



UNIDO, April 2012



(Independent Final Evaluation of the Project GF/VIE/08/005)

**INTRODUCTION OF BAT AND BEP METHODOLOGY TO
DEMONSTRATE REDUCTION OR ELIMINATION OF
UNINTENTIONALLY PRODUCED PERSISTENT ORGANIC
POLLUTANTS (UP-POPS) RELEASES FROM THE INDUSTRY IN
VIETNAM**



“Environmental consciousness and sustainable utilization of resources adopting environmentally sound technologies should be the principle of the entire industrial world”

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ABBREVIATIONS AND ACRONYMS USED IN THE REPORT

BAT	Best Available Technologies
BEP	Best Environmental Practices
CTA	Chief Technical Advisor
DAC	Development Assistance Committee
ESEA	East and South East Asia
ESM	Environmentally Sound Management
EU	European Union
GEF	Global Environment Facility
GVN	Government of Vietnam
HCB	Hexachlorobenzene
ISEA	Industrial Safety and Environment Agency
M&E	Monitoring and Evaluation
MOIT	Ministry of Industry and Trade
MONROE	Ministry of Natural Resources and Environment
MSP	Medium Size Project
NGO	Non Governmental Organization
NIP	National Implementation Plan
NPC	National Project Coordinator
NTA	National Technical Advisor
OECD	Organization for Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
PCB	Polychlorinated Biphenyl
PCDDs/PCDFs	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PMT	Project Management Team
POPs	Persistent Organic Pollutants
PRTR.....	Pollutant release and transfer registers
PSC	Project Steering Committee
RECP	Resource Efficiency and Cleaner Production
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNDP	United Nations Development Programme
UP-POPs	Unintentionally Produced Persistent Organic Pollutants
VEA	Vietnam Environment Agency
VNCPC.....	Vietnam National Cleaner production Centre.
WB	World Bank

MAP OF VIETNAM



1 EXECUTIVE SUMMARY

1.1 Background of Project

The Stockholm Convention in preparing the National Implementation Plan (NIP) for Vietnam has demonstrated that the reduction or elimination of POPs (Persistent Organic Pollutants) releases is a national priority and that it is committed to take appropriate actions.

In 2006, the Government of Vietnam (GVN) approved National Implementation Plan (NIP) for POPs that gave official foundation and guidelines for implementation of actions to control, reduce and eliminate POPs.

Persistent organic pollutants (POPs) are toxic, persistent, bio-accumulative chemicals, which spread through the air and water across national borders and accumulate in places far from where they released, causing major impacts on environment and human health.

U-POPs are among the POPs chemicals listed in the Stockholm Convention that have demonstrated chronic adverse effects on human health and the environment.

On 22 July 2002, Vietnam ratified the Stockholm Convention to control and eliminate Persistent Organic Pollutants (POPs) and became the 14th member of the Convention. The Convention was signed by the Governments of 151 countries on May 22nd 2001 in Stockholm and entered into force on 17 May 2004.

In Vietnam 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 no-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 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, allowing in this way favourable conditions for emissions of U-POPs and other toxic pollutants.

Over the last decade, the economy of Vietnam has made rapid steps in development of the industry and services. However, with regard to environmental protection, it seems that the monitoring and institutional capacity have not kept pace with this development

Adequate measures for environmental pollution prevention and control are not effectively designed and implemented and there is a lack of sufficient monitoring data for comprehensive assessment and rapid interventions.

According to the Action Plan of the Stockholm Convention (Part II of Annex C of the Convention), Vietnam has to apply, **BAT (Best Available Technologies)** and to promote **BEP (Best Environmental Practices)** in the new priority source categories, and at the same time to complete dioxin release reduction demonstrations in selected existing sources in the priority sectors by 2010.

The activities of this project concern the residential communities around the production facilities of these industries and also in all the areas beyond the direct beneficiaries of the project, such as communities handling the consequences of the environmental pollution caused by dioxin and furan emissions.

Besides the project is ensuring the commitment of the Government of Vietnam to the international community to limit and reduce dioxin and furan emissions resulting from industrial processes.

The strategy proposed by the National Implementation Plan (NIP) and the activities of this project towards the reduction of the industrial source categories that have the potential for comparatively high formation and release of UPOPs, includes efficient operation of combustion technologies, thermal and chemical processes, supported by necessary capacity building and regulatory framework strengthening consistent with the best available techniques and best environmental practices (BAT/BEP) guidelines.

UNIDO, according to its mandate, is committed to assist its developing country Member States in accordance with Article 12 of the Stockholm Convention, is the Executing Agency.

The national counterparts have been the Vietnam National Cleaner Production Centre, and Dioxin Laboratory (Vietnam Environment Administration).

The project effective duration of the implementation was from March/2010 until July/2011.

1.2 Overall and Specific Objectives of the project

The overall objective of this project is to establish the required human resources and infrastructure to implement the obligations of the Stockholm Convention in Article 5 "Measures to reduce and eliminate releases from unintentional production" and coordinate its activities with the national strategies for environmental protection and the national strategies for industrial and sustainable development and cleaner production, contributing in this way to the improvement of human and environmental health.



Emissions in cooking (a stage of the metallurgical process)

The specific objective of the project aims at:

- 1) reducing unintentional production of POPs in key sectors of the industry listed in the Source categories of Annex C of the Stockholm Convention by implementation of BAT/BEP;
- 2) Supporting the BAT/BEP projects, addressing **Unintentionally Produced Persistent Organic Pollutants (U-POPs)** related issues by developing monitoring and research capacities;
- 3) Achieving these specific objectives to enable the key industrial sectors of Vietnam, that have the potential for formation and release of UP-POPs into the environment, to acquire a more

sustainable development and for the country itself to comply with its obligations under the Stockholm Convention in respect to the UP-POPs releases.

-4) Developing adequate monitoring capacity to provide in Vietnam the required infrastructure and services for all future activities in the area of UP-POPs and POPs elimination projects.

-5) as initial target for the monitoring of the application of BAT/BEP measures to reduce UP-POPs emissions, four pilot industrial sectors have been selected: **(1. Steel making sector, 2. Pulp and Paper industry using chlorine as bleaching agent, 3. Waste incineration of hazardous and medical waste, 4. Cement industry utilizing the kilns for burning also hazardous waste (Co-processing))**

1.3 Financial Resources

The GEF, as the financial mechanism for the Stockholm Convention, has provided US\$ 800,000 incremental cost funding for the project.

The Government of Vietnam through the Ministry of Industry and Trade and MONRE/VEA has further committed US\$ 1,555,000 as cash (8,730 USD) and in-kind contribution to the project to be used mainly for capacity building for the demonstration sites, cleaner production assessments and part of the monitoring costs.

The in kind amount covers cost for office, reports, Salaries/allowances for project staff (National Project Director, Project Coordinator of VEA).

During the implementation of the project some internal budget revisions have taken place to adjust the budget according the needs of the operations, but always keeping the total amount.

The last revision was done in July 2011 to accommodate the costs for purchasing laboratory equipment, which has been transferred to the Dioxin Laboratory for environmental monitoring.

1.4 Conclusions

The investigation and calculation results of UPOPs emission levels performed by this project can be considered as an important, although still partial, database of persistent organic pollutants in some industries like paper and paper production, cement, metallurgy and waste incineration.

The project has produced satisfactorily the outputs foreseen and globally fulfilled the forecasted objectives, in spite of the relatively small budget and timing problems due to bureaucratic project approval procedures.

To sum up the important outcomes of the project have been:

- Public awareness about the activities has been an important pillar of the project.
- The beneficiaries of the awareness transferred by the project have been environment related State and private institutions, some industrial enterprises emitting UP-POPs, hazardous waste management enterprises and disposal facilities.
- Meetings, study tours, trainings and workshops have also been an important part of the project implementation, to support the building of the national capacities.
- The results have been very important in term of improving the capacity for BAT and BEP applications, particularly because creating a new experience for Vietnam with a systematic monitoring of UP-POPs (mainly dioxins and furans).
- Establishing a baseline review and UPOPs inventory for four industrial sectors.
- Preparation of technical guidelines and booklets for environmental sound and cost-effective practices for the selected industrial sectors that are releasing UP-POPs.

- The project has promoted cooperation among industrial sectors and technical national State and private institutions like the Vietnam Environment Administration, the Dioxin Laboratory and the Vietnam Cleaner Production Centre.
- Finally, the project has provided considerable contribution to Vietnam for increasing its national capacity for the implementation of the obligations under the Stockholm Convention and has played a leverage role to promote further the activities to reduce UP-POPs releases.

The project has further demonstrated that BAT implies 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 to participate in the pilot demonstration. They have to possess the appropriate technology for meaningful experiments and operations. The Vietnam Cleaner Production Centre conducted the assessments of the enterprises to ascertain their capacity to participate in the project.

A further positive impact it has been the positive interest of the Governmental authorities for the behaviour of the enterprises willing to pay more attention to the environment.

More in detail, the analysis and the trends of the data obtained thanks to the activities developed by the project, have proved that the following results have been achieved:

- Sensitised the authorities in establishing standards and parameters.
- Made possible to evaluate the effects of these strategies by building up action plans to minimize UPOPs emission and trends through updating UPOPs emission data.
- Showed the possibility to manage the mitigation of the unintentional formation and emission of Dioxins/Furans.
- Enhanced the ability to collect data and exchange information between administrators, scientists, research institutes and production enterprises.
- Estimation of the expenses for BAT/BEP implementation and analysis of the benefits as well as of environmental expenses due to the savings obtained from such applications.
- The project has successfully served as a leverage to promote further effort and investment from the Government to implement comprehensive monitoring and research on the issue of dioxins and UP-POPs emission from the industry.
- Many project activities have connected and supported other activities to implement the Stockholm Convention and cleaner production, linking many agencies.
- For stack gas sampling and monitoring Dioxin/Furan emissions, the project has made remarkable contribution in creating capacity building (knowledge, techniques, equipment, etc.) and can be said that for the first time Vietnamese staff can collect sampling and conduct analysis following international requirements and standards.
- The project has promoted the creation of a network of governmental bodies, organizations, experts for controlling Dioxin/Furan emissions, including world-class experts and labs. Cooperation activities and international workshops have contributed to capacity strengthening of Vietnamese officers and experts; increasing the technical reputation of Vietnam
- Due to limited time and budget, some project results have only met basic requirements, while practical demand is quite high. For example, the staff capable of collecting stack gas sampling is still small. Some BAT solutions have not been implemented; because the analysis of the BEP efficiency has not yet been made. If these activities had been deeper implemented, application and effectiveness would have been much more successful for the needs of the enterprises.

1.5 Recommendations

According to the findings these are the main recommendations:

To the Vietnamese authorities:

- It is imperative that Ministry of Natural Resources and Environment and the Ministry of Industry and Trade continue the monitoring of reduction of dangerous industrial emissions particularly U-POPs, according to the obligations of the Stockholm Convention.
- The new project already proposed to GEF for the application of BAT & BEP options to reduce UP-POPs releases from the waste incineration sector and considered as a follow up phase of the present project should establish an environmentally sound management system (ESMS) to introduce the BAT/BEP model implementing and reinforcing the national institutional and controlling capabilities, promoting and supporting the investment for the technological improvement of BAT/BEP measures
- Since globally in the world the industrial production alone is accounting for around 25 per cent of gas emissions from all sources, (which is considerably resulting in environment pollution and danger for the health not only of the life of the human being but for the nature in general), the main goal of the second phase of the project should be to minimize to the maximum extent possible, the danger to the ecosystem caused by not technologically appropriate waste incineration activities in the country.
- The laboratory capacity created by the project should be enlarged and utilized for other POPs related activities such as inventory and disposal of electronic waste and contaminated soils.
- It should be foreseen the construction of additional laboratories all over the country to provide appropriate analysis and controls not only limited to Dioxin but also for newly added POPs under the Stockholm Convention, especially for the ones produced by the steel industrial sector.
- The activities for replication of the achievements of the project should continue. The Dioxin Laboratory should give its services to cover the needs of the institutions and the enterprises of the entire region in terms of sampling, monitoring and analysis of U-POPs.
- Policies and national programs on regular monitoring of Dioxin/Furan emissions 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 should be shared and disseminated in the countries of the region.
- The Government should support and promote private sector investments into this field. State-of-the-art technologies can further reduce the costs for the control and monitoring also of other POPs.
- The Industrial Safety and Environment Agency (ISEA) belonging to the Ministry of Industry and Trade (MOIT) should continue to disseminate the project achievements and experiences when organizing and participating in BAT/BEP seminars and workshops.

To the Vietnam Environment Administration:

- Adherence to the ESM system and monitoring requirements should be assured and enforced by regular and periodical inspections at the enterprises.
- VEA should issue every year a list of the national Vietnamese laboratories authorized and certificated to control and analyze the emissions, according to the regulations and standards promulgated and updated by VEA.
- VEA should establish some rules in order to give time to the involved enterprises to adapt to the established standards. A delay time of at least three months from the publication of the standards is recommended.

- VEA should also organize periodical workshops and seminars for the concerned enterprises in order to present and explain to them the new established standards and regulations.

To UNIDO and GEF:

- UNIDO and the GEF should disseminate the results of the project in other countries for replication.
- Bring the positive achievements to the attention of official Vietnamese authorities to further disseminate awareness and promote possibility of further cooperation under the GEF portfolio.
- High political and technical level personnel of the Ministries involved in the project's activities should be regularly invited to the technical workshops concerning the development of the project.
- Considering that during the project closing workshop, the representative of GEF has highly appreciated the project results and has suggested to focus the activities on typical Vietnamese industries, the follow-up phase to be more effective should concentrate mainly on the sectors that cause the most problems and which are more diffused all over the country: i.e. the waste incineration activities and the project in the metallurgical sector.
- The follow up project should extend the technical assessments of the enterprises also to the REPC (Resource efficiency and Cleaner Production). More attention should also be paid to the quantity and the quality of the input materials, in accordance with the BAT&BEP criteria.
- It is recommended to further build the capacity of the Dioxin Laboratory to train additional persons and extend the network all over the country.

To the management of the project:

- The National Project Director should report to UNIDO (implementing Agency) on a quarterly basis. In case of these projects this procedure should be attentively monitored to allow in case of discrepancies in the implementation to take promptly corrective measures.
- Training and upgrading of skills and capacities should not finish at the end of the training course or seminar, but be reinforced periodically through refreshing courses and continuous professional advice. Control of Dioxin/Furan emissions from industries is difficult and there are few Vietnamese experts in this field. Therefore, attention to training and upgrading of capacities has to be continuous.
- The staff that benefited of the training received by the project should engage in transferring further to the staff of his enterprise the upgraded skills received.

The Evaluation Team trusts that the proposed recommendations will allow the management of the project to optimize the utilization of the resources, with the objective to complete the implementation of the forecasted outputs.

Environmental consciousness and the sustainable utilization of the natural resources through adopting environmentally sound technologies should be the principle of the entire industrial world.

2 PRESENTATION AND ANALYSIS OF THE PROJECT

2.1 Project description

2.1.1 Project general information

Project Title	Introduction of BAT/BEP methodology to demonstrate reduction or elimination of unintentionally produced persistent organic pollutants (UP-POPs) releases from the industry in Vietnam
Project's GEF ID Number	3011
Project number	GF/VIE/08/005
Country	Vietnam
Thematic area code	GEF EAE BC 16- Stockholm Convention
Implementing Agency	UNIDO
Duration	Two years (effective duration of activities from 3/2010 until 7/2011)
Project site	Hanoi, Vietnam
Project Approval Date	18/9/2009
Date of Project start	March 2010
Total Project Cost	USD \$ 2,390,000 (excl. support costs)
GEF Grant Amount	USD \$ 800,000 (including Project Preparatory Grant of \$ 50.000)
Government Ministry Resp.	Ministry of Natural Resources and Environment
Government Counterpart	Vietnam Environment Administration (VEA)
Government of Vietnam inputs	USD\$ 1,550,000 in kind
UNIDO Inputs	USD \$ 40,000 in kind

This project was financed by the GEF (Global Environment Facility) 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. So far, the GEF has allocated US\$ 8.8 billion, supplemented by more than US\$ 38.7 billion in co-financing 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 from its beginning, Vietnam has demonstrated that the reduction or elimination of POPs releases in general is considered a national priority and consequently he is committed to take the appropriate actions in this sense. Since 1993 Vietnam has adopted a series of regulations regarding the prohibition of production and utilization of all POPs pesticides. Vietnam, with the financial assistance of GEF has examined the POPs situation in the country and has approved the National Implementation Plan (NIP) that is detailing the legislative, management and the technical needs for the reduction and elimination of POPs.

According to this implementation plan Vietnam has to apply BAT and promote BEP in new source categories (Part II of Annex C of the Stockholm Convention) and complete dioxin release reduction demonstrations in the priority sectors by 2010.

To comply with these obligations has been the purpose to design and implement this project. According to the Convention the sector-wide introduction of BAT/BEP should be completed by 2020.

Also for this reason a follow-up of the project just completed has the appropriate framework of action.

The overall objective of this project is to establish the required human resources and infrastructure to implement the obligations of the Stockholm Convention in Article 5 "Measures to reduce and eliminate releases from unintentional production" and coordinate its activities with the national strategies for environmental protection and the national strategies for industrial and sustainable development and cleaner production, contributing in this way to the improvement of human and environmental health.

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 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 and on the overall development of the country.

The project has demonstrated the effectiveness of the introduction of BAT and BEP methodology in the four 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 Government of Vietnam, through the Ministry of Natural Resources and Environment (MONRE), Department of Pollution Control of the VEA (Vietnam Environment Administration), also the National focal point for the Stockholm Convention in Vietnam, and the Industrial Safety Techniques and Environment Agency (ISEA) belonging to the Ministry of Industry and Trade (MOIT) have been the national implementing partners of the project.

A Project Steering Committee composed by high-level representatives from the Ministry of Natural Resources and Environment, VEA, Ministry of Trade and Industry, Ministry of Science and Technology, Ministry of Planning and Investment and UNIDO had the role of overseeing the various POPs projects in the country. The Committee has met once per year and has facilitated the development of the projects in the sector, ensuring that no undue overlaps were taking place and providing the coordination of the activities at country level.

For the implementation of specific activities of the project, a Project Management Team (PMT) composed of representatives from VEA, MOIT and VNCPC was established.

Its task has been the day to day monitoring of the implementation progress based on the annual work plan and its indicators. The PMT had also the task to inform UNIDO of any problems and delays or difficulties faced during the implementation, in order that appropriate support or any adjustment could be timely done.

The Steering Committee in consultation with UNIDO recruited the Chief Technical Advisor (CTA) and the National Technical Advisor (NTA) to fine tune the progress and the performance of the project and select the national consultants.

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

2.2 Analysis of concept and design of the project

2.2.1 National context

The planned approach of this project accommodates Vietnam's obligations under the Stockholm Convention to start reducing about 25% of Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs) releases currently attributed to these source categories.

