p> <p>The exchange of information among the participating countries has been established</p> <p>Introduction of BAT/BEP in the Universities curricula of the region</p> <p>done</p>	<p>Adopted terms of cooperation ----- Reports prepared on coordination of the activities ----- National University partners identified for BAT/BEP University Curricula ----- 18 participants at workshop at Tsinghua University and 15 at Wadsworth Center. 4 laboratory technicians (Indonesia,Thailand ,Philippines, Mongolia) trained for one month on dioxin analysis. ----- Philippine Institute of Chemical Engineers and industrial associations had coordination role and training on</p>	<p>Satisfactory</p> <p>Partially Satisfactory</p> <p>Partially</p>

	<p>2.2.4: Assist developing educational courses at graduate and post-graduate level that could be used in the Region</p> <p>2.2.5: Develop regional coordination for research and development as well as technology transfer related to BAT/BEP</p>	partially established	<p>BAT/BEP on green boilers technologies.</p> <p>-----</p> <p>Accomplished only for fossil fuel-fired utilities</p> <p>The regional information exchange Partially accomplished through regional workshops.</p> <p>Website on activities of Forum established and updated on activities of SC.</p> <p>Accomplished only for fossil fuel-fired utilities and industrial boilers for chemical and mechanical students.</p> <p>Accomplished with Vietnam BAT/BEP and Wadsworth Center.</p> <p>The results of the study visits have been shared during the Steering Committee Meetings.</p>	<p>Satisfactory</p> <p>Partially Satisfactory</p> <p>satisfactory</p>
Comments on Component 2	<p>According the annual project implementation report the main objective and the activities foreseen have been satisfactorily implemented. However, some activities related to metallurgical, open burning and waste incinerators have not been fully achieved as, according to the report, no additional grant from the GEF has been received.</p> <p>Globally, the regional coordination mechanism on BAT/BEP has been created and the development of the human resources and of the technical capabilities now exists.</p>			
Outcome 3	Continuous reduction of UP-POPs in priority source categories using new tools and methodologies			
Output 3.1.	Regulatory/policy framework on BAT/BEP established			
	Activities expected to	Success	Status of	Rating

	be realized	indicators Achievements	implementation	
	<p>3.1.1: Review current national legislative system to identify barriers and gaps on the implementation of BAT/BEP.</p> <p>3.1.2: Form a task force to work on the legal aspects of BAT/BEP implementation.</p> <p>3.1.3: Prepare implementation schedule and legal framework of regional guidelines and guidance.</p> <p>3.1.4: Enforce regional guidelines and guidance in due course</p>	<p>Identification of barriers and gaps in national legislations</p> <p>Regional guidelines and guidance implemented by 2013</p> <p>Enforcement of regional guidelines and guidance</p>	<p>Task force report sent to Swedish EPA on legal framework</p> <p>Policy reports provided but no enforcement</p> <p>Task force formed with participation as member the National Coordinator of each country</p> <p>Workshop reports on regional Guidelines implementation</p> <p>Done only in Thailand and China regarding Standards on Incinerators and Crematoria and on Dioxin measurements.</p>	<p>Satisfactory</p> <p>Less than expected. Enforcement cannot be done due to lack of standards and infrastructures (laboratories)</p>
Output 3.2 Pollution prevention measures regionally applied in selected sectors prior to introducing BAT/BEP (Annex C, Part V-A of Stockholm Convention)				
	<p>3.2.1: Apply short term actions through existing institutions such as National Cleaner Production Centres (NCPCs), industrial research institutions, regional institutions such as Stockholm and Basel Convention Centres and AIT.</p> <p>3.2.2: Apply long term actions in selected sectors</p>	<p>Short term actions applied not later than 2011</p> <p>Long term actions continuously applied beyond 2011</p> <p>PP/CP methodology guidelines document</p>	<p>Regional CP Reports</p> <p>Coordination only with Lao Cleaner Production Centre</p>	<p>Less than expected</p> <p>Less than expected</p>

	according to the activity plan and work programme		Accomplished only with Fossil fuel fired utilities for Boilers and Power Plants	
Component 4	Improved regional capacity in release monitoring and assessment			
Outcome 4	Contribution of ESEA regional UP-POPs inventory to the UNEP UP-POPs global monitoring program			
Output 4.1	UP-POPs release estimates of selected priority source categories of the region established			
	Activities expected to be realized	Success indicators Achievements	Status of implementation	Rating
	<p>4.1.1: Design monitoring programs for training purposes in selected priority source categories.</p> <p>4.1.2: Provide measured data to further revision of I-TEQ emission factors in UNEP Toolkit (last version)</p> <p>4.1.3: Prepare guidelines for inventories for part II and III source categories, Annex C of the Convention (as required)</p>	<p>Identification of the facilities for monitoring the programs</p> <p>Emissions inventory based on analytical measurements in selected facilities</p> <p>Emission factors for relevant source categories</p>	<p>Selection criteria and audit reports Analytical and inventory reports</p> <p>Actual emission factor data Accomplished for Fossil fuel fired utilities</p> <p>Accomplished only for Fossil fuel fired utilities</p> <p>Accomplished only for Fossil fuel fired utilities</p>	<p>Less than expected</p> <p>Less than expected</p> <p>Less than expected, funds not enough. The cost of each assessment in industry costs around 25.000 \$ for each dioxin sampling campaign</p>
Output 4.2	Capacity in release monitoring and assessment specifically in sampling analysis and reporting of UP-POPs improved			

	Activities expected to be realized	Success indicators Achievements	Valuation rate of status of implementation	Rating
	<p>4.2.1: Review all main international guidance Documents on POPs monitoring network and programs of the United Nations University (UNU).</p> <p>4.2.2: Produce a summary of above monitoring documents for adoption and use</p>	Review all main international guidance documents on POPs Monitoring	<p>Review reports done. The cooperation was with UNEP and no collaboration with UNU</p> <p>Summary of monitoring guidance documents recommended for adoption and use</p>	<p>Satisfactory</p> <p>Satisfactory</p>
	<p>4.2.3: Train laboratory personnel on sampling methods of UP-POPs and sample preparations, analysis,interpretatiand reporting of results with specific reference to immune-essay methods.</p> <p>4.2.4: Train staff for certification of applied analytical methods for UP-POPs</p>	<p>Training courses for laboratory personnel on sampling methods and analysis of UP-POPs</p> <p>Establishment of certified monitoring atories <input type="checkbox"/></p> <p>Training courses for certification of applied analytical methods for UP-POPs and for certification of technical laboratory personnel Including hazardous operations</p>	<p>Training course reports through Wadsworth Center and Tsinghua University.</p> <p>Certification reports</p> <p>Training course through Wadsworth Center and Tsinghua University.</p>	<p>Satisfactory</p> <p>Satisfactory</p>

Component 5	Project management			
Outcome 5	Establishment of project management at regional level, stakeholder partnerships and monitoring and evaluation			
Output 5.1	Project Management structure established			
	Activities expected to be realized	Achievements	Valuation rate of status of implementation	Rating
	5.1.1: Establish BAT/BEP Forum 5.1.2: Recruit National Coordinators and other Experts and Creation of website for information exchange/sharing & online learning	Regional meetings held M&E reports	Regional meetings reports. Two meetings yearly for the 4 sectors from June 2010. M&E reports Personnel recruited Website Partially accomplished	Satisfactory satisfactory
Output 5.2	M&E framework designed and implemented according to GEF M&E procedures			
	Activities expected to be realized	Achievements	Valuation rate of status of implementation	Rating
	5.2.1: Project Inception Workshop 5.2.2: Prepare Inception report 5.2.3: Measure impact indicators on an annual basis 5.2.4: Prepare Annual Project Reports and Project Implementation Reviews 5.2.5: Annual review meetings and technical committee meetings 5.2.6: Carry out mid-term external evaluation 5.2.7: Final external evaluation 5.2.8: Complete Project Terminal Report 5.2.9: Carry out annual financial audits 5.2.10: Establish project management information		Accomplished Accomplished Done through annual meetings Accomplished Accomplished Not yet finished Not yet	Satisfactory Satisfactory Satisfactory Satisfactory Satisfactory satisfactory

	system (MIS) and project website to disseminate information to stakeholders		Partially accomplished	
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4.5 Efficiency of the project

The efficiency of a project is the extent to which the results have been obtained with the least costly resources possible. The relationship between the inputs utilized and the outputs produced, both in terms of quantity, quality and timeliness.

Generally it requires comparing alternative approaches to achieving an output, to see whether the most efficient approach has been used.

The assessment of efficiency is made rating how economically the inputs (human, financial, technical and material resources) have been converted into outputs.

In this regional project training courses and programs on new technologies and processes have been held. Long term actions continue to be applied after 2011, like the Cleaner Production methodology guidelines. The emissions inventory is based on the analytical measurements made in selected facilities of the participating countries.

The project has arranged in the region several training courses for laboratory personnel on sampling methods of UP-POPs, for laboratory personnel in sample preparation and analysis of UP-POPs and, finally, the project has helped for the establishment of certified monitoring laboratories.

Training courses for analytical needs and for certification of applied analytical methods for UP-POPs have been also organized through the activities of the project, like training courses for the certification of technical laboratory personnel, including hazardous operations.

The capacity of the government staff has been strengthened but it is not enough to cope with the environmental pollution control. Because the number of trained staff is not adequate and after they were trained they are not placed on the right job.

Globally it can be stated that the training foreseen has been satisfactory arranged with the funds at the disposal of the project. The project activities are especially related to capacity building of the national authorities and related staff, with minor focus on mitigation measures.

The training was oriented to focus particularly on relevant technical personnel and directly operational in the technical specific activities. It is suggested that in the future the participants to the trainings and study tours be carefully chosen by having strong and precise pre-selection criteria for the persons to be trained.

The awareness of the risks of POPs has been spread by the project at level of environmental related institutions and enterprises owners, but workers directly involved with the danger of the emissions have been only marginally reached, according to the people interviewed, although some collaboration with newspapers and specialized magazines exists.

The regional coordination mechanism on BAT/BEP has been created and the development of the human resources and of the technical capabilities now exists. Coordination on reduction of U-POPs exists only with the Lao Cleaner Production Centre, in order to propose energy efficiency solutions for the enterprises involved, to incorporate knowledge, cleaner production solutions and BAT/BEP in the enterprises.

The capacity of the institutions in release monitoring and assessment specifically in sampling analysis and reporting of UP-POPs has improved.

