

Independent Mid-Term Assessment

Environmentally Sustainable Management of Medical Waste - UNIDO project GF/CPR/07/008

People's Republic of CHINA



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO EVALUATION GROUP

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Abbreviations and acronyms

AIDS	Acquired Immune Deficiency Syndrome
APCD	Air pollution control device
APCS	Air pollution control system
BAT	Best available techniques
BEP	Best environmental practices
CAS	Chinese Academy of Sciences
CCCEPI	China Certification Centre of Environmental Protection Industry
CICG	Convention Implementation Coordinating Group
CIO	Convention Implementation Office
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EPB	Environmental Protection Bureau
FECO	Foreign Economic Cooperation Office
GEF	GEF Global Environment Facility
MI	Medical Institution
MOA	Ministry of Agriculture
MOC	Ministry of Construction
MOEF	Ministry of Environment and Forests
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOFCOM	Ministry of Commerce
MOFTEC	Ministry of Foreign Trade and Economic Cooperation
MOH	Ministry of Health
MOST	Ministry of Science and Technology
MW	Medical waste
MWI	Medical waste incinerator
NCG	National Coordination Group
NDRC	National Development and Reform Commission
ng	Nanogram
NGOs	Non-governmental Organizations
NIHA	National Institute for Hospital Administration
NPHMW	National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Wastes
NIP	National Implementation Plan
NSMNI	National Standard for Management on Nosocomial Infection
PCDD/PCDF	Polychlorodibenzo-para-dioxins and Polychlorodibenzofurans
PIR	Project Implementation Review
PMO	Project Management Office
PMT	Project Management Team
POPs	Persistent Organic Pollutants
SARS	Severe Acute Respiratory Syndrome
SCR	Selective Catalytic Reduction
SEPA	State Environmental Protection Administration
SETC	State Economic and Trade Commission
TCG	Technical Coordination Group
TEQ	Toxic Equivalent
TR	Tripartite Review
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Development Organization
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound

Glossary of evaluation related terms

Conclusions	: Conclusions point out the factors of success and failure of the evaluated intervention, with special attention paid to the intended and unintended results and impacts, and more generally to any other strength or weakness. A conclusion draws on data collection and analyses undertaken, through a transparent chain of arguments.
Logframe	: Management tool used to improve the planning and design of interventions, most often at the project level, also in literature referred to as LFA – Logical Framework Approach. It involves identifying strategic elements (inputs, outputs, outcomes, impact) and their causal relationships, indicators, and the assumptions or risks that may influence success and failure. It thus facilitates planning, execution and evaluation of a development intervention. Related term: results-based management (RBM)
Outcome	: The likely or achieved short-term and medium-term effects (including policy and institutional changes) of an intervention's outputs, will materialise after the intervention outputs have been delivered. Related terms: result, outputs, impacts, effect
Outputs	: The products, capital goods and services which result from a development intervention (the deliverables); may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Effectiveness	: The extent to which the development intervention's objectives and deliverables were achieved, or are expected to be achieved, taking into account their relative importance.
Efficiency	: A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results/outputs.
Impacts	: Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
Relevance	: The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donors' policies. Note: Retrospectively, the question of relevance often becomes a

	question as to whether the objectives of an intervention or its design are still appropriate, given changed circumstances.
Indicator	: Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor. Indicators should preferably be measured in quantitative terms, but also qualitative indicators are used.
Institutional development impact	: The extent to which an intervention improves or weakens the ability of a country or region to make more efficient, equitable, and sustainable use of its human, financial, and natural resources, for example through: (a) better definition, stability, transparency, enforceability and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Such impacts can include intended and unintended effects of an action.
Lessons learned	: Generalizations based on evaluation experiences with projects, programs, or policies that abstract from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design, and implementation that affect performance, outcome, and impact.
Recommendations	: Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at the reallocation of resources. Recommendations should be linked to conclusions
Results	: The output, outcome or impact (intended or unintended, positive and/or negative) of a development intervention at various levels and points in time. Related terms: outcome, effect, impacts
Sustainability	: The continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.

I. Executive summary

Overall assessment

In summary, it can be stated that this GEF-funded project is a highly relevant one as it takes into consideration the needs of China for the sound management of its medical wastes. In particular this project, which is in line with the National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Waste (NPHMW) that started in 2003, is implementing the BAT / BEP guidelines as recommended by the Stockholm Convention. Some of the stated objectives in the project document at midterm have not been reached, in particular the BAT level has not been reached yet by the disposal facilities using incineration technology. However, due to the dedication and commitment of the Project Management Team and assistance provided by UNIDO, the project is being satisfactorily implemented, supervised and monitored in the demonstration provinces. Ownership of the project is very high, and China is fully committed to manage its MW, having invested considerably since the start of the project. Given the size of the country and the amount of medical wastes generated, it will be essential that China continues to benefit from the Convention's financial support, and the technology transfer mechanism for full implementation to ensure impact. Finally, this project will provide useful experiences for the GEF, the international agencies and for (especially developing) countries in the sound management of medical wastes using different technologies.

Evaluation background

This evaluation followed the GEF guidelines for independent evaluations of full sized projects and was carried by a team of two evaluators: Mr. Nee Sun Choong Kwet Yive (Team Leader), and Mr. Jianxin ZHU (National evaluation consultant). After a review of project documentation, a two weeks evaluation mission was undertaken to China and several institutions and project demonstration cities were visited (see program of evaluation mission in the annex). UNIDO as well as counterpart staffs were interviewed.

Project summary

Following the outbreak of Severe Acute Respiratory Syndrome (SARS) in June 2003, the Chinese Government moved quickly to establish the National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Waste (NPHMW), in which China was committed to construct 332 dedicated MW disposal facilities across the country. Similar with the practice in many other developing countries, the NPHMW (also called nationwide investment program) envisaged adopting incineration as the technology of choice for most of these facilities. Faced with an urgent public health crisis, the government quickly established emergency incineration facilities to safely dispose of MW. The urgent expansion of the incineration program did not however fully take into account China's obligations under the Stockholm Convention.

The overall objective of this project is to reduce and ultimately eliminate the releases of unintentionally produced POPs and other globally harmful pollutants into the environment, and assist China in implementing its relevant obligations under the Stockholm Convention. The project is to interact with the Nationwide Investment Plan and promote the widespread adoption of best available techniques and best environmental practices (BAT/BEP) in the evolving medical waste management infrastructure and industry in a manner that reduces adverse environmental impacts and protects human health.

According to the Project Document, the expected outcomes were defined as follows:

1. Strengthened regulatory framework for MW management and upgrade or establish performance levels for dedicated MW disposal facilities
2. Strengthened institutional capacity for integrated MW management at national and local levels in support of the Nationwide Investment Plan
3. Demonstrated systems management and the application of BEP
4. Demonstrated BAT for MW disposal using thermal combustion including air pollution monitoring
5. Demonstrated BAT/BEP for MW thermal non-combustion, chemical treatment or other appropriate non-combustion treatments
6. Demonstrated spatially integrated and coordinated MW management and disposal systems in geographically defined clusters that include medical institutions and dedicated treatment and disposal facilities
7. Developed and formulated national strategy and action plan of BAT/BEP for MW management and disposal
8. Project management, monitoring and evaluation

Implementation approach

For implementation of the project, a similar approach as for NIP development was adopted by UNIDO (“mixed mode of execution”): a large subcontract of GEF funds USD 10,088,780 (representing 86.6 % of GEF funds) to the main partner FECO/SEPA for implementation of national activities including recruitment of national experts plus a smaller component (US\$ 1,561,220) directly UNIDO executed for agency fee and recruitment of international experts. This “mixed mode approach” is considered effective and efficient and is contributing to the satisfactory implementation of the project activities in the demonstration cities.

Relevance

The project is highly relevant given the amount of MW produced in China, estimated at 680,000 tons in 2010 that need to be soundly managed in order to minimize risk of exposure of the population and the environment to diseases and pollutants including dioxins. In particular this project is highly relevant with regard to the Stockholm Convention; it is assisting China to meet its obligations in reducing release of dioxin coming from the incineration of MW, which was considered as a NIP priority. The project is also highly relevant with regard to the National Plan for Hazardous and Medical Waste Management Program started in 2003 after the outbreak of SARS.

The relevance of this project is also very high with regard to existing environmental policies in China that are set to prevent and control environmental pollution, and to safeguard public health and environmental safety amongst others. As mentioned earlier, in recent years, the Chinese government has established a relatively complete regulatory framework for the MW management. However, as indicated in the Project Document, a number of gaps / barriers / issues still need to be addressed in particular issues relative to BAT/BEP guidelines, pollution standards, monitoring and enforcement of regulations and policies, and MW management and supervision in medical institutions (MI) across the country. This project is set forth to address such issues. As reported in the minutes of 4th meeting of the Steering Group of the project (Document no 39 of Annex 2), the Director of the FECO made the following statement “*The establishment of relevant policies, regulations and standards system planned to be conducted in the project is in line with relevant planning and major work of our Ministry, so it will be very helpful to advance the establishment of relevant policies and standards and environmental management system of our Ministry.*”

Major changes over project duration

The findings regarding the major changes that have occurred over the project duration at midterm can be discussed at three levels namely at national level, provincial/municipality level and stakeholder level.

Changes at National level

Through the development of this project, which is in line with National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Wastes (NPHMW) started in 2003, awareness at central governmental level has been further raised for the need to properly manage medical wastes in order to minimize the formation and release of dioxins and thus meeting its obligation towards the Stockholm Convention for the management of medical wastes in China. A very important impact of the project is the inclusion of the BAT/BEP guidelines for the management of medical wastes in the 12th Five Year program. High levels of funding are available for implementation not only for the project activities but also for other POPs related projects.

In the context of the project, a national inter-ministerial coordination mechanism for integrated MW management has been established that facilitates communication amongst different stakeholders.

Changes at Provincial and Municipality level

Awareness is also very high at local government level, consequently the BAT / BEP guidelines have also been included the 12th Five year Plan at provincial level. The national project management team (PMT) guided municipalities where the demonstration projects were carried out to set up cross-sectoral administration & guidance task forces for local medical waste disposal to ensure the implementation of the lifecycle approach of medical waste management. In this context, local Project Management Offices (PMOs) have been established in the demonstration provinces and municipalities. Within these PMOs a permanent committee and a MW coordination mechanism has been established involving all major departments (health department, environment department, pricing bureau, etc.).

From interviews carried out during field mission, the local EPB officers of the demonstration provinces and municipalities have indicated that with the implementation of the project, POPs monitoring and enforcement of POPs related policies and regulations are amongst their routine duties as per the “*Evaluation report on the supervision and management to the operation of facilities at medical waste disposal units by environmental protection departments*” (Document No. 43 of Annex 2).

Changes at Stakeholder level including academia and private sector

The National Institute for Hospital Administration (NIHA) is the major stakeholder with regard to implementing guidelines and policies in medical institutions in China. In that respect, a subcontract has been signed between CIO/FECO and NIHA for the implementation of BEP for the management of MW in MIs in China. A permanent state-level MW management Project Expert Panel (PEP) has been established by NIHA within which a Project Executive Office (PEO) has been set up. The members of the PEP and PEO are officers of public MIs. The PEO is responsible for:

- Day to day running of the project
- Organization, coordination and communication of the project activities
- Reporting of progress and report of project

NIHA has indicated during interviews that this project has contributed greatly in building its capacity for MW management. For example, in the context of the project, study tours have been organized in Hong Kong, Macao, UK and Germany to learn from experiences of MIs of these countries on the classification, transportation, storage, supervision, staff training and disposal of medical wastes.

This project has also created opportunities for leading research institutions in collaboration with the private sector to do research and development in key areas like dioxin reduction during incineration processes or non-incineration technology for treatment of medical wastes. For instance, the Department of Material Science & Engineering of Zhejiang University in collaboration with the Chongqing Liyang Mechanical & Electronic Engineering Company Ltd are designing and developing a Selective Catalytic Reduction (SCR) Technology for the dioxins emission destruction from medical wastes incineration disposal facilities to meet the BAT standard (0.1 ng I-TEQ/m³ in flue gases).

Effectiveness

The effectiveness of the project is satisfactory. However, some of the objectives stated in the project document have not yet been achieved at midterm. It should be pointed out however, that activities to meet those objectives are near completion.

As planned in the project document, the appropriate infrastructure has been set up and operational both at central and local level for the implementation of project activities. At central level, a Project Management Team (PMT) has been established and a project manager nominated within CIO and at local level local PMOs have been created within local EPBs.

However, most of the outputs planned to be completed at midterm are still on-going. These delays are partly due to the late start of the project by 5 months because of delays in funds transfer from UNIDO to FECO. Delays were also due to time lost in undertaking a second bidding exercise for selection of demonstration cities.

However despite these delays, the dedication and hard work of the CIO team and implementation structure put in place at central and at local level contributed to an effective implementation of project activities so far. For example, 17 out of the 22 National policies, technical guidelines and standards, and 10 out of the 16 Management measures and booklets planned have been already developed at midterm. Similarly, the MW coordination mechanism has been established and is fully operational. Furthermore, technology demonstration in 6 disposal centers and BEP implementation in most of the 20 selected demonstration MIs are fully activated. Involving key stakeholders like National Institute for Health Administration (NIHA) or local EPBs since the preparatory phase of the project was a very good strategic approach to overcome barriers and for the efficient execution of project activities. The proper monitoring and supervision of implementation of project activities by CIO with the assistance of national experts coming from leading institutions like the Chinese Academy of Sciences also helped in facilitating the operation of the project in the demonstration provinces and municipalities.

Sustainability

Chances for sustainability and sustained impact are very high in China, for the following reasons:

- China has a strong central government that, in the context of NIP development, has confirmed its determination to comprehensively take legal, economic, technical and necessary administrative measures to solve POPs issues including dioxins coming from MW.

- The incorporation of MWM issues in 12th five year plan at central and provincial level that indicate very high ownership.
- This MW project is in line with the National Plan for hazardous and Medical Waste Program started in 2003 for the sound management of medical wastes in China. Through this Program, China is fully committed to soundly manage its MW and has proposed to build 227 MW centralized disposal facilities using incineration technology. Since this project, it has been decided that 120 facilities across the country will be using non-incineration technology instead.
- The project is highly relevant to key stakeholders including private sector and high ownership has been demonstrated. For example this project is highly relevant to NIHA, responsible for hospital administration in China and NIHA is closely involved in project implementation.
- High level of co-funding is available both at central and local governmental level where awareness is very high and funds are made available to promote BAT / BEP for the MWM. Investment in infrastructure for monitoring is also happening (e.g. dioxin laboratory).
- The implementation capacity in terms of human resources (CIO and PMOs), offices and related infrastructure (FECO/SEPA, local EPBs), administrative system (FECO procurement, auditing and financial management systems) and management structure (FECO/SEPA, NCG, PMT, PMOs) already exists and is fully operational.
- CIO, exclusively responsible for implementation of POPs projects including the MW project, is a permanent body within FECO; it comprises 25 full staff members working full time in the implementation of project activities. This kind of infrastructure is rarely seen in any part of the world.
- High technical capacity exists in the country for monitoring, research and development (e.g. leading research institutions equipped with state of the art laboratories).
- The implementation of the project is on-going and is being monitored by the National Coordination Group (NCG) at central level and PMOs at local level with CIO as executing agency. This appears to be an effective monitoring system that significantly increases the likelihood of sustainability and continued impact of the MW project.