The strategy proposed by the National Implementation Plan (NIP) and this project for the industrial source categories that have the potential for comparatively high formation and release of these releases and polychlorinated biphenyls (PCBs) to the environment (Part II: Source categories, Annex C of the Stockholm Convention) 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 (PCDDs/PCDFs, HCB and PCBs) 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 most facilities in Vietnam there are very limited of off-gas and wastewater treatment. 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.

Based on the preliminary UP-POPs inventory, it can be concluded that there are a wide range of UP-POPs sources in Vietnam without control measures and no BAT/BEP experience and knowledge in respect to UP-POPs reduction.

This in combination with the fast development of industry can lead to increased releases of environmental pollution (including UP-POPs) threatening the Vietnamese environment and human health if no appropriate countermeasures would be taken.

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 guiding of BAT/BEP projects and for evaluating BAT/BEP implementation.



Emissions in a Steel Factory

The application of BAT/BEP will also be important for the successful implementation of the two other projects on the environmentally sound management of POPs currently developed in Vietnam:

- Building capacity to eliminate POPs pesticides stockpiles in Vietnam (GEF UNDP Project)
- PCB Management and Disposal Demonstration Project (GEF-World Bank Project)

Since it is likely that these projects will use incineration or co-incineration technologies for the final disposal of PCBs and POP pesticides, 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.

At the same time, analytical laboratories in Vietnam hold up-to-date analytical equipment; the gaps analysis showed that most of the facilities lack international accreditation as well as institutional and human resource capacity to perform PCDD/PCDF analysis in compliance with international standards.

In 2004, Vietnam has made national inventory of sources of Dioxin and Furan emissions focused on collecting statistics based on emission source statistical methods.

The inventory focused on gathering statistics on the sources of Dioxin and Furan emissions in areas destroyed by waste, production of ferrous metals, transport, in the process of uncontrolled burning in the field of production and use of chemicals, consumer products, the field of waste and landfill and other potential hot spots.

Given the different focus of the inventory in terms of POPs chemicals and environmental matrices covered, Vietnam yet has to build capacity for the monitoring of PCDD/PCDF and other unintentionally generated POPs releases from industrial sources, which is a key priority for the implementation of this project.

The implementation of the project may permit the country to have a better planning to meet compliance with its obligations under the Stockholm Convention on POPs, and through this to contribute to the improvement of the environmental situation in Vietnam and in the South-East Asia region where Vietnam is among the fastest growing economies, and eventually reduce and eliminate UP-POPs pollution burden to human health.

The introduction of BAT/BEP strategies is the key approach of Vietnam 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.”

Vietnam ratified the Stockholm Convention on 22 July 2002 and the Convention entered into force on 17 May 2004.

Considering this, all new industrial sources listed in Part II of Annex C of the Convention will be required to adopt BAT/BEP not later than 16 May 2008.

Furthermore, in all existing facilities prior to the former date, Vietnam is required under the Convention to promote BATs and BEPs in due course. The timeline confirms that the project is very appropriate and timely.

The implementation of the Stockholm Convention in Vietnam has been planned and is progressing in close coordination with the national strategies on development and environment. More specifically, and in the context of the environment, Vietnam has made significant progress in implementing the “National Strategy on Environmental Protection until 2010 and towards 2020”.

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. Although the Vietnamese government has 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.

One key issue is the lack of proper coordination among the various 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.

According to the Project Document, during the project preparation and design phase several gaps have been identified that will need to be addressed to ensure its successful implementation and the achievement of project objectives. These include:

- 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 pesticides and PCBs 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, and there is 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. This is particularly true in Vietnam with high annual industrial growth rate and intensive agricultural activities on which a large part of the population relies.

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

Though there has been significant progress achieved in implementing the “National Strategy on Environmental Protection until 2010 and towards 2020” to tackle the pollution from industrial sources, it is still at its early stage to adequately address all pollution release vectors such as air, water sediments and solids.

- a) Solid wastes – Hazardous and chemical wastes: Although Vietnamese government has been endeavoring to establish a legal and institutional framework for sound management of hazardous and chemical wastes, including POPs, there are still shortcomings that need to be addressed. The UP-POPs released on solids are not properly managed and can therefore directly contaminate land or if landfilled can further impact the environment.
- b) Air pollution: The overall exposures to particulates exceed permissible levels at many urban and industrial locations in Vietnam. 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 to air in the inventory have the potential to considerably increase with industrial development if appropriate measures, in particular BAT/BEP measures would not be taken. Up to now very limited control measures on UP-POPs emissions have been taken and there are no regulations in place.
- c) Water pollution: Lack of water treatment makes water contamination poses a major health threat in Vietnam. Aquatic and marine eco-systems are also threatened by the high amounts of untreated sewage and industrial wastewater generated in urban centers. The most of the industry in Vietnam is located near to the rivers or the sea. Around 90% of the 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, they are of concern for some industries (e.g. pulp and paper, textile and leather) and need to be addressed.



Sorting out of waste for recycling before incineration

A second concern related to UP-POPs and water is the management and lifecycle of sewage sludge.

It was discovered in industrial countries that POPs and other contaminants are impacting sewage sludge as a pollution sink and depending on the management of sewage sludge can contaminate agricultural fields and the more soluble contaminants the ground and drinking water. Since sewage sludge in Vietnam is often directly released from the water treatment plants and used in some cases in agriculture, the lifecycle of sewage sludge contaminants is important at least for risk assessment and need to be monitored and possibly managed.

Up to now Vietnam has no monitoring capacity to evaluate potential emissions. Without the establishment of a reliable dioxin monitoring (sampling and analysis), these activities cannot be planned nor conducted in the country.

These are the reasons why this project has been designed.

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

It should be noted that the required analytical capacity is available in Vietnam therefore capacity building activities for sampling and monitoring of emissions are the major needs to be focused by the project in order 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.

The GEF intervention in this project is justified by:

The expansion and modernization of the Vietnamese economy, and industry in particular, 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 pace with this expansion. Therefore, an external intervention is justified on the basis that these gaps cannot be bridged organically.

The absence of effective pollution prevention and control and management systems affecting significant segment of the Vietnamese industry sector 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. In this project, the assessment of the companies of the sectors involved, also to ascertain the level of their technology, is performed by the Vietnam National Cleaner production Centre.

The design of the project demonstrates that the pollution prevention and control measures in an integrated way will provide a basis for confidence generation among local decision makers receiving technology transfer.

2.3 Which are POPs and their sources

The **Stockholm Convention on Persistent Organic Pollutants** 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.

POPs are carbon based organic – halogenated substances:

- Highly toxic for the environment, humans and wildlife;
- Persistent in the environment and resisting to biodegradation;
- 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 at higher levels of concentration than in the food 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 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, in order 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 such as the Arctic, 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 exposed individuals.



Technicians of the Dioxin Laboratory collecting samples of emissions

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 of the mission. (Annex I)

The purpose of a final independent in-depth evaluation is to enable the project stakeholders (Government authorities, national counterparts, participating institutions, industries, GEF and UNIDO) to take final decisions on possible continuation or reorientation of the activities.

The analysis of the achievements or shortcomings of the project helps in this decision.

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

The evaluation process offers the opportunity to the project stakeholders to learn about possibilities of future re-orientation of the related activities and reconsider alternative approaches.

The evaluation process will provide with lessons and experiences for the eventual future design and implementation of similar projects aiming at building capacities for environmentally sound management.

Further, the evaluation is trying to determine, as systematically and objectively as possible, the relevance, efficiency, effectiveness, impact and sustainability of the project regarding, among others, also :

- Whether the chosen strategies and target groups have been properly selected or should they had been promoted with different strategies or should other target groups have been selected.
- Whether the goals set in the project document and in the work plan have been reached.

- Whether the inputs provided (expertise, training) have been of good quality.
- Whether the activities have been undertaken in a controlled and coordinated manner by protecting human health and the environment from the harmful effects of dioxin emissions.
- The efficiency of the project coordination.
- Which activities of the project have been the most useful and most successful applied (information, training, technical advice, policy advice...).
- The degree that the elements of the environmental management system have been put into practice in the demonstration areas.
- The quality of the Public Awareness activities.
- How the institutional strengthening and capacity building have been implemented and the corresponding guidelines developed.
- The level of the economic and environmental impact.
- The degree of influence in the implementation of dioxin emissions related legislations.
- How is advancing the gradual elimination of emissions containing dioxin in the demonstration areas.
- How are working the laboratories available for dioxin analysis.
- The quality of the professional and managerial competence to sustain the activities.
- Where are the gaps and where are the strengths for the continuation of the activities.
- The arrangements that can be made to strengthen the sustainability of the activities implemented by the project.
- The efficiency and utility of the success indicators as applied by the project activities.

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 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 Evaluation Team has considered the objectives stated in the Project Document and has analysed the results obtained in the implementation of the activities foreseen.

This report is based on the following material:

The Project Document dated on 18 September 2009, is indicating the basis and the strategy for the cooperation in this project, which is focused, according to the signed document, on:

“.....efficient operation of combustion technologies, thermal and chemical processes, supported by necessary capacity building and regulatory framework strengthening consistent with best available techniques and best environmental practices (BAT/BEP) guidelines and guidance.....

“..... a wide range of UP-POPs sources in Vietnam without control measures and no BAT/BEP experience and knowledge in respect to UP-POPs reduction.....

“.....a gaps analysis undertaken during the NIP development process revealed that Vietnam lacks institutional as well as technical capacity for the sampling and monitoring of PCDD/PCDF stack air emissions and other release vectors from industrial sources.

“..... the implementation of the pilot projects will have to be accompanied and guided by PCDD/PCDF release data, the project seeks to address the above-mentioned shortcomings by establishing reliable PCDD/PCDF air emission sampling and monitoring capacity.....

“..... need to monitor stack gas emissions of these facilities to exclude the unintentional formation and releases of PCDD/PCDFs into the environment.

“..... aims at implementing activities focusing on the education of personnel for extraction, clean up and analysis of different matrices, accreditation (ISO17025 for PCDD/PCDF) and the participation in international intercalibration studies.....

“..... the different focus of the study in terms of POPs chemicals and environmental matrices covered, Vietnam yet has to build capacity for the monitoring of PCDD/PCDF and other unintentionally generated POPs releases from industrial sources, which will be a key priority for the implementation of the proposed project.....

“..... introduction of BAT/BEP strategies will be the key approach of Vietnam 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.

“.....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.”

“..... implementation of the Stockholm Convention in Vietnam has been planned and is progressing in close coordination with the national strategies on development and environment.....

“.....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.

“..... important for sustainable development of Vietnam to reduce the impact on environment from the different pollutants and to implement pollution prevention and control measures in industry.

“..... Up to now Vietnam has no monitoring capacity to evaluate potential emissions. Without the establishment of a reliable dioxin monitoring (sampling and analysis), these activities cannot be planned nor conducted in the country.....

“ capacity building activities for sampling and monitoring of PCDDs/PCDFs are the major needs to be focused in order 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.

“..... 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.

These above mentioned activities have been complemented by the project with training, information, capacity building, policy advice, etc.

- The documentation provided by the project parties.
- The Project Progress Reports, which provide the executing agency, the management of the project and the evaluators with a valuable tool regarding the self-appraisal of the implementing parties of the results obtained and of the difficulties or obstacles encountered.
- Discussions with the UNIDO Project Manager, the National Project Director, the national technical Partners, the national consultants, the national counterparts and the staff of national institutions.
- Meetings with national counterpart institutions and high-ranking officials.
- Visits to some target beneficiaries and meetings with their managers, discussing the related problems, technology transfer and its application and their global experience with the project.

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 presented at a final presentation meeting in Hanoi and have been discussed with the parties involved in a lively session.

The Evaluation Team has attempted in this report to give a comprehensive image of the activities, discussing the issues in a way, which should be helpful for the responsible authorities to decide how to orient the activities in the future.

3.2 Composition and timetable of the mission

The observations and findings of the Evaluation Team are the result of this in-depth evaluation carried out in their own capacity.

The views and opinions of the team do not necessarily reflect the views of the Government of Vietnam or of UNIDO.

The mission team was composed of the following members:

Mr. Mario Marchich, international consultant, Team leader, specialized in evaluation of international technical assistance cooperation projects.

Mr. Pham Minh Chinh, National consultant in Environmental Science and Engineering at the University of Hanoi, familiar in evaluating achievements and shortcomings of projects dealing with industrial emissions.

The composition of the team has assured uniformity, impartiality and the guaranty that the views of the concerned parties have been considered under an informed point of view.

The mission assembled in Hanoi to start its work. The places visited in Vietnam to complete the evaluation have been: Hanoi, Thai Nguyen Province, Hai Duong Province and Phu Tho Province.

The agenda of the evaluation mission is contained in Annex II.

At the end of its work, the evaluation mission has presented in Hanoi on Thursday 22nd March 2012 at VEA Headquarters Office, 67 Nguyen Du Street, its draft findings, conclusions and related recommendations at a general debriefing meeting with the participation of the national parties concerned in the implementation of the activities.

The presentation has been followed by interesting and fruitful discussion with the participants. The results of these discussions have been taken into account in this report.

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

3.3 Evaluation Terminology and Glossary

There is a generally accepted international evaluation terminology. For this reason, in order to help the readers, it is useful to give here some definitions/explications of the meaning of the words used in this report.

This terminology corresponds in large part to the terminology used in the evaluation methodology followed by the major international institutions (UN, DAC, EU, OECD, OSCE,..) involved in projects of technical cooperation.

Below are reported the explanations of the terms concerning the evaluation, its concepts and the terminology used:

Terms	Explanation of Terms
Accountability	Obligation of the project managers to demonstrate that work has been conducted in compliance with defined responsibilities, rules, standards and performance expectations. For the evaluators it indicates the responsibility to provide accurate, fair and credible reports.
Activities	In the context of a project the activities are the main actions implemented to reach the foreseen outputs.
Appraisal	An assessment of the relevance, feasibility, design quality and potential sustainability of a project prior to the decision of approval and funding.
Appropriateness	It is the tailoring of the activities to the local needs, which contributes in increasing the ownership, accountability, and cost-effectiveness of the project accordingly. Appropriateness , together with Relevance is a complementary criterion used to evaluate both the wider goal of the intervention and its specific approach in terms of how it is responding to the local context and needs.
Assumptions	Conditions that are necessary to ensure that the planned activities will produce the expected results and that the logical link (effect – relationship) between the different levels of the project results will occur as expected, if not unexpected situations will happen.
Baseline	Facts about the condition of a country's situation and the performance of target institutions and beneficiaries, prior to the provision of the services.

Baseline Data	Data that describe the situation to be addressed by a project and that serve as the starting point for measuring the performance.
Beneficiaries	Individuals, enterprises or organizations/institutions, whether targeted or not, that benefit directly or indirectly from the project.
Best Practice	Operational practices that have proven successful in particular circumstances. Are used to demonstrate what works and what does not work and also to accumulate and apply knowledge.
Cause and Effect of environmental aspects	Causes of environmental aspects are the direct consequences at plant level (in terms of emissions or natural resources used), while Effects are their impacts on the eco-socio environment.
Client Feedback	Feedback provided from clients and partners receiving the services. The method is used for involving the counterparts in the evaluation process.
Coherence	Assessment of coherence should focus the extent to which policies of different actors are complementary or contradictory. This may involve any type of policy such as on promoting participation, capacity building, disposal of wastes, possibilities of generating revenues, all in relation with the environmental protection.
Conclusions	Conclusions and findings outline the factors of success or failure of the project under evaluation, with special attention paid to the intended and unintended results, in order to point out strengths or weaknesses.
Criteria	Qualitatively expressed “Indicators”, when it is not possible to use quantitative data.
Critical assumptions	In the context of the logical framework refer to the general conditions under which a development hypothesis will hold true or refer to conditions which are outside the control or influence of implementing parties and which are likely to affect the achievement of results.
Data	Specific quantitative and qualitative information or facts that are collected
Data Collection Tools	Methodologies used to identify information sources and collect information during an evaluation.
Design	It is an analytical tool for the assessment and description of a project in support to the expressed needs of the counterparts and beneficiaries.
Donor	The funding Organization or Government whose role is to participate in the evaluation, ensuring together with the executing agency, through the lessons learned, the necessary feedback on improvements, reorientation and funding.

Effect	General term to indicate what is changed by the project. It shows what the outputs have produced. It is the change resulting from the production of the outputs.
Effectiveness	The extent to which the outputs of the project are used to achieve the purposes. The extent to which stated intervention objectives are met. Effectiveness is therefore linked to evaluation of impact and long-term effects of the intervention. Implicit within the criterion of effectiveness is timeliness.
Efficiency	The relationship between the inputs utilized and the outputs produced, both in terms of quantity, quality and timeliness. It measures the outputs (qualitative and quantitative) achieved as a result of inputs. Generally requires comparing alternative approaches to achieving 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.
Evaluation	Analytical and objective feed-back on outputs, outcomes and impact of the implemented Technical Cooperation, used for accountability towards management, donors and counterparts, as well as for learning of lessons. Evaluation results are used to improve the quality of design and delivery of current and future activities.
Evaluation Feedback	Dynamic process which involves the presentation and dissemination of evaluation information, in order to ensure its application into new or existing Technical Cooperation activities. Observance of this process is ensuring that lessons learned are incorporated into the new operations.
Goal (also Purpose, or Mission)	Attempts at general level.
Impact	The extent to which the improved performance of the counterparts and the solution of the critical issues have produced a positive effect (in quantity and quality) on the target beneficiaries and on the overall development of the country. It means the changes achieved in the targeted beneficiary sector. It is the result of the long-term effect of the project as described in the development objective. However, changes may take months or even years to become apparent.
Independent in-depth evaluation	Independent assessment of performance, outcomes and impact, carried out by independent evaluators.
Indicator	Quantitative or qualitative variable that provides a simple and reliable basis for assessing results and/or performance of the project.
Inputs	Financial, Human, and Time resources that are put at the disposal of the project to implement the activities and produce the outputs.