4.6 Impact, results and monitoring

The impact is the achievement of effects and outcomes. The results may be positive or negative and may be produced by the project intervention, directly or indirectly, intended or unintended. The impact implies the relationship between the project's specific and overall objectives. Generally, they are the effects resulting from the application of the project inputs and indicate the performance of the project.

It shows the improved capabilities of the Counterparts and beneficiaries, after having received the assistance and it is the expected improved situation of the counterparts (government, institutions and pilot enterprises).

The results are analysed through the monitoring which is a continuous and periodic function that uses systematic collection of qualitative and quantitative data to keep activities under control, helping to identify implementation issues that warrant decisions at different levels of management. This continuing implementation review function provides the main stakeholders and the management with early indications about the progress or shortcomings in the achievement of outputs and objectives.

The project has been monitored by the Project Manager of UNIDO, by the annual ESEA BAT/BEP Forum Board Meetings and the Project Steering Committee meetings.

Some of the results of the project have been the following:

- Identification of the facilities for monitoring the programs.

- Regional guidelines and guidance documents which are part of the outputs produced.

The regional guidelines and guidance on BAT/BEP for the fossil fuel-fired utilities and industrial boiler sector fully incorporate the regional experience gained through the pilot demonstration activities.

- Steam efficiency is a vital component of productivity. Efficiency in steam usage means important savings. The education training programs promoted by the project include the theory of steam, application of steam products, plant design and system efficiency. They train also in conducting audits, which are the simple way to identify where and how to make high impact performance and cost saving improvements to the steam system. The objective of Steam System Management (SSM) is to reduce the life cycle costs of steam systems.

A typical annual industrial fuel bill to generate steam **may imply that average savings of 10/15% year could be achieved.** Bearing in mind that these savings are a reduction in overhead, they have a **direct impact on the profit** of the company.

Steam consumption is monitored understanding the need to achieve energy savings, cost savings and returns on investment, under environmental and health & safety pressures. Old boilers produce ten times higher emissions than modern boilers.

- According to the survey carried out in the project "Demonstration of BAT and BEP in the Fossil Fuel-fired Utilities and Industrial Boilers in response to the Stockholm Convention on

POPs” of November-December 2007 and of February-March 2009, in addition to the traditional fossil fuels there are some special types that are used in some of the participating countries, such as (i) fish residues as fuel in seasonal use in Cambodia, (ii) spent/used oils as boiler fuel, (iii) biomass fuel including wood, wood products, biogases, charcoal, demolition wood, and (iv) charcoal used for low pressure furnaces and stoves in Mongolia.

The issue of these fuels, some of which might even be categorized as hazardous wastes, has been addressed in the framework of the project activities.

- A survey on boilers using biomass and used oil in the Philippines was conducted and the final report was submitted to UNIDO. Further, a cost benefit analysis study of retrofitting from diesel-fired boiler to rice hull-fired boiler was included in the final report of the project.

- Cambodia has started a study on the use of fish residue as fuel. Lao PDR has completed a study on used oil-fired boiler and the follow up activities that are planned to apply BAT/BEP on these boilers. Mongolia following the initiatives of the Forum has conducted in 2012 the study on the use of low pressure furnaces and stoves.

- A survey on the market and trends of the use of biomass in Indonesia was conducted in 2012. Based on this survey, it resulted that there are three types of biomass, namely, palm fiber, palm kernel and bagasse that are in Indonesia commonly used.

- “Guidelines on Best Available Technologies for Pollution Prevention and Control for Medical Waste Treatment and Disposal” were issued by the Ministry of Environmental Protection of China in January 2012. This guideline serves as technical guidance document.

- The BAT/BEP requirements were amended into the “Law on Environmental Impact Assessment of Mongolia” in 2012 as a prerequisite to start a BAT/BEP project.

Further, the project has organized, conducted or participated in:

Five international/regional workshops/seminars meetings:

Subject	Location	Dates	Participants
Regulation Framework Workshop and project Inception	Vientiane, Lao P.D.R,	6-9 /12/ 2010	38
International Workshop on Hazardous Substances in the life cycle of Electronic and Electrical Products (new POPs)	Vienna	28 March – 2 April 2012	11
Regional Forum to promote strategies to reduce or eliminate UP-POPs from industry	Bali, Indonesia	10–12 /7/ 2012	17
Final ESEA BAT/BEP Forum Board meeting on results achieved	Nha Trang, Vietnam	13-15/12/2012	25

Three Study Tours:

Subject	Locations	Dates	Participants per country
Training on Practical Aspects of Implementation of SC on POPs	Bangkok, Thailand	12-16/9/2011	2 Vietnam 2 Lao P.D.R.

			2 Cambodia 2 Indonesia TOTAL 8
Training in analysis of organic contaminants using gas chromatography high resolution mass spectrometry	Wadsworth Centre, Dept of Health, Albany, New York ,USA	20 June – 18 July 2012	1 Thailand 1 Indonesia 1 Mongolia 1 Philippines TOTAL 4
Training on operations of combustion facilities and BAT/BEP facilities orientation	Italy:-Ansaldo Boiler manufacturing , Bari - Torrealvaliga Coal fired power Plant Civitavecchia, Rome - Center Agroenergies (CRAING) Monterotondo Rome.	26-29/11/2012	3 Cambodia 2 Indonesia 3 Lao P.D.R. 3 Mongolia 3 Philippines 3 Thailand TOTAL 17

Six international training seminars:

Subject	Location	Dates	Participants
Seminar on eco-town managers of UNIDO in collaboration with city of Kitakyushu.	Kitakyushu , Japan	11-16/7/2011	11
Course on Boiler Operations	Singapore	11-13/3/2012	17
Training of Trainers on Green Boiler Technology	Bangkok	2-3/4/2012	28
Seminar for eco-town managers in cooperation with city of Kitakyushu.	Kitakyushu , Japan	21-25/5/2012	14
Training on Dioxin sampling and analysis	Beijing, Tsinghua University	28-30/5/2012	27
Dioxin International Conference	Cairns, Australia	26-31/8/2012	2 persons sent

The project has also conducted several technical assessments concerning BAT/BEP measures in priority industrial sources categories of the industries in the region, as per the following table.

Country and type of company	Main recommendations proposed
Cambodia :Garment Industry	Wood boiler replacement 4 t/h
Indonesia. 1)Power Plant 2) Rubber Manufacturing	1 Suralaya power plant: Excess air control 2 Addition of economizer to a 10 t/h coal boiler
Lao PDR: Agro industry	Old oil Boiler replacement with a new coal boiler 5 t/h

Mongolia: Power Plant	Combustion system optimization of Unit 8- 100 MW
Philippines: Power plant	Integrated actions (BEP) to improve efficiency of Unit - 300 MW
Thailand: 1) Distillery 2) Oil Manufacturing	1 Addition of fuel emulsion system to a 10 t/h oil boiler (micro-emulsion) 2 Addition of air heater/ 16 t/h boiler control system upgrade
China, Indonesia, Lao PDR, Mongolia, Vietnam: Sintering Plants in the Iron and Steel Industries assessed in the above countries	More efficient slag and dust collection/disposal system Improved operations of the sinter plant; continuous parameter monitoring; minimization of feed materials contaminated with persistent organic pollutants or contaminants leading to formation of such pollutants; feed material preparation; suppression of formation using urea addition; recirculation of waste gases; improved flue gas treatment; adsorption/absorption with activated carbon injection; improved downstream activities (e.g. disposal of solid residues).
Vietnam and Thailand: Secondary steel production in electric arc furnaces	Improved raw material quality; improved furnace operations; improved off-gas collection; post-combustion followed by rapid quench of off-gases; adsorbent injection (for example, activated carbon); high-level de-dusting with fabric filters.
Lao PDR: Secondary copper production	Scrap pre-sorting and selection; cleaning feed materials; post-combustion followed by rapid quench of off-gases; ; activated carbon adsorption; fabric filter de-dusting.
Cambodia: Dumpsite	Efficient solid waste management including separation at source
Vietnam: Waste Incinerator	Control of waste input; improved techniques for combustion; improved flue gas, solid residue and effluent treatment; upstream (e.g. waste management techniques) and downstream (e.g. disposal of solid residues from incineration) activities.

Besides the international workshops and seminars organized by the central management of the project in UNIDO and concerning all the participant countries with some international experts, the countries themselves have also organized national workshops/meetings concerning national awareness activities and to disseminate the awareness of the danger of POPs releases, promoting inside the country BAT/BEP strategies.

Some of the subjects of these national workshops/seminars have been:

- Courses on Guidelines for Demonstration of Best Available Techniques and Best Environmental Practices for Fossil Fuel-Fired Utilities and Industrial Boilers.
- Energy Consumption & Its Adverse Impacts on Climate Change and Environmental Health
- Awareness Workshop for Demonstration of Best Available Techniques (BAT) and Best Environmental Practices (BEP) in fossil fuel-fired utility and industrial boilers in response to the Stockholm Convention on Persistent Organic Pollutants (POPs).
- Social and Environmental Development 2012: Best Available Techniques/Best Environmental Practices (BAT/BEP)
- Best Available Techniques/Best Environmental Practices (BAT/BEP) at National Conference for Environmental Engineering
- Green Boiler Technology Workshop
- Lecture on physicochemical properties of persistent organic pollutants from boilers and its fate in each environmental compartment;
- Training the technique to enhance the boiler efficiency in order to reduce the release amount of dioxins/furan by promoting Best Available Techniques (BAT);
- workshop on U-POPs abatement in iron and steel industry.
- Forum for flue gas desulfurization of sintering in steel making industry.
- Demonstration of best available techniques and best environmental practices (BAT/BEP) in
- Dioxins/Furans from Boilers and Emissions Reduction through BAT/BEP.
- Survey on biomass-fired boilers
- Safety regulatory framework on boilers and the boiler rules.
- Internal combustion engines used for electricity generation and dioxins formation.
- Banning of incineration and the issue of cement kilns co-firing wastes if temperature is sufficient to destroy dioxins.
- New technology of arresting particulate matter in stacks using mist before the cyclone separators.
- Cement kilns operating at 600°C and co-firing hazardous wastes may not be capable of dioxin/furan destruction.
- Reduction of CO₂ emission in the stack gas.

In some cases these workshops have been attended by more than 100 persons, representatives from government, from the academes, from industries, from professional organizations, from non-governmental organizations (NGO) and from international organizations.

To sum up the project has successfully attained the effects foreseen on capacity building and awareness rising on BAT/BEP activities related to the Stockholm Convention concerning the reduction of unintentional produced POPs emissions.