Strengths and weaknesses of the project

Strengths	Weaknesses
<ul style="list-style-type: none"> • Strong and committed central government and high ownership at all levels • High level of co-financing from central and local government, and private sector. • Well-designed project in line with the National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Wastes (NPHMW) and taking into consideration the real needs of the country and built along the lines of the Stockholm Convention especially with regard to BAT / BEP • Implementation of project taking advantage of the permanent infrastructure set up since NIP development in 2004 which includes: competent and 	<ul style="list-style-type: none"> • Some outputs at midterm not yet completed • Incineration or pyrolysis of MW not yet BAT level • Delays in disbursement of funds from UNIDO to FECO • Low involvement of UNIDO country office in execution or monitoring of project • No participation of NGOs

<p>adequately staffed national counterpart, CIO / FECO / SEPA). CIO is a division of FECO with 25 dedicated staff members working full time to implement POPs project.</p> <ul style="list-style-type: none"> • Good implementation approach by involving the major stakeholders (e.g. local government, NIHA) • High quality input involving leading international agencies, well qualified and experienced international experts and most prestigious national research institutes 	
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Recommendations

Conclusion/Context	Recommendation	Follow up by
<p>Since the development of the NIP, China is fully committed to implement the Convention and has invested considerably for the management of POPs. To be in line with the Stockholm Convention, China is also fully committed to soundly manage its MW and has invested significantly in the construction of MW disposal facilities in demonstration cities. The MW project is being run in six demonstration provinces and cities with the project funds being used for the upgrading of MW disposal centres. It will be essential that China continues to benefit from the Convention's financial support mechanism to ensure replication and sustainability of the MW project in other provinces.</p>	<ul style="list-style-type: none"> • Effort should be made to mobilize funding from authorities, private sector, international agencies and bilateral donors to ensure replication of BAT / BEP in other provinces. • Outcomes and experiences (lessons learned) should be summarized for replication of the program in other provinces. • Sustained effort for promotion of MW projects in other provinces should be encouraged at central and provincial level 	<p>GEF, UNIDO, CIO/FECO, other GEF agencies.</p> <p>CIO, PMOs, NIHA</p> <p>CIO/FECO, PMOs, EPBs</p>
<p>During recent years UNIDO has built up a significant POPs portfolio in the country. However, so far there is no involvement of UNIDO regional office in project implementation or monitoring. Only a temporary UNIDO officer (an intern: collaboration with Australian Government) was involved in helping to edit / correct draft reports.</p>	<p>UNIDO should increase efficiency of its supervisory and management functions either by installing relevant capacity (e.g. a technically specialized staff) at the regional office in Beijing or by delegating some activities to the regional office in Beijing.</p>	<p>UNIDO</p>
<p>The whole project is about the sound life cycle management of medical wastes from generation, segregation and interim storage in MIs, through collection and disposal at the MW disposal centres.</p>	<p>Project management should ensure that implementation and enforcement of BEP / BAT regulations, policies, standards and guidelines developed in the context of the project as well as their proper monitoring is being done adequately in provinces and municipalities where the project is</p>	<p>CIO, PMOs, NIHA, EPBs</p>

	being run.	
For replication purposes in other regions, in the ToRs of the subcontracts signed between CIO / FECO and the demonstration MW disposal centres, it is stated that the centres should help CIO/FECO in the replication of the project in other provinces by providing guidance and assistance where necessary.	CIO/FECO and PMOs should ensure that each participating demonstration centre that has developed a given technology for disposal of MW in the context of the project should strictly do as stated in the respective ToRs of the subcontract signed for successful replication in other provinces and municipalities.	CIO / FECO, PMOs, local EPBs
A number of outputs that should have been completed at midterm. But due to various reasons, like delay in funds transfer, the activities of these outputs are still on-going.	The PMT, CIO and UNIDO should closely monitor those activities and provide guidance if needed until completion.	CIO, UNIDO, PMT
The whole project is about reducing release of dioxins coming from the incineration of wastes in China by using BAT technologies. However, the MW disposal centres operating on incineration technology are not at BAT standard (0.1 ng I-TEQ/m ³ for flue gases) but at 0.5 ng I-TEQ/m ³ . To reach BAT standard, a SCR technology is being developed in collaboration between the Zhejiang University and Chongqing Liyang Mechanical & Electronic Engineering Company and that will be used to upgrade the APCS of the centres using incineration facility.	CIO / PMT should explicitly monitor the progress of the research activities on SCR and ensure that BAT standard is reached.	CIO, UNIDO, PMT and PMOs
The output “ <i>Demonstrate the application of BAT/BEP for treatment and disposal of MW in remote rural areas</i> ” activities have not yet started. The reason for this situation is that the PMT indicated that they will first learn from the six demonstration projects (see Table 1) and analyze the existing situation of medical waste disposal facilities of remote areas; then they will develop the ToRs for this output. As the six demonstration projects have suffered delays and are not completed, this is the reason why the activities for this output have not yet started.	It is recommended that as soon as possible / feasible even if the demonstration subprojects are not completed, the PMT should take actions for the output relative to remote rural areas to start. For example as the selection process is quite lengthy, the PMT should as soon as possible start procedures for the bidding exercise to select the demonstration remote rural area.	PMT, CIO, UNIDO
A subcontract (US\$ 1,600,000) was signed between NIHA and CIO/FECO for the implementation of BEP in 20 demonstration medical institutions. The evaluation team was able to visit two of these hospitals (Xiaogan	<ul style="list-style-type: none"> It is recommended that follow up actions are taken to ensure that subcontracts are signed and that activities start the earliest possible to avoid or minimize delays for 	CIO, PMT, PMOs

Central Hospital and Jiangxi Children's Hospital) where adequate waste systems were put in place to separate infectious from other wastes. However, according to feedback obtained from NIHA, a number of subcontracts have not yet been signed with some of the selected MIs. Moreover improvement on these segregation systems could be made by looking into cleaner production (CP) initiatives.	the completion of the project. For the minimization of wastes, it is recommended to explore possible CP initiatives for medical waste management and disposal.	CIO, PMT, NIHA
The implementation of the MW project is ongoing and is being monitored by the National Coordination Group (NCG) with CIO coordinating all activities. This appears to be an effective monitoring system that significantly increases the likelihood of sustainability and impact of the project.	The national monitoring system should be replicated at the provincial level to ensure sustainability across the country.	CIO, PMOs
In all demonstration cities, for the sustainability of MW disposal centres and as planned in the PD (in line with "the polluter pays" philosophy), a fee, whose amount is decided by the pricing committee set up within the PMOs, is to be paid by MIs to the disposal centres for treatment of their wastes. However, according to feedback received during interviews undertaken during field mission, a number of MIs is not paying the full amount due to the disposal centres.	An adequate monitoring mechanism needs to be set up to ensure that a fair and transparent business collaboration occur amongst the different stakeholders.	CIO, PMOs, NIHA, EPBs
In the documents submitted by CIO to the evaluation team, there was no evidence of any NGO participating in this project.	CIO and PMOs should consider the participation of NGOs in the project.	CIO, PMOs

Lessons learned

Conclusion/Context	Lessons Learned
Since the development of the NIP, China is fully committed to implement the Convention and has invested considerably for the management of POPs. In that respect, ownership of the MW project is very high as it deals with the reduction of dioxins from the medical sector. High ownership is also seen given the inclusion of Convention Implementation for better management of POPs, in particular medical waste, in the 12th five year plan at central and provincial level. Moreover the project is highly relevant given the amount of MW produced in China, estimated at 680,000 tons in 2010 and that need to be soundly managed in order to minimize risk of exposure of the population and the environment to diseases and pollutants including dioxins. The project is in line with the National Plan for Hazardous and Medical Waste Management Program started in 2003 after the outbreak of SARS in which China is fully committed to build centralized disposal facilities for the sound management of	Country drivenness and strong government are key factors for successful project implementation

<p>MW.</p> <p><i>The Convention Implementation Coordination Group (CICG)</i>, first established by China in 2003, is providing guidance and coordination for POPs management activities and Convention implementation. The CICG consists of the major 11 agencies including State Environmental Protection Administration (SEPA), National Development and Reform Commission (NDRC), Ministry of Foreign Affairs (MOFA), Ministry of Finance (MOF), Ministry of Public Health (MOH) and others</p> <p><i>The Convention Implementation Office (CIO)</i> is part of SEPA and is responsible for coordinating the day-to-day management of the Stockholm Convention implementation that includes the MW project in China.</p> <p><i>National, Provincial and Municipal Steering Groups:</i> The project has established a national steering group by drawing upon resources from related ministries for the oversight of the project.</p> <p><i>National Project Management Team (NPMT)</i> is composed of staff from SEPA, MOH, NDRC, MOC and other relevant agencies. SEPA has designated a coordinator/team leader.</p> <p><i>Three Municipal Project Management Offices (PMOs)</i> have been established in the cities where demonstration projects are being run.</p>	<p>A comprehensive and strategic management mechanism and adequate involvement of a wide range of stakeholders (NIHA, national experts, high level research and academic entities, local authorities and private partners) in all important events, including preparatory phase, inception, awareness campaign, training sessions, consultation meetings at both central and regional level are the basis to achieve effective implementation of project activities.</p> <p>Clearly defined and agreed roles of ministries and other stakeholders at both central and local level helps the process of collaboration and ensures good coordination for implementation of project activities.</p>
<p>For implementation of the project, a similar approach as for NIP development was adopted by UNIDO: a large subcontract of GEF funds USD 10,088,780 (representing 86.6 % of GEF funds) to the main partner FECO/SEPA for implementation of national activities including recruitment of national experts plus a smaller component (US\$ 1,561,220) directly UNIDO executed for agency fee and recruitment of international experts.</p>	<p>The mixed form of agency execution and national execution (through sub-contracts to counterparts) is a very efficient implementation modality when the national capacities are sufficient (substantive competence, procurement, financial management, auditing) and support from central and local government is strong and high level of co-funding is available.</p>
<p>This MW project, which is being implemented in cities of China having different level of socio-economic development e.g. cities with different population size, or found in remote areas or having different level economic development, is promoting BEP for the management of wastes in MIs and BAT operating both on incineration and non-incineration technologies for the sound disposal of MW.</p>	<p>The MW project will provide useful experiences for the GEF, the international agencies and developing countries for the sound management of medical wastes especially with regard to non-incineration technologies.</p>

II. Evaluation Background

II.1 Information on the evaluation

This midterm assessment is carried out in compliance to GEF and UNIDO evaluation policies in order to promote accountability for the achievement of the project objectives through the assessment of results, effectiveness, processes and performance of stakeholders involved during project implementation. This midterm evaluation also serves as a basis for adaptive management. It will give guidance to project management for better implementation of activities for the remaining duration of the project till completion so as to achieve all the objectives of the project.

The evaluation was undertaken from January – March 2011 by a team consisting of Dr. Nee Sun CHOONG KWET YIVE (International consultant, team leader) and Dr. Jianxin ZHU (National evaluation consultant).

II.2 Scope and objectives of the evaluation

The evaluation followed the GEF review criteria¹ and assessed the project with emphasis on those components for which GEF funds were required. More specifically, the main objectives of this evaluation, as reported in the Terms of Reference (annex 1), 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 GEF Project Review Criteria:

- Implementation approach
- Country ownership/Driveness
- Stakeholder participation
- Sustainability
- Replication approach
- Financial planning
- Cost-effectiveness
- Monitoring and evaluation

(b) Enhance project relevance, effectiveness, efficiency and sustainability by proposing a set of recommendations with a view to ongoing and future activities.

(c) Draw lessons of wider applicability for the replication of the experience gained in this project in other projects/countries.

¹ GEF guidelines for Implementing Agencies to Conduct Terminal Evaluations, May 2003

The key issue of the evaluation is whether the project has made significant impact on the management of medical wastes in China to effectively reduce release of dioxins during disposal of these wastes.

II.3 Information sources and availability of information

In general, the availability of information for evaluation purposes was satisfactory. The project document was made available by UNIDO. The specific documentation such as progress reports, consultants' reports, reports of contracted activities, minutes of meetings, reports of workshops, and demonstration projects were made available to the evaluation team by CIO / FECO. A substantial list of reports is given in annex 2. On request by the team during the field mission in China (13 January 2011 – 28 January 2011), CIO provided further documentation on the financial status of the project. An updated list of reports was also provided by CIO to the team during this field mission. Other information like the amount of GEF funds contracted to MEP/FECO by UNIDO was provided by CIO following email request by the evaluation team.

II.4 Methodological remarks, limitations encountered and validity of the findings

As stated in the TORs (Annex 1) the team analyzed the substantial documentation submitted by UNIDO and CIO/FECO. However, information that is posted on the China POPs website regarding medical wastes management exists only in Chinese version, no English version is available to date.

The interviews of Dr. Zhengyou PENG, the Project Manager and Dr. Mohamed EISA, Chief UNIDO POPs unit, were carried out at UNIDO Headquarters, Vienna on 12 January 2011.

During the field mission undertaken in China from 13 January – 28 January 2011, the evaluation team met with MEP/CIO/FECO, the National Institute for Health Administration (NIHA), representatives of local Environmental Protection Bureaus (EPB) of demonstration cities / provinces, representatives of demonstration medical institutions and representatives of demonstration treatment facilities. An agenda of the field mission as well as a list of persons interviewed during this field mission is given as Annex 3. A presentation on the preliminary findings of the midterm assessment exercise was made to CIO/FECO on 26 January 2011. The preliminary findings were also presented to the UNIDO Project Management and UNIDO evaluation unit (Vienna) on 17 February 2011 by video conference using the Skype internet facility. The presentations provided opportunities for receiving feedback on the preliminary findings of the assessment that have been considered and are reflected, where appropriate, in this report.

Additional information on specific questions for example further details the financial status of the project was also requested and obtained from CIO/FECO through frequent email communications.

III. Country and project context

III.1 Project summary

Following the outbreak of Severe Acute Respiratory Syndrome (SARS) in June 2003, the Chinese Government moved quickly to establish the National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Waste (NPHMW), in which China was committed to construct 332 dedicated MW disposal facilities across the country. Similar with the practice in many other developing countries, the NPHMW (also called nationwide investment program) envisaged adopting incineration as the technology of choice for most of these facilities. Faced with an urgent public health crisis, the government quickly established emergency incineration facilities to safely dispose of MW. The urgent expansion of the incineration program did not however fully take into account China's obligations under the Stockholm Convention.

The Stockholm Convention entered into force on 11 November 2004 for China. Article 5 of the Convention requires the Parties to take measures to reduce or, where feasible, eliminate releases of PCDD/PCDF and other unintentionally produced Persistent Organic Pollutants (UPOPs). Waste incinerators, including co-incinerators of municipal, hazardous or MW or of sewage sludge are on the foremost top of the list. In the National Implementation Plan (NIP) of China for the implementation of the Stockholm Convention on POPs, MW incineration is listed as a key PCDD/PCDF release source and, pursuant to the "Action Plan for Reduction and Elimination of PCDD/PCDF Releases"; priority should be given to the application of best available techniques and best environmental practices (BAT/BEP).

The overall objective of this project is to reduce and ultimately eliminate the releases of unintentionally produced POPs and other globally harmful pollutants into the environment, and assist China in implementing its relevant obligations under the Stockholm Convention. The project is to interact with the Nationwide Investment Plan and promote the widespread adoption of best available techniques and best environmental practices (BAT/BEP) in the evolving medical waste management infrastructure and industry in a manner that reduces adverse environmental impacts and protects human health. According to the Project Document, the expected outcomes were defined as follows:

- Strengthened regulatory framework for MW management and upgrade or establish performance levels for dedicated MW disposal facilities
- Strengthened institutional capacity for integrated MW management at national and local levels in support of the Nationwide Investment Plan
- Demonstrated systems management and the application of BEP
- Demonstrated BAT for MW disposal using thermal combustion including air pollution monitoring
- Demonstrated BAT/BEP for MW thermal non-combustion, chemical treatment or other appropriate non-combustion treatments
- Demonstrated spatially integrated and coordinated MW management and disposal systems in geographically defined clusters that include medical institutions and dedicated treatment and disposal facilities

- Developed and formulated national strategy and action plan of BAT/BEP for MW management and disposal
- Project management, monitoring and evaluation

Implementation arrangements

UNIDO is the GEF *Implementing Agency (IA)* for the project. A project focal point was established within UNIDO to assist with project execution. This focal point consists of dedicated core staff, supplemented by support from professional and support staff colleagues on a part-time as needed basis, including in particular senior staff engaged in the management and coordination of UNIDO's POPs program. In that respect, a UNIDO Project Manager assisted FECO/SEPA to coordinate the component work packages and to facilitate the international guidance provided by international experts.

For implementation, this MW project is benefiting from the whole existing infrastructure that was established in 2003 for NIP development and that is being used for implementation of POPs projects including this MW project and other GEF funded projects like the on-going project "*Strengthening institutions, regulations and enforcement (SIRE) capacities for effective and efficient implementation of the national implementation plan (NIP) in China*".