Lesson Learned	<p>It is a generalization based on the results of the evaluation that abstracts from a specific circumstance to a broader general situation. Normally, the lessons highlight strengths or weaknesses in formulation, design and implementation that affect performance and results.</p> <p>If lessons are to be learned from evaluations, assessment of relevance and appropriateness, it should involve the examination of why the interventions made by the project are relevant and/or appropriate in some cases, and not in other cases.</p>
Logical framework	<p>Management tool used to design technical cooperation projects. It identifies inputs, activities, outputs, results and their causal relationships.</p> <p>It includes indicators and the assumptions or risks that may influence the success or the failure in achieving the project objective(s).</p>
Milestones	<p>Important events or concrete results, marking the beginning or progress or end of activities and used to keep track that the activities are implemented as planned and according to the work plan.</p>
Monitoring	<p>Continuing implementation review function to provide the main stakeholders and the management with early indications about the progress or shortcomings in the achievement of outputs and objectives.</p>
Objective	<p>It is used as general term for aiming at results at different hierarchical levels (General development objective, immediate objective, specific objective, etc.).</p> <p>It will help the beneficiary in achieving the selected long-term development objective(s).</p>
Outcome	<p>Effects related to the target groups/beneficiaries assisted, showing the positive changes obtained by the counterparts in their performance and behaviour.</p> <p>Indicates the capabilities of the beneficiaries to have benefited of the assistance received.</p>
Output	<p>The final product in terms of activities executed, applying the input resources.</p> <p>It shows the improved capabilities of the Counterparts, after having received the assistance.</p> <p>The expected improved situation of the counterparts (government, institutions, pilot enterprises).</p>
Ownership	<p>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.</p> <p>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.</p>

Performance	The extent to which the project has produced valuable and sound outputs and their contribution to the final impact. Both, efficiency and effectiveness can be considered as measures for the performance of the project.
Project Document	A document that explains in detail and following the logical framework, the context, objectives, expected results, inputs, activities and budget of a project.
Quality Criteria	Evaluation criteria applied in order to assess the project performance. (Relevance, Efficiency, Effectiveness, Impact, Sustainability)
Recommendations	Advisory proposals (not binding or mandatory), aiming at enhancing the quality and the effectiveness of the project, redesigning objectives or suggesting reallocation of resources. Any recommendation should be linked to a conclusion and should be directed to the party responsible for taking the respective action.
Relevance	Is the extent to which the project is consistent with the problem area identified in relation to the country's development goals and constraints and needs of counterparts, beneficiaries and services/expertise. 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 and logical framework matrix, appropriateness of the objectively verifiable indicators of achievement. (See also Appropriateness)
Result	General term for the effects that result from the application of the project inputs. It indicates the performance of the project.
Sustainability	Capability of the counterpart (Institution or enterprise) to maintain and further develop outputs and outcomes produced with the support of the project and/or to adjust them in order to ensure the continuation of the benefits to the target beneficiaries, when the assistance of the project has been finished.
Target	A specific objective. The mark at which is aimed by the activities of the project.
Target Groups	The main beneficiaries from the programme or project that are expected to gain improvements and advantages from the results.
Terms of Reference	Definition of purpose, scope, method, team composition and timetable of the evaluation exercise.

4 Analysis of the activities and Findings

4.1 Context, Concept and relevance of the project

We will analyze in this chapter the extent to which the objectives of the project's intervention are consistent with the needs and requirements of the end-users, the government policies, donor policies and UNIDO mandate and priorities.

4.1.1 Extent to which the barriers have been removed

The Evaluation Team can conclude that, based on the project objectives and its results, the obstacles to the adoption of BAT/BEP measures in Vietnam, have been removed because:

- 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. So, the project has been supported by government and environment donors to receive the necessary inputs for BAT/BEP implementation.
- The outcomes of project include the relevant technology information on the facilities and therefore specific technology requirements could be identified. It conducted to the adoption (planning, procurement, introduction, implementation and monitoring) of BAT/BEP and has allowed incremental cost calculations.
- Technical experience and capacity in identifying and performing the rational use of BAT/BEP has made possible their efficient and timely adoption. In addition, knowledge on UP-POPs formation, reduction and avoidance at technical/engineering not only at research/academic level but also the knowledge of the relationship of technological processes/operation conditions and UP-POPs releases has allowed that this technology received high attention at all levels and could be transmitted efficiently and promptly.
- Adequate sampling capacities for UP-POPs of Dioxin Laboratory increased thanks to the projects help for establishing a reliable dioxin monitoring (sampling and analysis) and these activities could be planned and conducted in the country. The project also offered the possibility to start using high quality and expensive analytical instruments in Vietnam. The activities of the project have also made possible to establish the PCDDs/PCDFs inventory system for implementing the necessary control measures for reducing pollution.
- As a further result of the project, the coordination among the various government agencies and private sectors on their activities related to UP-POPs is now better. To this has also contributed the adoption of BAT/BEP.

4.1.2 Effects related to target groups and beneficiaries according to the Project Document

Outcome 1: 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

- The following industrial pilot enterprises representing 4 selected industrial sectors, have been chosen to participate in the project:
 - Bac Son Environment and Industry JSC (URENCO 10) joint-stock company belonging to URENCO Hanoi (waste incineration);

- Luu Xa Steel Rolling Company, belonging to Thai Nguyen Iron and Steel joint stock corporation
 - TISCO (iron and steel industry)
 - Bai Bang pulp and paper company (pulp and paper production using chlorine as bleaching agent), and Holcim Vietnam Ltd (cement kilns incineration).
- The Vietnam Cleaner Production Company (VNCPC Ltd) , the Dioxin Laboratory and the Vietnam Environment Administration (VEA) have been identified and nominated as major scientific counterparts of the Project which has been able to provide expertise in BAT/BEP application and UP-POPs monitoring, respectively.
 - In order to conduct monitoring of UP-POPs in the pilot activities, the Staff from Dioxin Laboratory and some international consultants (Dr. Kare Katensen, Mr. Peter Lepom) collected some samples to analysis U-POP in water, bottom ash, stack gas in the selected enterprises before and after application of BAT/BEP.
 - The monitoring capacity and the linking of the research institutions and programs such as VNCPC, Hanoi University of Science, Hanoi University of Technologies on UP-POPs, POPs and other relevant toxic pollutant emissions in the country have been reinforced through the activities of the project.
 - A national expert team was composed and recruited for developing and establishing baseline review of the present situation of the 4 selected industries in Vietnam, which included iron and steel production, waste incineration, cement kilns and pulp and paper industry. Updated information on various issues of these industries such as technology, production, management and situation of the BAT and BEP application was gathered and reviewed.
 The consultant team comprises of 4 experts on the above industrial sectors and conducted field surveys in the pilot enterprises to collect realistic and most up-to-date information. On the other hand, a national expert was hired for establishing a baseline review of the current status of UP-POPs (mainly dioxins and furans) from industry in Vietnam, and the analytical methods for determining these contaminants in industrial and environmental samples. The current situation on the possible sources and potential emissions of dioxins from various industrial sectors, as well as methodologies for measurements of dioxins were comprehensively reviewed.
 BAT-BEP surveys and sampling collection for baseline monitoring of UP-POPs were also conducted.
 Various industrial and environmental samples such as wastewater, dust, ambient air and stack gas were collected and analyzed for dioxins, furans and other relevant contaminants.
 - These field investigations were conducted by the two sub-contactors of the project, Dioxin Laboratory and Vietnam Cleaner Production Center, jointly with VEA, Hanoi National University of Technology and Staff of the Project.
 These Pilot project activities were technically assisted by 2 international experts and 3 national experts.
 - Regarding Capacity Building, the activities have also supported the development of four booklets for BAT/BEP Application in the some selected industries based on the previously achieved experiences, industrial facilities and suitable economical, facilities conditions

- The booklets have been translated in English and sent to some enterprises belonging to the four industrial sectors. So that technical staff, managers of the enterprises and environmental manager could use them to raise awareness of U-POP and application BAT/BEP reducing U-POP emissions.
- Raising awareness of general public on UP-POPs sources and BAT/BEP applications, besides the achievements of the project, have contributed booklets for BAT/BEP application, some reports on baseline review on BAT/BEP, U-POP and information on POP, U-POP published on television, newspapers, books, videos...

Outcome 2: 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 on the national and regional scale and review and possibly improve national policies and regulations

- National policies and regulations related to these matters, particularly those linked with potential releases of dioxins/furans were also reviewed.
- Further technical trainings were also conducted in the framework of the kick-off activities at 3 pilot enterprises. The coordination and link between implementation of Stockholm Convention action plan and BAT/BEP activities was also highlighted through these training activities.
- In addition, various activities within the framework of the project and PCB Management Project (also implemented by Pollution Control Department) were complementary. BAT/BEP application measures were also reviewed for trial burning of PCBs in cement kilns in Holcim Vietnam Ltd. Technical guidelines for waste incineration was also reviewed by experts recruited by the project. The role of BAT/BEP measures for UP-POP reduction in the overall goal of POPs management were highlighted through such activities.
- The Project has coordinated with National Implementation Plan project and Dioxin Laboratory Project to implement some activities related to management of POP, U-POP, especially Dioxin.
- Also the participation in Annual ESEA meeting for BAT/BEP forum, offering contribution for creating a network to tackle UP-POPs related issues, have been a successful outcome of the project.
- The staff of the project has participated in some international workshops and meetings on POP, BAT/BEP to learn the experiences on POP management in some developed countries

Outcome 3: Capacity building for monitoring procedures for UP-POP chemicals as one key prerequisites for implementing BAT/BEP but also many other obligations of the Stockholm Convention

- The training course in June 2010 also focused on the UP-POP monitoring. National experts from Dioxin Laboratory, Vietnam Environment Administration (VEA) and an international expert gave lectures on the fundamental knowledge on UP-POPs and their potential toxic impacts.

Detailed techniques on sampling collection, storage, identification and quantifications using advanced analytical techniques, have been promoted by the project.

Particularly, laboratory visits and practical trainings were also organized for the trainees to observe and experiment techniques of on-site field measurements and analytical procedures for determination of dioxins and related chemical pollutants. More than 60 technical staff from different industrial enterprises and other research and monitoring institutions were trained.

- Dioxin Laboratory and VEA have been strengthened through field investigations, sampling surveys in industrial pilot enterprises with technical supports from national and international experts. Experiences in investigating and collection of industrial samples were substantially strengthened for staff of the Dioxin Lab.
- Advance training on monitoring U-POP were held in Dioxin Laboratory, during the training courses international experts gave some lectures related to U-POP monitoring. A more thorough experimental practice was given for the trainees to gain some more in-depth knowledge on UP-POPs analytical techniques, as well as demonstration and practice on the High Resolution GC-MS for the determination of dioxins/furans.
- To build further the capacity the project has arranged the sending of technical staffs to short term training courses in advanced laboratories (Wadsworth Center, NY, US and Eurofins Company, Germany) for training of dioxins analysis in industrial and environmental samples. These trainees are expected to be skilful in analytical methods for dioxins and able to set up analytical system for dioxins determination in VEA Lab with high reliability.
- A study tour in Australia was organized to learn and exchange knowledge and experiences on how to tackle different issues related to environmental monitoring and remediation, pollution prevention, familiarizing the participants with analytical methods and using advanced analytical equipment for determination of dioxins/furans in industrial/environmental samples.
- Some training courses for technical staff of the pilot enterprises (Nam Son waste incineration, Thai Nguyen Steel and Iron Production Company, and Bai Bang Pulp and Paper Company) were held with technical lectures given by international and national experts.
- Some laboratory sampling equipments have been purchased through some budget lines of the project.

Outcome 4: A socio-economic development program established to address efficacy and efficiency of possible control measures in meeting risk reduction goals including incremental cost estimation for the implementation of BAT/BEP at enterprise level and sector level

- Within the framework of the sub-contract with VNCPC, national experts from different industrial sectors were recruited to provide technical assistance for clean production and BAT/BEP application during the pilot projects at the industrial enterprises.
- Surveys for projected total cost estimates for countrywide BAT/BEP implementation have been undertaken in all 4 target sectors of the project.

- Methodology for incremental cost estimation and cost effectiveness evaluation for BAT/BEP implementation has been developed in order to produce reports about these issues at enterprise and sector level.
The methodology and reports for risk reduction and incremental cost estimation have been supported by international experts.
- The project has prepared an inventory of U-POPs emissions from the four selected industries using the toolkit to calculate emissions as input for the model of incremental cost estimation and cost effectiveness evaluation for BAT/BEP implementation.
- Incremental cost and Cost/effectiveness calculations have been carried out in all the selected pilot enterprises.
- The report on the inventory of U-POP emissions from the four selected industries has been completed.
- The reports on incremental cost estimation for the implementation of BAT/BEP at enterprise and sector levels were also finished.



Measurement equipment for emissions provided by the project

Outcome 5: Project management, monitoring and evaluation.

The Project monitoring management structure and evaluation procedures were prepared through:

- Establishment of a Steering Committee composed of the following members: General Director of VEA, Head of the Steering Committee, Vice-Director, ISEA, Ministry of Industry and Trade, a representative of Ministry of Science and Technology, a

representative of Ministry of Planning and Investment, and UNIDO Hanoi Representative.

The first meeting was held on 25 January 2010 and may be considered as the official launching of the Project.

In the report was presented the detailed 1st annual work plan, with a detailed and specific elaboration of “Outputs and Activities”.

- The project in co-operation with the Dioxin Laboratory Project and two projects belonging to Vietnam Environment Administration held a workshop on “Dioxins and Organ halogen Contamination from Agent Orange and Unintentional Production in Vietnam”. This workshop represented one of the most important activities of the Project. It provided a forum for participants from different industrial sectors and people working in the field of environmental management and monitoring to exchange their knowledge and practical experiences.
- Thanks to the workshop, international and national experts shared knowledge about dioxin, status of dioxin contamination in Vietnam, treatment and BAT and BEP for environment managers and staffs of the pilot enterprises of BAT/BEP project. At the same time, information to develop guidelines of introduction BAT/BEP to reduction or elimination of UP-POPs releases from the selected industries in Vietnam was provided by the experts.
- A 2nd Steering committee meeting was organized in January 2011 in Hanoi. The objective of the 2nd Steering committee meeting was to present results and progress of the project. Related issues on project management and technical implementation were also reviewed. Results, shortcomings and challenges were evaluated and discussed in order to have a better understanding among relevant stakeholders and ensure effective implementation.
- A 3rd Steering committee meeting was held on 27 July 2011 in Hanoi. The objective of the meeting was to present overall results of the Project in 2 years, and future perspectives related to the management of U-POPs and the application of BAT/BEP, especially in Waste incineration and iron and steel production.
- A final workshop was organized on 29 – 30 July 2011 in DaNang. The major purpose was to present the outcomes of the BAT/BEP Project. The workshop was also partly supported by World Bank PCB Management Project and Dioxin Laboratory Project by Bill and Melinda Gates Foundation and the Atlantic Philanthropies. Results and lessons learned from the on-going GEF projects were also reviewed. The workshop provided a forum for international and local scientists to exchange experiences in an effort to help Vietnam in fulfilling the obligations under Stockholm Convention to phase out POPs production and usage, and reduce POPs releases.

4.1.3 Stakeholders’ ownership

This section assesses the ownership of stakeholders in the design and implementation of the project. Ownership 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

Stakeholder	Ownership of stakeholders
MONRE	<ul style="list-style-type: none"> - Serve the project in coordinating relevant ministries, sectors and localities for implementation of BAT/BEP in Vietnam; - Develop network of relevant ministries, sectors, universities, research institutions, waste treatment enterprises, NGOs and local communities for implementation of BAT/BEP; - Develop capacity, including human and material resources for the monitoring of Annex C about POPs of the Stockholm Convention; - Develop and finalise policies, institutions and legal documents for the prevention, reduction and elimination of UP-POPs in accordance with the roadmap of Stockholm Convention; - Develop a national information system for the management of UP-POPs and hazardous wastes.
VEA MONRE	<ul style="list-style-type: none"> - National implementing partner and the national focal point for the Stockholm Convention in Vietnam. VEA has significantly contributed to the design and drafting of this project proposal as well as to the mobilisation of co-financing. - Allocation of resources for Bac Son Environment and Industry JSC (URENCO 10) joint-stock company belonging to URENCO Hanoi (waste incineration); and provide expertise in BAT/BEP application and UP-POPs monitoring, respectively.
UNIDO	<ul style="list-style-type: none"> - Executing agency/GEF agency of the project and with the responsibility of the day-to-day overlook of the project management. UNIDO is committed to assist its developing country Member States with fulfilment of their obligations under the Stockholm Convention. UNIDO has committed considerable effort to build this assistance program, both in support of the Convention implementation and in furtherance of UNIDO's mandate and corporate strategy in support of the Millennium Development Goals.
ISEA MOIT	<ul style="list-style-type: none"> - Collaboration with relevant ministries, sectors and localities in developing options for promoting BAT/BEP in pilot projects to minimize the unintentional production and release of UP-POPs from industrial production activities; - Study and apply technologies and guide the application of the model technologies in the sound management, treatment and disposal of UP-POPs. - Allocation of resources for Luu Xa Steel Rolling Company, belonging to TISCO; Bai Bang pulp and paper company and Holcim Vietnam Ltd; VNCPC.
VNCPC	<ul style="list-style-type: none"> - Contribute BAT/BEP expertise developed during the pilot projects. Preparation of teaching materials and workshops and further active involvement in BAT/BEP implementation..
Private sector	<ul style="list-style-type: none"> - Private sector engagement has been encouraged at the design phase of this project and throughout the project implementation.

NGOs	<ul style="list-style-type: none"> - NGOs have contributed actively by commenting on the development of strategies and legal documents on environmental protection, exchanging experiences and expertise, enhancing international cooperation, disseminating knowledge of environmental protection, and also supporting governmental authorities in supervising environmental protection.
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Metallurgical processes

4.2 Project strategy

Project strategy:

The project strategy proposed by the National Implementation Plan (NIP), sectoral Action Plan and this project for the industrial categories that have the potential for comparatively high formation and release of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs) to the environment (Part II: Source categories, Annex C of the Stockholm Convention) includes efficient operation of combustion technologies, thermal and chemical processes, supported by necessary capacity building and regulatory framework strengthening, consistent with best available techniques and best environmental practices (BAT/BEP) guidelines.

This planned approach also accommodates Vietnam's obligations under the Stockholm Convention to start reducing about 25% of PCDDs/PCDFs releases currently attributed to these categories.

The project and related activities can be divided in five phases, which are fully integrated under the overall project management processes:

- Phase I establishes the management structure and oversees the implementation national wide and in addition assesses the monitoring capacities on POPs/UP-POPs.
- Phase II improves the inventory of UP-POPs sources with a focus on basic information for BAT/BEP implementation by evaluating the technologies presently used as a base for incremental cost estimates. As possible methodology, developing pollutant release and transfer registers (PRTR) have been considered. It also highlights the baseline of socio-economic implications of the industries and their public awareness and participation aspects.
- Phase III conducts pilot projects in selected facilities and industries for key UP-POPs sources.
- In Phase IV, the specific BAT/BEP national action plans are developed and implemented through generated funding resources.
- Phase V represents replication and dissemination of the implementation of the activities of the project, which turns into a sustainable program at national level.

Assessments, study tours, promotion, assistance and management of the application of Best Available Techniques and Best Environmental Practices to reduce and finally eliminate the unintentional production of POPs from industrial production and living activities may also belong to Phase IV with:

Objective:

- Review the use of appropriate technologies that could reduce PCDD/PCDF emissions in different industries; promote and support the application of BAT and BEP to reduce unintentionally produced Dioxins/Furans.
- Continuously reduce PCDD/PCDF from daily activities.

Expected Outcomes:

- Technologies that could reduce PCDD/PCDF emission in different industries have been reviewed and assessed.
- Guidelines on BAT and BEP appropriate for the national circumstances in Vietnam have been developed.
- Programmes for businesses, industries and communities to apply BAT and BEP to sustainably reduce PCDD/PCDF release sources have been promoted and supported.