However, being a demonstration project, the project covers only a selected number of facilities (as we have seen above, maximum two for each country). Therefore, it cannot be said that it has been very effective in globally reducing in the region human and environmental exposure to POPs. Only if the findings and the improvements proposed in these pilot facilities are diffused to other facilities, only then it will be truly effective in reducing globally human and environmental exposure to POPs.

To achieve this result, we know that important funding possibilities are necessary, also to demonstrate to the enterprises that BAT/BEP methodologies are useful for an improved efficiency which allows a better productivity and a subsequent sustainability of the activities of the project.

4.7 Sustainability

Sustainability is the capability of the counterpart (institution or enterprise) to maintain and further develop the outputs and outcomes produced with the support of the project and to adjust them to ensure the continuation of the benefits delivered to the target beneficiaries, when the assistance of the project has been finished.

The principle is that the projects need to be environmentally as well as financially and socially sustainable.

This project has established Project Coordination Units in each participating country and has appointed the National Coordinators.

The overall implementation progress can be rated as satisfactory with some marginal shortcomings. After three years of activities and in the absence of adequate funding (each assessment in the industry with collecting of samples and their analysis is quite expensive) it is difficult to foresee and assess what can be the future sustainability of the project.

The participating countries have translated in their national languages the guidelines prepared by the Stockholm Convention Secretariat for the awareness raising campaign.

The workshops for disseminating information on UP-POPs and on policy frameworks on BAT/BEP have been organized with the leadership of the Swedish EPA and participation of all member countries.

The main objective has been satisfactorily implemented. However, some activities such as the ones related to sampling and monitoring of UP-POPs releases in the metallurgical and waste incinerator sectors have not been fully achieved, because the initial funding was not sufficient to complete the forecasted activities and no additional grant has been received.

It has to be taken into account that the cost for each assessment in industries for taking sampling and conducting the analysis of dioxin emissions due to fossil fuel fired facilities can be estimated

at around US\$ 25,000. The recently approved introduction of BAT/BEP in open burning activities will fully implement UP-POPs monitoring in open burning sources.

The regional guidelines and guidance on BAT/BEP to reduce dioxin and furans emissions are among the overall strategic goals of this regional project.

The dioxin and furans emissions inventories of the participating countries have revealed that the open burning activities sector is accountable for a total of about 3000 g TEQ/year dioxin releases into the environment, which is one of the leading sources of UP-POPs.

According the UNEP toolkit for the identification and quantification of dioxin and furan releases this sector includes:

- a) Various biomass burning activities such as agricultural residue burning, sugarcane burning, forest fires, etc. and
- b) Waste burning and accidental fires, including dump site fires and backyard trash burning.

Release reduction from these, generally diffused sources, requires coherent legislative and institutional capacity from the government side, significant investments and technical capacity from the private and public sector. The project has played an important role in the regional awareness raising about this danger.

Concerning the sustainability of this project it has to be taken into account that an important aspect of sustainability of GEF projects is the sustainability of results, not necessarily of the activities that have produced the results. In the case of GEF projects it is not always well specified the timeframe in which the results have to become finally sustainable.

The project has provided experience for analysis of cost/effectiveness to plan dissemination of the results, however, to achieve replication specific actions with work plan and budget to foster knowledge transfer such as training workshops, technical assessments in selected enterprises and information exchange have to be continued to be carried out.

Of course the main problem is the awareness sensitization among the beneficiaries and the financing. Some enterprises have understood the importance and the risk of dioxin and furan and have invested in BAT/BEP methodologies and equipment to reduce the emissions and improve the energy efficiency.

All the persons that have benefitted of the training offered by the project have unanimously declared the usefulness of the project and have expressed the wish to have longer training.



Cambodia: The UNIDO Project Manager, Ms. Carmela Centeno, visiting a pilot demonstration factory



Cambodia. Phnom Penh. Ministry of Foreign Affairs.

5. Conclusions and specific recommendations

Based on the analysis of the achievements of the project, the evaluator presents the following general conclusions and recommendations concerning:

- Concept and Design of the project
- Implementation of the activities
- Relevance and Strategy
- Monitoring and Reporting
- Awareness rising and training
- Sustainability

On concept and design of the project

Conclusion:

Based on a preliminary UP-POPs inventory, it can be concluded that there is a wide range of UP-POPs sources in the East and South East Asia region. These emissions are without control measures and there is very limited BAT/BEP experience and knowledge in respect to their reduction.

Diffusion and application of BAT/BEP is important for the successful implementation of other projects on environmentally sound management of POPs.

The establishment of the emissions inventory has been facing difficulties due to the lack of basic knowledge in the chemistry and environmental impact of UP-POPs. Additionally the assessment of incineration technologies and the technologies of other relevant industrial facilities indicates a lack of expertise in the respective technology sectors and in BAT/BEP. Therefore, is a need to monitor stack gas emissions of these facilities to exclude the unintentional formation and releases of PCDD/PCDFs.

Most of the ESEA facilities lack international accreditation as well as institutional and human resource capacity to perform the analysis in compliance with international standards.

Although Governments have been endeavoring to establish a legal and institutional framework for sound management of chemicals and hazardous wastes, including POPs, there are still shortcomings that need to be addressed. Proper coordination among the various government agencies and private sectors on their activities related to UP-POPs is absolutely necessary.

It is crucially important for a sustainable development to reduce the impact on environment from the different pollutants and to implement pollution prevention and control measures in industry.

Without the establishment of a reliable dioxin monitoring (sampling and analysis), these activities cannot be planned nor conducted with efficacy.

The expansion and modernization of the industry has occurred rapidly and there are gaps in the institutional capacity to effectively implement adequate pollution prevention and control. Introduction of pollution abatement has not kept pace with the industrial expansion.

The design of the project demonstrates that the pollution prevention and control measures in an integrated regional system may provide a basis for confidence generation among local decision makers receiving technological support.

Recommendation 1:

Thanks to the activities of the project now a certain capacity has been built in the region and some baseline standards have been established. However, there is still a wide lack of capacity for measurement of the emissions. However, at this moment it is not clear how the Governments will budget to continue this awareness and sensitisation campaign.

This project has demonstrated the effectiveness of the introduction of BAT and BEP methodology in the selected industrial sectors, demonstrating possibilities for reduction and elimination of unintentionally produced POPs releases, applying these practices.

Recognizing the need for dioxins and UP-POPs monitoring, the Governments have agreed to provide in this project a financial support (around US\$ 1, 7 million in cash and kind) to prepare a Regional Plan for Introduction of BAT/BEP Strategies in order to measure dioxins emissions in several industrial sectors which have high potential for dioxin formation and releases.

It is imperative that the countries continue the monitoring of reduction of dangerous industrial emissions; particularly U-POPs and that promote and support investments for the technological improvement of BAT/BEP measures.

It is recommended to continue to support projects in the area of POPs and U-POPs, considering that new chemicals have been added to the list of the Stockholm Convention.

On Implementation of the activities

Conclusion:

The impact obtained by the project demonstrates the extent to which the improved performance of the counterparts and the consequent awareness of the critical problems existing have produced positive effects on the target beneficiaries.

Other important impact has also been the success of the awareness campaign at the level of the government institutions and also inside the management of the enterprises selected.

The issue of the dioxin emission from industry became a matter of concern and has received attention at governmental and enterprise level.

Considering the short implementation time, the project has achieved a lot of success. The time has been very short to approach the selected companies, to visit them and to collect samples for the analysis. During the time of implementation few samples for enterprises have been collected. Collecting samples requires weeks and a team of 4-5 persons each.

The project has demonstrated that BAT implies also reinforcement of the technology applied. Due to that, the development of the project confirms that it necessary more time to select and convince the enterprises willing to participate in the pilot demonstration. They have to possess the appropriate technology for meaningful experiments and operations.

Another positive impact of the project has been the interest of the Governmental authorities for the behaviour of the enterprises willing to pay more attention to the environment.

Recommendation 2:

Considering that collecting samples is a long process, in case of a follow-up project, this should be of longer duration. The relevant **Ministry of Environment in each country should regularly assure the enforcement of the obligations related to the Stockholm Convention.**

UNIDO and the GEF should disseminate the positive results of the project in other countries for possible replication.

Policies and national programs on regular monitoring of Dioxin/Furan emission should be developed; jointly to the development of a system of incentive mechanisms for the BAT/BEP application in industries. The policies and regulations experimented and established thanks to the activities developed by the project should be shared and disseminated to other countries.

In case of a follow up project, it will be a necessary requirement, to investigate and specify more accurately on which parameters the investment costs for BAT/BEP applications are based for a profitable implementation of these applications.

Conclusion:

From the questionnaires distributed and the interviews conducted, it results that all the trainees request to further improve the training activities.

It was also requested that the period of some trainings be expanded with one additional week.

Recommendation 3:

The training should involve particularly the relevant personnel and who is directly operational in the technical activities. Administrative and political personnel should not participate in practical training or study tours.

This may be addressed by having precise pre-selection criteria for the persons to be trained.

The period of training should be expanded with one additional week.

The type of sampling should also be expanded to include other sources such as ambient air.

On Relevance and Strategy

Conclusion:

The project has created awareness but still a lot has to be done to phasing out POPs and reduce the human and environmental exposure to them.

The introduction of BAT/BEP strategies is the key approach to reduce and eliminate UP-POPs and other pollutant releases to the environment. National technical capabilities have been strengthened learning how to measure dioxin and furans in stack gas samples, using sampling methods and chemical analysis to trace levels of dioxins in these samples.

However, official common standards have not been established.

As far as the industries concerned in the entire region, only few of them have been reached within the project implementation.

Recommendation 4:

It is recommended to establish standards for stack sampling. In some countries this is a necessity for the usefulness of the training.

Conclusion:

Thanks to the project the pilot demonstration enterprises have raised awareness and capacity of the technical personnel through updated professional competencies in applying BAT/BEP to reduce UP-POPs emissions in the priority industrial sectors.

Recommendation 5:

It is recommended to continue the collaboration with the private sector that has proved to be very useful.

Conclusion:

In some countries regulations on dioxins are in place but analytical and technical capacities are still insufficient. The project through trainings conducted on dioxin analysis and laboratory establishment has contributed to the improvement of enforcement of the laws. However, the real fighting actions will start only when the hardware component will be in place and operational.

Recommendation 6:

It is, therefore, recommended that future projects foresee the establishment of certified laboratories, the delivery of appropriate equipment and trained technicians for conducting the sampling and the analysis.

Conclusion:

According to some participants, while the project aims at mitigating human health problems through the reduction of UP-POPs release, it only covers a minor part of the entire problems. In

fact, heat and power generation, being one of the most significant sources of dangerous emissions in the all region, it represents only one third of the total releases caused by open burning and disposal.