The infrastructure includes:

- *The Convention Implementation Coordination Group (CICG)*, first established by China in 2003, is providing (i) review of significant policies related to POPs management and control, (ii) guidance and coordination for POPs management activities and Convention implementation. The CICG consists of the following 11 agencies: State Environmental Protection Administration (SEPA), National Development and Reform Commission (NDRC), Ministry of Foreign Affairs (MOFA), Ministry of Finance (MOF), which is the GEF Focal Point in China, Ministry of Commerce (MOC), Ministry of Science and Technology (MOST), Ministry of Agriculture (MOA), Ministry of Public Health (MOH), Ministry of Construction (MOC), General Administration of Customs (GAC) and the State Electricity Regulatory Commission (SERC).
- *The Convention Implementation Office (CIO)* is part of SEPA and is responsible for coordinating the day-to-day management of the Stockholm Convention implementation in China. The CIO provides guidance to ensure the successful implementation of the project, including regular monitoring and enforcement inspections. As the CIO is not an independent legal entity, *Foreign Economic Cooperation Office (FECO)* is the national executing agency (NEA) and is representing SEPA and the CIO in the management and completion of contracts for project implementation.

For this project and as planned in the PD the following have been established:

- *National, Provincial and Municipal Steering Groups*: The project has established a national steering group by drawing upon resources from related ministries or commissions in charge of development and reform, environment, health, construction, and pricing to provide the project team with political guidance and inter-ministerial coordination support. To facilitate the extensive demonstration and replication activities at provincial and municipal levels, the National Steering

Group has encouraged and assisted provincial and municipal governments in the establishment and operation of their own corresponding steering groups.

- *National Project Management Team (NPMT)* is composed of staff from SEPA, MOH, NDRC, MOC and other relevant agencies. SEPA has designated a coordinator/team leader. The Project Management Team is responsible for the day-to-day management and execution of the project, and oversees local project management offices.
- *Three provincial Local Project Management Offices (PMOs)* has been established in the 6 provinces where demonstration of coordinated planning that will spatially cluster incineration and non-incineration facilities. To achieve optimal socio-economic and environmental benefits, implementation of an effective medical waste transfer system in a geographically defined regional context is being undertaken in these provinces.
- *Six municipal PMOs* have been established in the 6 municipalities where there are extensive demonstrations of BAT/BEP for integrated medical management that cluster the medical institutions and medical waste treatment or disposal facilities.

Budget Information

Overall Cost and Financing (including co-financing):

Summary of Financing for Full Project	Amount (US\$)
GEF	
Project	11,650,000
Sub-Total	11,650,000
Co-financing	
Government of China	15,000,000
SEPA (In kind)	3,800,000
MOF (Cash)	4,500,000
MOH	
Government of USA (In kind and cash)	120,000
Private enterprises (In kind)	9,557,140
UNIDO	100,000
Sub-Total	33,077,140
FULL PROJECT COST	44,727,140

Source: project document

III.2 Brief description including history and previous cooperation

Consistent with the worldwide trends in healthcare delivery, China has moved in the 1980s from a system, which did not readily dispose of clinical equipment and materials, to a system that relies much more on single-use and disposal. This change has resulted in significantly more volumes of MW being generated in the country today. The nature and characteristic of the MW has also changed significantly with plastics and polymers contributing large fraction to the overall mixture.

Improved management, particularly in the field of infection control, did not match changes in the healthcare delivery system in the field of modern materials and equipment. The absence of effective infection control measures created an environment where the risks of cross infection and hospital acquired infections was increased. This increased risk was in turn met by an even greater reliance on single use disposable clinical equipment and materials resulting in even more MW being generated. This, coupled with the socio-economic indicators of economic development including increased life expectancy and care of the aged, creates increased demand for healthcare services leading to a continuous upward trend in the volumes of MW being generated for the foreseeable future.

Surveys and inventories carried out during the preparatory phase of the project revealed that the net amount of MW, excluding domestic waste produced in healthcare settings nationwide in 2006, was approximately 670,000 tons, with a daily average output of 1,780 tons. It is estimated that the annual generation of MW in China will be up to 680,000 tons by 2010.

Historically in China, before 2003, most of the MW was disposed of in a decentralized way within MIs by simple incineration, causing severe secondary pollution and creating a serious risk to public health. For example, medical waste incinerators (MWIs) namely, a 5-tonne/day incinerator located in Beijing Chest Hospital and a 4-tonne/day incinerator located in Benxi Municipal Waste Treatment Plant, Benxi City, Liaoning Province were first installed in China in 1990. Over the ensuing 10 years (up to 2000), 17 MW incineration facilities were constructed across the country.

China's standardized management of MW began just after the SARS outbreak. With the priority given by the Government to this issue, the management of MW within MIs has gained rapid progress. This has laid a favourable foundation not only for effective infection control but also for the future safe environmental management of MW including the implementation of international environmental protection conventions.

In 2003, when the NPHMW, shortly nationwide investment program, was approved and implemented, the centralized disposal of MW in dedicated facilities was introduced. The national survey on hazardous waste and MW disposal facilities conducted by SEPA in 2005-2006 found that there are 149 dedicated MW treatment facilities, including 43 facilities built in response to SARS. There are still 263 simple MWIs in commission at MIs, which should be demolished according to the current laws and regulations.

The existing 149 dedicated MW treatment facilities (85 in the East, 33 in the Centre and 31 in the Western regions of China) have a total disposal capacity of 1,327 tons per day. The eastern region has the highest capacity of MW treatment in the country (775 tons per day or 336,000 tons per year) accounting for 58% of the national capacity. The treatment capacity of the Central and the Western regions is 318 ton/day and 233 ton/day, accounting for 24% and 18% of the national treatment respectively.

Incineration including pyrolysis is the most widely used technology in the existing MW disposal facilities. Among the 149 dedicated disposal facilities, one facility is using the autoclaving technique, another facility applying microwaving imported from Canada and USA and all the others applies incineration or pyrolysis. Among the 149 incineration facilities, there are 10 rotary kiln incineration facilities with a relatively larger capacity generally ranging from 10 to 30 ton/day; the rest deploy pyrolysis furnaces, which have relatively smaller capacity than the rotary kilns. It should be noted that 70 incinerators have not installed even the basic APCD and the majority of the remainder incineration facilities have limited devices to control the PCDD/PCDF emissions.

Most of the incineration facilities have unmeasured emission levels of PCDD/PCDF-like compounds. The estimation of annual air emissions of PCDD/PCDF from MWIs is quite dependent on extrapolations, engineering judgment and the use of assumptions. In addition, the information about the activity levels of these facilities is also quite limited.

In the development of the NIP, PCDD/PCDF releases from the incineration of MW in China were estimated based on the Standardized Toolkit for Identification and Quantification of PCDD/PCDF Releases under the assumption that all the MW incinerators are equipped with air pollution control devices. The result showed that in 2004 the total amount of PCDD/PCDF releases from MW incinerators in China reached 427.4g TEQ, accounting for 8.47% of the total releases to air from all sources listed in the Toolkit.

III.3 Project specific framework conditions; situation of the country; major changes over project duration

III.3.1 Project specific framework conditions; situation of the country

Since the late 1980s, a series of laws, regulations and standards have been promulgated in succession by the Congress, the State Council, relevant ministries and local governments for the MW management in China. For example, the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution Caused by Solid Wastes promulgated in 1995 together with infection control and health and safety regulations specifically include Prevention and Treatment of Infectious Diseases Act (1989) and related provisions on the treatment of articles, sewage, feculence and excreta arising in healthcare delivery.

A series of regulations have been promulgated to address the proposed disposal of single use clinical materials and equipment requiring a combination of sterilization and destruction beyond possible reuse and recognition prior to disposal as non-hazardous waste in regulated landfills. Control and accountability measures are also stipulated by the regulations. For instance, the Technical Standard for Sterilization was promulgated in 2002. It classifies medical waste in eight categories (general domestic waste, infectious

waste, sharps, pathological waste, cytotoxic waste, chemical waste and radioactive waste) and provides specific minimum treatment requirements on disinfections or treatment for each category of medical waste. The standard sets a foundation for the appropriate operation of all treatment technologies including the levels of thermal exposure necessary to safely sterilize potentially infectious waste. The technical standard is particularly applicable to the selection and operation of non-incineration technologies including autoclave, microwave and chemical treatment technologies.

While the regulatory framework, supported with guidance and standards, for the management of MW is being improved in China, their enforcement is proving to be difficult. Supervision and inspection on the implementation of the regulations and standards in the past years found that (i) hospitals still could not cover all aspects of MW management; (ii) incinerators in most hospitals had difficulty meeting the prescribed air pollution emission limits, and (iii) pursuant to the “*polluter pays principle*” the capacity of the hospitals and other medical institutions to address the complete spectrum of MW management is challenged with the issues of capacity, equipment, competence, awareness and funding.

An outcome of the response to the outbreak of SARS in the spring of 2003 was a coordinated approach to the management of MW. This approach dictated the abandonment of outdated incinerators in hospitals in favour of dedicated centralized MW treatment facilities that would be operated under strict management parameters and consistent with the best international practice. The response led to the formulation of the NPHMW jointly by the National Development and Reform Commission (NDRC) and State Environmental Protection Administration (SEPA), which require the construction of 332 dedicated disposal facilities nationwide.

Besides the above laws and regulations for infection control and environmental protection associated with MW management and disposal, with the transition of China’s economy from a planned to a more market led model, China has in recent years promulgated a series of laws, regulations and policies to provide a legal support framework to facilitate investment in the environmental protection sector and market led commercialization of appropriate segments of the waste sector including MW management. For example, in December 2002, the Ministry of Construction (MOC) specifies that the administrative departments in charge of the municipal public sector should (i) further transform the system of governmental management from direct management to macro-management; and (ii) encourage other public and private funding and foreign capital to invest in the construction of municipal public facilities to form a diversified investment pattern and consequently promote the market based operation of the municipal public sector. Furthermore, the Regulations on Management of Health Care Waste promulgated by the State Council in June 2003 specifies that dedicated MW disposal units may charge healthcare establishments for the recovery of the cost of MW disposal. This lays a legal foundation for market-based operation of the management and disposal of MW. The Notice Concerning the Implementation of Fee-charging System to Promote Industrialization of Hazardous Waste Disposal released in November 2003 jointly by the NDRC, SEPA, Ministries of Health, Finance and Construction, requires that regional and local governments should be separated from enterprise management in hazardous waste disposal. A competition mechanism for the construction and operation of disposal facilities for hazardous wastes (including MW) should be introduced. Finally, the NPHMW approved in December 2003 by the State Council requires that non-

governmental funds should be actively encouraged to invest in the construction of hazardous and MW disposal facilities together with the governmental investment and the facilities should be operated by enterprises in a professional and efficient way.

MW management in China involves a wide range of government functional departments of comprehensive planning, financing, health, environment, safety, transportation and construction under the existing regulatory framework. There are organizations with administrative functions of supervision and administration entrusted by the government such as the National Development and Reform Commission (NDRC), Ministry of Finance (MOF), Ministry of Science and Technology (MOST), General Administration of Quality Supervision (AQSIQ), State Environmental Protection Administration (SEPA), Ministry of Health (MOH), Research Institute of Hospital Management (RIHM), Local Environmental Protection Bureaus (LEPB), Local health bureaus at county level and above, Pricing Bureaus and other government functional departments including the monitoring stations, industrial associations and training centres in both health and environment sectors. In general, all the aforementioned institutions have important and indispensable roles to play in realizing the life-cycle management of MW. In reality, their capacities for MW management are generally low and are at an early stage of development due to the very short time since China has formally begun to regulate MW management. There is also a great disparity of capacity among different institutions therefore top priority should be given to institutional strengthening.

There is great disparity of economic development and allocation of medical resources among and within the Eastern, Central and Western regions of China. This has caused significant regional differences in the type and quantity of MW. Due to lack of data and absence of relevant surveys and statistics, it is difficult to make a precise estimation on the quantities of MW being produced at present in China. Surveys carried out during the preparatory phase indicated that the MW generated per bed per day in China is 0.37kg in 2005, very close to figures reported by the WHO for China. The Eastern part of China has the highest level of approximately 0.50kg, while the Centre has a moderate level of 0.3kg and the West with the lowest of 0.29kg, indicating the relationship with the economic development level of the regions. China Health Statistical Yearbook 2006 shows that in 2005, the total number of hospital beds in the Eastern, Central and Western regions were 1,452,325; 1,033,700 and 881,477; and the outpatients 767,560,868; 328,481,304; and 300,591,229, respectively. Based on the generation factors determined above, it is estimated that the total production of MW nationwide in 2005 was approximately 540,000 tons, of which 55.4%, 25.5% and 19.1% were produced in the Eastern, Central and Western regions respectively. In 2006, the nationwide MW production totalled to 570,000 tons.

Before June 2003 in China, most of the MW was disposed of in a decentralized way within MIs by simple incineration, causing severe secondary pollution and creating a serious risk to public health. China's standardized management of MW began just after the SARS outbreak. With the priority given by the Government to this issue, the management of MW within MIs has gained rapid progress. This has laid a favourable foundation not only for effective infection control but also for the future safe environmental management of MW including the implementation of international environmental protection conventions Pursuant to the Regulations on MW Management; most MIs have established a MW management system to deal with matters relating to

hospital MW management. Duties of departments involved in the MW management are defined in the management system. For example, the department of general affairs and logistics is responsible for the collection, transfer and temporary storage of health care wastes. Healthcare doctors and nurses classify MW and the department of infection control is responsible for supervision, inspection and feedback on the treatment of MW. Emergency response plans in case of leakage of healthcare have also been established.

MW producing units classify MW pursuant to relevant laws and regulations of the state, and have MW collected, registered and temporarily stored by their logistics departments, and then handed over to MW centralized disposal units for off-site disposal or directly disposed of by the producing units themselves in a sound and safe manner. MW that is consigned to centralized disposal facilities generally includes infectious waste, unidentifiable pathological waste, sharps, etc. Identifiable body parts, organs and other pathological waste are generally transported to funeral parlours for incineration disposal. Pharmaceutical wastes, radioactive wastes and mercury-containing wastes are directly treated by waste producing units and are generally not handed over to centralized disposal centres for disposal.

Health administrative departments of various levels and professional societies have trained MW related staff in MIs on relevant knowledge and skills. Training materials in the forms of course materials, pamphlets, posters and CDs have been prepared and disseminated effectively. For example, the Tianjin Municipal Environmental Protection Bureau in cooperation with Tianjin Municipal Health Bureau produced CDs on Tianjin Children's Hospital MW management and distributed them to each MI in the municipality for publicity and training.

As can be seen, during the last decades China has established a relatively complete regulatory framework for the MW management. MW management systems have also been developed and implemented in MIs. However, for China to meet its obligations towards the Stockholm Convention POPs, the following gaps / barriers / issues, as listed in the Project Document, need to be addressed:

- a) Tradition in hospitals of direct disposal of medical waste without treatment or with poorly designed treatment processes.
- b) Development of China's Nationwide Investment Plan for new medical waste treatment facilities without regard to BAT/BEP, minimized PCCD/F emission or consideration of non-combustion technologies.
- c) Existing laws and regulations are too general and may be impractical in some cases and lack of detailed rules to support their implementation.
- d) The standards for the control of pollution from incineration are too low and the standards for the control of pollution from non-incineration treatment are still under development.
- e) Lack of inter-ministerial mechanisms to provide coordination and guidance upon cross-sectoral policy and implementation issues.
- f) Stakeholder conflict of interests.
- g) Weak institutional capacities for supervision and inspection of medical institutions and dedicated disposal facilities in the areas of pollution monitoring, environmental impact assessment and operational risk assessment.
- h) Lack of BAT/BEP demonstration for the lifecycle management of MW including:
 - BEP in medical care institutions
 - BAT/BEP for incineration process of MW

- BAT/BEP for pyrolysis process of MW
 - BAT/BEP for autoclaving process of MW
 - BAT/BEP for other technically available non-incineration processes of MW
 - Treatment and disposal of MW in remote rural areas
 - Integrated MW management among institutions
 - Regionally coordinated MW treatment in cluster among the dedicated MW facilities.
- i) Lack of techno-economic policies and incentives promoting adoption of BAT/BEP.
 - j) Lack of certification and labelling program to provide open, reliable and comparable information on technical and environmental performances of MW treatment equipment for the disposal facility owners.
 - k) Lack of commercially available options for diversified investment and professional operation in MW treatment and disposal facilities.
 - l) Lack of effective personnel training systems to provide qualified human resources for BAT/BEP based lifecycle management of MW.
 - m) Lack of stakeholder awareness.
 - n) Lack of effective mechanism to promote research, development and application of technically feasible and locally affordable processes, techniques and equipment.