Main Activities:

- Undertaken additional surveys and assessment of the use of technologies that could reduce PCDD/PCDF emissions in different industries; forecast industrial development trends and develop options and relevant roadmaps to promote BAT and BEP to reduce PCDD/PCDF releases sources.
- Developed and issued guidelines on BAT and BEP appropriate for the national conditions in Vietnam.
- Developed and applied standards for technologies and practices that have a high probability of releasing PCDD/PCDF; Enhanced the supervision and application of environmental standards for PCDD/PCDF.
- Monitored unintentional production and release of PCDD/PCDF from various technologies, as recommended by the Stockholm Convention.

- Raised communities' awareness of elements of their lifestyle and habits that could potentially cause unintentional production of PCDD/PCDF, and options to reduce unintentional releases.

4.3 Inputs and budget

4.3.1 Financial inputs

The GEF, as the financial mechanism for the Stockholm Convention, has provided US\$ 800,000 incremental cost funding for the project that includes US\$ 50,000 expended for the project preparation.

The Government of Vietnam through the Ministry of Industry and Trade and MONRE/VEPA has further committed US\$ 1,550,000 as cash and in-kind contribution to the project to be used mainly for capacity building for the demonstration sites, cleaner production assessments, socio-economic programme and part of the monitoring costs.

The initial budget in USD offered by GEF for the activities of the Project was originally subdivided as follows:

1. Project preparation	39,988
2. International experts	159,237
3. Travel of project staff	38,635
4. National experts	110,000
5. Subcontracts	220,000
6. In-service training	40,000
7. None – UNDP group training	29,500
8. None – UNDP group meeting	37,640
9. Equipment	50,000
10. Sundries	25,000
Total	750,000

To the above mentioned amount has to be added a Co-financing of USD 1,555,000 from the Government of Vietnam, divided as follows:

- 8,730 USD in cash from the Vietnam Environment Administration,
- an amount in kind equivalent of USD 1,546,270 from the Ministry of Natural Resources and Environment, which covers the cost for office venue and instruments, reports, Salaries/allowances for key project staff (National Project Director, Project Coordinator of VEA) etc.

Therefore, the total budget including all the inputs can be quantified in: **US\$ 2,395,000** divided according to the various contributing parties as follows:

- GEF: \$ 800,000 (including the Project Preparation grant of \$ 50,000)
- Government of Vietnam (Ministry of Industry, Monroe/VEA) \$ 1,555,000 (in kind)
- UNIDO inputs: \$ 40,000 (in-kind)

During the implementation of the project some internal revisions of the budget have taken place to adjust the budget lines according the needs of the operations, but always keeping the total amount. The last revision was done in July 2011 to transfer funds from budget line 51 to adjust various project's expenditures, among them especially to budget line 45 to accommodate the costs for the purchase of the laboratory equipment, which at the end of the project has been transferred to the Dioxin Laboratory in Hanoi, as national executing institution for environmental monitoring.

4.3.2 Human, technical and administrative inputs

Persons name	Agencies	Area activities
Tu Binh Minh National project manager	Hanoi University of Science	Technical and Administrative
Pham Manh Hoai	Vietnamese Hanoi University of Science	Technical
Vu Cong Hoe	Vietnamese Hanoi University of Civil Engineering	Technical
Nguyen Thi Kim Thai	Vietnamese National University of Civil Engineering	Technical
Pham Ngoc Toan	Vietnamese Institute of Labor Science and Social Affairs, Ministry of Labor Invalids and Social Affairs	Technical
Tang Thi Hong Loan	Vietnamese EPRO Consulting JSC	Technical
Le Thi Thoa	Vietnamese Biogas Project Division	Technical
Bui Quang Trung	Vietnamese National University of Civil Engineering	Technical
Duong Hong Anh	Vietnamese Research Centre for Environmental Technology and Sustainable Development (CETASD), Hanoi University of Science	Technical
Pham Thi Ngoc Mai	Vietnamese Faculty of Chemistry, Hanoi University of Science	Technical
Do Duc Thanh	Vietnamese DIGISUN Media Production JSC	Technical
Tham Thi Hong Phuong	Vietnamese Communication specialist	Technical
Roland Weber	German POPs Environmental Consulting, Goeppingen, Germany	Technical
Kåre Helge Karstensen	Danish Chief scientist, Found. for Scientific & Industrial Research (SINTEF)	Technical
Denis Lalonde	Canadian Specialist - air emission	Technical
Pasquale Spezzano	Italian UNIDO consultant	
Chu Duc Khai	MONRE	Technical
Nguyen Hung Minh	Dioxin Lab, VEA	Technical
Nguyen Anh Tuan	Pollution Control Department, VEA	Technical
Nguyen Ngoc Vinh		Technical
Tuong Thi Hoi	Hanoi University of Technology	Technical
Ngo Thi Nga	Hanoi University of Technology	Technical
Dinh Manh Thang	VEA	Administrative
Nghiem Trung Dung	Hanoi University of Technology	Technical
Tran The Loan Vietnamese National project Director	Pollution Control Department, VEA	Administrative
Le Ke Son	VEA	Administrative
Do Thanh Bai	Institute of Industrial Chemistry. MOIT	Technical
Dang Son	Bai Bang Pulp and Paper Company, Vietnam Paper Corporation	Technical
Staff of Luu Xa Steel Making	TISCO	

Staff of Bai Bang Pulp and Paper Company	Vietnam Paper Corporation	
Staff of Nam Son Incineration Company	URENCO	
Staff of Holcim Vietnam Ltd	Holcim Vietnam Ltd	
Staff of VNCPC	VNCPC	
Staff of Dioxin Lab	VEA	Technical
Staff of UNIDO	UNIDO	Administrative

4.4 Role of the Executing Agency

UNIDO has been the executing agency of the project and had the responsibility of the day-to-day monitoring of the project management.

- UNIDO is committed to assist its developing country Member States with fulfilment of their obligations under the Stockholm Convention.
- UNIDO is executing and/or developing a range of demonstration and capacity building projects to support the Convention implementation, including several BAT/BEP related projects. UNIDO has committed considerable effort to build this assistance program, both in support of the Convention implementation and in furtherance of UNIDO's mandate and corporate strategy in support of the Millennium Development Goals.
- Establishing international contacts and collaborations.
- Developing incremental cost estimation methodology for BAT/BEP implementation for different industrial source categories.
- Reviewing international experience of incremental cost calculation for BAT/BEP implementation.
- Evaluating cost benefit of BAT/BEP measures introduced to reduce UP-POPs.
- Conducting consultative meetings with implementing agencies.
- Recruiting a Chief Technical Advisor (CTA, international consultant), a National Technical Advisor (NTA), policy experts, technical experts in BAT/BEP monitoring and research.
- Establishing the project management structure

4.5 Effectiveness of the project

4.5.1 Benefits delivered

- Good cooperation with counterparts, high quality of expertise and the selection of the right type of laboratory equipment contributed to effectiveness.
- The project has permitted the country to have a better planning to meet compliance with its obligations under the Stockholm Convention on POPs, and through this to contribute to the improvement of the environmental situation in Vietnam and in the South-East Asia region where Vietnam is among the fastest growing economies.
- Eventually the project has contributed to reduce and eliminate UP-POPs pollution burden to human health. The introduction of BAT/BEP strategies are 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.
- The project intervention has effectively introduced the BAT/BEP concept in Vietnam. More than four companies benefited from BAT/BEP solutions. All key stakeholders

interviewed under the evaluation survey stated to be “very satisfied” with the project services.

- The project introducing BAT/BEP to reduce POPs has been effective in developing the capacity of the Dioxin laboratory of VEA. Technical capability has been strengthened to measure dioxin and furans in stack gas samples using sampling methods and chemical analysis to trace levels of dioxins in these samples.
- In view of the limited budget, the project design has been overambitious. Besides the initial baseline monitoring no follow up of demonstration plants was done. Other activities included joint workshops, training courses among different GEF-supported projects and a participation in regional BAT/BEP Forum in east and Southeast Asian region.
- A draft report on developing a methodology for incremental cost estimation and cost effectiveness evaluation for BAT/BEP implementation at enterprise and sector level has been completed.
- The project supported the National Strategy on Pollution Control in respect to monitoring as mentioned in the NIP, which is to “Develop and complete monitoring network following the national plan for environmental monitoring”.
- All stakeholders have raised the capacity of technical personnel with professional competencies in applying BAT/BEP in the priority industrial categories to reduce UP-POPs emissions.

4.5.2 Beneficiaries

The evaluation team has concluded that the intended beneficiaries have participated in the project activities.

The behavioural pattern of the beneficiaries and their understanding of the issues have significantly changed.

Direct Beneficiaries have been:

- Bac Son Environment and Industry JSC (URENCO 10) joint-stock company belonging to URENCO Hanoi (waste incineration);
- Luu Xa Steel Rolling Company, belonging to Thai Nguyen Iron and Steel joint stock corporation - TISCO (iron and steel industry);
- Bai Bang pulp and paper company (pulp and paper production using chlorine as bleaching agent);
- Holcim Vietnam Ltd (cement kilns incineration);
- Dioxin Lab, VEA.

Indirect Beneficiaries:

- Vietnam government, Vietnamese population, Environment management agencies, Vietnam Industry sector.

4.6 Efficiency of the activities

The BAT/BEP project to reduce emissions of POPs converted resources and inputs into results in a timely and cost-effective manner and also reached the goals set in project document and in the work plan:

4.6.1 Primary outputs.

To realize the foreseen outputs in the Project Document, the following activities have been accomplished:

Output 1. Capacity building of managerial and technical personnel with professional competencies in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases.

- Baseline review reports (conducted by national and international experts) have been prepared about formation and release of Dioxin/Furan in the four selected industrial sectors with high potential of UP-POPs release: steel making; waste treatment (incinerators); cement production (co-processing in cement kilns); pulp and paper production.
- Some reports have been produced on Dioxin/Furan emission in some industrial sectors in Vietnam (applying the UNEP UP-POPs inventory and calculation toolkit).
- The project organized activities of capacity building and training for the enterprises representing the four industrial sectors (Thai Nguyen Iron and Steel JSC (TISCO) – steel making, Bac Son urban and industrial waste incineration, Holcim cement company, co-processing hazardous waste, and Bai Bang pulp and paper).
- Organization in June 2010 of a training course attended by 100 persons on BAT/BEP application and UP-POPs monitoring in the four industrial sectors. The participants were of some environmental monitoring centers, research institutes and environmental management agencies.
- Dissemination of knowledge about measures combining reduction of UP-POPs release with treatment of the emissions.
- Elaboration of four booklets for BAT/BEP application to reduce UP-POPs release in steel making; waste treatment (incinerators); cement production (co-processing in cement kilns); pulp and paper production.
- Collaboration with newspapers and specialized magazines, publishing articles and newsletters about activities and results obtained by the project.
- A documentary in collaboration with Vietnam Green Program was developed for the Vietnam Television (VTV2 channel, 30 minutes), in order to raise public awareness on risks caused by POPs, Dioxin/Furan releases and the positive results obtained through BAT/BEP applications.

Output 2. 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 cleaner production activities in the industry.

- Trained 15 managerial and technical officers in short-training courses abroad: Eco-town program in Japan on eco-town and eco-industry; management and monitoring of POPs-contaminated sites in UK; management and treatment of chemicals- contaminated sites in Australia; Analysis of Dioxin and toxics in USA.
- Organized general training course about BAT/BEP and UP-POPs monitoring for officers of VEA; Industrial Safety Techniques and Environment Agency and enterprises of selected industries; disseminated information, lectures linking BAT/BEP application and cleaner production.
- Vietnamese officials and experts have been invited at the East Asia and Southeast Asia Forum on BAT/BEP (in China, Cambodia, and Laos).
- Made surveys and provided technical assistance to laboratories to analyze Dioxin and POPs in general (collaborating with the PCB project).
- Organized an international workshop on “Dioxin and Halogenated Organic Pollutants from Agent orange and unintentionally produced sources” in Quang Ninh province (end 2010).
- Coordinated with Dioxin Lab and VEA the report on the “Status of dioxin contamination in Vietnam”.
- Coordination with Pollution Control Dept (Task on revision of the National implementation plan of Stockholm Convention in Vietnam – Decision 184) in assessing the dioxin contamination in Vietnam.
- Coordination with Vietnam Cleaner Production Center, Industrial Safety Techniques and Environment Agency to propose energy efficiency solutions for enterprises involved in the project, in order to incorporate knowledge, cleaner production solutions and BAT/BEP in the enterprises.
- In 2011 organization in Da Nang of the international workshop on “Control of UP-POPs release via BAT/BEP application and experience of GEF POPs related projects in Vietnam” with participation of world-class international and national experts on POPs and State management agencies on environmental protection.
- The project officers and experts, after being trained, have actively participate in develop and broaden tasks on POP pollution control, implementation of Stockholm Convention in Vietnam (e.g. evaluation and control of UP-POPs release from industries; development of the project on e-waste control; etc.)
- The project results have been presented in workshops like East Asia and Southeast Asia Forum on BAT/BEP in Laos and China, Dioxin 2011 International Symposium in Belgium, GEF projects in Da Nang, workshops for information sharing in Australia, USA, Japan, UK, UNEP Switzerland, UNIDO. These activities have contributed to the active connection among POPs related projects in Vietnam and activities and projects of other countries and international organizations.

Output 3. Capacity building for monitoring procedures for UP-POP chemicals as key prerequisites for implementing BAT/BEP and also many other obligations of the Stockholm Convention.

- Organization of trainings on “BAT/BEP application and UP-POPs monitoring” for the industrial sectors; in-depth trainings on BAT/BEP application and UP-POPs monitoring for each selected enterprise.
- Supporting Dioxin Lab –VEA to join the cross-checking Dioxin analysis program (hosted by UNEP).
- Supporting Vietnamese officials and experts to attend advanced training courses at international labs on Dioxin and POPs analysis: Wadsworth Center - New York, USA; Eurofins Company - Germany.
- Organizing in-site trainings on stack gas sampling: under international and national experts; disseminating lectures on practical samplings at industrial waste incinerators and cement kilns.
- Inviting some world-class international experts in UP-POPs monitoring sampling to train in-depth officers of Dioxin Lab about UP-POPs sampling (some advanced methods to take samples and analyze UP-POPs in theory and practice);
- Upgrading the Dioxin Lab – VEA with knowledge and techniques to do stack gas sampling and providing the Dioxin Lab with equipments for Dioxin sampling and monitoring.



The Dioxin laboratory in Hanoi

Output 4. Incremental cost estimation for implementation of BAT/BEP at enterprise and sector level:

- Assessing the methods to calculate cost-benefit of BAT/BEP application for the selected industries; setting up model of cost-benefit for BAT/BEP application for industries to support the development and issuance of management decisions.
- Development of the report “Estimation of incremental cost and cost effectiveness for BAT/BEP application”
- Recommending measures to encourage the private sector to invest into BAT/BEP application via analysis of cost/benefit of BAT/BEP application in enterprises; supporting compliance of environmental regulations associated with measures to reduce UP-POPs and other emission; increasing responsibility of environmental/safety technique of the staff of the enterprises.
- Awareness raising, dissemination of information and solutions for environmental incentives for enterprises.

Output 5. Project management, monitoring and evaluation:

- The project was developed and approved in compliance with the procedures specified in Decree No. 131/2006/ND-CP of the Government promulgating the regulations on management and use of ODA and other relevant documents.
- Project reporting was done as required by UNIDO operational and financial regulations (UNIDO directly managed the project, signed contracts, made payments and carried out control).
- Project reporting by Vietnam side was done as required by regulations of VEA, PCD. Other requirements on ODA reporting were also fulfilled.
- Annually, the Project Steering Committee met with participation of all relevant parties to review and decide the activities of the project. The participants were: Ministry of Natural Resources and Environment (Dept. of Finance, Dept. of Planning, Dept. of Personnel; Dept. of International Cooperation), VEA, Ministry of Planning and Investment; Ministry of Finance, Ministry of Industry and Trade and UNIDO.

4.6.2 Information dissemination.

a. Training and workshops

No	<i>Events</i>	<i>Time</i>	<i>Location</i>
1	1 st Steering Committee meeting	25 – Jan - 2010	<i>Hanoi, Vietnam</i>
2	Inception workshop	28 – Jan - 2010	<i>Hanoi, Vietnam</i>
3	Training course on BAT/BEP application and U-POP monitoring in selected industries in Vietnam	2-4 – June - 2010	<i>Hanoi, Vietnam</i>
4	Workshop on BAT/BEP application and U-POP monitoring in waste incineration industry to demonstrate reduction or elimination of U-POP	17 – August - 2010	<i>URENCO, Hanoi, Vietnam</i>

5	Workshop on BAT/BEP application in steel factory to demonstrate reduction or elimination of U-POP	24 – August - 2010	<i>TISCO, ThaiNguyen, Vietnam</i>
6	The Midterm workshop –joint workshop on “ Dioxins and organ halogen contamination from agent orange and unintentional production in Vietnam”	06 – 08 January - 2011	<i>HaLong, Vietnam</i>
7	2 nd Steering Committee meeting	10 – Jan - 2011	<i>Hanoi, Vietnam</i>
8	Workshop on BAT/BEP application and U-POP monitoring in cement kilns industry in Vietnam	30 – May - 2011	<i>Holcim, KienGiang, Vietnam</i>
9	3 rd Steering Committee meeting	27 – Jun – 2011	<i>Hanoi, Vietnam</i>
10	Final workshop “Persistent Organic Pollutants in Vietnam: Results, Lessons Learnt and Future Perspectives from GEF-supported Projects”	29 - 30 July - 2011	<i>Danang, Vietnam</i>

b. Printed materials

b1. Booklet

- **“How to applying BAT/BEP to eliminate UPOP from Steel – making process – Electric Arc Furnace, Waste incinerators, cement sector and Pulp and Paper Making in Vietnam”.**

The content of the booklet: the booklet includes introduction to U-POPs, technological status of Vietnam’s four industrial sectors and U-POPs formation during production process of the sectors and then, the measures of BAT and BEP application for each sector suitable with the conditions and specific characteristics of Vietnam. In addition, the Booklet also presents some examples of national and international BAT/BEP applications to reduce and eliminate U-POPs.

The communication experts group coordinated with the Project to format and design the printed materials of the booklet to transfer the easiest information to readers. 700 copies of the booklets in both English and Vietnamese were distributed to the enterprises of the industrial sectors, scientists and managers to work out policies, action and technical plans as well as operation measures for production process to reduce U-POPs emission.

- Printed materials on booklet were also distributed to environmental managers of the units of the Ministry of Natural Resources and Environment and to the Ministry of Industry and Trade.
- The booklet presents measures of BAT/BEP application for each industrial sector. Some of BEP measures are easy to apply and do not require lots of budget to implement while BAT methodology demands investment on high technology.