Recommendations 7:

Following the above conclusion and in case of follow up of the project, it is recommended to pay more attention on the reduction of the emissions and less on the clean up of POPs.

On Monitoring and Reporting

Conclusions:

The results are analysed through the monitoring which is a continuous and periodic function that uses systematic collection of qualitative and quantitative data to keep activities under control, helping to identify implementation issues that warrant decisions at different levels of management. Identification of the facilities for monitoring the application and results of the programs has been made by the management of the project.

Regional guidelines and guidance documents are part of the outputs produced.

The regional guidelines and guidance on BAT/BEP for the fossil fuel-fired utilities and industrial boiler sector fully incorporate the regional experience gained through the pilot demonstration activities.

Recommendation 8:

It is recommended that the Governments apply strong follow up actions adopting policies and enforce the necessary guidelines. The policies issued may be then used as basis/guidance for the industry to implement Best Available Techniques and adopt Best Environmental Practices.

In cooperation with the government authorities, it is recommended to establish ambient air standards on persistent organic pollutants.

Recommendation 9:

It is recommended to foresee actions for continuing the regional cooperation for monitoring and analysis, that is very important for the countries in the region. A laboratory that can be utilized in the Region for UNIDO or government projects needs to be established.

On Awareness rising and training

Conclusion:

The project has created awareness among public and private sectors and other relevant stakeholders exposed to POPs and has contributed to capacity building for the introduction of BAT/BEP strategies, putting in place a common regional legislative and policy framework.

The capacity to enforce the legislation, although still only partially and with several weaknesses has increased.

The awareness of the danger of POPs has increased among the communities and industries dealing with them, although still not very diffused among the normal population.

Unfortunately there is lack of interest from the side of the private sector.

Recommendation 10:

In case of further projects derived from the experience of this regional Project, it is recommended to stress the importance of the trainings and of the study tours. They have been viewed as very useful and consequently, encouraged the companies to pay attention to the environmental quality and proper management of emissions.

Recommendation 11:

It is recommended to maintain and reinforce the networks created as result of the project. Information exchange with other companies (national and international) is very important for creating awareness and outlining the opportunities for better process efficiency.

Conclusion:

In some of the countries involved in the project regulations on dioxin emissions are in place, but analytical and technical capabilities are still absent, also because the necessary hardware and instrumentation are missing.

Recommendation 12:

It is recommended that in case of similar projects conducting trainings on dioxin analysis, the activities have to take off only when the instrumentation and the laboratory facilities are in place.

On Sustainability**Conclusion:**

The projects need to be environmentally as well as financially and socially sustainable. This project has established Project Coordination Units in each participating country and has appointed the National Coordinators. The overall implementation progress can be rated as satisfactory with some marginal shortcomings. However, after three years of activities and in the absence of adequate funding (each assessment in the industry with collecting of samples and their analysis is quite expensive) it is difficult to foresee and assess what can be the future sustainability of the project.

Recommendation 13:

The sustainability of the activities of the project should continue to be demonstrated through the inclusion of BAT/BEP in the universities curricula. Actually, this is already made in some universities of the participating countries.

It is recommended that in the future for similar projects, different levels of capacity building exercises should be provided. A proper needs assessment is very important to program and direct the actions.

Conclusion:

It has to be taken into account that an important aspect of sustainability of GEF projects is the sustainability of results, not necessarily of the activities that have produced the results.

The project has provided experience disseminating the results, however, to achieve possibilities of replication specific actions with work plan and budget to foster knowledge transfer, technical assessments in selected enterprises and information exchange have to continue to be carried out.

While there has been sufficient budget from the management of the project concerning the implementation of the activities regarding awareness and BAT/BEP actions, the government counterparts did not contribute to the budget as expected and in proportion to their needs.

Recommendation 14:

It is recommended to the participating countries to foresee an appropriate budget to face the danger of the UP-POPs, which seems not being for them a top priority when it comes to environmental issues.



LAO P.D.R. Unauthorized illegal open fire burning along of the Mekong River. Waste and old tyres, which release dioxin, are burnt.



Vientiane: The Headquarters of UNDP in Lao.

6. LESSONS LEARNED

(Identify project lessons is a key component of any project evaluation.

Lessons learned are generalizations, positive or negative, based on evaluation experiences.

The lessons derived may abstract from specific circumstances to broader situations.

Frequently the lessons highlight strengths or weaknesses in formulation, design and implementation that can affect performance and results.

Therefore, the lessons may be useful for improving quality and effectiveness in future projects.

However, it has to be observed that lessons learned from a project are not always applicable to other countries or projects, which can have a different political or industrial situation).

The following lessons may be derived from this evaluation:

- 1) Proper and regular monitoring of the project gives the opportunity to adjust timely the production of the outputs according to the initial planning.
- 2) The analysis and dissemination of the experiences of a successful project require that actions are started to promote the replication of the results in other regions or countries. The positive results obtained may create opportunity for developing state or private mechanisms to promote the utilization of co-financed resources.
- 3) Regional projects need much more effort to meet the timelines than single country projects, where the action does not need the consensus of several national partners.
- 4) Improving technological capabilities it is a considerable help for the country for not depending on the changes of the global markets and for improving the effectiveness and the efficiency of the productivity.
- 5) Technology is a combination of several actions, such as adoption of BAT/BEP methodologies, purchase of machineries, international expertise, training, study tours and of new technological processes developed in the enterprises themselves.
- 6) Implementation or adaptation of innovative technological changes for BAT/BEP methodologies may involve investments and consequently may originate the problem of financing for the concerned enterprises.
- 7) During the formulation of a project attention should be paid to the quantitative figures of the outputs to be accomplished, in order to avoid that later, when evaluating the results achieved, these are different than expected in relation to the target indicators expressed in the project document. In some cases this may indicate that the forecast was too optimistic or too pessimistic.
- 8) Sudden changes in the global economic and political environment may have a strong influence on the implementation of a project and often may not be foreseen in the project preparation phase. An efficient project management, good coordination, seriousness and dedication of the implementing project partners, may mitigate the possible negative effects of any economic difficulty.
- 9) The sense of ownership of a country in implementing a project is of fundamental importance for achieving results of good quality. In the case of a regional project if a partner is scarcely committed, this may influence negatively the global progress of the implementation of the entire project.



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Terms of Reference

Independent Evaluation

Project number: GF/RAS/10/006

Project title: Regional Plan for Introduction of BAT/BEP Strategies to Industrial Source Categories of Stockholm Convention Annex C of Article 5 in ESEA Region

GEFSEC Project ID: 3572– Stockholm Convention

Starting date: August 2010

Duration foreseen: 2 years

Project site: Regional: Cambodia, People's Republic of China, Indonesia, Lao PDR, Mongolia, Philippines and Thailand

Government Co-ordinating agencies: Ministry of Industry, Mines and Energy (*Cambodia*); Ministry of Environmental Protection (*China*); 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*)

Co-operating countries: Brunei, Republic of Korea, Japan, Singapore and Vietnam

Implementing agency: UNIDO

Project Inputs:

US\$ 1,000,000 including GEF Project Preparatory Grant (PPG) of US\$ 50,000

Agency Support costs (10%): US\$ 90,000

UNIDO inputs: US\$ 400,000 (in-kind)

Counterpart's inputs:

- Governments of Cambodia, People's Republic of China, Indonesia, Lao PDR, Mongolia, Philippines and Thailand

US\$ 260,000 (cash), US\$ 1,429,000 (in-kind)

- US\$ 91,760 (cash/in-kind) Swedish Environmental Protection Agency (SwEPA)

Total Co-finance: US\$ 2,180,760

GRAND PROJECT TOTAL:

US\$ 3,130,760 excluding PPG and agency support costs

US\$ 3,270,760 including PPG and agency support costs

I. Project Background

Brief Description as per Project Document

The East and South East Asia (ESEA) Forum of best available techniques (BAT) and best environmental practices (BEP) is the first forum that has been established by UNIDO for developing and formulating a regional action plan on BAT/BEP and for supporting a programmatic approach in reducing unintentionally produced persistent organic pollutants (UP-POPs). Formally launched on October 5, 2007 during an Inaugural Ministerial Meeting in Bangkok, Thailand, the main objective of the Forum is to create an enabling, non-legally binding framework for regional cooperation to facilitate the development, diffusion and deployment and transfer of BAT/BEP through concrete and substantial initiatives.

In accordance with the relevant resolutions of the third and fourth sessions of the Conference of the Parties (COP3 and COP4) of the Stockholm Convention (SC) the project overall objective aims at reducing and, where feasible, eliminating UP-POPs releases by producing a detailed plan to enable ESEA countries adopt and introduce BAT/BEP strategies and enhance the relevant guidelines and guidance on BAT/BEP for priority industrial source categories listed in Part II and II, Annex C of the Convention, addressing specific features of industry, common practices in the region and related socio-economic considerations. The plan will also incorporate the regional experience gained through pollution prevention/cleaner production (PP/CP) measures and will address partnering on investments and joint ventures. The immediate objective of the project aims at establishing a regional coordination mechanism that will support the regional and national plans and strategies of participating countries to meet their obligation to the SC particularly the introduction and demonstration of BAT/BEP in identified priority industrial source categories. The project will anchor on the ESEA BAT/BEP Forum as a platform to create an agile and productive regional cooperation that will facilitate exchange of information and sharing of experiences and together explore opportunities to reduce or eliminate the release of UP-POPs from industrial sources and common practices.

The project will establish harmonized methodology (ies) for the inventory of each type of source category and UP-POPs baseline inventories achieved by specifically designed sectoral studies. The project will introduce a systematic tool for the industry to assimilate structured decision making through a criterion route of selection and ranking of clean process design, retrofitting and operations. **The final objective is to collectively update knowledge on technology transfer, sampling analysis, research for development and contribute to global monitoring of UP-POPs releases using a regional programmatic approach in order to avoid each country adopting different solutions to implement BAT/BEP, depending on relevant local standards and laws as well as on local social and economic conditions.**

The scope of project in general covers the industrial sectors listed in part II and III source categories of the Annex C of Convention in participating ESEA countries, in terms of regional BAT and BEP guidelines and guidance made available to local officials and implemented in the region, coordination mechanism established, regional application of PP/CP methodology, capacity in monitoring releases, capacity building and awareness raising addressed.