III.3.2 Major changes over project duration

The findings regarding the major changes that have occurred over the project duration at midterm can be discussed at three levels namely at national level, provincial/municipality level and stakeholder level.

Changes at National level

Through the development of this project, which is in line with National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Wastes (NPHMW) started in 2003, awareness at central governmental level has been further raised for the need to properly manage medical wastes in order to minimize the formation and release of dioxins and thus meeting its obligation towards the Stockholm Convention for the management of medical wastes in China. A very important impact of the project is the inclusion of the BAT/BEP guidelines for the management of medical wastes in the 12th Five Year program. High levels of funding are available for implementation not only for the project activities but also for other POPs related projects. For instance, the central government has invested substantially in central treatment medical wastes facilities in demonstration cities. For example, it has invested 5.85 million yuans for the construction of the central medical waste treatment facility of Xioagan. The central government has also invested significantly in the construction of state of the art laboratories (e.g. in Nanchang and Ningbo). These laboratories are responsible for the monitoring dioxins in flue gases coming from incineration medical wastes and also for the monitoring other POPs coming from other sources.

In the context of the project, a national inter-ministerial coordination mechanism for integrated MW management has been established that facilitate communication amongst different stakeholders. According to final reports of the 1st and 2nd Tripartite Meetings (Document No. 42, Annex 2) guidance meetings have been held across the Ministry of Environmental Protection of the PRC to communicate and coordinate on issues like the

design of the state-funded medical waste disposal program, the selection of demonstration municipalities and local demonstration sites. Numerous meetings were held to have a direct communication with local governments, environmental protection bureaus and health bureaus for building and implementing a medical waste disposal and coordination mechanism. Technical seminars were held to improve the communication among medical waste disposal technology providers, disposal facilities, local environmental supervision and administration departments and local health administrations, thus advancing the establishment and implementation of local medical waste disposal coordination mechanisms.

Feedback gathered from CIO during the field mission indicated that with this mechanism there is better cooperation between different ministries/departments for the management of wastes in the health sector. The response of these different ministries/departments and other stakeholders are much more rapid. For example this has facilitated the setting up of waste stream management system and a systematic medical waste management system involving all major stakeholders like Ministry of Health and its department the National Institute for Hospital Administration (NIHA), which is responsible to implement guidelines and policies in medical institutions (MIs) in China. This trans-department/ministries mechanism has also greatly helped in the development of policies and guidelines as response was quicker from the different stakeholders, who participated actively in the development of these policies and guidelines by providing readily feedback, input and information to the project. At midterm a total of 22 national policy, technical guidelines & standard and 16 management measures and booklets have been developed including BAT and BEP guidelines and related policies as planned in the PD. A list of submitted reports at midterm is given in Annex 2.

Changes at Provincial and Municipality level

In the context of this project, subcontracts have been signed between CIO and the demonstration provinces (Jilin, Jiangxi, Henan, Hubei, Hunan and Gansu provinces) and demonstration municipalities (Xioagan, Nanchang, Xinxiang, Yiyang, Pingling, Chanchun, etc.). Given the awareness that has been raised at local government level, the BAT / BEP guidelines have also been included the 12th Five year Plan at provincial level. High levels of funding are also available at provincial level for medical wastes management. For example, a total of 26 million yuans was invested for the construction of the Nanchang medical waste disposal centre that uses the incineration technology. Local government of Guangzhou has invested in the construction of a state of the art laboratory located at the premises of Guangzhou EPB. Amongst its activities, this laboratory is responsible to monitor the level of dioxin in flues of medical waste incineration.

The national project management team (PMT) guided municipalities where the demonstration projects were be carried out to set up cross-sectoral administration & guidance task forces for local medical waste disposal to ensure the implementation of the lifecycle management of medical waste management. In this context, local Project Management Offices (PMOs) have been established in the demonstration provinces and municipalities. Within these PMOs a permanent committee and a MW coordination mechanism has been established involving all major departments (health department, environment department, pricing bureau, etc.). For instance, these committees have worked out and put in place a system for the sound and safe collection and transportation

of medical wastes from the MIs to the centralized treatment facilities to be disposed of. Similarly, these committees were responsible to determine the fee that each MI should pay to the centralized MW disposal Center for the treatment of their wastes such that the centralized center is economically sustainable on the long term. However, according to feedback gathered during interviews, not all MIs were paying the full amount to the MW disposal centres. CIO and PMOs should put in place a proper monitoring mechanism to ensure that a fair and transparent business collaboration occur amongst the different stakeholders. The committees also decided on the bed fee (minimal and low e.g. 2 yuans per night in Xiaogan municipality), which did not exist before the project, and that the MIs would request from each patient for MW management.

From interviews carried out during field mission, the local EPB officers of the demonstration provinces and municipalities have indicated that with the implementation of the project, POPs monitoring and enforcement of POPs related policies and regulations are amongst their routine duties as per the *“Evaluation report on the supervision and management to the operation of facilities at medical waste disposal units by environmental protection departments”* (Document No. 43 of Annex 2).

In all the demonstration municipalities, prior to the project, most of MIs were incinerating their MW in small incinerators and thus producing significant amount of dioxins. With the project, the medical wastes of all medical institutions in the demonstration cities are currently being treated at the centralized medical waste treatment centre.

Changes at Stakeholder level including academia and private sector

NIHA is the major stakeholder with regard to implementing guidelines and policies in medical institutions in China. In that respect, a subcontract has been signed between CIO/FECO and NIHA for the implementation of BEP for the management of MW in MIs in China. In that context, a permanent state-level MW management Project Expert Panel (PEP) has been established by NIHA within which a Project Executive Office (PEO) has been set up. Note that the members of the PEP and PEO are officers of public MIs. The PEO is responsible for:

- Day to day running of the project
- Organization, coordination and communication of the project activities
- Reporting of progress and report of project

NIHA has indicated during interviews that this project has contributed greatly in building its capacity for MW management. For example, in the context of the project, study tours have been organized in Hong Kong, Macao, UK and Germany to learn from experiences of MIs of these countries on the classification, transportation, storage, supervision, staff training and disposal of medical wastes. Prior to the project, there existed a catalogue for the classification of medical wastes developed in the context of NPHMW. However, this classification was still confusing according to medical staff interviewed at the Xiaogan Central Hospital and the Jiangxi Children’s Hospital. In the context of the project, this catalogue was reviewed and updated by incorporation of BEP guidelines and information gathered during study tours. And this new updated version is much more comprehensive according to staff interviewed. However, they feel that they still need further training for better management and segregation of MW.

During the field visit at Xiaogan Central Hospital and the Jiangxi Children's Hospital, the evaluation team could inspect the good segregation systems put in place in these hospitals to separate wastes to be treated at the centralized disposal centre from the other wastes that are normally disposed along with municipal solid wastes. The staff of these MIs indicated their change in attitude regarding MW management and that they are much better aware about the needs to properly manage, segregate and minimize the volume of waste to be disposed of in order to reduce costs. The staff of these hospitals also indicated that the project has further enhanced their capacity to manage MW by applying BEP guidelines.

During site visits at the centralized disposal centres at Xiaogan using autoclave technology and Nanchang using incineration, the evaluation team could see that the staff was well trained and that they were also fully aware of the need to properly dispose of the medical wastes. Although the incineration facility at Nanchang is not yet running under BAT condition, the release of dioxin reduction was significantly reduced, by more than 99% reduction as compared to what was being released when the medical wastes of Nanchang city were being destroyed in small incinerators. With the upgrading of the Air Pollution Control System (APCS) of the centres using incineration technology (including the Nanchang disposal center) with a Selective Catalytic Reduction (SCR) Technology being developed by Zhejiang University and Chongqing Liyang Company (see next paragraph), it is anticipated that the BAT emission level of 0.1 ngTEQ/m³ will be reached. Table 1 gives also information about the plan of retrofitting in order to upgrade the disposal facilities participating using the project funds.

This project has also created opportunities for leading research institutions in collaboration with the private sector to do research and development in key areas like dioxin reduction during incineration processes or non-incineration technology for treatment of medical wastes.

For instance, the Department of Material Science & Engineering of Zhejiang University in collaboration with the Chongqing Liyang Mechanical & Electronic Engineering Company Ltd are designing and developing a Selective Catalytic Reduction (SCR) Technology for the dioxins emission destruction from medical wastes incineration disposal facilities to meet the BAT standard (0.1 ng I-TEQ/m³ in flue gases). The incineration disposal facilities participating in this project will be equipped by these SCRs developed locally. It should be pointed out here that this technology (SCR) already exists in developed countries however due to its very high price and high operating costs, most MW using incineration technology and other waste facilities like municipal waste operators find it prohibitive to import such technology (See reports 49 and 50 of Annex 2). It should also be noted that SCR technology represents a huge market in China given the high number of incinerators (medical waste, municipal waste and others) in operation in the country. For example, 147 medical wastes incinerators were in operation in 2007 and all of them do not meet the BAT standard.

III.4 Positioning of the UNIDO project

China, the most populated country, is faced with a difficult challenge to soundly manage its medical wastes (680,000 tons by 2010) in order to reduce / eliminate release of dioxins. According to a dioxin inventory carried out in 2004 for NIP development, the incineration of medical waste was responsible for the release of 427.4g TEQ, accounting for 8.47% of the total releases to air from all sources listed in the Toolkit.

In this context, this UNIDO project is playing an important role in helping China meet its obligation towards the Stockholm Convention with respect to the management of MW. With the running of the project in the demonstration provinces and municipalities and in line with NPHMW, this project is laying down the foundation for the sound management of medical wastes across the country. Indeed, with the development and enforcement of regulation with regard to BAT requirement, the upgrading of disposal facilities to BAT standard and implementation of BEP in MIs, it is anticipated that China will be fully compliant with the recommendations of the Stockholm Convention in regard to medical waste management. Moreover, the capacities of all the stakeholders involved in MW management will have been further enhanced and the appropriate infrastructure and inter-ministerial mechanism put in place for MW management with CIO serving as facilitating body.

The private sector and the central and local governments have financed the construction of the MW centralized disposal centres in demonstration provinces / cities. The GEF funds, US\$ 2,276,000 representing 19.5% of GEF funds (see Table 1) will be used to upgrade these facilities and another significant amount (US\$ 1,600,000, 13.7 % of GEF funds) has been subcontracted to NIHA for medical waste management in public MIs. GEF funds have also been used for the training of MIs staff and organization of workshops and awareness campaigns. Table 1 also gives information about the technology used in each treatment center of the demonstration cities and the amount of waste treated annually.

Table 1: Information on MW disposal center of the demonstration cities

Demonstration sites	Technology	Plan to retrofit	Estimated Budget (USD)	Tons of wastes treated per year
Changchun MW disposal center	Rotary kiln	Bag filter and APCS	667,600	7300t/year (20 t/day)
Yiyang MW disposal center	By-batch pyrolysis	Bag filter and SCR tower;	307,600	1825 t / y (5 t/day)
		Auto control system	90,210	
Nanchang MW disposal center	Continuous pyrolysis	Bag filter and SCR tower;	259,000	5475 t/y (15 t/day)
		Boiler and bed activated carbon tower	163,630	
Xiaogan MW disposal center	Autoclave	Auto loading & auto control system;	276,860	1825 t/y (5 t/day)
		compressing equipment;	58,000	
		waste gas treatment equipment;	51,000	
		MW tracking system	53,900	
Pingliang MW disposal center	Microwave disinfection	shredding system;	144,000	1095 t/y (3t/day)
		MW tracking and monitoring system;	63,000	
		waste gas treatment equipment	23,500	
Xinxiang MW disposal center	Chemical disinfection	Auto loading system and slag-out twist;	26,800	2920 t/y (8t/day)
		auto washing system;	47,300	
		MW tracking system	43,600	
Total			2,276,000	

III.5 Counterpart organization and changes in the situation of the country

MW management in China involves a wide range of government ministries, departments and commissions both at central and at local level. These include National Development and Reform Commission (NDRC), Ministry of Finance (MOF), Ministry of Science and Technology (MOST), General Administration of Quality Supervision (AQSIQ), State Environmental Protection Administration (SEPA), Ministry of Health (MOH), Research Institute of Hospital Management (RIHM), Local Environmental Protection Bureaus (LEPB), Local health bureaus and Pricing Bureaus. In general, all the aforementioned institutions have important and indispensable roles to play in realizing the life-cycle management of MW. In reality, their capacities for MW management are generally low and are at an early stage of development due to the very short time since China has formally begun to regulate MW management.

With the project development, the responsibilities of the different stakeholders have been clearly defined and their capacities strengthened. As mentioned earlier, these stakeholders participated actively in the different stages of the project both at central level and at local level by providing feedback, input and information whenever needed for the development of policy papers or guidelines. For example the pollution control standard for incineration of MW is under solicitation stage and submitted to different institutions / ministries and other stakeholders awaiting for their comments and feedback.

- **Specially established convention implementation institutions for POPs projects**

In 2004, the NIP Leading Group, named National Coordination Group for Convention Implementation (NCG), led by SEPA and involving 11 commissions and departments was established. As the national coordination mechanism of the Chinese government for implementation of the Stockholm Convention, it is responsible for reviewing and implementing national guidelines and policies on POPs management and control, and coordinating important issues related to POPs management and convention implementation. The same year, SEPA established the Office of the National Coordination Group named Convention Implementation Office (CIO). This is office under the National Coordination Group for Convention Implementation it is acting as the focal point for China's implementation of the Stockholm Convention. It is responsible for the establishment and improvement of convention implementation management information mechanisms, as well as organization, coordination and management of POPs project. It is within this infrastructure set up in 2004 for NIP development that this MW project is being implemented by CIO, which is Division V of FECO and employing 25 permanent staff members.

- **Local implementation capacity**

Local implementation capacity has been established gradually. As planned in the Project Document, local Project Management Offices (PMOs) have been established in the demonstration municipalities. Within these PMOs, permanent committees have been set up and MW coordination mechanisms have been established involving all major local departments (health department, environment department, pricing bureau, etc.) for the long term MW management in these demonstration municipalities. The evaluation team was able to interact with those of the Xiaogan and Nanchang municipalities during the field mission. From the interviews, it can be concluded that these PMOs involving the major local stakeholders like local EPB, local pricing bureau or local health departments are fully operational and very efficient in the implementation and monitoring of project activities. For example, as planned in the PD, for the sustainability of the MW disposal centres these PMOs decided on the fee that each MI should pay for treatment of MW and also on bed fee to be paid by outgoing patients.

IV. Assessment

IV.1 Implementation approach

IV.1.1 Implementation

For implementation of the project, a similar approach as for NIP development was adopted by UNIDO: a large subcontract of GEF funds USD 10,088,780 (representing 86.6 % of GEF funds) to the main partner FECO/SEPA for implementation of national activities including recruitment of national experts plus a smaller component (US\$ 1,561,220) directly UNIDO executed for agency fee and recruitment of international experts. In this respect, a subcontract was signed between UNIDO and FECO/SEPA and the terms of reference of the subcontract contained all the activities to implement the MW project in demonstration provinces and cities as described in the project document. Since the large subcontract was given to the national project counterpart, this part of the project can be regarded as nationally executed. As UNIDO is executing the international component of the project, this approach can be qualified as a “mixed mode of execution”.

As mentioned earlier, the project is benefitting from the infrastructure (CICG and CIO) put in place in 2003 for NIP development. The implementation followed the approach originally agreed upon by stakeholders and as planned in PD. A national project management team (PMT) coming from the Convention Implementation Office (CIO), a division of FECO, has been established from which a national coordinator has been nominated. The different committees and groups (e.g. TCG, MEP Steering Group) at national and local level have been established for the proper implementation, supervision and monitoring of project activities. For implementation of project activities at local level, sub-contracts were signed with the selected cities and with the help of PMT, the appropriate infrastructure like local Project Management Offices were established in these demonstration cities as discussed in earlier sections (sections III.3.2 and III.5).