- This printed information helps managers and policy makers to figure out which applications are a must for the enterprises.. This information is very important for the ongoing orientation activities of Vietnam for elimination of UPOPs emissions to protect human health and the environment.

b2. Printed information on U-POPs emissions status:

- Based on the inventory reports of U-POPs emissions in the four industrial sectors conducted by the inventory specialists of the Project, the communication team coordinated with the inventory specialists to compose, format and design these reports into printed materials. About 300 copies of this printed material were distributed to the management units of the Ministry of Industry and Trade and to the Ministry of Natural Resources and Environment.
- These printed materials present U-POPs emissions status of the four industrial sectors and of the transportation sector. It includes the technological status of the sectors and the UNDP Toolkit measures to calculate the U-POPs emission level for each industrial sector. The final result was compared with the industrial sectors in Vietnam and in the region and with the international equivalent ones.
- These printed materials help managers and policy makers to have a thorough overview on U-POPs emission status in Vietnam as well as the emission level of industrial sectors in other countries of the world. Based on this overview, managers and policy makers will be able to work out compulsory or priority policies as well as orientations on BAT/BEP applications to achieve the objective of the most effective U-POPs emission reduction.

b3. Newspaper of Industry and Trade

*** Introduction about Newspapers of Industry and Trade:**

- The Newspaper of Industry and Trade is the official organ of the national key economic sectors. News and articles on National industrialization and modernization are one of the main contents of each issue, especially the Electronic Newspaper of Industry and Trade.

Newspaper of Industry and Trade is an effective publisher and one of the newspapers which have the most special subjects and special issues in Vietnam. As official organ of the Ministry of Industry and Trade, the Newspaper has readers who are mostly from communities of industrial and commercial enterprises. The Newspaper not only plays an effective role as Information Bridge between enterprises but also between enterprises and consumers.

*** List of Articles of BAT/BEP project on Newspapers of Industry and Trade:**

- 1 Dioxins/Furan Emission Observation and Controls in Viet Nam Find out the solutions for the arduous question
- 2 Further Learning about the BAT/BEP Project
- 3 Applying BAT/BEP in key industries
- 4 BAT/BEP Project – For environment and human health
- 5 BAT/BEP Project – Need to expand implemented
- 6 BAT/BEP Project – 50% of Success depends on the enterprise

b4. Other articles, magazines and newspapers:

- On 28th January 2010: in the electronic newspaper of the Ministry of Industry and Trade and in the web site <http://vea.gov.vn> of Vietnam Environment Administration there was an article named “Inception of BAT/BEP Project”.
- On 18th October 2011: The online news <http://tintucxalo.vn> had an article on the final Workshop of BAT/BEP project. The article presented outcomes of the BAT/BEP project and some outcomes, as well as some lessons of current POPs projects funded by GEF in Vietnam.

c. DVDs and television

- Background information about U-POPs and BAT/BEP project, including IAE program documents and Operational Notes from Specialists was recorded in 5 DVDs in 30 minutes in Vietnamese (with English subtitle) has been delivered to public.
- The VTV1 and VTV2 of Vietnam Television broadcasted information on the Project’s activities through news which lasts 5 minutes and was re-broadcasted twice on VTV1 and 4 times on VTV2 at 06.00 a.m and 12.30 p.m.

d. Websites

- The official website: <http://pops.org.vn>. This website provides information on Vietnam’s Decisions, Instructions, Circulars, Standards, related to POPs, dioxin and furan to help policy makers to work out managing measures and relevant orientations for BAT/BEP application to eliminate U-POPs emissions.
- The community can refer to this website for information relating to POPs, U-POPs, BAT/BEP. This is the official and unique website on POPs in Vietnam. Articles, legislative documents relating to POPs, projects on POPs management in Vietnam and POPs treating technologies to implement Stockholm Convention in Vietnam are all available on the website.

4.6.3 Monitoring

- Project monitoring management structure and evaluation procedures were established.
- The project was developed and approved in compliance with procedures specified in the Decree No. 131/2006/ND-CP of the Government promulgating the regulation on management and use of ODA and other relevant documents.
- Project reporting was done as required by UNIDO operational and financial regulations.
- Project reporting by Vietnam side was done as required by regulations of VEA, PCD. Other requirements on ODA reporting were also fulfilled.

The Project Steering Committee met annually with participation of all relevant parties to review and decide the activities of the project.

4.7 Replication, Training and Public awareness

This was the first project in Vietnam to explore and apply BAT/BEP for the reduction and, where feasible, the elimination of releases of UP-POPs in selected enterprises of four different industrial source categories. The project provided experience for analysis of cost/effectiveness to plan a countrywide dissemination of the results.

To achieve replication specific actions with work plan and budget to foster knowledge transfer such as training workshops, scientific evaluations and publication, information exchange have been carried out.

Its major elements are summarized below:

- *Cooperation with Vietnam Cleaner Production Center*: The approach to closely involve the VNCPC into the Stockholm Convention BAT/BEP process can be applied with respective country specific modifications in all developing countries and regions hosting a cleaner production centre.
- *Pilot Projects*: The project selected and implemented pilot projects for industries with the aim of countrywide replication. In the respective pilot projects local staff have been educated and trained, with the purpose that after the completion of the project, national experts are formed and available for national wide implementation of BAT/BEP in the relevant sectors.
- *Training*: The project involved capacity building by developing and delivering training modules. The training modules have been developed together with international experts, and have involved local staff in order that they will be able to serve as resource persons for training beyond the project life.
- *Monitoring capacity*: One of the most important prerequisites of adopting BAT/BEP is adequate monitoring capacity, which has been developed during the project. This may provide services to all other BAT/BEP projects in the country and the capacity might be used in neighbouring countries. Furthermore, the development of monitoring capacity itself can be replicated in the country (e.g. in South Vietnam). The approach of developing monitoring capacity might be transferred with country specific adaptation also in other countries.
- *Scientific and engineering capacity*: BAT technology needs understanding of application and skills for implementing the principles in industries in the same sector, having however different operation parameters. In the project scientific and engineering capacity has been established having understanding of the basic and detailed principles of applied technologies. This engineering capacity will then be able to successfully adopt BAT/BEP measures even in those enterprises that have different conditions and process parameters from those of the pilot projects. This approach is the application of transmission of simple replication towards flexible replication.
- *Innovative financing mechanisms*: Replication of BAT/BEP adaptation measures beyond the project life will require capacity that includes not only know-how and a supportive policy environment, but also innovative financing mechanisms. Through exploring and piloting BAT/BEP in selected industries, the project has introduced models for mobilization of a broader set of financing options and established cooperation patterns

with the private sector to take over the goals of the project and engage in adaptation work in the future.

- *Knowledge transfer through knowledge management:* The reports have been presented in the form of workshop reports, newsletters, inventory and data collection reports. *In addition workshop modules have been developed which can be used for regional workshops in the regional provinces of Vietnam.* The conclusions of the scientific evaluations of the data and regular monitoring results have been published in scientific journals and will be integrated into public awareness programs beyond the project. In addition knowledge transfer will be facilitated through UNIDO internationally. Vietnam is a member country of the Regional BAT/BEP Forum for East and South East Asia (ESEA) countries, which was established in Bangkok in October 2007. The purpose was to share information and exchange the experiences gained during the implementation of the BAT/BEP pilot projects with other Forum member countries.

4.8 Long - term impacts of the Project.

The project had for objective to introduce BAT/BEP to reduce POPs release from the waste incineration sector; iron and steel industry; pulp and paper production using chlorine as bleaching agent and cement kilns incineration. This goal had to be reached through capacity building for BAT/BEP application, collecting UP-POP sampling and performing its analysis.

- The capacity building for BAT/BEP application at the waste incineration sector & iron and steel industry seem to be sustainable. But, there are some difficulties in applying it at pulp and paper production using chlorine as bleaching agent and for cement kilns incineration.
- The capacity built at the dioxin laboratories seems to be sustainable, with a low risk of losses through turnover of staff. Laboratories are able to obtain a budget for repairing, maintaining and replacing equipment. But the sustainability of these capacities depends on continued financing of the Government and the capability to retain trained staff. The project has however been too small to create wide spread awareness among enterprises, which would be necessary for sustainable effects in terms of changed behaviour and reduced POPs releases.
- The project has produced satisfactory outputs and has demonstrated the usefulness of the cooperation between UNIDO and the Government of Vietnam to achieve this goal.
- The project has built an initial structure for BAT BEP application in Vietnam adapted to the country needs, global priorities, stakeholders and partners. All counterparts have been properly prepared for taking over, technical, financial and managerial activities.

4.9 Rating of the project performance regarding:

The ratings are according as follows: HS=Highly Satisfactory; S= Satisfactory; MS=Marginally Satisfactory; MU=Marginally Unsatisfactory; U=Unsatisfactory; HU=Highly Unsatisfactory.

4.9.1 Objectives.

The project has achieved all its primary objectives.

The following ratings have been indicated by the National Project Manager in the final self evaluation of the achievements attained through the activities of the project.

No	Objectives (Overall and specific)	Ratings
	The overall objective of the Project is to establish the required human resources and infrastructure to implement the obligations of the Stockholm Convention	S
	The specific objective of the project aims at Reducing unintentional production of POPs in key sectors of the industry and supporting the BAT/BEP projects and addressing other UP-POPs related issues by development of monitoring and research capacities	S

4.9.2 Outcomes and Outputs.

The project had five main components which foresaw the production of 14 outputs.

The production of all the outputs is rated very satisfactory; just one output is rated marginally satisfactory.

The logical framework was precisely reporting in the project document the indicators of success with their sources of verification.

Below are reported the outcomes and the outputs with the ratings given by the project management and approved by UNIDO closing the project:

The output 1 of the first Outcome has been rated as marginally satisfactory because after the application of the BAT/BEP in the pilot enterprises, the project had not the possibility (due to the short duration time of the project and limited financial available resources) to measure again in these enterprises what was the level of reduction of the POPs emissions after the application of the BAT/BEP.

No	<i>Outcomes and Outputs</i>	Ratings
	Outcome 1: 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	S
	Output 1: Pilot projects for UP-POPs reduction in the sectors of waste incineration, cement kilns, pulp and paper production and secondary metallurgical industry	MS
	Output 2: Developing of monitoring capacity and linking of the research institutions and programs such as VNCPC on UP-POPs, POPs and other relevant toxic pollutant emissions in the country	HS

Output 3: Harmonization of BAT/BEP reduction measures for UP-POPs with reduction measures for other environmental relevant pollutant releases	S
Output 4: Development of information, education and communication (IEC) materials and implementation of IEC programs	HS
Outcome 2: 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 Cleaner Production activities in the industry on the national and regional scale and review and possibly improve national policies and regulations	S
Output 2.1 Coordinating project activities with other national and regional programs related to the BAT/BEP implementation	S
Output 2.2 Survey and evaluation of international policies and regulations on UP-POPs and other pollutant releases from pertinent industrial source categories and their relationship and potential relevance for BAT/BEP measures	HS
Outcome 3: Capacity building for monitoring procedures for UP-POP chemicals as one key prerequisites for implementing BAT/BEP¹ but also many other obligations of the Stockholm Convention	HS
Output 3.1 Training on the monitoring of UP-POP chemicals in Vietnam for guiding and assessment of BAT/BEP projects	HS
Outcome 4: A socio-economic development programme established to address efficacy and efficiency of possible control measures in meeting risk reduction goals including incremental cost estimation for the implementation of BAT/BEP at enterprise level and sector level	S
Output 4.1 Incremental cost estimation and cost-effectiveness evaluation for BAT/BEP implementations	S
Output 4.2 Compilation of incremental cost estimates at sector level for total cost estimates for BAT/BEP implementation at national level	S
Output 4.3 Evaluation of cost/benefit of BAT/BEP options and comparison with environmental cost savings and improvement of occupational health and safety	S

	Output 4.4 Development of incentives/rewards system for adopting BAT/BEP	S
	Output 4.5 Developing financing mechanism and programs for adopting BAT/BEP	S
	Outcome 5: Project management, monitoring and evaluation	S
	Output 5.1 Establish the project management structure	S
	Output 5.2 Design and implement an M&E mechanism according to GEF M&E procedures	S

4.10 Contribution of the project to GEF focal area strategic targets.

4.10.1 Global environmental benefits

The project has contributed to global environmental objectives.

- The capacity building of BAT/BEP application to reduce UP-POPs in selected industrial sectors is mostly satisfactory. The project has provided useful technical support to industrial enterprises to make them aware of the dioxin emissions and the importance of the application of BAT and BEP measures to reduce/mitigate dioxins emissions and releases.

- The capacity strengthening of UP-POP monitoring and analysis has been effectively implemented.

The Dioxin Laboratory (major beneficiary of the Project, having also received by the project appropriate equipment) has been highly strengthened in term of stack gas sampling and chemical analysis of dioxin and furans.

This laboratory now has become one of the strongest laboratories in Vietnam with experience in monitoring of UP-POPs emissions and releases, such as dioxins and other persistent organic pollutants.

These are objectives of the MDGs that are supposed to be of crucial concern in all GEF supported projects.

4.10.2. Local environmental benefits

The project has provided useful technical support for key industrial sectors and has demonstrated that the pollution prevention and control measures applied in an integrated way may provide a basis for confidence generation among local decision makers receiving technology transfer.

4.11 Possibilities of sustainability.

Project sustainability has four pillars: legal, technical, financial and institutional.

4.11.1 Legal

The project is in line with the objectives of the Policies of the Government of Vietnam. The BAT/BEP solutions can be sustainable with appropriate policies and legal provisions for management of chemicals and hazardous wastes, including POPs.

4.11.2 Technical

The application of BAT / BEP in the design, operation and monitoring is reasonably necessary. The BAT / BEP will actually be one solution benefiting both environment and economy. However, experience and knowledge related to the BAT / BEP in the field have still a gap: lack of information and specialists.

It is to be noted that new technologies have been transferred to create the necessary technical capacity for the management of the POPs emissions, but it is still not sufficient to cover the needs of all the country.

4.11.3 Financial.

The waste incineration sector & iron and steel industry seem to be sustainable. But their sustainability depends on continuous and appropriate Government's policies and further donor support.

Techniques of BAT / BEP are difficult to be applied in the pulp and paper production using chlorine as bleaching agent and cement kilns incineration, due to its high costs.

4.11.4 Institutional.

The project has introduced for the first time in Vietnam BAT/BEP applications to reduce POPs release. Expert teams have provided extensive training at different levels of the environment management sector creating environmental consciousness

Now there is in the country appropriate level of knowledge to continue the project activities, of course the Government should provide adequate financial support or incentive.

The Dioxine Laboratory has now staff well sensitized, competent, trained and conscious of the problem. The recommendation to extend its network of laboratories in the country should be attentively followed.

4.12 Indicators of success

The analysis of success is based on the indicators written in the Project Document for each project component and output.

The ratings are taken from the final performance report prepared by the project management at the completion of the project.

The Outcome 4 has been rated as marginally satisfactory because the Report on Incremental Costs prepared and the cost/effectiveness calculation of the BAT/BEP applications does not clearly indicate on what the cost estimates are based for a profitable implementation of the BAT/BEP measures.

It may result that the annual incremental cost may be too expensive and the expected annual health care return benefits not really suitable to the situation in Vietnam.

It will be necessary requirement, to investigate and specify more accurately on which parameters the investment costs are based.

Outcomes	Indicators (means of verification)	Target (monitoring mechanism)	Rat ngs
Outcome 1: 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	1. Technological units for process improvement and optimization in selected pilot enterprises developed and in operation 2. Sampling and monitoring capacity established and monitoring programs of 4 pilot projects evaluated by expert 3. Number of managerial and technical employee reached by Capacity building activities	Reduction of UP-POPs and other targeted pollutant releases to acceptable release levels under the Stockholm Convention on POPs Sufficient number of laboratories with sampling and monitoring capacity At least one managerial and technical employee per participating pilot enterprise trained in applying BAT/BEP in priority industrial source categories to reduce UP-POPs releases	S
Outcome 2: 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 on the national and regional scale and review and possibly improve national policies and regulations	1. Number of pilot projects that also relate to other national pollution reduction programs. 2. Steering group/project management team reports results of the project to the Chair of the Regional ESEA BAT/BEP Forum and participates in Forum meetings. 3. Criteria for policy and regulatory gap analysis is developed for industry sector with particular reference to selected 3 pilot source categories in the context of BAT/BEP.	All 4 pilot projects are linked to other national and regional pollution reduction programs. Participation of representatives of the PSC in all meetings of the ESEA BAT/BEP Forum during the implementation of the project. Policy and regulatory gap analysis report for industry sectors with particular reference to selected 3 pilot source categories in the context of BAT/BEP conducted and report published.	S
Outcome 3: Capacity building for monitoring procedures for UP-POP chemicals as one key prerequisites for implementing BAT/BEP but also many other obligations of the Stockholm Convention	1. Educated experts in the field of the pilot projects 2. In plant training programs started 3. Trained national personnel is evaluated by international sampling expert	At least one technical employee per participating pilot enterprise trained in sampling and monitoring UP-POPs releases. Use of the trained technical staff of 4 pilot projects and as educational tool for in-plant training programs	S

<p>Outcome 4: A socio-economic development program established to address efficacy and efficiency of possible control measures in meeting risk reduction goals including incremental cost estimation for the implementation of BAT/BEP at enterprise level and sector level</p>	<ol style="list-style-type: none"> 1. Incremental cost and Cost/effectiveness calculation of BAT/BEP measures to be adopted in 4 selected pilot enterprises 2. Sectoral indicators for occupational health and safety in selected industrial sources 3. Number of techno-economic policies promoting adoption of BAT/BEP and encouraging investment in BAT/BEP from the private sector 	<p>Incremental cost and Cost/effectiveness calculation carried out in all selected pilot enterprises</p> <p>Surveys for projected total cost estimate for countrywide BAT/BEP implementation undertaken in all 4 target sectors</p> <p>Indicators for occupational health and safety adopted for all four target sectors</p> <p>Policies promoting adoption of BAT/BEP and encouraging investment in BAT/BEP from the private sector adopted</p>	<p>MS</p>
<p>Outcome 5: Project management, monitoring and evaluation</p>	<ol style="list-style-type: none"> 1. Project monitoring management structure established 2. Project monitoring and evaluation procedures established 	<p>Establishment of Project Steering Committee and National Project Management Team</p> <p>Recruiting of technical experts to form the project expert team</p> <p>Training of all members of project management teams</p> <p>Holding Inception Workshop</p> <p>Issuing Inception Report</p> <p>Issuing Project Annual reports</p> <p>Holding review meetings</p> <p>Carrying out visits to operating facilities</p> <p>Preparing and issuing Project Terminal Report</p>	<p>S</p>



Technicians of the Dioxin Laboratory collecting stack samples in a factory

5. CONCLUSIONS AND RESPECTIVE RECOMMENDATIONS ON GENERAL OUTCOMES

Based on the observation and the analysis on the achievements of the project, the Evaluation Team came up with 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

	Conclusions		Recommendations
1	<p><u>On concept and design of the project</u></p> <p>Based on a preliminary UP-POPs inventory, it was concluded that there are a wide range of UP-POPs sources in Vietnam without control measures and no BAT/BEP experience and knowledge in respect to their reduction.</p>	1	<p>Thanks to the activities of the project now a certain capacity has been built in Vietnam and some baseline standards have been demonstrated. However, there is still a lack of capacity for measurement. However, at this moment the Government</p>