Purpose of the project

The overall objective of the regional project aims at reducing and, where feasible, eliminating unintentional POPs (UP-POPs) releases, by producing a detailed plan to enable ESEA countries to adopt and introduce BAT/BEP strategies and enhance the relevant guidelines and guidance on BAT/BEP for priority industrial source categories listed in Part II and III, Annex C of the Stockholm Convention. The purpose is to address specific features of industry, common practices in the region and related socio-economic considerations. The program also incorporates the regional experience gained through pollution prevention/cleaner production (PP/CP) measures and aims at joint ventures among countries sharing similar source releases of unintentionally produced persistent organic pollutants (UP-POPs).

The final objective is a common updated knowledge on technology transfer, sampling analysis, research for development and contributing to global monitoring of UP-POPs releases using a regional programmatic approach. To avoid that each country adopts different solutions to implement BAT/BEP,

depending on relevant local standards, laws and regulations, or local social and economic conditions, it is necessary an Applicable Legal Framework for a successful introduction of BAT/BEP measures.

Most countries had no specific laws for POPs and UP-POPs. Most of participating countries had environmental quality standards and emission and discharge control regulations. Training was highly needed at different levels, like an integrated pollution prevention and control.

Direct regulations on environmental quality and emissions standards, technology or process standards are needed, together with investments for new technologies.

The immediate objective of the project aims at establishing inventories for each type of source category and UP-POPs baseline inventories achieved by specifically designed sector studies and targeted capacity building. In addition the project seeks to reinforce the significant linkages among the concepts of energy efficiency, burning process optimization and reduction of UP-POPs emission, addressing the requirements of the SC and of the Climate Change protocol. During the monitoring campaigns in the selected facilities, not only UP-POPs releases were targeted, but also process parameters giving information on the performance of the plant, thus allowing a proper implementation of BEP measures.

The scope of project covers promoting and facilitating dissemination and transfer of BAT/ BEP measures in the priority source categories of the ESEA countries through a voluntary regional coordination mechanism using the ESEA BAT/BEP Forum as a platform of information exchange and experience sharing.

The four priority sectors for the operations of the project are:

1) Fossil fuel-fired utilities and industrial boilers, 2) metallurgical industry, 3) open burning and 4) waste incineration.

The project was approved by GEF in June 2010 and the implementation started in September 2010 through the financing of a GEF grant of US\$ 950.000 and a co-financing of US\$ 2,180,760 divided as follows:

US\$ 400,000 in kind as UNIDO input, US\$ 1,689,000 in kind and cash from the seven participating countries and US\$ 91,760 from the Swedish Environmental Protection Agency.

The total available budget of the project is US\$ 3,130,760.

Originally the project was expected to be completed in two years on 31 August 2012, but it was extended by four months until end 2012. The extension was granted to organize the final Steering Committee Meeting in December 2012 and a final project workshop with the participation of all member countries.

UNINTENTIONALLY PRODUCED PCBs and HCB

PCBs and HCB are listed in the Stockholm Convention as industrially produced POPs. In addition, the Convention lists PCBs and HCB as unintentionally formed POPs, together with the PCDD/PCDF.

Therefore, the industrially produced PCBs and HCB have to be treated in accordance with Article 3 of the Convention, while the unintentionally produced PCBs and HCB have to be reduced together with PCDD/PCDF in accordance with Article 5 of the Convention.

The unintentionally formed PCBs and HCB are separately treated from the industrial produced PCBs and HCB.

Unintentionally produced PCBs and HCB are formed through most industrial processes in parallel to PCDD/PCDF. Therefore the source categories for PCDD/PCDF release described in the PCDD/PCDF inventory are at the same time the sources of unintentionally formed PCBs and HCB. The PCDD/PCDF, PCB and HCB have similar chemical and physical properties.

HCB has a higher volatility and a higher stability compared to PCDD/PCDF and PCBs. Therefore it has to be considered that BAT countermeasures like adsorption technology and catalytic oxidation result in lower destruction removal efficiency. This justifies to use the PCDD/PCDF inventory as base for the BAT/BEP process for the whole range of unintentionally formed POPs (UP-POPs) and to treat all four UP-POPs together in the BAT/BEP processes of reduction measures.

High amount of HCB can be formed in some processes of the chemical industry (e.g. PVC production) and are not covered by the PCDD/PCDF inventory.

Project context within the Stockholm Convention

In May 2001, the Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted with the aim of protecting human health and the environment from POPs. The GEF became the principal financial mechanism by the decision of the Conference of Parties (COP). In October 2002, the GEF Assembly approved the addition of POPs as a new GEF focal area, and in November 2003, the GEF Council approved a GEF Operational Program on POPs – OP 14.

Article 13.2 of the Convention provides that developing countries Parties and Parties with economies in transition will have access to new and additional financial resources to enable them to meet the agreed full incremental costs of implementing measures that fulfil their Convention obligations.

Article 5 of the Stockholm Convention addresses measures that Parties shall take measures to reduce releases of unintentionally produced POPs listed in Part I Annex C with the goal of their continuing minimization and, where feasible, ultimate elimination. Part II of this Annex is a list of source categories that “have the potential for comparatively high formation and release of these chemicals to the environment.”

For the new sources listed in Part II — which includes any new or any substantially modified facility — Parties are required to use best available techniques.

This requirement is to be “phased in as soon as practicable but no later than four years after entry into force of the Convention for the Party.”

Analysis of Barriers of the project

Lack of regional coordination/cooperation in the implementation of Stockholm Convention

The most important barrier that was identified in the preparatory phase of the proposed project was the complete lack of regional and sub-regional coordination and cooperation in the implementation of the Stockholm Convention. It was a surprising finding as the countries of ESEA region showed a very close cooperation in banning most of the POPs pesticides earlier than it was required by SC. Cooperation has mostly sought outside the region even in those cases where expertise and experience existed in the region. The project aims to build regional cooperation that would make more efficient the implementation of the SC requirements.

Other common barriers found in the participating ESEA countries that may impede the implementation of project outcomes, inputs and activities were also identified such as:

a) Lack of public awareness on POPs

Government agencies involved in addressing and regulating UP-POPs related issues are often lacking enhanced awareness and fully understanding regarding the hazards posed by POPs on human health and the environment. The same holds true for professional training institutes. There is scarcity of data on occupational exposure and only a few publications are available on POPs impact on public health. Moreover, the public has little or no awareness of the burden posed by UP-POPs, which often results in increased exposure. Though some activities are listed in the national NIPs, there is currently a lack of public awareness on the need of reduction UP-POPs and a lack to promote information of UP-POPs through media.

b) Lack of national standards in regulating UP-POPs in some source categories

While the most industrialized among the participating countries already have regulations on management of wastes or standards for releases from some industrial sources such as waste incineration, many countries have still to introduce them in their legislative system. Moreover, a comprehensive regulatory approach is missing in the region and, where exist, different national standards are applied regulating UP-POPs emissions from different industrial sources, and generally higher than those adopted in developed countries.

c) Inadequate technical knowledge and experience by stakeholders in BAT/BEP

There is a lack of adequate technical knowledge in new, environmentally sound, innovative technologies meeting BAT/BEP requirements even among the technical experts and also the lack of technical guidelines that hamper the selection and purchase of appropriate equipment, hence impede the dissemination and transfer of BAT/BEP in the region.

d) Need of updated inventories on the main industrial sources categories

The project will rely on extended and updated inventories of the different types of facilities in the region, in the main industrial sources, such as incineration, power generation, metallurgical sector, cement industry, pulp and paper industry, etc. This process could be made difficult by the incomplete and inconsistent data supplied (especially regarding capacities, consumptions, type of technology used etc.). Additionally, there is a lack of data records, monitoring network system at both national and regional level. The risk is that returned questionnaires can not provide representative description of total number of facilities in the main industrial sectors.

e) Need for common methodology for PCDD/PCDF inventory assessment

The need for understanding and applying a common methodology for PCDD/PCDF inventories in each industrial sector became evident in the preparatory phase of this project. In spite of the fact that a seemingly common methodology was applied, the participating countries sent a variety of data, which were incomparable. The harmonization of the methodology is required.

f) Lack of laboratory facilities, technical knowledge, experience, or standard methodology for UP-POPs monitoring

While some institutes in the ESEA region have already acquired up-to-date analytical equipment for PCDD/PCDF analysis, there is a general low technical capability for sampling of PCDD/PCDF stack air emissions and other release vectors from industrial sources. Lack of monitoring capacity hinder or make difficult the effective enforcement of POPs regulations, and limit the POP reporting requirements. Additionally, there is lack of methodology for POPs monitoring (sampling and analysis) in the participating countries. The lack of a regional dioxin laboratory impedes the quick start up of monitoring programs in the ESEA region.

g) Lack of coordinated research activities on UP-POPs in the region

There is a lack of research and development capability to follow up recent developments. Due to lack of financing, the lack of facilities and the stakeholders' conflict of interest, graduate education curricula and regional R & D network have not been established yet at regional level.

h) Lack of understanding to manage equipment in an environmentally sound manner

Small or medium-size industries do not value environmental services. Principles of environmental accounting are not used. Industries are often unwilling to replace old equipment, given the cost of new ones and the lack of funding available for such purchases.

Owners of large boilers, incinerators or cement kilns are almost exclusively large state-owned firms, which are restricted in their ability to make such purchases independently.

i) Inadequate waste separation policy and control measures for reducing the release of UPPOPs from all sources

Current regulations in many developed countries focus almost exclusively on gaseous emissions, and tend to be less stringent about the transfer of toxic substances to solid waste (e.g. fly ash and bottom ash produced in combustion process). Enforcement of laws is particularly insufficient in the medium-and small-scale enterprises. As emerged from the preparatory surveys carried out in the participating countries, waste separation practice are rarely applied and POP contaminated wastes are left in open air storage sites. Stricter rules are generally applied in large facilities, coupled with some reuse practice.

j) Fast economic growth hampers the adoption of BAT/BEP

The industry sector in ESEA region is growing steadily at a rate close to 10 %. Due to the economic and social pressures present in the societies of the region, the economic development priorities often leave behind environmental considerations. Environmental pollution (including UP-POPs pollution), if not controlled, can be the major drawback by burdening environment, destroying eco-systems and threatening human health with the risk to slow down economic development. This is particularly true in the South

East Asia region with high annual industrial growth rate and intensive agricultural activities on which a large part of the population relies.

h) Occupational health and safety

Even where owners and workers are aware of the dangers posed by exposure to POPs contaminated wastes, they lack the personal protective equipment and knowledge to safely work with. Safe workplace practices are not consistently adopted. There is lack of awareness and education for management, employees and workers exposed to this kind of wastes.

Local, Regional and Global Benefits expected

The project foresees to establish a regional coordination mechanism that will support the national plans and strategies of participating countries to meet their obligation to the SC particularly the introduction and demonstration of BAT/BEP in identified priority industrial source categories.