IV.1.2 Supervision, monitoring and evaluation

During interviews, CIO indicated that the logical framework provided in the PD was used for the implementation of project activities. CIO with the assistance of FECO financial and procurement division applied existing FECO procedures for sub-contracting activities, for procurement or for the management of project funds. For example for the sub-contracting of any activity, a bidding exercise was always carried out in order to identify the best sub-contractor. Or, progress reports were always requested before disbursements of funds. As per FECO rules, the accounts of the projects were annually audited. Audits were carried out for 2008 and 2009 (Document No. 60, Annex 2).

The monitoring and supervision of the project so far has been adequate. Planned steering committee meetings according to the PD have been organized (Document No. 39 of Annex 2). Tripartite annual review meetings were held to discuss the Project

Implementation Review (PIR) (Document No. 42 of Annex 2) and complete audits of the project for the years 2008 and 2009 were undertaken by a private accounting firm (Document No. 60 in Annex 2). The evaluation team did not note any inconsistent or unusual remarks in these audit reports. The planned midterm assessment is being undertaken to evaluate the progress of the project.

The guidance from the UNIDO Project Manager (PM) (Vienna headquarters) was mainly on technical issues and on procurement procedures. According to feedback gathered during field mission, the assistance of the UNIDO PM was considered very valuable. The UNIDO PM being a Chinese national greatly facilitated communication with NPT. The UNIDO PM undertakes 2 missions yearly to CIO to monitor and evaluate the progress of the project. CIO indicated that they frequently communicated with the UNIDO PM either through telephone or through emails for guidance or advice. However, during field mission it was found that the involvement of the UNIDO Regional Office in the project was very low. Only a temporary UNIDO officer (an intern: collaboration with Australian Government) was involved in helping to edit draft reports, but was not involved in supervision or monitoring of project activities.

IV.1.3 Quality of inputs

National experts of different panels or recruited for the project (e.g. for incineration and non-incineration technologies) came from leading academic institutions (e.g. Tsinghua University, or institutions of the Chinese Academy of sciences). Note that Tsinghua University is one of the most prestigious university in China. Feedback obtained during interviews indicates that the guidance and input of these national experts were very crucial in the development and implementation of activities like assisting in construction of disposal facilities or development of ToRs for these disposal facilities. For example, Tsinghua University organized the stakeholder awareness raising activities; the Institute of High Energy Physics (IHEP) / Chinese Academy of Sciences developed the Standards and Specifications for non-incineration technologies for medical waste disposal.

The evaluators were impressed with the state-of-the-art instrumentation e.g. HRGC/HRMS or GC/MS/MS or HRLC/HRMS found in the modern dioxin laboratories (Tsinghua University and Guanzhou EPB) that they visited during the field mission. These laboratories, which carry out monitoring activities at medical waste incinerators, participated successfully in an inter-calibration exercise in which more than 40 dioxin international laboratories participated.

IV.1.4 Stakeholder involvement

Overall the participation of stakeholders in the project has been satisfactory both at central and at provincial level. As seen earlier, the major ministries, departments or offices are members of the different steering committees (see section III.1). For example, the Ministries of Health and Finance are represented in the steering committee at central level whereas the department of health and the pricing bureau form part of the PMOs at local level. In the context of the project, a trans-department mechanism has been established to

facilitate communication amongst the major stakeholders. In particular, as indicated by CIO through this mechanism information required to develop policies, guidelines or standards was obtained much easier from the different stakeholders.

The inception workshop of this project, organized over two days (19 – 20 March 2008), was attended by 155 participants including representatives of GEF, UNIDO, UNIDO regional Office, all major ministries, local EPBs, private sector, academia, research institutes and the written media (Document 40, Annex 2). As can be seen in the documents submitted by CIO for this midterm assessment, participation of the stakeholders to national and local steering committees was always very satisfactory; no absentee was noted in all the meetings (Documents No. 8 and 39, Annex 2). Whenever required, experts or consultants recruited in the context of the project activities also participated in these meetings to provide clarification / explanation on technical issues to steering committee members. For example, the Institute of High Energy Physics, Chinese Academy of Sciences was very often co-opted in these steering committees to provide explanation on non-incineration technology issues (document No.8, Annex 2).

So far, the private sector has been involved in the construction and operation of MW disposal centres or in technology development. For example, the Xioagan Company has invested 4.1 million yuans for the construction of the Xiaogan MW disposal centre operating on autoclaving, whereas the Chongqing Liyang Company Ltd is trying to develop a low cost SCR technology for the abatement of dioxins in flue gases.

The involvement of the public has been essentially through awareness initiatives / activities. For example, more than 8000 persons visited the website of the project. The general public can also visit a permanent exhibition on whole lifecycle management of MW created by CIO and held at the premises of CIO/FECO.

In the documents submitted by CIO to the evaluation team, there was no evidence of any NGO participating in this project. No evidence was also obtained during interviews. It is therefore recommended that project management should consider taking actions to involve NGOs in the activities of project for example in awareness campaigns.

IV.1.5 Replication Approach

For the BAT/BEP demonstration subprojects, subcontracts have been signed between FECO and the 6 demonstration MW disposal facilities running on six different treatment technologies (see Table 1). In each of the terms of reference (ToRs) of the six subcontracts (Documents No. 13, 16, 17, 22, 25 and 26 of Annex 2) it is clearly stated that the demonstration MW disposal facility will assist CIO/FECO for replication in other provinces.

The texts relative for replication strategy in other cities / provinces as stated in the ToRs of each of the subcontracts are given below:

- For the subprojects on the technologies: **Rotary Kiln Incineration; Pyrolytic Incineration By-batch** and **Pyrolytic Continuous Incineration**, the text taken from the ToRs reads as follows:
 - *“According to the project construction and operation experience, propose suggestions on BAT/BEP management and disposal mode for rotary kiln or pyrolytic incineration technology with a continuous or batch feeding system appropriate to real conditions of China.”*
 - *“Assist the FECO's expert in carrying out the preparation of standards and technical specifications such as BAT/BEP guidelines for rotary kiln incineration with a continuous feeding system, coordinate with relevant testing and verification work, and assist in relevant research and development activities for the medical waste project.”*
 - *“Propose the replication suggestions and act as BAT/BEP demonstration base, cooperate with the FECO to carry out BAT/BEP construction and management experience summary and replication work, and coordinate with experience exchange, study and discussion on mode, and personnel training, etc.”*

- For the subproject on the **Autoclaving** technology, the text taken from the ToRs reads as follows:
 - *“Put forward suggestions on preparation of medical waste BAT/BEP guidelines, assist the experts of the Center in developing BAT/BEP technical guidelines on medical waste autoclaving, cooperate to carry out relative verification tasks, and put forward suggestions on achievement replication.”*
 - *“As a demonstration base adopting BAT/BEP to treat medical wastes, we should cooperate with the Convention Implementation Office to replicate the experiences and technology of BAT/BEP, and cooperate to carry out the experience exchange, study and discussion on mode, personnel training, etc.”*

- For the subprojects on the technologies **Microwaving Disinfection** and **Chemical Disinfection**, the text taken from the ToRs reads as follows:
 - *“Assist in preparation and technical replication and application of BAT/BEP guideline”*
 - *“Assist the FECO experts in preparing BAT/BEP technical guideline for chemical disinfection or microwave disinfection of medical wastes,”*
 - *Assist the FECO in carrying out the implementation of BAT/BEP related test and verification work, and propose opinions and suggestions on the achievements replication”*
 - *“Support the BAT/BEP replication and application, and as BAT/BEP demonstration base for disposal of medical wastes, propose the replication opinions and suggestions, cooperate with the FECO to carry out the replication work of BAT/BEP construction experience and technology, and*

coordinate with experience exchange, study and discussion on mode, personnel training”

Given that the BAT / BEP guidelines for MW management are included in the 12th Five Year Plan at central level, all the provinces in China must also adopt those guidelines in their local 12th Five year Plan. Therefore all new MW disposal facilities across China must operate at BAT/ BEP standard whatever the technology they are running on and older non-BAT/BEP ones are planned to be phased out. Consequently according to CIO, all newly built treatment centres must operate under BAT/BEP conditions. This context is favoring replication of demonstration subprojects and there are indications that this is happening. Indeed, during the field mission in the context of this midterm assessment, staff of the Nanchang MW disposal centre informed the evaluation team that representatives of a neighboring province came to learn from the Nanchang experience as they were in the process of construction a similar MW disposal centre. It can be anticipated that replication of this project in other provinces across China is very likely to happen if the demonstration subprojects prove to be successful.

IV.1.6 Cost-effectiveness and incremental cost analysis

The effectiveness of the project is discussed in details later in this report (see section IV.3). The project has been very effective in leveraging co-funding during the preparatory phase. Of the total project funds (US\$ 44,727,140), GEF funds (US\$ 11,650,000) represent 26% of the total and the rest 74% (US\$ 33,077,140) come from co-funding sources with China participating at the level of 54.3% (US\$ 24,300,000) and the private sector at 21.4% (US\$ 9,557,140), and the remaining funds coming from USA (0.3%) and UNIDO (0.2%).

To date, the six demonstration MW disposal facilities are not operating under BAT /BEP conditions. It is planned in the project to upgrade these facilities to the BAT/BEP level. As can be seen on Table 1, US\$ 2,276,000 of GEF funds (representing 19.5% of total GEF funds) will be used to purchase the appropriate piece of equipment to retrofit each of these facilities to upgrade them to BAT/BEP level.

The impact of these upgrading will correspond to a significant reduction of dioxin release as seen in Table 2 that gives the different scenario before and after upgrading with BAT / BEP equipment. As can be seen from Table 2, with the upgrading of disposal centres using incineration / pyrolysis, a reduction of 8.27 µg TEQ / year is expected if the BAT level is reached. As for disposal centres running on non-incineration technologies (chemical treatment, microwave and autoclave), a 100% dioxin reduction corresponding to 4.2 µg TEQ / year is already seen before upgrading as no incineration is done; the upgrading will done to improve the loading or other system of the disposal facility (see Table 1).

Another significant amount (US\$ 1,600,000, 13.7 % of GEF funds) has been subcontracted to NIHA for the sound medical waste management in public MIs. In particular best environmental practices as recommended in the guidelines of the convention are being implemented in these demonstration MIs. GEF funds have also been used for the training of MIs staff and organization of workshops and awareness campaigns.

Table 2: Reduction in dioxin release and incremental cost analysis

Technology of MW disposal centre	Incineration/pyrolysis	Non-incineration
Tons of wastes treated yearly	14,600	5,870
Reduction of dioxin before upgrading of centre ($\mu\text{g TEQ / year}$)	0	4.2
Project funds of GEF funds used to upgrade disposal centre (US\$)	1,488,040	787,960
Reduction of dioxin after upgrading of disposal centre ($\mu\text{g TEQ / year}$)	8.27	4.2
Incremental cost analysis (US\$ / g dioxin)	179,932	N/A

IV.2 Project relevance and ownership

IV.2.1 Country drivenness / ownership

Since the development of the NIP, China is fully committed to implement the Convention and has invested considerably for the management of POPs. In that respect, ownership of the project is very high as it deals with the reduction of dioxins from the medical sector. High ownership is also seen given the inclusion of Convention Implementation for better management of POPs, in particular medical waste, in the 12th five year plan at central and provincial level. A very high ownership has also been observed during the field mission at the level of CIO / FECO / SEPA, responsible for project management at country level. During the interviews, the evaluation team could clearly see the dedication and commitment of the CIO officers involved in the management of the project. There are also indications that ownership is also high at local level where the local EPB officers indicated that enforcement of regulation and policies for MW form part of their routine duties. The commitment of other stakeholders like NIHA and other institutions including research bodies and universities in the project development and implementation was also noted. NIHA, for example, indicated that this project, which is complementary to the National Plan for Hazardous and Medical Waste Management Program started in 2003 after the outbreak of SARS, has provided them in opportunities for further enhancing their capacity in the management of MW. For example, the study tours undertaken gave them an opportunity to learn from the experiences of MIs of other countries already implementing MW segregation.

IV.2.2 Relevance to the country

The project is highly relevant given the amount of MW produced in China, estimated at 680,000 tons in 2010, and that need to be soundly managed in order to minimize risk of exposure of the population and the environment to diseases and pollutants including dioxins. In particular this project is highly relevant with regard to the Stockholm Convention; it is assisting China to meet its obligations in reducing release of dioxin coming from the incineration of MW, which was considered as a NIP priority. The project is also highly relevant with regard to National Plan for Hazardous and Medical Waste Management Program started in 2003 after the outbreak of SARS.

The relevance of this project is also very high with regard to existing environmental policies in China that are set to prevent and control environmental pollution, and to safeguard public health and environmental safety amongst others. As mentioned earlier, in recent years, the Chinese government has established a relatively complete regulatory framework for the MW management. However, as indicated in the Project Document, a number gaps / barriers / issues still need to be addressed in particular issues relative to BAT/BEP guidelines, pollution standards, monitoring and enforcement of regulations and policies, and MW management and supervision in MIs across the country. This project is set forth to address such issues. As reported in the minutes of meeting of 4th Session of the Steering Group of the project (Document no 39 of Annex 2), the Director of the FECO made the following statement *“The establishment of relevant policies, regulations and standards system planned to be conducted in the project is in line with relevant planning and major work of our Ministry, so it will be very helpful to advance the establishment of relevant policies and standards and environmental management system of our Ministry.”*

The demonstration subprojects (field visit at autoclaving treatment facility in Xiaogan and incineration facility at Nanchang centralized medical waste incineration center) are highly relevant given the very high volume of medical wastes produced in China. The promotion of different treatment technologies (incineration and non-incineration) is also highly relevant given the differences in the socio-economic realities of the regions e.g. cities with different population size or remote areas. And as it is planned in the project, in municipalities producing less than 15 tons of MW daily the non-incineration technology will be favored and for those producing more than 15 tons, the incineration technology will be used for the treatment of the MW.

IV.2.3 Relevance with regard to target groups

This project is of direct relevance to groups involved in the generation and management of medical wastes, which include staff of MIs, staff of centralized MW disposal facilities, and the general public. These groups are potentially at risk through direct exposure to these infectious wastes. In particular, the employees of disposal facilities using the incineration technology are potentially at risks not only to the infectious wastes they are handling but also to dioxins that are formed during incineration. The population living near medical wastes incinerators are also potentially at risk if these facilities are not employing BAT equipment especially the appropriate Air Pollution Control Systems (APCS) for the control of flue gases.

The different medical institutions and disposal centres visited during the field mission confirmed the relevance of this project to strengthen their capacity. For example, the staff of Xiaogan Central Hospital and Jiangxi Children’s Hospital indicated that participation to study tours in foreign countries (Macao, Taiwan, UK, Germany, etc.) was a very valuable experience and helped to improve their capacity in waste management especially in regard to waste segregation. The staff of the Xiaogan Disposal Center using non-incineration technology (autoclaving) pointed out that the construction of the facility was done on solid scientific basis through the technical assistance the Institute of High Energy Physics, Chinese Academy of Sciences whose services were sub-contracted for this project.

Similarly, the project is highly relevant to research communities and private sector as the management of MW constitute may constitute a major market niche for some high tech devices like the SCR technology for example. For instance, the Zhejiang University in collaboration with the Chongqing Liyang Mechanical & Electronic Engineering Company is undertaking research to develop a low cost SCR technology for a potential market of more than 200 facilities including medical and municipal wastes facilities operating on the incineration technology. The SCR technology has already been developed in OECD countries; however it is too expensive for the local operators.

However, continued relevance will depend on enforcement of corresponding policies and legal framework for BAT/BEP at all levels (central and provincial). In that respect, it is important that implementation and enforcement of policies related to BAT / BEP should be explicitly monitored by CIO and local agencies.

IV.2.4 Relevance to the GEF and UNIDO

This project is highly relevant to the GEF Focal area *Chemicals Strategy* of which the “Phase out POPs and reduce POPs releases” is the objective number 1. This objective responds to the GEF’s mandate as the financial mechanism of the Stockholm Convention. As stated in the minutes of meeting of third Meeting for the Fifth Replenishment of the GEF Trust Fund²: Building on GEF-4 programs, the GEF will further its efforts to assist eligible countries in implementing POPs reduction projects in accordance with their NIP priorities, and will build upon and strengthen sustainable capacities for chemicals management to do so.