<p>In combination with fast development of industry this leads to increased releases of environmental pollution threatening environment and human health if no appropriate countermeasures are taken.</p> <p>Priority areas identified in the NIP include the stack emission sampling and other industrial release and analysis of PCDD/PCDFs, which is a prerequisite for guiding and evaluating BAT/BEP implementation.</p> <p>Application of BAT/BEP will also be important for the successful implementation of other projects on environmentally sound management of POPs currently developed in Vietnam.</p> <p>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.</p> <p>Since it is likely that these projects will use incineration or co-incineration technologies for the final disposal of PCBs and POP pesticides, there is also a need to monitor stack gas emissions of these facilities to exclude the unintentional formation and releases of PCDD/PCDFs.</p> <p>Analytical laboratories in Vietnam hold up-to-date analytical equipment. However, the gaps analysis showed that most of the facilities lack international accreditation as well as institutional and human resource capacity to perform the analysis in compliance with international standards.</p> <p>The establishment of the emissions inventory has been facing difficulties due to lack of basic knowledge in chemistry and environmental impact of UP-POPs. Additionally assessment of incineration technologies and the technologies of other relevant industrial facilities have severe faults indicating a lack of expertise in the respective technology sectors and in BAT/BEP.</p> <p>Although the Government has 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.</p> <p>One key issue is the lack of proper coordination among the various government agencies and private sectors on their activities related to UP-</p>	<p>has not yet budgeted to continue this awareness and sensitisation campaign.</p> <p>The project has demonstrated the effectiveness of the introduction of BAT and BEP methodology in the four selected industrial sectors, demonstrating possibilities for reduction and elimination of unintentionally produced POPs releases, applying these practices.</p> <p>Recognizing the need for dioxins and UP-POPs monitoring, the Government has agreed to provide financial support for the Dioxin Laboratory and VEA has agreed, through a national research program, to have more comprehensive surveys in order to measure dioxins emissions in several industrial sectors which have high potential for dioxin formation and releases.</p> <p>The Vietnamese Government through the Ministry of Science and Technology funds this program with an amount of about USD 700,000.</p> <p>Therefore it can be said that the UNIDO BAT/BEP project plays a leverage role to promote further the activities to reduce UP-POPs releases in order to fulfil the obligations under the Stockholm Convention.</p> <p>It is imperative that Ministry of Natural Resources and Environment and the Ministry of Industry and Trade continue the monitoring of reduction of dangerous industrial emissions particularly U-POPs, according to the obligations of the Stockholm Convention.</p> <p>The new project already proposed to GEF for the application of BAT & BEP options to reduce UP-POPs releases from the waste incineration sector and considered as a follow up phase of the present project should establish an environmentally sound management system (EMSS) to introduce the BAT/BEP model implementing and reinforcing the national institutional and controlling capabilities, promoting and supporting the investment for the technological improvement of BAT/BEP measures</p> <p>The laboratory capacity created with the help of the project should be</p>
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	<p>POPs.</p> <p>It is crucially important for sustainable development of Vietnam to reduce the impact on environment from the different pollutants and to implement pollution prevention and control measures in industry.</p> <p>Up to now Vietnam had no monitoring capacity to evaluate potential emissions. Without the establishment of a reliable dioxin monitoring (sampling and analysis), these activities cannot be planned nor conducted in the country.</p> <p>The expansion and modernization of the Vietnamese industry occurred rapidly in a short period and there are gaps in the institutional capacity to effectively implement adequate pollution prevention and control. Introduction of pollution abatement and management system has not kept pace with this expansion.</p> <p>Therefore, an external intervention is justified and the design of the project demonstrates that the pollution prevention and control measures in an integrated way will provide a basis for confidence generation among local decision makers receiving technology transfer.</p>		<p>maintained and enlarged in the second phase and utilized for other POPs related activities such as inventory and disposal of electronic waste and contaminated soils.</p> <p>VEA should issue every year a list of the national Vietnamese laboratories authorized and certificated to control and analyze the emissions, according to the regulations and standards promulgated and updated by VEA.</p> <p>Continue to support projects in the area of POPs, and U-POPs, particularly considering that new chemical have been added to the list of the Stockholm Convention.</p>
	<u>CONCLUSIONS</u>		<u>RECOMMENDATIONS</u>
2	<p style="text-align: center;"><u>Implementation of the activities</u></p> <p>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 and on the overall development of the country.</p> <p>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 involved.</p> <p>The issue of the dioxin emission from industry became a matter of concern and has received attention at governmental and enterprise level.</p> <p>Considering the short implementation time, the project has achieved a lot of success. The time has been very short to approach the four sectoral companies, to visit them and to collect samples for the analysis. During the time of implementation no more than two samples for enterprises have been possible to</p>	2	<p>Considering that collecting samples is a long process, in case, a follow-up project should be of longer duration. During the project there has not been enough time to check and carefully select the waste for incineration containing chlorine</p> <p>Ministry of Natural Resources and Environment should regularly assure the enforcement of the obligations. UNIDO and the GEF should disseminate the results of the project in other countries of the region for possible replication.</p> <p>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</p>

	<p>be collected. Collecting samples requires few weeks and a team of 4-5 persons each.</p> <p>The project has further 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. The Vietnam Cleaner Production Centre conducted the assessments of the enterprises to ascertain their capacity to participate in the project.</p> <p>Another positive impact of the project has been the positive and surprised interest of the Governmental authorities for the behaviour of the enterprises willing to pay more attention to the environment.</p> <p>The Report on the Incremental Costs and the cost/effectiveness calculation of the BAT/BEP applications does not clearly indicate on what the cost estimates are based for a profitable implementation of the BAT/BEP measures. It may result that the annual incremental cost may be too expensive and the expected annual health care return benefits not really suitable to the situation in Vietnam.</p>		<p>experimented and established thanks to the activities developed by the project should be shared and disseminated in the countries of the region.</p> <p>The Dioxin Laboratory should give its services to cover the needs of the institutions and the enterprises of the region in terms of sampling, monitoring and analysis of U-POPs.</p> <p>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.</p>
	<u>CONCLUSIONS</u>		<u>RECOMMENDATIONS</u>
3	<p><u>Relevance and Strategy</u></p> <p>The relevance of this project is the extent to which it is consistent with the problem area identified in relation to the country's development goals and constraints and needs of counterparts, beneficiaries and services. 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 and appropriateness of the verifiable indicators of achievement.</p> <p>The establishment of inventory of the Furan/Dioxin emissions has been facing difficulties due to lack of basic knowledge in the chemistry and environmental influence of UP-POPs. Additionally the assessment of incineration technologies and the technologies of other relevant industrial facilities has severe</p>	3	<p>The need for dioxins and UP-POPs monitoring, thanks to the project has been recognized by the Government, who has agreed to provide financial support for the Dioxin Laboratory. Further, VEA has agreed, through a national research program, to have more comprehensive surveys in order to measure dioxins emissions in several industrial sectors which have high potential for dioxin formation and releases.</p> <p>The Vietnamese Government through the Ministry of Science and Technology has funded this program with an amount of about USD 700,000. Therefore, the BAT/BEP project has played a leverage role to promote further the activities to reduce UP-POPs releases in order to fulfil the obligations under the</p>

	<p>faults indicating lack of expertise in the respective technology sectors and in BAT/BEP. Although the Vietnamese Government has tried 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. The weaknesses and limitations in institutional capacity relating to policy and regulations are evident. One key issue is the lack of proper coordination among various government agencies and private sectors on their activities related to UP-POPs.</p> <p>During the project preparation phase several gaps have been identified that the Project is facing and need to be addressed to ensure its successful implementation and the achievement of the project objectives.</p> <p>The absence of effective pollution prevention and control and management systems affecting significant segment of the Vietnamese industry sector is of international concern.</p> <p>The operation of BAT/BEP facilities requires the application of regulatory controls including feasibility assessments, environmental impact assessments and operating licenses.</p> <p>The project's strategy has attempted to face these problems and it has demonstrated that the pollution prevention and control measures in an integrated way may provide the basis for confidence generation among local decision makers.</p> <p>The project has provided support to the country for complying with the obligations of the Stockholm Convention, improving the environment and updating the technology of the selected enterprises.</p> <p>The outcomes of the project have provided useful contribution to further develop the guidelines on BAT & BEP, supporting the cooperation of UNIDO with the Government of Vietnam to achieve this goal.</p>		<p>Stockholm Convention.</p> <p>This leverage role should be continued through further support also during the recommended second phase of the project, since, the development of the project has confirmed that it necessary more time to select and convince the enterprises willing to participate in the pilot demonstrations. They have to possess the appropriate technology for meaningful experiments and operations.</p> <p>The Vietnam Cleaner Production Centre should continue to conduct the assessments of the enterprises to ascertain their capacity to participate in the project.</p> <p>It is recommended to foreseen the construction of additional laboratories all over the country to provide appropriate analysis and controls not only limited to Dioxin but also for newly added POPs under the Stockholm Convention, especially for the ones produced by the steel industrial sector.</p> <p>The activities for replication of the achievements of the project should continue.</p>
4	<p style="text-align: center;"><u>CONCLUSIONS</u></p> <p style="text-align: center;"><u>Monitoring and Reporting</u></p>	4	<p style="text-align: center;"><u>RECOMMENDATIONS</u></p>
	The general capacity has been established for the environmentally sound management of control and measurement of emissions through the adoption of international practices.		The capacity the project has created in the field of emissions PCB management and BAT/BEP applications should be maintained and possibly utilized for other

<p>Technical awareness on ESM concerning dioxin emissions has been created among the national technical parties involved at state and private level.</p> <p>Developing of monitoring capacity and linking of the research institutions and programs such as VNCPC on UP-POPs, POPs and other relevant toxic pollutant emissions in the country has been an important achievement of the project.</p> <p>The project management structure has been properly established and has worked regularly under the guidance of the Steering Committee and UNIDO as executing agency.</p> <p>Regular reporting has been done to the UNIDO project manager and technical booklets on the activities in the selected sectors have been prepared.</p> <p>The project is a good example of cooperation between state and private sector to achieve global environmental benefits.</p> <p>It has been observed that the project had not the possibility (due to the short duration time of the project and limited financial available resources) to measure again in these enterprises what was the level of reduction of the POPs emissions after the application of the BAT/BEP.</p> <p>Therefore, a final analysis of the benefits derived</p>	<p>POPs related activities such as inventory and disposal of hazardous wastes and also contaminated soils.</p> <p>The laboratory capacity, created by the project, should be maintained and utilized for the inventories of newly added POPs under the Stockholm Convention.</p> <p>The activities for replication of the achievements of the project should continue.</p> <p>Direct assistance to individual enterprises should be strictly limited to those taking part in a pilot scheme for demonstration purpose, to avoid the risk of market distortions.</p> <p>The Evaluation Team recommends that these positive achievements are brought to the attention of the official channels of the Vietnamese authorities to further disseminate the awareness and promote the possibility of further cooperation under the GEF portfolio.</p> <p>High political and technical level personnel of the Ministries involved in the project's activities should be regularly invited to the technical workshops concerning the development of the project.</p> <p>The National Project Director should report to UNIDO (implementing Agency) on a quarterly basis. In case of these projects this procedure should be attentively monitored to allow in case of discrepancies in the implementation to take promptly corrective measures. The degree of achievement of the objectives should be indicated for each output/outcome.</p> <p>Enterprises dealing with hazardous wastes management should continue to invest in adopting BAT/BEP. The Government should continue to support promoting private sector investments into this field. State-of-the-art technologies can further reduce the costs of disposal of also other POPs.</p> <p>It is recommended to establish local project management points in selected provinces as appropriate.</p> <p>It is strongly recommended that, in case of a second phase of the project, measures the level of reduction of the POPs emissions after the application of the BAT/BEP made in the pilot enterprises., the project had not the possibility (due to the short duration time of the project and limited financial available resources) to</p>
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	from the application of the BAT/BEP measures has not been done.		measure again in these enterprises what was the level of reduction of the POPs emissions after the application of the BAT/BEP.
	<p style="text-align: center;"><u>CONCLUSIONS</u></p>		<p style="text-align: center;"><u>RECOMMENDATIONS</u></p>
5	<p style="text-align: center;"><u>Awareness rising and training</u></p>	5	
	<p>Public awareness activities have been important pillars of the project.</p> <p>The beneficiaries of the awareness transferred by the project have been environment related State and private organizations, some industrial enterprises emitting UP-POPs, hazardous waste management enterprises and disposal facilities.</p> <p>The project has raised awareness of policy makers on specific BAT/BEP issues including waste management policies. Also it has raised awareness of general public on UP-POPs sources related to releases from common practices. Several sources of UP-POPs are related to common practices of population at large, which are:</p> <ul style="list-style-type: none"> - Open burning of waste, - Open burning of agricultural waste and Household heating <p>Capacity building for monitoring procedures for UP-POP chemicals are key prerequisites for implementing BAT/BEP and also many other obligations of the Stockholm Convention.</p> <p>To comply with raising and transfer awareness the project has :</p> <ul style="list-style-type: none"> -Organized trainings on “BAT/BEP application and UP-POPs monitoring” for industrial sectors and for each selected enterprise. -Supported the Dioxin Lab providing some equipment for analysis. -Supported Vietnamese officials and experts to attend advanced training courses, study tours and workshops at international labs on POPs analysis -Organized in-site trainings under international experts on stack gas sampling; - Lectures on practical samplings at industrial waste incinerators and cement kilns. -Organized lectures of world-class international experts on UP-POPs monitoring sampling to train in-depth officers of Dioxin Lab (advanced methods to take samples and analyze UP-POPs in theory and practice in enterprises); - The results of Project are very important in term of 		<p>The exchange of information regarding the analysis, results and methodologies applied has to continue to be disseminated to assure the general application of the best environmental practices.</p> <p>The training and upgrading of skills and capacities should not finish at the end of the training course or seminar, but be reinforced periodically through refreshing courses and continuous professional advice. Control of Dioxin/Furan emission from industries is difficult and there are few Vietnamese experts in this field, therefore, the attention to training and upgrading of the existing capacities has to be continuous and it is of paramount importance.</p> <p>The training and upgrading of skills and capacities should not stop at the end of the training course or seminar, but be reinforced periodically through refreshing courses and continuous professional advice.</p>

	improving the capacity for BAT and BEP application, particularly because creating a new experience for Vietnam with a systematic monitoring of UP-POPs (mainly dioxins and furans).		
6	<p style="text-align: center;"><u>CONCLUSIONS</u></p> <p style="text-align: center;"><u>Sustainability</u></p>	6	<p style="text-align: center;"><u>RECOMMENDATIONS</u></p>
	<p>The overall objective of the project was to establish the required human resources and infrastructure to implement the obligations of the Stockholm Convention in Article 5 "Measures to reduce and eliminate releases from unintentional production" and coordinate its activities with the national strategies for environmental protection and the national strategies for industrial and sustainable development and cleaner production, contributing in this way to the improvement of human and environmental health.</p> <p>Supporting the necessary capacity building and regulatory framework to strengthen best available techniques and best environmental practices (BAT/BEP) guidelines.</p> <p>The project has implemented all the activities foreseen in the project document and all the results and outcomes have been reached in a satisfactory manner.</p> <p>The outcomes of this project provide a useful contribution to further develop at national level the guidelines on BAT and BEP.</p> <p>The project has produced satisfactory outputs and has demonstrated the usefulness of the cooperation between UNIDO and the Government of Vietnam to achieve this goal.</p> <p>The project has been successful in capacity building for BAT/BEP application, collecting UP-POP sampling and performing its analysis.</p>		<p>It is recommended to coordinate the participation of universities and research institutions in the follow up pilot project (monitoring and engineering).</p> <p>The cooperation between State and private sector to achieve global environmental benefits should continue, taking the opportunity of the favourable momentum, since VEA has agreed, through the national research program, to have more comprehensive surveys in order to measure dioxins emissions in several industrial sectors which have high potential for dioxin formation and releases. The above in compliance with the obligations of the Stockholm Convention.</p> <p>Thanks to the activities of the project now a certain capacity has been built in Vietnam and some baseline standards have been demonstrated. However, there is still a lack of capacity for measurement.</p> <p>The Government has not yet budgeted to continue this awareness and sensitisation campaign, the evaluation team recommends continuing this activity in the framework of the new follow up project proposed.</p> <p>The enterprises should pay to the Laboratory for the analysis of the emissions, which should be an obligation foreseen by the legislation and enforced by the VEA.</p> <p>Technology development reduces the prices for the proper disposal of the waste and this approach is more sustainable than subsidizing the disposal costs of the wastes.</p>

5.1 General Conclusions

The investigation and calculation results of UPOPs emission levels performed by this project can be considered as an important, although still partial, database of persistent organic pollutants in some industries like paper and paper production, cement, metallurgy and waste incineration.

The project has produced satisfactorily the outputs foreseen and has globally fulfilled the forecasted objectives, in spite of the problems of relatively small budget and of timing due to some complicated bureaucratic project approval procedures

More in detail, the analysis and the trends of the data obtained thanks to the activities developed by the project, have proved that the following results have been achieved:

- Sensitised the authorities in establishing standards and parameters.
- Made possible to evaluate the effects of these strategies by building up action plans to minimize UPOPs emission and trends through updating UPOPs emission data.
- Showed the possibility to manage the mitigation of the unintentional formation and emission of Dioxins/Furans.
- Enhanced the ability to collect data and exchange information between administrators, scientists, research institutes and production enterprises.
- Allowed to estimate the expenses for BAT/BEP implementation and to analyse the benefits as well as environmental expenses due to the savings obtained from such applications.
- Collaboration between Project, GEF, donor, Vietnam management agencies, international and national counterparts was smooth and constructive, which helped keeping up with the progress.
- The project has successfully served as a leverage to promote further effort and investment from the Government to implement comprehensive monitoring and research on the issue of dioxins and UP-POPs emission from the industry.
- Many project activities have connected and supported other activities to implement the Stockholm Convention and cleaner production, linking many agencies.
- For stack gas sampling and monitoring Dioxin/Furan emissions from the chimneys, the project has made remarkable contribution in creating capacity building (knowledge, techniques, equipment, etc.) and can be said that for the first time Vietnamese staff can collect sampling and conducting analysis properly following international requirements and standards.
- The project has promoted the creation of a network of governmental bodies, organizations, experts for controlling Dioxin/Furan emissions, including world-class experts and labs. Cooperation activities and international workshops have contributed to capacity strengthening of Vietnamese officers and experts; increasing the technical reputation of Vietnam
- Due to limited time and budget, some project results have only met basic requirements, while practical demand is quite high. For instance, the number of staff capable of collecting stack gas sampling is still small. Some BAT solutions have not been implemented; because the analysis of the BEP efficiency has not yet been controlled and analysed. If these activities had been deeper implemented, their application and effectiveness would have been much more successful for the needs of the enterprises.
- The Report on the Incremental Costs and the cost/effectiveness calculation of the BAT/BEP applications does not clearly indicate on what the cost estimates are based for a profitable implementation of the BAT/BEP measures.