The project will favour the dissemination of regional guidelines and guidance in managing BAT and BEP, thus promoting exchange of information and sharing of technical experiences.

As a preliminary action, the project will promote the strengthening of the pollution prevention measures and cleaner production methodologies in the region, easing the introduction of BAT/BEP and thus encouraging countries and private investors in reducing the risk of UP-POPs to human health and the environment at national, regional and global levels.

The setting up or strengthening of policy and regulatory framework for disseminating BAT and BEP in the region is envisaged in the project. Thus, regulations and standards will be set up or elaborated to include not only operational safety but also environmental considerations and advanced regional education opportunities in the area of POPs.

In long term the project should facilitate the preparation of the baseline inventory of UP-POPs releases in the main source categories. From the updated national baseline inventories, regional/sub-regional projections will be prepared and the implementation of the corresponding regional action plan will deliver the global environmental benefits of the project.

The project will also contribute to the further enhancement of the UNEP Toolkit.

Being the first BAT/BEP Forum launched by UNIDO, the ESEA Forum shall serve a fundamental role in the establishment of similar initiatives in other regions. UNIDO envisages the creation of a global BAT/BEP Forum through the unified action of the ESEA Forum with Central and Eastern Europe, Caucasus and Central Asia (CEECCA), Arab and African regions where BAT/BEP forums are to be launched. The ESEA Forum, as part of its main functions, shall endeavour to stimulate awareness and promote the creation of other regional forums.

Special Features of the project

Special attention the project should have given to local and traditional practices that could be potential sources of UP-POP such as crematoria and burning animal carcass. Moreover, the issue of peculiar non traditional burning devices and fuels will be further addressed, such as fish residues in seasonal use in Cambodia, spent/used oils as boiler fuel, low pressure furnaces and stoves using charcoal in Mongolia.

Specific monitoring programs will address not only the main combustion emissions source, but also pulp and paper mills including waste paper recycling enterprises and common practices such as open burning.

The project will include the set up of a suitable process for the certification and accreditation of laboratories dealing with hazardous operations, including the training of the staff.

EXPECTED OUTCOMES OF THE PROJECT

Five substantive Outcomes have been developed to achieve the project objectives:

Outcome 1: Expansion of regional guidelines and guidance on BAT/BEP by addressing specific features of the industry in the region, common practices, including local and traditional practices and related socio-economic considerations.

The main activities under this outcome will be the preparation and adoption of regional BAT/BEP guidelines and the guidance for local officials.

Regional guidelines and guidance will be prepared to adequately address technical issues, common practices including local and traditional practices and socio-economic considerations. These expanded BAT/BEP guidelines will be disseminated among relevant stakeholders to improve institutional capacity in understanding POPs pollution in general and UP-POPs releases from industrial sectors in particular.

Outcome 2: Establishment of BAT/BEP regional coordination mechanism for developing human resources, technical capabilities and networking capacities.

The existing SC and Basel Centres in the region and other relevant training institutions will be invited to provide specific training programs to government officials and technical personnel of private and public sectors. This will be also linked to the development of a regional information exchange, university curricula on environmentally sound technologies as well as development of regional coordination for research and development. These activities will be accompanied by regular awareness raising campaigns, identifying target groups according to their involvement in the industrial sector and producing information materials for each target group and for the public at large.

Outcome 3: Continuous reduction of UP-POPs in priority source categories using new tools and methodologies.

For this outcome, National Cleaner Production Centers (NCPCs) and existing Cleaner Production (CP) programs as well as other training institutions in the participating countries will be approached to provide preliminary technical assistance and strategies including capacity building. Project activities and endeavours will focus on the widespread dissemination of cleaner production and pollution prevention methods to the stakeholders' technicians and managers through a series of targeted training course. This has the aim to start the introduction of soft actions for the reduction of pollution and for energy saving, thus facilitating the next implementation of the more binding and relatively more expensive BAT/BEP.

Outcome 4: Contribution of ESEA regional UP-POPs inventory to the UNEP UP-POPs global monitoring programme.

Training on designing monitoring programs determining UP-POPs releases will be carried out in selected priority source categories for the determination of UP-POP releases. At the same time, the establishment of regional UP-POPs baseline inventory will be conducted. Data will be provided to further revise I-TEQ emission factors in the latest version of UNEP Toolkit.

Based on the measured UP-POPs and inventory data collected, UP-POPs releases in selected priority source categories can be projected at regional level. Common rules for calculating PCDD/PCDF releases will be prepared (if required) according to regional characteristics. Consequently, the continuous updating of the inventory of UP-POPs releases will be facilitated in each of the participating countries. A survey of the existing monitoring capacity in the ESEA region will be carried out and all the main guidance documents on POPs monitoring will be reviewed for their adoption in the region in cooperation with UNEP and other parties. Adequate regional capacity will be created by strengthening national and regional centres of excellence (national laboratories, private laboratories) through training in monitoring and assessment, and in sampling, analysis, interpretation of data and reporting of UP-POPs.

Outcome 5: Establishment of the project management at regional level, stakeholder partnership and monitoring and evaluation.

Reasons for UNIDO assistance

UNIDO is committed to assist its developing and transition economy country Member States in accordance with Article 12 of the Stockholm Convention. In addition, UNIDO is executing and/or developing a range of demonstration and capacity building projects geared to support Stockholm Convention implementation in a wide range of countries. These activities are compatible with UNIDO's mandate and will lead towards achieving the MDGs.

Conscious that the Conference of Parties of Stockholm Convention requested the Secretariat and urged parties and other donors to initiate activities to promote guidelines on BAT and BEP at regional, sub-

regional and national levels, UNIDO has been requested by the Governments of the ESEA sub-region to develop and formulate the proposed project.

The Conference of Parties also invited parties to provide to the Secretariat comments on their experience in implementing the revised draft Guidelines on BAT and Provisional Guidance on BEP. The outcomes of this Project will provide a useful contribution to further enrich and update the guidelines.

The successful implementation of the project will mostly depend on the abilities of the implementing/executing agency and local counterparts to work with multiple counterparts at regional level. UNIDO has advanced experience in POPs management including several global and regional projects in different aspects of industry sector development. In addition, the organization has experience in investment promotion and technology transfer, which is a component in many UNIDO's projects and important for the present project as well. This experience will assist to raise and leverage the required co financing.

It is noteworthy to mention that the UNIDO RENPAP programme that has a strong element of pesticide waste management and using substitutes for POPs pesticides such as bio- and botanical pesticides formally opted to take up programs and projects in POPs focal area focusing on the development of pesticides alternatives. The infrastructure developed by and the experience gained through RENPAP will be of relevance in the proposed project in ESEA region taking into account the growing list of POPs.

UNIDO's in-kind contribution to the project comprises the establishment of a project focal point and the provision of the part-time assistance of a professional staff in its Environmental Management Branch (EMB) to ensure the effective implementation of the project.

Reasons for the GEF Intervention

The GEF intervention is justified for the following reasons:

- The expansion and modernization of the industry is occurring in rapid pace within a short transition period and there are gaps in the institutional capacity to effectively design and implement adequate pollution prevention and control. The introduction of pollution abatement and management system has not kept with this expansion.

External intervention is justified because these gaps cannot be bridged organically.

- The absence of effective pollution prevention and control and management systems affecting significant segment of the industry sector is of international concern.

- The application of BAT/BEP involves prior hazard identification and environmental impact assessment and the application of appropriate technologies to address the issues in their social, geographical, economic and cultural contexts. The operation of BAT/BEP facilities requires regulatory controls including feasibility and environmental impact assessments.

- The project will demonstrate the pollution prevention and control measures in an integrated way providing awareness among local decision makers receiving technology transfer.

II. Objectives and scope of the evaluation

According to the GEF document (Eval. Doc. 1 2006), evaluation has the following objectives:

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

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

The above explains the concept and role of evaluation within GEF defining its framework.

On evaluation issues, specifically it establishes requirements for how GEF activities should be evaluated in line with international principles and standards for monitoring and evaluation.

Definition: Evaluation is a systematic and impartial assessment of an activity, project, program, strategy, policy, sector, focal area, or other topics. It aims at determining the relevance, impact, effectiveness, efficiency, and sustainability of the interventions and contributions of the involved partners. It should

provide evidence-based information that is reliable and useful, enabling the timely incorporation of findings, recommendations, and lessons into the decision-making processes.

The purpose of the evaluation is to enable Governments, counterparts, GEF, UNIDO and other stakeholders to:

- d) Verify prospects for development impact and sustainability, providing an analysis of the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators. The assessment includes examination of the relevance of the objectives according to project evaluation parameters.
- e) Examine project relevance, effectiveness, efficiency and sustainability by drawing conclusions and recommendations in relation to future activities.
- f) Draw lessons of applicability for replication of the experience gained in this project.

III. Methodology

The evaluation will follow UNIDO and GEF evaluation guidelines and policies. The purpose of this evaluation is to enable the stakeholders to take decisions on the future and look at the impact and sustainability of the results obtained so far.

This evaluation will be based on the analysis of the Project technical reports, workshop reports and reports of the PM. The evaluation will determine the progress made towards the achievement of outcomes and will identify possibilities of correction if needed.

It will be carried out as an independent in-depth evaluation using a participatory approach. The UNIDO staff associated with the project will be regularly consulted throughout the evaluation.

Scope

An in-depth evaluation is an activity in the project cycle that attempts to determine the relevance, efficiency, effectiveness, impact and sustainability of the project. The evaluation will assess the achievements of the project against its objectives, including a re-examination of the relevance of the objectives and of the project design. It will also assess to what degree the assumptions identified in the project document held true and identify other factors that have facilitated or impeded the achievement of the objectives. While a review of the past is in itself important, the independent evaluation is expected to lead to detailed recommendations for the future orientations and also lessons learned for the future.

In particular, the in-depth evaluation will pay attention to the following issues:

Relevance (to national development and environmental agendas, recipient country commitment, and regional and international agreements). The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs global priorities and partners' policies.

- Has there been any development in the Capacity building of managerial and technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases?
- Relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions.
- Were the project's outcomes consistent with the focal areas/operational strategies of GEF and in line with the UNIDO mandate, objectives and outcomes defined?
- Was the project concept in line with the development priorities and plans of the countries (ownership)? Was the project formulated with participation of national counterpart and/or target beneficiaries?
- How has been applied the concept of the project to reduce and eliminate releases from "unintentional production" and coordinate its activities with the national strategies for

environmental protection, industrial sustainable development and cleaner production? Thus contributing to the improvement of human and environmental health?