As mentioned in the Project Document³, UNIDO is fully committed to assist 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, including China and India that have opted to undertake the NIP development through the GEF full project cycle. In addition, UNIDO is executing or developing a range of demonstration and 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.

IV.3 Effectiveness: attainment of objectives and planned results

As planned in the PD and mentioned in earlier sections, the appropriate infrastructure has been set up and operational both at central and local level for the implementation of project activities. At central level, a Project Management Team (PMT) has been established and a project manager nominated within CIO and at local level local PMOs

² Third Meeting for the Fifth Replenishment of the GEF Trust Fund, October 14-15, 2009, Paris, France

³ Project Document, Environmentally Sustainable Management of Medical Wastes in China, **GEFSEC Project ID: 2927**, page 36

have been created within local EPBs. The effectiveness of the project is satisfactory. However, some of the objectives stated in the project document have not yet been achieved at midterm. It should be pointed out however, that activities to meet those objectives are near completion.

Although all of project activities planned for the first half of the project (as per PD) have been initiated, the project has suffered some delays. According to the timeline of activities given in Project Document, activities of a number of outputs should have started in the first half of the project. Table 3 reports on the status of activities for these outputs. Some remarks are also reported to highlight some important points. Note that the outputs with an asterisk in Table 3 mean that this output should have been completed at mid-term. As can be seen (Table 3), most of the outputs planned to be completed at midterm are still ongoing. These delays are partly due to the late start of the project which was supposed to start in October 2007 but it effectively started in March 2008 because of delay in funds transfer from UNIDO to FECO. In the selection of cities for the chemical and autoclave demonstration projects, the PMT had to do a second bidding exercise as during the first bidding exercise only one candidate city applied. Eventually Pingliang and Xinxiang were selected as demonstration cities during the second bidding exercise. This delayed the start of these demonstration projects by about three months. As for the output “*Demonstrate the application of BAT/BEP for treatment and disposal of MW in remote rural areas*” activities have not yet started. The reason for this situation is that the PMT indicated that they will first learn from the six demonstration projects (see Table 1) and analyze the existing situation of medical waste disposal facilities of remote areas then they will develop the ToRs for this output. As the six demonstration projects have suffered delays and are not completed, this is the reason why the activities for this output have not yet started. It is recommended that as soon as possible / feasible even if the demonstration projects are not completed, the PMT should take actions for this output relative to remote rural areas to start. As the selection process is quite lengthy, the PMT should as soon as possible start the procedures for the bidding exercise for the selection of the demonstration remote rural area.

A subcontract for the sum of US\$ 1,600,000 was signed between NIHA and CIO/FECO for the implementation BEP in 20 demonstration medical institutions (MIs). The evaluation team was able to visit two of these MIs (Xiaogan Central Hospital and Jiangxi Children’s Hospital) where adequate waste systems were put in place to separate infectious from other wastes. However, according to feedback obtained from NIHA, a number of subcontracts have not yet been signed with some of the selected MIs. It is recommended to take actions and follow up to ensure that these subcontracts are signed and that activities start the earliest possible to avoid or minimize delays in the completion of the project. Moreover improvement on these segregation systems could be made by looking further into cleaner production (CP) initiatives and that could be implemented in these MIs.

However despite these delays, the dedication and hard work of the CIO team and implementation structure put in place at central and at local level helped to a very

effective implementation of project activities so far. For example, 17 out of the 22 National policies, technical guidelines and standard, and 10 out of the 16 Management measures and booklets planned in PD have already developed at midterm. Similarly, the MW coordination mechanism has been established and fully operational. And as planned in the PD, technology demonstration in 6 disposal centers (Table1) and BEP implementation in most of the 20 selected demonstration MIs are fully activated. Involving key stakeholders like National Institute for Health Administration (NIHA) or local EPBs since the preparatory phase of the project was a very good strategic approach to overcome barriers and for the good execution of project activities. The proper monitoring and supervision of implementation of project activities by CIO with the assistance of national experts coming from leading institutions like the Chinese Academy of Sciences also helped in facilitating the running of the project in the demonstration provinces and municipalities.

As mentioned earlier, all the persons interviewed including staff of medical institutions at Xiaogan Central Hospital or the Jiangxi Children's Hospital and the staff of the MW disposal Centers at Xiaogan and Nanchang indicated that the training and assistance (from national experts) that they received in the context of the project definitely helped to further enhance their capacity for the management of MW. The medical staff involved in the direct handling of the medical wastes also indicated that their attitude has changed and that they constantly try to look for ways and means to improve on the existing system. For instance, at the Jiangxi Children's Hospital for better control they have implemented a logbook system where they note all the daily use of consumables to be disposed of at the treatment centre.

The high level of local in cash and in kind contribution is also contributing to achieve the implementation of BAT / BEP in the demonstration cities. For example, a total of 26 million yuans was invested for the construction of the Nanchang medical waste disposal centre that uses the incineration technology. During the field visit, the evaluation team was found that this facility was not operating under BAT condition. Indeed, the BAT level of 0.1 ng TEQ/m³ of dioxin release in flue gases has not yet been reached; the level is still at 0.5 ng TEQ/m³. However, the facility operators are confident that this limit will be reached when the air pollution control system of their facility will be upgraded by addition of an SCR using active carbon, which is being developed by Zhejiang University in collaboration with the Chongqing Liyang Mechanical & Electronic Engineering Company Ltd. This SCR will be purchased with the project funds. Follow up is required by CIO, PMO and local EPB to ensure that BAT standard has been reached when upgrading of the centralized facilities with the SCR is done.

At midterm a number of activities have been undertaken to raise awareness amongst the major stakeholders and the general public. A report for these activities has been submitted (Document No. 38 of Annex 2). For example, posters highlighting the potential hazards of medical wastes, as well as the necessity and importance of scientific management and targeting the medical staff and the patients were produced and disseminated in medical institutions across the country. A blog on the China POPs Website (<http://www.china->

pops.net/popsbbs/home.asp?userid=234) that gives all information on medical wastes management in China and also information about the project exists and is continuously being updated. However, this blog exists only in Chinese version. If this website could exist also in English version, information found there in could be useful to other countries especially developing countries with medical wastes management problems. According to CIO, to date the blog has been visited by more than 8000 persons.

Some activities of the project benefitted from media coverage. For example, as mentioned in section IV.1 (Stakeholder involvement), the inception workshop was attended by representatives of general media (China Daily, People daily and Xin Hua News Agency) and specialized media (Health News, Economic daily, China Environment News and Science & Technology daily) (Document No. 40, Annex 2). Subsequently information regarding the MW project was reported in publications of these media.

During the field mission, the evaluation team could visit a permanent exhibition on medical wastes management organized by CIO at the FECO premises. This exhibition constituted by miniatures with detailed explanations show the whole life cycle of medical wastes from generation to disposal including transportation and possible heat recovery. Different technologies available for disposal of MW were also on exhibition. During our visit, a group of students of the Peking University accompanied by their teacher was also visiting the exhibition, which was being explained to them by a CIO staff.

A short film produced by UNIDO on medical waste management life cycle management from collection in hospital (filmed at Xioagan Central Hospital), through transport (filmed in Xioagan City) to disposal (filmed at Xiaogan MW disposal Center using autoclave) was shown at the Shanghai Universal Exhibition in 2010. The film that exists in both Chinese and English version was seen by the evaluation team during the field visit at Xiaogan. Copies of this short film are available at CIO.

Table 3: Status of activities of project outputs at mid-term.

Planned activities for each output as per PD	Status	Remarks
1.1* Strengthen the regulatory framework for MW management	Ongoing	17 out of the 22 National policy, technical guidelines and standard and 10 out of the 16 Management measures and booklets planned in PD have already developed so far. E.g. <i>Technical Specification of Performance Testing for Facilities of Medical Wastes HJ561-2010</i> . But, promulgation of regulations for MWI still not done to BAT level or guidelines for waste MWM still under revision and not yet promulgated.
1.2 Upgrade or establish performance levels for dedicated MW disposal facilities	Ongoing	Pollution control for incineration of MW: under solicitation stage. As such the standard for flue gases in MWI is still at 0.5 ngTEQ/m ³ and not at 0.1 ngTEQ/m ³ as per BAT. Pollution control for non-incineration treatment of

		MW: draft stage
2.1 Establish a long-term national coordination mechanism for integrated MW management	Completed	Coordination mechanism both at national and local levels established: steering committees and PMOs established
2.2 Strengthen supervision and inspection on medical care institutions on MW management	Ongoing	Mechanism in place. FECO, NIHA and local EPBs / PMOs are responsible for monitoring and supervision.
2.3 Strengthen the monitoring and supervision capacity on MW treatment and disposal	Ongoing	Reports submitted
2.4 Strengthen the EIA on disposal facilities	Ongoing	EIA guidelines for MW being revised. BAT/BEP being considered
2.5 Strengthen the capacity to audit the operation of disposal facilities	Ongoing	Demonstration incineration disposal facility not yet BAT standard.
3.1 Demonstrate BEP in medical care institutions for the management of MW	Ongoing	Selection criteria established MIs already selected. Agreement with some selected MIs not yet signed to implement BEP for MWM. Inception workshop not yet held.
4.1* Demonstrate the application of BAT for incineration of MW	Ongoing	Facility not yet BAT standard. Bidding for the upgrading of facility already done.
4.2* Demonstrate the application of BAT in pyrolysis process of MW	Ongoing	Facility not yet BAT standard. Bidding for the upgrading of facility already done.
5.1* Demonstrate the application of BAT in autoclaving process of MW	Ongoing	Tender for procurement of automating feeding system to upgrade facility already done.
5.2* Demonstrate the application of BAT in other non-incineration process of MW	Ongoing	Technical specifications under revision
5.3* Demonstrate the application of BAT/BEP for treatment and disposal of MW in remote rural areas	Not yet started	
6.1 Demonstrate the application of integrated MW Management among institutions at the municipal level	Ongoing	Agreements signed with cities / institutions. Integrated MW plan already developed. Working meetings between CIO and local stakeholders already taken place.
6.2 Demonstrate coordinated MW treatment among the dedicated MW facilities at the provincial level	Ongoing	ToRs to select 3 provinces ready. Coordination mechanism in place.
7.1* Formulate techno-economic policies that promote the adoption of BAT/BEP	Ongoing	Final drafts of BAT/BEP guidelines, economic policy and costing guidelines ready but not yet promulgated
7.2 Demonstrate and promote different commercial models for the construction and	Ongoing	ToRs cleared. Research work will start soon

operation of MW treatment and disposal facilities		
7.3 Strengthen national capacity to develop new MWs treatment technologies appropriate to China's socio-economic context	Ongoing	VOC and odour control research and development already carried out. Pilot scale plan completed
7.4 Develop and implement a MW treatment equipment certification and labeling program	Ongoing	ToR cleared. Research will start soon.
7.5 Establish training and accreditation systems for lifecycle management of MW that support BAT/BEP	Ongoing	Training material for operation and management in MW disposal centers and MW management in MIs are ready. Training to start soon and centres where training will be given already identified.
7.6 Extensive stakeholder awareness raising	Ongoing	Posters created, symposiums held, website, short film on MW treatment shown at 2010 Shanghai World exhibition. MW permanent exhibition at CIO / FECO premises, accessibility to general public. Website for MW project created : http://www.chinapops.net/popsbbs/home.asp?userid=234
8.1* Establish the project management structure	Completed	Steering Group and working mechanism established; project expert and technical experts recruited; core expert group for medical institution management established; PMOs established at local level
8.2 Design and implement an M&E mechanism according to GEF M&E procedures	Ongoing	Inception workshop held; Tripartite Review meetings for 2008 and 2009 held (PIR); project review meeting held twice; formulation of annual work plan for 2008, 2009 and 2010; Complete 2008, 2009 project auditing and progress report; midterm assessment being undertaken

* The asterisk means that the output should have been completed at midterm.

IV.4 Efficiency

Overall, the project applied a mixed form of agency execution, national and regional execution that is proving to be an efficient approach (as compared to full agency execution). In this context, a contract for the sum of USD 10,088,780 (representing 86.6 % of GEF funds) was signed between FECO and UNIDO Headquarters for the implementation of national activities. The remaining funds were managed by UNIDO for agency cost and for the recruitment of international experts. Table 4 below resumes the status of funds managed by FECO at mid-term. It can be seen that at mid-term 37.5 % of total funds are already committed for a total of 36 subcontracts (see Annex 4 for list of subcontracts) have been signed to initiate the activities of the different outputs highlighted in Table 3. It should be pointed out here that the procedure for procurement of equipment

for the upgrading of the waste treatment centres of demonstration cities (see Table 1) including Nanchang and Xiaogan (that the evaluators visited) is on-going and the costs, amounting to \$ 2,276,000 are not included in the committed funds given in Table 4. If these funds are included then the total committed funds would be \$ 6,055,783, equivalent to 64% of approved funds. A detailed budget summary of the project submitted by FECO is given in Annex 5.

The committed funds were also used for the recruitment of high quality experts (coming from leading academic institutions like the Chinese Academy of Sciences) both at central and regional levels that provided appropriate guidance and very valuable assistance and contributed to the proper implementation of project activities. For example the Institute of High Energy Physics (IHEP), Chinese Academy of Science, developed the guidelines for pollution control for non-incineration treatment of MW, and technical specifications of monitoring for non-incineration disposal facilities (Document No. 47 of Annex 2). During interviews, IHEP indicated that these guidelines and standards were developed in close consultation with the disposal MW facility operators. For example, IHEP undertook a number of on-site inspections (at Xiaogan for autoclave and at Xinxiang for chemical treatment) and analyses to check whether these installations would meet the requirements of these guidelines or standards.

Table 4: Status of funds managed by FECO

Item	Funds approved (US\$)	Contract signed at midterm (US\$)	% of funds spent
Subcontracts including recruitment of experts	9,456,010	3,631,211	38.4 %
Workshops / training / meetings	573,250	144,935	25.3 %
Translation / printing	59,520	3,637	6.1 %
Total	10,088,780	3,779,783	37.5 %

It was felt from CIO that the current limit (US\$ 20,000) to seek approval from UNIDO for procurement was too low. According to feedback gathered during interviews, increasing this limit (e.g. US\$ 50,000) would definitely contribute to increase efficiency and avoid delays in project implementation.

As mentioned early, it was found that the involvement of the UNIDO Regional Office in the project was very low. Only a temporary UNIDO officer (an intern: collaboration with Australian Government) was involved in helping to edit draft reports, but not in supervision or monitoring of project activities. With a significant POPs portfolio in the country, UNIDO, Head Quarters in Vienna could increase efficiency of its supervisory

and management functions by delegating some activities to the regional office in Beijing. For example, by decentralizing activities like procurement or other administrative duties to the regional office could significantly improve in the efficiency of the project. Indeed, feedback obtained during field mission clearly indicate that delays to the project were partly due procurement procedures and time taken at UNIDO Headquarters for approval of these procurements, which could significantly be shortened if these decisions were taken at the regional office level.

IV.5 Impact and Sustainability

IV.5.1 Impact

Awareness for the need to properly manage and dispose of medical wastes has been raised at all levels and impact of the project is high. The impact that the project has had so far is listed below:

- The inclusion of the BAT/BEP guidelines for the management of medical wastes in the 12th Five Year program indicates the strong commitment of the central government to soundly manage MW.
- High levels of funding are available both at central and local level not only for implementation of the project but also for other POPs related projects. For instance, substantial funding has been invested for the construction of the MW disposal centres in the demonstration cities e.g. at Xiaogan and Nanchang that the evaluators visited. Provincial governments (e.g. at Guangzhou) have invested in state of the art laboratories for monitoring of POPs.
- The appropriate infrastructure and mechanism to enforce / implement regulations, polices, guidelines and systems for the sound management of MW exists both at central and local level.
- The project has created opportunities for collaboration between academia and private sector for technology innovation / development, e.g. SCR technology being developed by Zhejiang University in collaboration with the Chongqing Liyang Mechanical & Electronic Engineering Company Ltd.
- During interviews carried out during field mission, feedback gathered indicated that awareness is high amongst medical staff members regarding the need to soundly manage medical wastes. In that respect, their attitude has changed and as far as possible they try to minimize the generation wastes during their duties.
- The segregation system to separate infectious waste from normal waste that existed in MIs of demonstration cities was improved with the implementation of

the project and training that was given to medical staff for MW management further enhanced their capacities. However the staff indicated that further training is required.