It may result that the annual incremental cost may be too expensive and the expected annual health care return benefits not really suitable to the situation in Vietnam.

5.2 Specific Recommendations to the Stakeholders

According to its findings the Evaluation Team presents the following recommendations:

To the Vietnamese authorities:

- It is imperative that Ministry of Natural Resources and Environment and the Ministry of Industry and Trade continue the monitoring of reduction of dangerous industrial emissions particularly U-POPs , according to the obligations of the Stockholm Convention .
- The new project already proposed to GEF for the application of BAT & BEP options to reduce UP-POPs releases from the waste incineration sector and considered as a follow up phase of the present project should establish an environmentally sound management system (EMSS) to introduce the BAT/BEP model implementing and reinforcing the national institutional and controlling capabilities, promoting and supporting the investment for the technological improvement of BAT/BEP measures
- Since globally in the world the industrial production alone is accounting for around 25 per cent of gas emissions from all sources, (which is considerably resulting in environment pollution and danger for the health not only of the life of the human being but for the nature in general), the main goal of the second phase of the project should be to minimize to the maximum extent possible, the danger to the ecosystem caused by not sustainable and not technologically appropriate waste incineration activities in the country.
- The laboratory capacity created with the help of the project should be maintained and enlarged in the second phase and utilized for other POPs related activities such as inventory and disposal of electronic waste and contaminated soils.
- It should be foreseen the construction of additional laboratories all over the country to provide appropriate analysis and controls not only limited to Dioxin but also for newly added POPs under the Stockholm Convention, especially for the ones produced by the steel industrial sector. The activities for replication of the achievements of the project should continue
The Dioxin Laboratory should give its services to cover the needs of the institutions and the enterprises of the region in terms of sampling, monitoring and analysis of U-POPs.
- 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 in the countries of the region.
- As follow up to the activities of the project it is recommended during the next years to prioritize the setting up of monitoring points in zones critical under the economic point of view. The linking of the exchange of information between the monitoring points and the national network should be reinforced.
- The Government should support and possibly promote private sector investments into this field. State-of-the-art technologies can further reduce the costs for the control and monitoring also of other POPs.

- The Industrial Safety Techniques and Environment Agency (ISEA) belonging to the Ministry of Industry and Trade (MOIT) should continue to publicize and disseminate the project achievements and experiences when organizing and participating in Bat/BEP seminars and workshops.

To the Vietnam Environment Administration:

- Adherence to the ESM system and monitoring requirements should be assured and enforced by regular and periodical inspections at the enterprises.
- VEA should issue every year a list of the national Vietnamese laboratories authorized and certificated to control and analyze the emissions, according to the regulations and standards promulgated and updated by VEA.
- VEA should establish some rules in order to give time to the involved enterprises to adapt to the established standards. A delay time of at least three months from the publication of the standards is recommended.
- VEA should also organize periodical workshops and seminars for the concerned enterprises in order to present and explain to them the new established standards and regulations.

To UNIDO and GEF:

- UNIDO and the GEF should disseminate the results of the project in other countries for replication.
- Continue to support projects in the area of POPs, and U-POPs, particularly considering that new chemical have been added to the list of the Stockholm Convention.
- Bring the positive achievements to the attention of official channels of Vietnamese authorities to further disseminate awareness and promote the possibility of further cooperation under the GEF portfolio.
- High political and technical level personnel of the Ministries involved in the project's activities should be regularly invited to the technical workshops concerning the development of the project.
- Considering that during the project closing workshop, the representative of GEF has highly appreciated the project results and has suggested to focus the activities on typical Vietnamese industries, the follow-up phase to be more effective should concentrate mainly on the sectors that cause the most problems and which are more diffused all over the country: i.e. the waste incineration activities and the project in the metallurgical sector.
- The follow up project should extend the technical assessments of the enterprises also to the REPC (Resource efficiency and Cleaner Production). Today energy is costly and energy saving should be the first consideration for a country to achieve sustainable growth, especially in countries experiencing increasing costs for energy consumption. In several cases the use of energy in industry is not very efficient and this may be attributed to outdated manufacturing technologies. More attention should also be paid to the quantity and the quality of the input materials, in accordance with the BAT&BEP criteria.

- It is recommended to further build the capacity of the Dioxin Laboratory to train additional persons and extend the network all over the country.

To the Management of the project:

- The National Project Director should report to UNIDO (implementing Agency) on a quarterly basis. In case of these projects this procedure should be attentively monitored to allow in case of discrepancies in the implementation to take promptly corrective measures. The degree of achievement of the objectives should be indicated for each output/outcome.
- Direct assistance to individual enterprises should be strictly limited to those taking part in the pilot scheme for demonstration purpose, to avoid the risk of market distortions.
- The training and upgrading of skills and capacities should not finish at the end of the training course or seminar, but be reinforced periodically through refreshing courses and continuous professional advice. Control of Dioxin/Furan emission from industries is difficult and there are few Vietnamese experts in this field, therefore, the attention to training and upgrading of the existing capacities has to be continuous and it is of paramount importance.
- The staff that benefited of the training received by the project should engage in transferring further to the staff of his enterprise the upgraded skills received.
- Some documents and reports prepared by the management of the project do not indicate the date, it is suggested that in the future the documents prepared by the project are always dated.
- 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.

6. LESSONS LEARNED

(Lessons learned are generalizations, positive or negative, based on evaluation experiences with projects. The lessons derived can 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 can be retained for improving quality and effectiveness of the assistance in future projects.

However, it has to be considered that the lessons learned in the evaluation of a project are not always applicable to other countries or projects, which can have a different situation under the political or industrial point of view.)

The following lessons have been derived from this evaluation:

- 1) During the formulation of a project particular 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 by the project, 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.

- 2) Proper and regular monitoring of the project gives the opportunity to adjust timely the production of the outputs according to the initial planning.
- 3) The compilation, analysis and dissemination of the experiences of a positive and 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 the opportunity for developing mechanisms at national or regional level to promote the utilization of co financed resources (private or state).
- 4) Improving the available national technological capabilities it is a considerable help for the country for not depending on the changes of the global markets.
- 5) Technology is a combination of several actions, like joint ventures, licensing, purchase of machinery, consultancy and training, maintenance contracts and even new technological processes originated and developed in the enterprises themselves. Implementation or adaptation of innovative technological changes normally involves investments and consequently it originates the problem of financing for the interested enterprises.
- 6) Technology development reduces the prices for the proper disposal of the waste. This approach is more sustainable than subsidizing the disposal costs of the wastes.

TERMS OF REFERENCE OF FINAL INDEPENDENT EVALUATION

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

**Terms of Reference
Independent Final Evaluation**

Project number: GF/VIE/08/005

Project title: Introduction of BAT and BEP methodology to demonstrate reduction or elimination of unintentionally produced persistent organic pollutants (UPPOPs) releases from the industry in Vietnam

Thematic area code FG50 CE17 – Stockholm Convention

Starting date: June 2008

Duration foreseen: 2 years

Project site: Hanoi, Vietnam

Government Co-ordinating agency: Ministry of Natural Resources and Environment

National Counterpart: Vietnam Environment Administration (VEA)

Executing agency/ cooperating agency: VEA

Project Inputs:

- GEF \$ 800,000 (including PPG of \$50,000)
- Government of Vietnam (Ministry of Industry, Monroe/VEPA) \$ 1,555,000
- *UNIDO inputs:* \$ 40,000 (in-kind)
- *Support costs (10%):* \$ 75,000

- GRAND TOTAL: \$ 2,395,000 (EXCL. SUPPORT COSTS)

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I. Project Background

Short Summary

By becoming a party to the Stockholm Convention from its beginning, Vietnam has demonstrated that the reduction or elimination of POPs releases is a respective national priority and that it is committed to take appropriate actions. Since 1993, Vietnam has paid close attention to the management of POPs and other toxic chemicals. The Government has adopted a series of legal documents on prohibition of the production and use of all POPs pesticides in Vietnam. DDT and Lindane have been officially prohibited since 1993. All nine of the POPs pesticides covered by the

Stockholm Convention have now been prohibited from use. PCBs are only imported and used under strict conditions pursuant to the regulations of the Ministry of Industry (MOI). Vietnam has, with the financial assistance from GEF, studied the POPs situation in the country and elaborated a National Implementation Plan (NIP) detailing the legislative, management as well as technical needs for reducing and eliminating POPs. The action plan section of the NIP details priority areas to be tackled by 2020.

According to the Action Plan, Vietnam is to apply BAT and promote BEP in new sources in priority (Part II of Annex C of the Stockholm Convention) source categories by 16 May 2008, and complete dioxin release reduction demonstrations in selected existing sources in the priority sectors by 2010.

The sector-wide introduction of BAT/BEP is planned to be completed by 2020.

Overall and Specific Objectives of the project

The overall objective of the Medium Size Project (MSP) is to establish the required human resources and infrastructure to implement the obligations of the Stockholm Convention in Article 5 "Measures to reduce and eliminate releases from unintentional production" and coordinate its activities with the national strategies for environmental protection and the national strategies for industrial and sustainable development and cleaner production and thus contribute to the improvement of human and environmental health.

The specific objective of the project aims at:

- Reducing unintentional production of POPs in key sectors of the industry listed in source categories in Annex C of the Stockholm Convention by implementation of BAT/BEP; and
- Supporting the BAT/BEP projects, addressing other UP-POPs related issues by the development of monitoring and research capacities.
- Achieving these specific objectives will enable the key industrial sectors that have the potential for comparatively high formation and release of UP-POPs into the environment to acquire a more sustainable development and for the country to comply with its obligations under the Stockholm Convention in respect to the UP-POPs releases.

Further, the development of adequate monitoring capacity will provide the required infrastructure and services for all future activities in the area of UP-POPs and POPs destruction projects.

Project history and context

1. The strategy proposed by the National Implementation Plan (NIP), sectoral Action Plan, and this proposed Medium-sized Project (MSP) for the industrial source categories that have the potential for comparatively high formation and release of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs) to the environment (Part II: Source categories, Annex C of the Stockholm Convention) includes efficient operation of combustion technologies, thermal and chemical

processes, supported by necessary capacity building and regulatory framework strengthening consistent with the best available techniques and best environmental practices (BAT/BEP) guidelines. This planned approach also accommodates Vietnam's obligations under the Stockholm Convention to start reducing about 25% of PCDDs/PCDFs releases currently attributed to these source categories.

2. It is predicted that the annual average economic growth rate in the period of 2001-2010 will be about 7.0-7.2%, with agriculture-forestry-fishery growth of 3.5-4.0%, industry-construction by 10-10.5% and services increasing by 6.0-6.5%. Economic planning envisages that by 2010, Gross Domestic Product (GDP) per capita will be US\$ 860.

Vietnam is changing its economic structure to enhance competitiveness and adaptability within the international situation, with the increase in industries and services contribution, and the decrease in agriculture-forestry fisheries contribution.

In its process of industrialization and modernization, Vietnam has been facing many challenges on the way towards sustainable development. One of the most serious environmental problems currently faced by Vietnam is air pollution.

Industrial emissions, coal combustion and increasing number of motor vehicles using fossil fuel are main causes of loss of air quality in urban and industrial areas. Overall exposures to particulates, CO, CO₂, SO₂ and NO_x exceed permissible levels at many urban locations. The situation needs imperatively the implementation of the National Strategic Plan for pollution reduction by introducing BAT/BEP measures and the project of reducing unintentionally produced POPs (UP-POPs), should be one part of these activities.

3. UP-POPs (PCDDs/PCDFs, HCB and PCBs) 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 most facilities in Vietnam there are very limited of off-gas and wastewater treatment. 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 hazardous wastes in unsafe ways, either by mixing it with non-hazardous waste and storing it on site, or just dumping them.

Most industrial hazardous waste from larger industries is either treated onsite 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.

4. Based on the preliminary UP-POPs inventory, it can be concluded that there are a wide range of UP-POPs sources in Vietnam without control measures and no BAT/BEP experience and knowledge in respect to UP-POPs reduction.

This in combination with the fast development of industry can lead to increased releases of environmental pollution (including UP-POPs) threatening the Vietnamese environment and human health if no appropriate countermeasures would be taken.

5. Chronic impairment to human health through exposure to POPs and other pollutants and contamination of the environment has direct implications to national and international efforts to meet sustainable development targets in human health and indirectly impacts efforts to reduce poverty and improve attainment of educational opportunities. Studies on UP-POPs

indicate that eliminating them can lead to reduction in the environmental degradation rate and in the longterm, to reduce its harmful and dangerous influence on health both to present and future generations.

Such an approach has prompted the international action that resulted in the adoption of the Stockholm Convention on POPs. The actions proposed relate directly to UP-POPs listed in Annex C, Part II of the Convention.

6. The rationale of the proposed MSP originated from the needs identified during the inventory process conducted in the course of the NIP preparation, according to the priorities and key objectives established by the NIP.
7. Priority areas identified in the NIP include stacking emission sampling of other industrial release and analysis of PCDD/PCDFs, which are a prerequisite for guiding of BAT/BEP projects and for evaluating BAT/BEP implementation.
8. While several institutes in Vietnam have already acquired up-to-date analytical equipment for PCDD/PCDF analysis (two laboratories with HRGC/HRMS and one laboratory with LRMS equipment), a gaps analysis undertaken during the NIP development process revealed that Vietnam lacks institutional as well as technical capacity for the sampling and monitoring of PCDD/PCDF air emissions and other release vectors from industrial sources.
9. As the implementation of the pilot projects will have to be accompanied and guided by PCDD/PCDF release data, the MSP seeks to address the above-mentioned shortcomings by establishing reliable PCDD/PCDF air emission sampling and monitoring capacity.
10. This will also be important for the successful implementation of the following two other projects on the environmentally sound management of POPs currently developed in Vietnam:
 - Building capacity to eliminate POPs pesticides stockpiles in Vietnam (GEF UNDP Project)
 - PCB Management and Disposal Demonstration Project (GEF-World Bank Project)Since it is likely that these projects will use incineration or co-incineration technologies for the final disposal of PCBs and POP pesticides, there is an absolute need to monitor stack gas emissions of these facilities to exclude the unintentional formation and releases of PCDD/PCDFs into the environment.
11. At the same time that analytical laboratories in Vietnam hold up-to-date analytical equipment, the gaps analysis showed that most of the facilities lack international accreditation as well as institutional and human resource capacity to perform PCDD/PCDF analysis in compliance with international standards. Therefore, the proposed MSP aims at implementing activities focusing on the education of personnel for extraction, clean up and analysis of different matrices, accreditation (ISO17025 for PCDD/PCDF) and the participation in international inter calibration studies.
12. From 2004 to 2006, Vietnam participated in the study "Background Air Monitoring of Persistent Organic Pollutants in East Asian Countries" that was a part of the POPs Monitoring Project in East Asian Countries, 2006. The study supported by the Ministry of Environment of Japan was a contribution to the UNEP-led Effectiveness Evaluation of the Stockholm Convention and was submitted to the third meeting of the Conference of the Parties to the Convention in 2007. Its aim was to provide comparable and scientifically sound data on the media considered to be essential (i.e. air deposition), and contributing to further operationally the global monitoring programme. However, the study faced several technical difficulties and measured ambient air concentrations of all POPs, except PCBs and PCDD/PCDFs, at a single site in Tam Dao, about 50 km north of Hanoi.
13. Given the different focus of the study in terms of POPs chemicals and environmental matrices covered, Vietnam yet has to build capacity for the monitoring of PCDD/PCDF and

other unintentionally generated POPs releases from industrial sources, which will be a key priority for the implementation of the proposed project.

14. While there are currently no activities under the Stockholm Convention Effectiveness Evaluation programme in Vietnam, all information gathered as well as experiences gained on the sampling and monitoring of PCDD/PCDFs during the implementation of this MSP will be shared with UNEP and the Secretariat of the Stockholm Convention.
15. Furthermore, the project will support the National Strategy on Pollution Control in respect to monitoring as mentioned in the NIP, which is to “Develop and complete monitoring network following the national plan for environmental monitoring. Further, it will link information between the monitoring centres and monitoring points with the national network.”
16. Their implementation will permit the country to have a better planning to meet compliance with its obligations under the Stockholm Convention on POPs, and through this to contribute to the improvement of the environmental situation in Vietnam and in the South-East Asia region where Vietnam is among the fastest growing economies, and eventually reduce and eliminate UP-POPs pollution burden to human health. The introduction of BAT/BEP strategies will be the key approach of Vietnam 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.
17. 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.
18. 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.
19. 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.”
20. 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.” The Convention entered into force to Vietnam on 22 July 2002.

Considering that the Stockholm Convention entered into force on 17 May 2004, all new industrial sources listed in Part II of Annex C of the Convention will be required to adopt BAT/BEP not later than 16 May 2008. Furthermore, in all existing facilities prior to the former date, Vietnam is required under the Convention to promote BATs and BEPs in due course.

21. The implementation of the Stockholm Convention in Vietnam is progressing in close coordination with the national strategies on development and environment. More specifically, and in the context of the environment, Vietnam has made significant progress in implementing the “National Strategy on Environmental Protection until 2010 and towards 2020”.

Preliminary gap analysis

22. PCDD/PCDF are closely related to the production and use of chlorinated pesticides and industrial chemicals (like PCB). The preliminary Vietnamese PCDD/PCDF inventory lists about 500g TEQ annually (which does not include the Vietnam War legacies).

Furthermore one major risk for destruction projects of POPs stockpiles and other chlorinated organics is the formation and release of PCDD/PCDF and other UP-POPs. Up to now Vietnam has no monitoring capacity to evaluate potential emissions. Without the establishment of a reliable dioxin monitoring (sampling and analysis), these activities cannot be planned nor conducted in the country. Also the results of the POPs destruction pilot studies can be questioned without the evaluation of PCDD/PCDF releases.

23. The establishment of the PCDD/PCDF inventory has been facing difficulties due to lack of basic knowledge in the chemistry and environmental fate 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. Although the Vietnamese government has been endeavouring 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. 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. This hampers data gathering and information exchange.
24. It is indicated that 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.
25. During the project preparation phase several gaps have been identified that the Project is faced and that will need to be addressed to ensure its successful implementation and the achievement of project objectives. These include:
- The widening gap between the rapid industrial development and the status of pollution prevention and control infrastructure that is lagging behind.
 - Current disposal and treatment practices to eliminate POPs pesticides and PCBs pose unacceptable burden to human health and environment by generating UP POPs.
 - Establishment of the PCDDs/PCDFs inventory has been facing difficulties due to lack of basic knowledge in chemistry, persistence, bio-accumulation and potential long-range environmental transport of PCDDs/PCDFs.
 - 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, and there is a lack of detailed rules to support their implementation.
 - Enforcement of laws and regulations is particularly insufficient in the medium-and small-scale enterprises (MSE) sector.