- Is the project's design adequate to address the problems? Was a participatory project identification process applied in selecting problem areas and national counterparts?
- Does the project have a clear development objective, the attainment of which can be determined by a set of verifiable indicators?
- Are the chosen strategies and target groups concerning Capacity Building of self-reliant managerial and technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases, correctly chosen or should they being promoted with different strategies or should other target categories have been selected?
- the extent to which the project has been consistent with the policy framework.
- the quality of the problem analysis and the project's intervention logic and logical framework matrix, appropriateness of the objectively verifiable indicators of achievement
- the extent to which the objectives correctly address the identified problems.
- the extent to which the nature of the problems originally identified have been faced;
- the quality of stakeholders and target groups and of institutional capacity issues;
- the quality of the strategic options, of the implementation strategy and of management and coordination arrangements;
- the appropriateness of the monitoring arrangements ;

Efficiency (Sound management and value of money spent) A measure of how economically inputs (funds, expertise, time, etc.) are converted into results.

- Has the project reached the goals set in project document and in the work plan?
- Was the project cost effective?
- Have the resources provided (expertise, training) been of good quality?
- Have been the activities undertaken in coordinated manner for reducing and eliminate releases from “unintentional production” of UP-POPs releases?
- Has the project established enhanced efficiency in reducing, avoiding and eliminating UP-POPs releases and reducing releases of other pollutants by coordinating the implementation of the Stockholm Convention action plans with BAT/BEP activities in the industry at regional scale, reviewing and improving national policies?
- Has the project established enhanced capacity building for monitoring procedures for UP-POP chemicals as prerequisite for implementing BAT/BEP?
- Has the project addressed efficacy and efficiency of possible control measures for the implementation of BAT/BEP at sector level?
- How it was the project management and coordination?

Effectiveness (attainment of objectives and planned results). The extent to which the development intervention's objectives were achieved, or are expected to be achieved.

- Which activities of the project have been the most used (capacity building for monitoring, information, training, technical advice, policy advice...)?
- To what degree the elements of capacity building of technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases have been effective?
- How effectively the tangible objectives of the project, have been implemented?
- How have been spread the awareness of risks and the Stockholm Convention at the level of environment related organizations and enterprises owners?
- How good was the quality of the capacity building provided by the project?

- How enhanced capacity building for establishment and operation of adequate monitoring infrastructure for UP-POP chemicals has been implemented?
- What has been the utility of the success indicators as applied by the project activities?

Impact (Achievement of effects and outcomes) Positive and negative, primary and secondary long-term effects produced by the project intervention, directly or indirectly, intended or unintended. The impact implies the relationship between the project's specific and overall objectives.

At impact level the evaluation will make an analysis of the following aspects:

- Extents to which project's objectives have been achieved, in particular the overall objective.
- Whether the effects of the project:
 - d) Have been facilitated or constrained by external factors.
 - e) Have produced any unexpected impacts and how have these affected the overall impact.
 - f) Have been facilitated or constrained by the project management, by co-ordination arrangements or by the participation of relevant stakeholders.
- To what degree do the companies implement the Capacity Building of their managerial and competent technical personnel in applying BAT/BEP in priority industrial source categories to reduce UP-POPs release?
- The enhanced capability for establishment and operation of adequate monitoring infrastructure for UP-POP chemicals as key prerequisites for implementing BAT/BEP and the many other obligations of the Stockholm Convention?
- How has the project influenced implementation of related national legislations?

Sustainability (It is the likely continuation of the achieved results and project outcomes). Continuation of benefits after the development assistance has been completed.

- Quality of the professional and managerial competence to sustain the activities?
- Are there any weaknesses and which are the strengths? What is the quality of the management system?
- How well have been trained for their tasks the institutions and enterprises selected?
- Are there any sources of funding or direct income, current and potential?
- What arrangements can be made to strengthen the sustainability of the activities?

Mutual reinforcement (coherence) (It is the extent to which activities undertaken allow the GEF and UNIDO to achieve its development policy objectives). There is complementarity with National policies and with other donors' interventions? How country's policies and donor's intervention complement each other. This is the connection to higher level policies (coherence). There is likeliness that results will mutually reinforce or may **duplicate**?

UNIDO-GEF value added

The evaluation will also analyze how the project (its objectives, targeted beneficiaries, timing, etc.) is creating synergy with the intervention of other Donors avoiding duplication or optimizing synergies.

The conclusions of the Evaluation Team on all above-mentioned points will be reflected, where appropriate, as recommendations for the continuation and sustainability of the activities promoted by the project.

The analysis will be based on the following:

3. A desk review of project documents including:

- (a) The original project document, monitoring reports (such as progress and financial reports to UNIDO and GEF annual Project Implementation Review reports), output reports and relevant correspondence.
 - (b) Notes of the Steering Group meetings.
 - (c) Other project-related material produced by the project.
4. The evaluation team will use interviews with project management and technical support and surveys for counterparts and stakeholders involved.
 5. Interviews with project partners
 6. On-site observation of results achieved, including interviews of beneficiaries of improved technologies.
 7. The evaluators shall determine whether to seek additional information and opinions from representatives of any donor agencies or other organizations.
 8. Interviews with the UNIDO Country Offices and sub-regional authorities dealing with project activities. In case, the evaluators may also discuss with relevant GEF Secretariat staff.

Conclusions, Recommendations and Lessons learned

Conclusions

The conclusions should be organized in clusters in order to provide an overview of the assessed subject. It should feature references to the findings, showing how the conclusions derive from data, interpretations, analysis and judgment criteria.

Conclusions should report not only the successes observed but also issues requiring modifications or a different course of action. They will be organized by order of importance.

Recommendations

The recommendations are always related to conclusions and may derive from one or more conclusions. They intend to improve the project or to prepare the design of a new intervention.

The value of evaluation depends on quality of the recommendations offered.

Therefore, they should be as realistic and pragmatic as possible; they should take careful account of the circumstances currently prevailing in the context of the project.

They could concern organizational and operational aspects, such as policies, technologies, institutional development, and regional or sectoral strategies.

Recommendations must be clustered and targeted to the appropriate audiences.

Lessons Learned

They are based on the findings. The report should indicate the main lessons learned from the project results. Lessons learned are generalizations, positive or negative, based on evaluation. They derive from the analysis and abstract from specific circumstances to broader situations.

Normally the lessons highlight strengths or weaknesses in formulation, design and implementation that can affect performance and results. Therefore, the lessons can be retained for improving the quality and effectiveness of the assistance in future projects.

IV. Evaluation Team and Timing

The evaluation team will be composed of the following:

- One international consultant, Team leader, specialized in methodology of evaluation of technical assistance projects. Knowledge of UNIDO projects dealing with environment an advantage. Knowledge and drafting ability in English.
- One international chemical or environmental engineer, familiar in evaluating technical cooperation projects dealing with release of UP-POPs into the environment. Knowledge of BAT and BEP methodology for the reduction or elimination of unintentionally produced persistent organic pollutants (UP-POPs). Management of POPs and other toxic chemicals. Knowledge of GEF and UNIDO technical cooperation activities an asset. Good knowledge of English.

Consultants will be contracted by UNIDO. Tasks are specified in the respective job descriptions.

Members of the evaluation team must not have been involved in the design and/or implementation of the project.

Timing

The evaluation is scheduled to take place in the period October/November 2013, including two/three weeks in the selected countries involved in the project.

The final version of the evaluation report will be submitted in Word and in three hard copies to the UNIDO project Manager within six weeks after the debriefing at the latest.

V. REPORTING

Evaluation report format

The report should be brief, to the point and easy to understand. It must explain; the purpose of the evaluation, what was evaluated and the methods used. The report must identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should provide information on when the evaluation took place, the places visited, who was involved and be presented in a way that makes the information accessible and comprehensible. The report should include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination.

Evidence, findings, conclusions and recommendations should be presented in a complete and balanced manner. The evaluation report shall be written in English.

To ensure that the report considers the views of parties concerned and the possibility that they are followed up, it is required that the main conclusions and recommendations be presented in draft and discussed with the development partners in the field and with UNIDO in Vienna

As the report is the product of an independent team of persons acting in their personal capacities, it is up to the evaluators to make use of the comments made by the parties involved and to reflect them as they think is the best in the final report. However, the evaluation team is responsible for correcting any factual errors brought to their attention prior to the finalization of the report. The evaluators will take the comments into consideration in preparing the final version of the report.

Annex 1 - Outline of an in-depth project evaluation report

Executive summary

- Must provide a synopsis of the storyline which includes the main evaluation findings and recommendations
- Must present strengths and weaknesses of the project
- Must be self-explanatory and should be 3-4 pages in length

I. Evaluation objectives, methodology and process

- Information on the evaluation: why, when, by whom, etc.
- Scope and objectives of the evaluation, main questions to be addressed
- Information sources and availability of information
- Methodological remarks, limitations encountered and validity of findings

II. Country and project background

- Brief country context: an overview of the economy, the environment, institutional development, demographic and other data of relevance to the project
- Sector-specific issues of concern to the project or important developments during the implementation period
- Project summary:

- Fact sheet of the project: including project objectives and structure, donors and counterparts, project timing and duration, project costs and co-financing
- Brief description including history and previous cooperation
- Project implementation arrangements and implementation modalities, institutions involved, major changes to project implementation
- Positioning of UNIDO (other donors, private sector, counterparts etc.)

III. Project assessment

It is the key chapter and should address all evaluation criteria outlined in the TOR. Assessment must be based on factual evidence collected and analyzed from different sources. The evaluators' assessment can be broken into the following sections:

- A. Design**
- B. Relevance**
- C. Effectiveness**
- D. Efficiency**
- E. Sustainability**
- F. Project coordination and management**

IV. Conclusions, Recommendations and Lessons Learned

Annexes should include the evaluation TOR, list of interviewees, documents reviewed, a summary of project identification and financial data, and other detailed quantitative information. Dissident views or management responses to the evaluation findings may later be appended in an annex.