- Best environmental practices (BEP) are being promoted in the MIs whereas BAT/BEP are being promoted in MW disposal centres.
- In all demonstration cities, a proper system for collection, transportation and disposal of MW has been established in the context of the project. In addition a fee system to be paid by MIs to MW disposal centers has been installed for sustainability of these centres.
- In the context of NPHMWP, it was planned to build 277 MW disposal centers using incineration facility, but with the project near 120 are now planned to run on non-incineration technologies and this will significantly decrease the amount of dioxin released to the environment. In demonstration cities, medical wastes are no longer being incinerated in small facilities at the MIs but they are disposed of in the demonstration centralized facilities using either incineration or non-incineration technologies (see Table 1). As a result a significant reduction in dioxin release is expected. Indeed if the incineration facilities were operating at BAT standard i.e. 0.1 ng I-TEQ/m³ then the effective reduction in dioxin release would be 12.47 g I-TEQ annually, with a reduction of 8.27 g I-TEQ from facilities operating on incineration technology and a reduction of 4.2 g I-TEQ from facilities running on non-incineration technology (see Table 1 for tons of wastes treated annually by each facility). The emission factors of the toolkit have been used to estimate these figures.
- The officers of local EPBs (Xioagan and Nanchang) also stated that the POPs project including this MW project have contributed to raise the awareness of the provincial government regarding the need to eliminate sources of dioxins and more generally of POPs. As a result the enforcement POPs regulations / policies are included in the daily duties of EPB officers.
- High levels of funding are also available at local level for POPs activities. State of the art laboratories have been constructed in Guangzhou and Ningbo for monitoring of POPs including dioxin in flue gases coming from incineration of MW.
- Much more funds coming from the central government are available for research on POPs including dioxins.
- According to feedback gathered during field visit at Nanchang MW disposal center, neighboring provinces came to learn from the Nanchang experience as

these provinces were in the process of implementing centralized systems for the management of MW.

Given the changes that have occurred so far at all levels and for all stakeholders over the duration of the project, it can be concluded that the impact of the project has been very high and has produced tangible and very positive outcomes.

IV.5.2 Sustainability

Chances for sustainability and sustained impact are very high in China, for the following reasons:

- China has a strong central government that, in the context of NIP development, has confirmed its determination amongst others to comprehensively take legal, economic, technical and necessary administrative measures to solve POPs issues including dioxins coming from MW.
- The incorporation of MWM issues in 12th five year plan at central and provincial level that indicate very high ownership.
- This MW project is in line with the National Plan for hazardous and Medical Waste Program started in 2003 for the sound management of medical wastes in China. Through this Program, China is fully committed to soundly manage its MW and has proposed to build 227 MW centralized disposal facilities using incineration technology. Since this project, it has been decided that 120 facilities across the country will be using non-incineration technology instead.
- The project is highly relevant to key stakeholders including private sector and high ownership has been seen. For example this project is highly relevant to NIHA, responsible for hospital administration in China and NIHA is much involved in project implementation.
- High level of co-funding is available both at central and local governmental level where awareness is very high and funds are made available to promote BAT / BEP for the MWM. Investment in infrastructure for monitoring is also happening (e.g. dioxin laboratory).
- The implementation capacity in terms of human resources (CIO and PMOs), offices and related infrastructure (FECO/SEPA, local EPBs), administrative system (FECO procurement, auditing and financial management systems), management structure (FECO/SEPA, NCG, PMT, PMOs) already exist and is fully operational.
- CIO, responsible for implementation of POPs projects **exclusively** including the MW project, is a permanent body within FECO; it comprises of 25 full staff members working full time in the implementation of project activities. This kind of infrastructure where so many staff members working full time exclusively on the implementation of projects is rarely seen in any part of the world.

- High technical capacity exists in the country for monitoring, research and development (e.g. leading research institutions equipped with state of the art laboratories).
- The implementation of the project is on-going and is being monitored by the National Coordination Group (NCG) at central level and PMOs at local level with CIO as executing agency. This appears to be an effective monitoring system that significantly increases the likelihood of sustainability and continued impact of the MW project.

IV.6 Summary: strength and weaknesses of the project

At midterm a review of the implementation of the project leads to the following main observations reported in the box below

Strength	Weaknesses
<ul style="list-style-type: none"> • Strong and committed central government and high ownership at all levels • High level of co-financing from central and local government, and private sector. • Well-designed project in line with the National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Wastes (NPHMW) and taking into consideration the real needs of the country and built along the lines of the Stockholm Convention especially with regard to BAT / BAP • Implementation of project taking advantage of the permanent infrastructure set up since NIP development in 2004 which includes: competent and adequately staffed national counterpart, CIO / FECO / SEPA). CIO is a division of FECO with 25 dedicated staff members working full time to implement POPs project. • Good implementation approach by involving the major stakeholders (e.g. local government, NIHA) • High quality input involving leading international agencies, well qualified and experienced international experts and most prestigious national research institutes • Good cooperation between central and provincial governments 	<ul style="list-style-type: none"> • Some outputs at midterm not yet completed • Incineration or pyrolysis of MW not yet BAT level • Delays in disbursement of funds from UNIDO to FECO • No involvement of UNIDO country office in execution or monitoring of project • No participation of NGOs

V. Recommendations

Conclusion/Context	Recommendation	Follow up by
<p>Since the development of the NIP, China is fully committed to implement the Convention and has invested considerably for the management of POPs. To be in line with the Stockholm Convention, China is also fully committed to soundly manage its MW and has invested significantly in the construction of MW disposal facilities in demonstration cities. The MW project is being run in six demonstration provinces and cities with the project funds being used for the upgrading of MW disposal centres. It will be essential that China continue to benefit from the Convention's financial support mechanism to ensure replication and sustainability of the MW project in other provinces.</p>	<ul style="list-style-type: none"> • Effort should be made to mobilize funding from authorities, private sector, international agencies and bilateral donors to ensure replication of BAT / BEP in other provinces. • Outcome and experience should be summarized for replication program in other provinces. • Sustained effort for promotion of MW project in other provinces is encouraged at central and provincial level 	<p>GEF, UNIDO, CIO/FECO, other GEF agencies.</p> <p>CIO, PMOs, NIHA</p> <p>CIO/FECO, PMOs, EPBs</p>
<p>During recent years UNIDO has built up a significant POPs portfolio in the country. However, so far there is no involvement of UNIDO regional office in project implementation or monitoring. Only a temporary UNIDO officer (an intern: collaboration with Australian Government) was involved in helping to edit / correct draft reports.</p>	<p>UNIDO should increase efficiency of its supervisory and management functions either by installing relevant capacity (e.g. a technically specialized staff) at the regional office in Beijing or by delegating some activities to the regional office in Beijing.</p>	<p>UNIDO</p>
<p>The whole project is about the sound life cycle management of medical wastes from generation, segregation and interim storage in MIs, though collection and disposal at the MW</p>	<p>Project management should ensure that implementation and enforcement of BEP / BAT regulations, policies, standards and guidelines developed in the context</p>	<p>CIO, PMOs, NIHA, EPBs</p>

disposal centres.	of the project as well as their proper monitoring is being done adequately in provinces and municipalities where the project is being run.	
For replication purposes in other regions, in the ToRs of the subcontracts signed between CIO / FECO and the demonstration MW disposal centres, it is stated that the centres should help CIO/FECO in the replication of the project in other provinces by providing guidance and assistance where necessary.	CIO/FECO and PMOs should ensure that each participating demonstration centre that has developed a given technology for disposal of MW in the context of the project should strictly do as stated in the respective ToRs of the subcontract signed for successful replication in other provinces and municipalities.	CIO / FECO, PMOs, local EPBs
A number of outputs that should have been completed at midterm, but due to various reasons like delay in funds transfer, the activities of these outputs are still on-going.	The PMT, CIO and UNIDO should closely monitor those activities and provide guidance if needed until completion.	CIO, UNIDO, PMT
The whole project is about reducing release of dioxins coming from the incineration of wastes in China by using BAT technologies. However, the MW disposal centres operating on incineration technology are not at BAT standard (0.1 ng I-TEQ/m ³ for flue gases) but at 0.5 ng I-TEQ/m ³ . To reach BAT standard, a SCR technology is being developed in jointly collaboration between the Zhejiang University and Chongqing Liyang Mechanical & Electronic Engineering Company and that will be used to upgrade the APCS of the centres using incineration facility.	CIO / PMT should explicitly monitor the progress of the research activities on SCR and ensure that BAT standard is reached.	CIO, UNIDO, PMT and PMOs
The output “ <i>Demonstrate the application of BAT/BEP for treatment and disposal of MW in remote rural areas</i> ” activities have not yet started. The reason for this situation is that the	It is recommended that as soon as possible / feasible even if the demonstration subprojects are not completed, the PMT should take actions for the output relative to remote rural areas to start. For	PMT, CIO, UNIDO

<p>PMT indicated that they will first learn from the six demonstration projects (see Table 1) and analyze the existing situation of medical waste disposal facilities of remote areas then they will develop the ToRs for this output. As the six demonstration projects have suffered delays and are not completed, this is the reason why the activities for this output have not yet started.</p>	<p>example as the selection process is quite lengthy, the PMT should as soon as possible start procedures for the bidding exercise to select the demonstration remote rural area.</p>	
<p>A subcontract (US\$ 1,600,000) was signed between NIHA and CIO/FECO for the implementation BEP in 20 demonstration medical institutions. The evaluation team was able to visit two of these hospitals (Xiaogan Central Hospital and Jiangxi Children’s Hospital) where adequate waste systems were put in place to separate infectious from other wastes. However, according to feedback obtained from NIHA, a number of subcontracts have not yet been signed with some of the selected MIs. Moreover improvement on these segregation systems could be made by looking into cleaner production (CP) initiatives.</p>	<ul style="list-style-type: none"> • It is recommended that follow up actions are taken to ensure that subcontracts are signed and that activities start the earliest possible to avoid or minimize delays for the completion of the project. • For the minimization of wastes, it is recommended to explore possible CP initiatives for medical waste management and disposal. 	<p>CIO, PMT, PMOs</p> <p>CIO, PMT, NIHA</p>
<p>The implementation of the MW project is on-going and is being monitored by the National Coordination Group (NCG) with CIO coordinating all activities. This appears to be an effective monitoring system that significantly increases the likelihood of sustainability and impact of the project.</p>	<p>The national monitoring system should be replicated at the provincial level to ensure sustainability across the country.</p>	<p>CIO, PMOs</p>
<p>In all demonstration cities, for the sustainability of MW disposal centres and as planned in the PD (in line with “the polluter payer” philosophy), a</p>	<p>An adequate monitoring mechanism needs to be set up to ensure that a fair and transparent business collaboration occur amongst the</p>	<p>CIO, PMOs, NIHA, EPBs</p>

<p>fee, whose amount is decided by the pricing committee set up within the PMOs, is to be paid by MIs to the disposal centres for treatment of their wastes. However, according to feedback received during interviews undertaken during field mission, a number of MIs is not paying the full amount due to the disposal centres.</p>	<p>different stakeholders.</p>	
<p>In the documents submitted by CIO to the evaluation team, there was no evidence of any NGO participating in this project.</p>	<p>CIO and PMOs should consider the participation of NGOs in the project.</p>	<p>CIO, PMOs</p>

VI. Lessons learned

Conclusion/Context	Lessons Learned
<p>Since the development of the NIP, China is fully committed to implement the Convention and has invested considerably for the management of POPs. In that respect, ownership of the MW project is very high as it deals with the reduction of dioxins from the medical sector. High ownership is also seen given the inclusion of Convention Implementation for better management of POPs, in particular medical waste, in the 12th five year plan at central and provincial level. Moreover the project is highly relevant given the amount of MW produced in China, estimated at 680,000 tons in 2010 and that need to be soundly managed in order to minimize risk of exposure of the population and the environment to diseases and pollutants including dioxins. The project is in line with the National Plan for Hazardous and Medical Waste Management Program started in 2003 after the outbreak of SARS in which China is fully committed to build centralized disposal facilities for the sound management of MW.</p>	<p>Country drivenness and strong government are key factors for successful project implementation</p>
<p><i>The Convention Implementation Coordination Group (CICG)</i>, first established by China in 2003, is providing (i) review of significant policies related to POPs management including MW and control, (ii) guidance and coordination for POPs management activities and Convention implementation. The CICG consists of the major 11 agencies including State Environmental Protection Administration (SEPA), National Development and Reform Commission (NDRC), Ministry of Foreign Affairs (MOFA), Ministry of Finance (MOF), Ministry of Public Health (MOH) and others</p> <p><i>The Convention Implementation Office (CIO)</i> is part of SEPA and is responsible for coordinating the day-to-day management of the Stockholm Convention implementation that includes the MW project in China. The CIO provides guidance to ensure the successful implementation of the project, including regular monitoring and enforcement inspections. <i>Foreign Economic Cooperation Office (FECO)</i> is the national executing agency (NEA) and is representing SEPA and the CIO in the</p>	<ul style="list-style-type: none"> • A comprehensive and strategic management mechanism and adequate involvement of a wide range of stakeholders (NIHA, national experts, high level research and academic entities, local authorities and private partners) in all important events, including preparatory phase, inception, awareness campaign, training sessions, consultation meetings at both central and regional level are the basis to achieve effective implementation of project activities. • Clearly defined and agreed roles of ministries and other stakeholders at both central and local level helps the process of collaboration and ensures good coordination for implementation of project activities.

<p>management and completion of contracts for project implementation.</p> <p><i>National, Provincial and Municipal Steering Groups:</i> The project has established a national steering group by drawing upon resources from related ministries for the oversight of the project. To facilitate the extensive demonstration and replication activities at provincial and municipal levels, the National Steering Group has encouraged and assisted provincial and municipal governments in the establishment and operation of their own corresponding steering groups.</p> <p><i>National Project Management Team (NPMT)</i> is composed of staff from SEPA, MOH, NDRC, MOC and other relevant agencies. SEPA has designated a coordinator/team leader. The Project Management Team is responsible for the day-to-day management and execution of the project, and oversees local project management offices.</p> <p><i>Three Local Project Management Offices (PMOs)</i> have been established in the cities where demonstration projects are being run.</p>	
<p>For implementation of the project, a similar approach as for NIP development was adopted by UNIDO: a large subcontract of GEF funds USD 10,088,780 (representing 86.6 % of GEF funds) to the main partner FECO/SEPA for implementation of national activities including recruitment of national experts plus a smaller component (US\$ 1,561,220) directly UNIDO executed for agency fee and recruitment of international experts. Since the large subcontract was given to the national project counterpart, this part of the project can be regarded as nationally executed. CIO applied existing FECO procedures for procurement, sub-contracting activities or for the management of project funds. As UNIDO is executing the international component of the project, this approach can be qualified as a “mixed mode of execution”.</p>	<p>The mixed form of agency execution and national execution (through sub-contracts to counterparts) is a very efficient implementation modality when the national capacities are sufficient (substantive competence, procurement, financial management, auditing) and support from central and local government is strong and high level of co-funding is available.</p>

<p>This MW project, which is being implemented in cities of China having different level of socio-economic development e.g. cities with different population size, or found in remote areas or having different level economic development, is promoting Best Environmental Practices (BEP) for the management of wastes in MIs and Best Available Technologies (BAT) operating both on incineration and non-incineration technologies for the sound disposal of MW.</p>	<p>The MW project will provide useful experiences for the GEF, the international agencies and developing countries for the sound management of medical wastes especially with regard to non incineration technologies.</p>
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VII. Overall assessment

According to the TOR of this evaluation (annex), it is required to assess and rate the different categories of the project from Highly Satisfactory (HS) to Highly Unsatisfactory (HU). Rating for sustainability sub-criteria are as follows: Likely (L), Moderately Likely (ML), Moderately Unlikely (MU) and Unlikely (U).