On the above gaps some more points can be added:

26. With rapid economic development, environmental pollution (including UP-POPs pollution), if not controlled, can be the major drawback by burdening environment, destroying ecosystems and threatening human health with the risk to finally hamper, slow down and eventually stop economic development. This is particularly true in Vietnam with high annual industrial growth rate (ca. 10%) and intensive agricultural activities on which a large part of the population relies. Therefore, it is crucially important for sustainable development of Vietnam to reduce the impact on environment from the different pollutants and to implement pollution prevention and control measures in industry.

Reasons for the GEF Intervention

The GEF intervention is justified for the following reasons:

- The expansion and modernization of the Vietnamese economy and 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 pace with this expansion.
- External intervention is justified on the basis that these gaps cannot be bridged organically.
 - The absence of effective pollution prevention and control and management systems affecting significant segment of the Vietnamese industry sector 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, environmental impact assessments and operating licenses.
 - The project will demonstrate the pollution prevention and control measures in an integrated way and provide a basis for confidence generation among local decision makers receiving technology transfer.
- The project in this way provides some defence against technology dumping.

REASONS FOR UNIDO ASSISTANCE

UNIDO is committed to assist its developing country Member States in accordance with Article 12 of the Stockholm Convention. The GEF has approved Enabling Activities proposals submitted by UNIDO for more than 40 countries that have opted to undertake the NIP development through the GEF full project cycle. In addition, UNIDO is executing a range of capacity building projects geared to support Convention implementation in a wide range of developing countries and countries with economies in transition. UNIDO has made considerable effort to build this assistance programme. This commitment is based on a clear understanding that these activities are compatible with UNIDO's mandate and corporate strategy and will lead towards the Millennium Development Goals.

Since the Conference of Parties of Stockholm Convention requested the Secretariat and other donors to initiate activities to promote guidelines on BAT and BAP of regional, sub regional and national levels, UNIDO has been requested by the Government of Vietnam to develop and formulate this MSP.

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 MSP will provide a useful contribution to further develop the revised draft guidelines on BAT and BEP.**

Hence, UNIDO cooperates with the Government of Vietnam to achieve this goal.

II. Objectives and scope of the evaluation

The purpose of the mid-term evaluation is to enable the Government, counterparts, the GEF, UNIDO and other stakeholders and donors to:

- (a) 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 re-examination of the relevance of the objectives and other elements of project design according to project evaluation parameters.
- (b) Examine project relevance, effectiveness, efficiency and sustainability by drawing conclusions and recommendations with a view to ongoing and future activities.
- (c) Draw lessons of applicability for the replication of the experience gained in this project in other projects/countries.

III. Methodology

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

This evaluation will be based on the analysis of the Project Review/Financial Reports, 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 whereby the UNIDO staff associated with the project will be kept informed and regularly consulted throughout the evaluation.

Scope

An in-depth evaluation is an activity in the project cycle that attempts to determine as systematically and objectively as possible 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/risks as 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 (Relevance to national development and environmental agendas, recipient country commitment, and regional and international agreements)

- 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 (e.g. companies, civil society, beneficiaries of capacity building and training, etc.).

- Were the project's outcomes consistent with the focal areas/operational program strategies of GEF? Were they in line with the UNIDO mandate, objectives and outcomes defined in the Programme & Budget?
- Was the project concept in line with the development priorities and plans of the country (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 at hand? Was a participatory project identification process applied and was it instrumental in selecting problem areas and national counterparts?
- Does the project have a clear thematically focused 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 and programme framework within which the project is placed, in particular the National Implementation Plan, the development and sector policies?
- the project's coherence with current/on going initiatives;
- 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 stated objectives correctly address the identified problems and the internal consistency of the stated objectives;
- 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 justification of the implementation strategy, and of management and coordination arrangements;
- the analysis of assumptions and risks;
- the appropriateness of the monitoring arrangements ;

Efficiency (Sound management and value of money spent)

- Has the project reached the goals set in project document and in the work plan?
- Was the project cost effective?
- Have the inputs 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 national and regional scale, reviewing and possibly improving national policies and regulations ?
- Has the project established enhanced capacity building for monitoring procedures for UP-POP chemicals as prerequisite for implementing BAT/BEP?
- Has the project established a socio-economic development program to address efficacy and efficiency of possible control measures in meeting risk reduction goals, including cost estimation for the implementation of BAT/BEP at enterprise level and sector level?

- How it was the project management and coordination?

Effectiveness (attainment of objectives and planned results)

- 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?
- This includes 1) Pilot projects in the sector of the secondary copper, secondary iron and steel industry and secondary aluminium. 2) Pilot projects in the sector of waste incineration including municipal, hazardous and medical waste incinerators. 3) Pilot project with cement kiln firing waste or hazardous waste. 4) Pilot project with pulp and paper mills using chlorine bleaching.
- How effectively the tangible objectives of the project, (*which are: 1. Reducing unintentional production of POPs in key sectors of the industry listed in Part II: Source categories in Annex C of the Stockholm Convention by implementation of BAT/BEP. 2 .Supporting the BAT/BEP projects, addressing other UP-POPs related issues by development of monitoring and research capacities*) have been implemented?
- How have been spread the awareness of the risks and the Stockholm Convention at the level of environment related organizations of the Government 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 efficiency and utility of the success indicators as applied by the project activities?

Impact (Achievement of effects and outcomes)

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:

- Extent to which the objectives of the project have been achieved as intended, in particular the project planned overall objective.
- Whether the effects of the project:
 - a) have been facilitated or constrained by external factors.
 - b) Have produced any unintended or unexpected impacts and if so 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 competent technical personnel in applying BAT/BEP in priority industrial source categories to reduce UP-POPs release?
- The level of enhanced efficiency of the pilot enterprises 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 cleaner production activities in the industry and review of national policies and regulations?
- 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?
- Which socio-economic development program has been established to address efficacy and efficiency of possible control measures in meeting risk reduction goals, including cost estimation for the implementation of BAT/BEP at enterprise level and sector level?

- Which project management structure and M&E mechanism has been put in place?
- To what degree has the project influenced implementation of related national legislations?

Sustainability (Likely continuation of the achieved results and project outcomes)

- Quality of the professional and managerial competence to sustain the activities?
- Are there any gaps and which are the strengths? What is the quality of the management system?
- How well have been trained for their tasks the staff members of 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 implemented by the project?

Mutual reinforcement (coherence) *(It is the extent to which activities undertaken allow the GEF and UNIDO to achieve its development policy objectives).*

How country's policies and donor's intervention complement each other. This is the connection to higher level policies (coherence).

- likelihood that results and impacts will mutually reinforce one another
- Likelihood that results and impacts will duplicate.

UNIDO-GEF value added

The evaluation will also analyze how the project (its objectives, targeted beneficiaries, timing, etc.)

- is creating actual synergy (or duplication) with the intervention of other Donors
- Involves concerted efforts by other States, optimizes synergies and avoid duplication.

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:

1. A desk review of project documents including, but not limited to:
 - (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. The evaluation team will use interviews with project management and technical support and surveys for counterparts and stakeholders involved.
3. Interviews with project partners, in particular those that have been selected for co-financing.
4. On-site observation of results achieved in demonstration projects, including interviews of actual and potential beneficiaries of improved technologies.

5. The evaluators shall determine whether to seek additional information and opinions from representatives of any donor agencies or other organizations.
6. Interviews with the UNIDO Country Office in Vietnam and national and sub-regional authorities dealing with project activities, as necessary. 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.

The conclusions should report not only the successes observed but also the issues requiring further thought on modifications or a different course of action.

Conclusions will be organized by order of importance.

Recommendations

The recommendations are always related to the conclusions. A recommendation may derive from one or more conclusions. They intend to improve or reform the project in the framework of the cycle under way, or to prepare the design of a new intervention.

The value of evaluation depends on quality and credibility 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, country or sectoral strategies.

Recommendations must be clustered and prioritized, carefully targeted to the appropriate audiences at all levels.

Lessons Learned

They are based on mission findings. The report should indicate the main lessons learned from the project. Lessons learned are generalizations, positive or negative, based on evaluation experience. They derive from the evaluation 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 formation and release of UP-POPs to the environment. Knowledge of BAT and BEP methodology for the reduction or elimination of unintentionally produced persistent organic pollutants (UP-POPs) released from the industry. Management of POPs and other toxic chemicals. Good knowledge of English.

- One national consultant with background as chemical or electrical engineer and experienced in the field of environment. Knowledge of and experience in Persistent Organic Pollutants, experience in evaluation of environmental projects. Knowledge of GEF and UNIDO technical cooperation activities an asset. Good knowledge of English required.

All consultants will be contracted by UNIDO. The tasks of each team member are specified in the respective job descriptions.

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

Timing

The evaluation is scheduled to take place in the period March/April 2012, including two weeks in Vietnam.

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 reports should be brief, to the point and easy to understand. It must explain; the purpose of the evaluation, exactly what was evaluated and the methods used. The report must highlight any methodological limitations, 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 and distillation of lessons.

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

In order to ensure that the report considers the views of the 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 the 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 project² and important developments during the project 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 the UNIDO project (other initiatives of government, other donors, private sector, etc.)
 - Counterpart organization(s)

III. Project assessment

This is the key chapter of the report and should address all evaluation criteria and questions outlined in the TOR (see section III Evaluation Criteria and Questions). 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 Learnt

This chapter can be divided into three sections:

A. Conclusions

This section should include the main evaluation conclusions related to the project's achievements and shortfalls. It is important to avoid providing a summary based on each and every evaluation criterion. The main conclusions should be cross-referenced to relevant sections of the evaluation report.

B. Recommendations

This section should be succinct and contain few key recommendations. They should:

- be based on evaluation findings
- realistic and feasible within a project context
- indicate specific institution(s) responsible for its implementation and have a proposed timeline for implementation.
- be commensurate to the available capacities of project team and partners
- Take resource requirements into account.

Recommendations should be structured by addressees:

- UNIDO
- Government and/or Counterpart Organizations
- Donor

C. Lessons Learned

- Lessons learned must be of wider applicability beyond the evaluated project but must be based on findings and conclusions of the evaluation
- For each lessons the context from which they are derived should be briefly stated

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
11/03/2012		Arrival in Vietnam	Hanoi
12/03/2012	11.00 – 12.00	Briefing with UNIDO Country Office in Vietnam (Mr. Gilabert)	Hanoi
	12.00 – 13.30	Lunch with Mr. Gilabert	
	14.00 – 16.00	Working with BAT/BEP Project office	
13/03/2012	AM	Working with Government Implementing partners and:	Hanoi Mr. Mario, Mr. Chinh, Mr. Loan, Mr. Tuan, Mr. Minh Ms. Nga, Ms. Tan
	08.00 – 10.00	Working with Dr. Tran The Loan, VEA, National Project Director, main implementing agency and	
13/03/2012	10.30 – 12.00	Working with Mr. Nguyen Van Thanh, Industrial Safety Techniques and Environment Agency (ISEA) - Ministry of Industry and Trade (MOIT), co-implementing agency	
	15.00 – 17.30	Arrival to Thai Nguyen	
14/03/2012	AM		Thai Nguyen Province Mr. Mario, Mr. Chinh, Mr. Khai, Mr. Nam, Mr. Quan, Mr. Quy, Mr. Cuong, Minh Mr. Mario, Mr. Chinh, Mr. Khai, Mr. Nam
	08.00 – 10.00	Working with TISCO Steel Company	
	10.00 – 12.00	Working with TISCO Steel Company	
	PM	Field survey Luu Xa Company	
	12.00 – 13.00	Lunch	
	13.00 – 14.00	Go to the Cement Company	
	14.00 – 16.00	Stack gas sampling in VINACONMIN in Thai Nguyen province	
	16.00 – 18.30	Go back to Hanoi	
15/03/2012	AM	Working with Dioxin Laboratory, VEA. (Technical partner)	Hanoi Mr. B.Minh, Mr. H.Minh Ms. Nga, Mr. Nhan, Ms. Hoi,
	PM	Working with Working with Vietnam cleaner production Center (VNCPC) (Technical partner)	

16/03/2012		Working with Vietnam Green Environment Company Go back to Hanoi	Hai Duong Province Mr. Mario, Mr. Chinh, Mr. Minh, Mr. Son,
17/03/2012 18/03/2012		Wrap-up Free day Sunday	Mr. Mario, Mr. Chinh,
19/03/2012	AM PM	Working with Bai Bang Company Lunch Field survey Bai Bang Company Go back to Hanoi	Phu Tho Province Mr. Mario, Mr. Chinh, Dr. Son, Mr. Son, Mr. Luong Mr. Phu,
20/03/2012	AM PM	Arrival in URENCO (Bac Son waste incineration Company) Working with URENCO leaders Lunch Field survey Bac Son Company Go back to Hanoi	Nam Son - Hanoi Mr. Mario, Mr. Chinh, Mr. Minh Mr. Tường, Mr. Giang, Mr. Hung, Mr. Hiep,
21/03/2012	AM, PM	Internal work	Mr. Mario, Mr. Chinh,
22/03/2012	AM	Wrap-up with BAT/BEP Project Office and debriefing with UNIDO Country Office	List of Participants
23/03/2012	AM	Wrap-up with UNIDO Country Office	Mr. Mario, Mr. Chinh, Mr. Minh Ms. Nga
Sunday 25th March		Go back to Vienna	

List of Participants at final Debriefing

No.	Name	Affiliation
1.	Dr. Trần Thế Loan	Pollution Control Department, VEA, Project Director
2.	Dr. Nguyễn Anh Tuấn	Pollution Control Department, VEA
3.	Dr. Từ Bình Minh	National Project Manager
4.	Dr. Mario Marchich	International expert, evaluation mission team leader
5.	Mr. Patrick Gilabert	UNIDO Representative
6.	Ms. Nguyễn Thị Mỹ Hoàng	UNIDO Programme Officer
7.	Mr. Chu Đức Khải	National Expert

8.	PGS. TS. Ngô Thị Nga	Expert, VNCPC
9.	Mr. Trần Đức Chung	VNCPC
10.	PGS. TS. Trương Thị Hội	National Expert
11.	Dr. Nguyễn Hùng Minh	Dioxin Laboratory, VEA
12.	Dr. Vũ Đức Nam	Dioxin Laboratory, VEA
13.	Mr. Phạm Minh Chính	National expert, evaluation team
14.	Ms. Phạm Thị Nguyệt Nga	Officer, VEA
15.	Ms. Lê Thị Tân	Officer, VEA
16.	GEF Hanoi Office representative	GEF Hanoi Office representative
17.	Representative of Department of International Relations, VEA	Representative of Department of International relations, VEA
18.	Mr. Phạm Trường Giang	URENCO Hanoi, a pilot enterprise
19.	GEF Hanoi Office representative	GEF Hanoi Office representative
20.	Representative of Department of International Relations, VEA	Representative of Department of International relations, VEA
21.	Mr. Phạm Trường Giang	URENCO Hanoi, pilot enterprise

List of Persons interviewed and Companies visited

Name	Institution	Location	Title
Mr. Patrick Gilabert	UNIDO	Hanoi	UNIDO Representative
Ms. Nguyen My Hoang	UNIDO	Hanoi	Programme Officer on Environment and Energy
Mr. Nguyen Anh Tuan	Ministry of Natural Resources and Environment (MONRE) Vietnam Environment Administration (VEA) Pollution Control Dept.	Hanoi	Head of Division
Ms. Pham Thi Nguyet Nga	Min.of Natural Resources and Environment (VEA)	Hanoi	Official Internat. Cooperation and Science & Technology Dept.
Ms. Le Thi Tan	Ministry of Natural Resources and Environment (MONRE) Vietnam Environment Administration (VEA)	Hanoi	Project Assistant
Mr. Hoang Danh Son	Ministry of Natural Resources and Environment (MONRE) (VEA)	Hanoi	Director Department of International Cooperation and Science , Technology
Mr. Tu Binh Minh	Hanoi University of Science VNU	Hanoi	National Project Manager
Mr. Tran The Loan	Vietnam Environment Administration (VEA) Pollution Control Dept. (PCD)	Hanoi	Vice Director
Mr. Nguyen Van Thanh	Ministry of Industry and Trade (MOIT) Industrial Safety Techniques and Environment Agency (ISEA)	Hanoi	Vice Director
Mr. Vu Duc Nam	Dioxin laboratory	Hanoi	Engineer Environmental Science & Technology
Mr. Chu Duc Khai	Vietnam Foundry & Metallurgy Science & Technology Association (VFMSTA)	Hanoi	Vice President and General Secretary
Mr. Pham Hong Quan	TISCO - Thai Nguyen Iron and Steel Joint Stock Corporation	Thai Nguyen	Deputy General Director
Mr. Nguyen Bao Quy	TISCO - Thai Nguyen Iron and Steel Joint Stock Corporation	Thai Nguyen	Manager of Technical Safety and Environment Dept.
Mr. Dong Van Curong	TISCO - Thai Nguyen Iron and Steel Joint Stock Corporation	Thai Nguyen	Deputy Chief Technical Safety and Environment Dept.
Mr. Ha	TISCO - Thai Nguyen Iron and Steel Joint Stock Corporation	Thai Nguyen	Officer Technology Dept. Liaison person for the project

Mr. Dao Be	Luu Xa Company, Steel Production	Thai Nguyen	Director
Mr. Tuan	Luu Xa Company, Steel Production	Thai Nguyen	Chief Safety Department
Mr. Nguyen Van Vu	Luu Xa Company, Steel Production	Thai Nguyen	Chief Technical Department
Mr. Nguyen Hung Minh	Dioxin laboratory	Hanoi	Dept. of Environmental Chemistry & Ecotoxicology
Mr. Prof. Tran Van Nhan	Vietnam Cleaner Production Centre	Hanoi	Director of the Centre
Mr. Dinh Manh Thang	Vietnam Cleaner Production Centre	Hanoi	Senior Consultant in Cleaner Production & Energy Efficiency
Mr. Tran Duc Chung	Vietnam Cleaner Production Centre	Hanoi	Consultant in Cleaner Production
Mr. Nguyen Tuan Son	GECCO-Green Environment Production & Trade Services Industrial & Hazardous Waste Treatment	Hai Duong Province	Vice Director
Mr. Dang Van Son	Giay – Bai Bang Vietnam Paper Corporation	Phu Tho Province	Chief Technical Dept. Responsible for Environment Protection
Mr. Mr. Son	Giay – Bai Bang Vietnam Paper Corporation	Phu Tho Province	Chief Waste Water Treatment Plant
Mr. Phan Luong	Giay – Bai Bang Vietnam Paper Corporation	Phu Tho Province	Officer of Technical Dept.
Mr. Trieu Manh Tuong	URENCO- Urban Environment and Industry Limited Company	Nam Son Hanoi	Vice Director
Mr. Pham Truong Giang	URENCO- Urban Environment and Industry Limited Company	Nam Son Hanoi	Deputy Dir. Technologies and Engineering Dept. Design & Manufacturing of equipment for Industrial Incineration Focal Point for Project
Mr. Hung	URENCO- Urban Environment and Industry Limited Company	Nam Son Hanoi	Deputy Director Dept. Waste Collection and Treatment