AGENDA OF EVALUATION MISSION**ANNEX II**

Date	Time	Activities	Venue
29/10/2013	15.00	Arrival in Thailand	Bangkok
30/10/2013	9.00 – 10.00	Interview with PCD Pollution Control Dept. Ministry of Environment (government counterparts)	Bangkok
	10.30 – 12.00	Interview with private sector (pilot facilities) – Companies Oleen and Redbull	
	13.00 – 16.00	Interview with Dioxin trainees Interview with pilot university (NIDA) Interview with SGS (Mineral Environmental Agricultural Services) sampling collection.	
	16.00 – 17.30	Interview with Prof. Siwatt Nat. Project Manager Director NIDA Centre for Research & Development	
30/10/2013			
15.00	Travel to Cambodia Phnom Penh	Mr. M. Marchich, Ms. Leah Texon, Ms. Carmela Centeno Arrival Phnom Penh 21.00	Phnom Penh
1/11/2013	8.00	Depart from the guesthouse and head to the Ministry of Environment	Phnom Penh
	08:30- 12:30	Meeting with DG, Mr. Ken Choviran (Nat. Project Manager Boiler Project) and trainees	
	14.00 – 17.00	Visit to Factory Dignity Knitter	
	17.30 – 18.30	Interview with Mr. Ken Choviran	
2 – 3/11/2013		Week end	
4 -6 /11/2013		Mr. Marchich leave	
7/11/2013	Travel to Lao P.D.R. Vientiane	Arrival Vientiane 19.30	Vientiane

8/11/2013	8.30	Meeting at UNDP with Mr. Sommai Faming Head UNIDO Operations in Laos	Vientiane
	9.15 – 12.30	Interviews with Mr. K. Keodalavong, Dir. Environm. & Chemistry Div. Ministry of Industry Mr. Sengratry Kythavone, Nat. Univ. of Laos Mr. Khammanythip Vongxay, V. President Lao Agro Ind. Mr. Somchai Siriwong Boiler Operator Lao Agro , pilot company. Mr. Phousy Inthaphanya, Univ of Laos Faculty of Science Dept. of Chemistry	
9-10/11/2013		Week end	Vientiane
11/11/2013	8.30 – 13.00	Interviews with: Chansapha Phamanivong, Ministry of Health Mr. Mr. Xaixama Bouapha, Lao Brewery Ms. Noyladda Naovarangsy, Ministry of Natural Resources and Environment Mr. Phonethipp Phetsomphou, Nat. Project Manager Boiler Project, Deputy National Focal point of SC Mr. Virasack Chundara , Min. of Natural Resources and Environment Mr. Sommai Faming	Vientiane
12/11/2013	12.00	Travel back to Vienna via Bangkok	

List of Persons interviewed and Companies visited

Name	Institution	Location	Title
Ms. Carmela Centeno	UNIDO	Vienna	Project Manager
Ms. Teeraporn Wiriwutikorn	Ministry of Environment Pollution control Dept. Thailand	Bangkok	SC focal point
Mr. Siwatt Pongpiachan	Director NIDA Centre for Research & Development	Bangkok	National Project Manager Boiler project
Ms. Woranut Deelamun	University Rachamongkon Lecturer in Air Pollution	Bangkok	Trainee in Dioxine analysis
Ms. Chalalai	Ministry of Environment Waste and hazardous management bureau	Bangkok	Assistant of National Coordinator
Mr. Atip	Red Bull Distillery (demonstration company)	Bangkok	Factory Manager
Mr. Nopwarin Dvangdee	Red Bull Distillery (demonstration company)	Bangkok	Head Engineer
Mr. Kwanchai Tiemchavi	Oleen (Oil production Co.) (demonstration company)	Bangkok	Head Engineer
Ms. Wadsana Pattana	SGS (Minerals and Environmental Agricultural Services) Environmental inspections	Bangkok	Trade Service Sales Manager
Mr. Thepson Yommana	SGS (Minerals and Environmental Agricultural Services)	Bangkok	Technical Manager
Mr. Vann Monyneath	Ministry of Environment of Cambodia Dept. of Technical affairs	Phnom Penh	Deputy Secretary general of NCDM (National Committee Coastal Mangt & Development)
Mr. Lohn Heal	Ministry of Environment of Cambodia Directorate of Technical Affairs	Phnom Penh	Director General Head Ozone Unit
Mr. Ken Choviran	UNIDO Project	Phnom Penh	National Project Manager Boiler Project
Mr. Meng Chamnan	Institute of Technology of Cambodia (ITC) University Project Counterpart	Phnom Penh	Lecturer and Project Trainee Trainer of Trainers
Ms. Khun Sarours	Great Honour Textile Factory Ltd.	Phnom Penh	Safety and compliance Officer
Mr. Cheng Sokha	Great Honour Textile Factory Ltd.	Kandal	Human Resources Manager
Mr. Sommai Faming	UNIDO	Vientiane	Head UNIDO Operations in Laos
Mr. Khamphone .Keodalavong	Ministry of Industry and Commerce	Vientiane	Director Industrial Environment & Chemistry Division

Mr. Sengratry Kythavone,	National Univ. of Laos	Vientiane	Associate professor Faculty of engineering
Mr. Khammanythip Vongxay	Lao Agro Industry Ltd. (demonstration Company) Boiler Project	Vientiane	Vice President Lao Agro Industry Ltd.
Mr. Somchai Siri Wong	Lao Agro Industry Ltd. (demonstration Company)	Vientiane	Boiler Operator
Mr. Phousy Inthaphanya	University of Laos Faculty of Science, Dept. of Chemistry	Vientiane	Lecturer and Trainee at Dioxin Training in Beijing
Mr. Chansapha Phamanivong	Ministry of Health	Vientiane	Technical Manager at Division Food and Drug Quality Control Centre
Mr. Xaixama Bouapha	Lao Brewery Ltd.	Vientiane	Mechanical engineer, energy boilers compressors
Ms. Noyladda Naovarangsy	Ministry of Natural Resources and Environment	Vientiane	Chief of Laboratory for analysis of waste water
Mr. Phonethipp Phetsomphou	Deputy National Focal point of SC	Vientiane	National Project Manager Boiler Project
Mr. Virasack Chundara	Ministry of Natural Resources and Environment.	Vientiane	Assistant to Dir. General and Former Director of Cleaner Production Centre (CPC) of Laos

Name of Company/institution	
Year of establishment	
Type of activity	
Number of employees	

1. How did you first learn about the project and its activities?

☐ Approached by project staff ☐ Through Media (Press etc.) ☐ Colleagues, Other Firms

2. When did you first learn about this project? Month Year.....

3. Which services did you receive or participate in?

☐ Training of your Staff

☐ Participation in seminars

- Contracts for POPs reduction

☐ On job training for laboratory equipment

4. How many times did you meet the staff executing the activities of the project (national project manager, UNIDO project manager)?

5. Following the project assistance, did your Company improved its capability in developing procedures, guidelines for maintenance, safety measures to avoid unintentional POPs releases, applying appropriate monitoring procedures or utilizing financial mechanisms? ☐ Yes ☐ No

6. How do you rate the project strategy?

☐ Very useful☐ Satisfactory, useful or normal

☐ Not very useful

□ Useless

7. How do you rate the professional knowledge of the project staff (national project manager)?

☐ Very good

☐ Satisfactory

☐ Not very good

☐ Poor

8. Do you plan to continue using the improved competencies of your managerial and technical personnel in applying BAT/BEP in industrial source categories to reduce UP-POPs releases?

☐ Yes☐ No

9. Any facilities established or upgraded by project for reduction of UP-POP releases? ☐ Yes

☐ No

10. If yes, which ones?

11. What improvement steps did you take or do you plan, as a consequence of the assistance received by the project?

	Action taken (Amount \$ & year)	Planned (Amount \$ & year)
Nothing		
Operational improvements		
Investments, if any		

12. What do you think was the best contribution of the project to your way of doing business?

13. Anything you did not appreciate concerning the services of the project?

14. Are there other institutions offering similar assistance in the country? ☐ Yes ☐ No
If so, please Name:

15. Do you have any suggestions for future improvements and sustainability of the activities?

Interview guidance for personnel trained in BAT and BEP methodology for reduction or elimination of Unintentionally Produced Persistent Organic Pollutants (UP-POPs) releases from industry

1) Name:
2) Company or Institution:
3) Position in the company/institution:
4) Training and practical experience acquired thanks to the project (Please elaborate).
5) How do/would you apply the new skills learned:
6) Your opinion on the practical application of the training offered by the project:
7. Comments/suggestions on how to further improve the training received:

8) Any ideas for implementing measures to reduce/eliminate releases from unintentional production and coordinate activities with the national strategies for environmental protection and industrial sustainable development (focus, drivers, barriers and overcoming)

9) In your opinion, which are the possible further contributions of the project, contacts to other industries and possible other stakeholders etc.:

10) Others, if any:

**Independent Evaluation of UNIDO project:
GFRAS10006**

Job Description

Post title	International Evaluation Consultant
Duration	25 work days spread over 3 months
Started date	October 2013
Duty station	Home-based, Bangkok, Pnohm Penh, Vientiane

Duties

The consultant will evaluate the projects according to the Terms of Reference. She will be responsible for preparing the final draft evaluation report, according to the standards of the UNIDO Evaluation Group. S/he will perform the following tasks:

Main duties	Duration/ location	Deliverables
Review project documentation and relevant country background information (national policies and strategies, UN strategies and general economic data...); determine key data to collect in the field and prepare key instruments (questionnaires, logic models...) to collect these data through interviews and/or surveys during and prior to the field missions	4 days	List of detailed evaluation questions to be clarified; questionnaires/ interview guide; logic models; list of key data to collect, draft list of stakeholders to interview during the field missions
Briefing with the relevant project staff at HQ	2 days	Interview notes, detailed evaluation schedule and list of stakeholders to interview during the field missions
Conduct field mission to selected country as agreed with the project counterparts	9 days (Bangkok: 29 – 31 Oct; Pnohm Penh: 31 Oct-2 Nov) Vientiane (2 -6 Nov)	
Prepare the evaluation report according to TOR and template provided in annex 1 of the TOR	6 days	2 Draft evaluation report Brief input report to country evaluation

Main duties	Duration/ location	Deliverables
Revise the draft project evaluation reports based on comments from stakeholders and edit the language and form of the final version according to UNIDO standards	4 days	Final evaluation report
TOTAL	25 days	

Qualifications and skills:

- ✓ Advanced degree in environmental science, development studies or related areas
- ✓ ***Knowledge and experience in POPs, the Stockholm Convention and environmental projects***
- ✓ ***Knowledge and experience in the field of evaluation (of development projects)***
- ✓ Experience in GEF projects and knowledge of UNIDO activities an asset
- ✓ Knowledge of and experience in the project region an asset

Language: English

Absence of Conflict of Interest:

According to UNIDO rules, the consultant must not have been involved in the design and/or implementation, supervision and coordination of and/or have benefited from the programme/project (or theme) under evaluation. The consultant will be requested to sign a declaration that none of the above situations exists and that the consultants will not seek assignments with the manager/s in charge of the project before the completion of her/his contract with the Evaluation Group.