Criterion	Evaluator's summary comments	Evaluator's Rating
Attainment of project objectives and results (overall rating)	Although some outputs are not yet completed as planned in PD, there is significant progress in implementation of activities to meet the objectives of the project at midterm.	S
<i>Effectiveness</i>	Effectiveness very high – High levels of co-funding mobilized	HS
<i>Achievement of outputs and activities</i>	High quality outputs produced	HS
<i>Relevance</i>	Project highly relevant. Highly relevant to the China's 11th Five-Year Program and the priority actions/activities set in the NIP of the Stockholm Convention.	HS
<i>Efficiency</i>	Mobilization of co-funding was high (Central MOF, local government and enterprises) and contributed to the efficiency of GEF funding, especially in the dioxin monitoring capacity.	S
Sustainability of project outcomes (overall rating)	Chances are high for sustainability given the strong central government, the high level of funds, and incorporation of POPs reduction and Stockholm Convention implementation in 12 th five year program	L
<i>Financial</i>	High level of local funding likely to be available	L
<i>Socio Political</i>	Strong central government and strong commitment to meet Convention requirements	L
<i>Institutional framework and governance</i>	Appropriate infrastructure in place (FECO/CIO) with 25 permanent staff working for	L

	monitoring and POPs project implementation	
<i>Ecological</i>	The Stockholm Convention is about the sound management of toxic chemicals	L
Monitoring and Evaluation (overall rating)	Monitoring and evaluation appropriate from CIO though Project steering committee meetings or tripartite meetings for Project Interim Review of project	S
<i>M & E Design</i>	Adequately planned	S
<i>M & E Plan Implementation (use of adaptive management)</i>	CIO / FECO followed appropriate rules so as to meet UNIDO requirements. Implementation approach adapted to local level	HS
<i>Budgeting and Funding for M & E activities</i>	Appropriately planned - National experts recruited to provide very useful technical guidance and assistance for project implementation both at central and local level.	HS
Catalytic Role	Demonstration provinces playing leading role. Other provinces showed interest	HS
Quality at entry and implementation approach	Leading national research institutes involved, implementation approach based on continuity involving stakeholders since preparatory phase	HS
Country ownership / drivenness	High ownership at all levels	HS
Stakeholders involvement	Involvement of key stakeholders at central and provincial level since preparatory phase	HS
Financial planning	Disbursement of funds could be improved	S
UNIDO Supervision and backstopping	Adequate, however UNIDO head quarters could delegate some administrative and supervisory activities to regional office	S
Overall Rating	Highly relevant, effective and efficiently run project at midterm – High quality outputs produced at midterm	S

Annexes

Annex 1: ToRs of Evaluation



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Terms of Reference

Independent Terminal Evaluation of the UNIDO Project:

Project Number: GF/CPR/07/008

ENVIRONMENTALLY SUSTAINABLE MANAGEMENT OF MEDICAL WASTE IN CHINA

September 2010

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I. Project Background and overview

Project origin and objectives

Following the outbreak of Severe Acute Respiratory Syndrome (SARS) in June 2003, the Chinese Government moved quickly to establish the National Plan for Construction of Facilities for Disposal of Hazardous Waste and Medical Waste (NPHMW), in which China was committed to construct 332 dedicated MW disposal facilities across the country. Similar with the practice in many other developing countries, the NPHMW (also called nationwide investment program) envisaged adopting incineration as the technology of choice for most of these facilities. Faced with an urgent public health crisis, the government quickly established emergency incineration facilities to safely dispose of MW. The urgent expansion of the incineration program did not however fully take into account China's obligations under the Stockholm Convention.

The Stockholm Convention entered into force on 11 November 2004 for China. Article 5 of the Convention requires the Parties to take measures to reduce or, where feasible, eliminate releases of PCDD/PCDF and other unintentionally produced Persistent Organic Pollutants (UPOPs). Waste incinerators, including co-incinerators of municipal, hazardous or MW or of sewage sludge are on the foremost top of the list. In the National Implementation Plan (NIP) of China for the implementation of the Stockholm Convention on POPs, MW incineration is listed as a key PCDD/PCDF release source and, pursuant to the "Action Plan for Reduction and Elimination of PCDD/PCDF Releases"; priority should be given to the application of best available techniques and best environmental practices (BAT/BEP).

The overall objective of this project is to reduce and ultimately eliminate the releases of unintentionally produced POPs and other globally harmful pollutants into the environment, and assist China in implementing its relevant obligations under the Stockholm Convention. The project is to interact with the Nationwide Investment Plan and promote the widespread adoption of best available techniques and best environmental practices (BAT/BEP) in the evolving medical waste management infrastructure and industry in a manner that reduces adverse environmental impacts and protects human health.

According to the Project Document, the expected outcomes were defined as follows:

1. Strengthened regulatory framework for MW management and upgrade or establish performance levels for dedicated MW disposal facilities
2. Strengthened institutional capacity for integrated MW management at national and local levels in support of the Nationwide Investment Plan
3. Demonstrated systems management and the application of BEP
4. Demonstrated BAT for MW disposal using thermal combustion including air pollution monitoring
5. Demonstrated BAT/BEP for MW thermal non-combustion, chemical treatment or other appropriate non-combustion treatments
6. Demonstrated spatially integrated and coordinated MW management and disposal systems in geographically defined clusters that include medical institutions and dedicated treatment and disposal facilities
7. Developed and formulated national strategy and action plan of BAT/BEP for MW management and disposal
8. Project management, monitoring and evaluation

Relevance to GEF programmes

The GEF intervention can be justified as follows:

- Waste incinerator of medical wastes is an industrial source category that has the potential for comparatively high formation and release of unintentional POPs to the environment.
- While the response to the SARS outbreak was effective, it was a 'fire fighting' response by applying incinerators without appropriate Air Pollution Control System. The project addresses the capacity and technological barriers to the implementation of the necessary management and technology systems with

reference to best international norms and practices expressed as BAT and BEP in order to assure reduction of releases from this source of unintentional production.

- Even the 2003 NPHMW addressed the specific issue of infection control and does not fully take into account the obligations of the Stockholm Convention. The project, by addressing the reduction of POPs generation from healthcare waste and the managed segregation and handling of MW streams, complements the NPHMW and integrates the country's obligations under the Convention.

- The application of BAT involves the prior hazard identification and environmental impact assessment and the application of appropriate non-combustion technologies to address the identified issues in their social, geographical, economic and cultural contexts. The planning, construction and operation of dedicated MW treatment facilities requires the application of regulatory controls including feasibility assessments, planning permits, environmental impact assessments and operating licenses. The project will demonstrate these regulatory controls in an integrated way and provide a basis for confidence generation with the international community. In this way, the project provides some defense against technology dumping.

- Infection control and MW management requires a closed circuit management system, which integrates hygiene, health, safety and environmental management systems across the total cycle of health care provision, waste collection, transportation, storage and disposal. This project addresses the gaps involved in the delivery of this integration.

Implementation arrangements

UNIDO will be the GEF *Implementing Agency (IA)* for the project. A project focal point will be established within UNIDO to assist with project execution. This focal point will consist of dedicated core staff, supplemented by support from professional and support staff colleagues on a part-time as needed basis, including in particular senior staff engaged in the management and coordination of UNIDO's POPs program. UNIDO will make these services available as part of its in-kind contribution to the project.

The Convention Implementation Coordination Group (CICG), first established by China in 2003, will provide (i) review of significant policies related to POPs management and control, (ii) guidance and coordination for POPs management activities and Convention implementation. The CICG consists of the following 11 agencies:

1. State Environmental Protection Administration (SEPA)
2. National Development and Reform Commission (NDRC)
3. Ministry of Foreign Affairs (MOFA)
4. Ministry of Finance (MOF), which is the GEF Focal Point in China.
5. Ministry of Commerce (MOC)
6. Ministry of Science and Technology (MOST)
7. Ministry of Agriculture (MOA)
8. Ministry of Public Health (MOH)
9. Ministry of Construction (MOC)
10. General Administration of Customs (GAC)
11. State Electricity Regulatory Commission (SERC)

The Convention Implementation Office (CIO) is part of SEPA and is responsible for coordinating the day-to-day management of the Stockholm Convention implementation in China. The CIO will provide guidance to ensure the successful implementation of the project, including regular monitoring and enforcement inspections. As the CIO is not an independent legal entity, *Foreign Economic Cooperation Office (FECO)* will be the national executing agency (NEA) and will represent SEPA and the CIO in the management and completion of contracts for project implementation.

National, Provincial and Municipal Steering Groups: The project will establish a national steering group by drawing upon resources from related ministries or commissions in charge of development and reform, environment, health, construction, and pricing to provide the project team with political guidance and inter-ministerial coordination support. To facilitate the extensive demonstration and replication activities at provincial and municipal levels, the National Steering Group will encourage and assist provincial and municipal governments in the establishment and operation of their own corresponding steering groups.

National Project Management Team (NPMT) will be composed of staff from SEPA, MOH, NDRC, MOC and other relevant agencies. SEPA will designate a coordinator/team leader. The Project Management Team will be responsible for the day-to-day management and execution of the project, and will oversee local project management offices.

Three provincial Local Project Management Offices (PMOs) will be established in the 6 provinces where demonstration of coordinated planning that will spatially cluster incineration and non-incineration facilities will be carried out to achieve optimal socio-economic and environmental benefits by implementing an effective medical waste transfer system in a geographically defined regional context.

Six municipal PMOs will be established in the 6 municipalities where there will be extensive demonstrations of BAT/BEP for integrated medical management that will cluster the medical institutions and medical waste treatment or disposal facilities.

Budget Information

A) Overall Cost and Financing (including co-financing):

Output	GEF (US\$)	CO-FINANCE (US\$)						Co-Financing Total
		UNIDO	USA ⁴	MOF ⁵	MOH ⁶	SEPA ⁷	Enterprises ⁸	
1. Strengthened regulatory framework	373,785				73,819	440,476		514,295
2. Strengthened institutional capacity	1,409,485		30,000	1,260,125	1,031,713	1,168,348		3,490,185
3. Demonstrated systems management and application of BEP	628,125		50,000	51,100	1,595,275		1,696,375	2,324,500
4. Demonstrated BAT for MW disposal using thermal combustion including air pollution monitoring	2,432,600		40,000			5,399,800	5,359,800	10,799,600
5 Demonstrated BAT/BEP for MW non-combustion treatments	1,984,450					3,667,523	3,932,928	7,600,450
6. Demonstrated spatially integrated and coordinated MW management and disposal systems	1,137,200				272,850	827,388	186,963	1,287,200
7 Developed and formulated national strategy and action plan of BAT/BEP for MW management and disposal	2,565,085			730,495	1,526,344	3,496,466	77,450	5,830,755
8. Project management, monitoring and evaluation	1,119,270	100,000		1,758,280				1,858,280
GRAND TOTAL	11,650,000	100,000	120,000	3,800,000	4,500,000	15,000,000	9,557,140	33,077,140

Source: project document

⁴ The Government of the United States of America

⁵ The Chinese Ministry of Finance (MOF)

⁶ The Chinese Ministry of Health (MOH)

⁷ The State Environmental Protection Administration of China (SEPA)

⁸ 6 enterprises had to be selected to provide a total co-financing amount of US\$ 9,557,140

B) UNIDO budget (GEF funding excluding agency support cost):

	Total Allotment (US\$)	Disbursement (US\$)	Unliquidated Obligation (US\$)	Uncommitted Balance (US\$)
Personnel	1,321,220	240,813	32,568	1,047,839
Contracts	6,861,030	3,704,956	5,214,383	-2,058,309
Training	3,467,750	2,906,795	645,550	-84,595
<i>Total</i>	<i>11,650,000</i>	<i>7,069,105</i>	<i>5,892,501</i>	<i>-1,095,064</i>

Source and date of information: UNIDO Infobase, September 2010

II. Objectives and scope of the evaluation

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

- (b) 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 GEF Project Review Criteria (annex 3)⁹:
 - Implementation approach
 - Country ownership/Drivenness
 - Stakeholder participation
 - Sustainability
 - Replication approach
 - Financial planning
 - Cost-effectiveness
 - Monitoring and evaluation
- (c) Enhance project relevance, effectiveness, efficiency and sustainability by proposing a set of recommendations with a view to ongoing and future activities.
- (d) Draw lessons of wider applicability for the replication of the experience gained in this project in other projects/countries.

The key question of the evaluation is whether the project has made a significant contribution to reducing the effects of POPs on human health and the environment.

⁹ see "Guidelines for Implementing Agencies to Conduct Terminal Evaluations, May 2003)

III. METHODOLOGY

The evaluation will follow UNIDO and GEF evaluation guidelines and policies. It will be carried out as an independent in-depth evaluation using a participatory approach whereby the UNIDO staff associated with the project is kept informed and regularly consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Evaluation Group (EVA) on any logistic and/or methodological issues to properly conduct the review. The draft report will be delivered to UNIDO EVA and circulated to UNIDO staff associated with the project, including the UNIDO office in China. Any comments or responses to the draft report will be sent to UNIDO EVA for collation and onward transmission to the evaluation team leader; he/she will be advised of any necessary revisions.

The findings of the evaluation 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 (NIP, Inventories, action plans, sub-regional strategies, etc.) and relevant correspondence.
 - (b) Notes from the Technical Coordination Group (TCG) meetings.
 - (c) Other project-related material produced by the project staff or partners.
2. Interviews with project management and technical support including Mr. Zenghyou Peng, UNIDO Project Manager, Mr. Mohamed Eisa, Chief UNIDO POPs Unit, project staff in China and administrative staff associated with the project's financial administration if necessary.
3. Interviews with project partners, in particular the Government of the United States, MOF, MOH, SEPA and the 6 enterprises that have been selected for co-financing as shown in Section D and E of the project document.
4. Interviews and telephone interviews with intended users for the project outputs and other stakeholders involved with this project. The evaluator shall determine whether to seek additional information and opinions from representatives of any donor agencies or other organisations.
5. Interviews with the UNIDO Country Office in China that will be visited by the evaluation team, the project's management group (FECO/SEPA), and the various national and sub-regional authorities dealing with project activities as necessary. The evaluator shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.
6. Other interviews, surveys or document reviews as deemed necessary by the evaluator and/or UNIDO EVA.

Project Evaluation Parameters

A. Project Relevance

Country ownership/drivenness. This is the relevance of the project to national development and environmental agendas, recipient country commitment, and regional and international agreements. Examples of possible evaluative questions include: Was the project design in-line with the national sectoral and development priorities and plans and regional agreements (such as the Abidjan Convention etc.)? Are project outcomes contributing to national and regional development priorities and plans? Were the relevant country representatives, from government and civil society, involved in the project? Did the recipient government maintain its financial commitment to the project?

Relevance to target groups: 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.).

Relevance to the GEF and UNIDO: In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies of GEF? Were they in line with the UNIDO mandate, corporate strategy and core competencies? Ascertain the likely nature and significance of the contribution of the project outcomes to the wider portfolio of the GEF Operational Programme (OP) #14.

B. Effectiveness: attainment of objectives and planned results (progress to date):

The assessment of project results seeks to determine the extent to which the project objectives were achieved, or are expected to be achieved, and assess if the project has led to any other positive or negative consequences. While assessing a project's outcomes the evaluation will seek to determine the extent of achievement and shortcomings in reaching the project's objectives as stated in the project document and also indicate if there were any changes and whether those changes were approved. If the project did not establish a baseline (initial conditions), the evaluator should seek to estimate the baseline condition so that achievements and results can be properly established (or state simplifying assumptions used). Assessment of project outcomes should be a priority. Outcomes are the likely or achieved short-term and medium-term effects of an intervention's outputs. Examples of outcomes could include but are not restricted to stronger institutional capacities, higher public awareness (when leading to changes of behaviour), and transformed policy frameworks or markets. The evaluation should assess the extent to which the project's objectives were effectively and efficiently achieved or are expected to be achieved and their relevance.

- Evaluate how, and to what extent, the stated project objectives have been met, taking into account the "achievement indicators" specified in the project document and logical framework. Assess the project's success in producing each of the programmed outputs and activities to date, both in quantity and quality as well as usefulness and timeliness.
- Identify the potential longer-term impacts.
- Describe any catalytic or replication effect of the project, both within the project (such as the replication of demonstrations) and outside of the project. What examples are there of replication and catalytic outcomes that suggest increased likelihood of sustainability? Replication approach, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects, or replication within the projects. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated within the same geographic area but funded by other sources). Does the project have a strategy for replication?

C. Assessment of sustainability of project outcomes:

Sustainability is understood as the probability of continued long-term project-derived outcomes and impacts after the GEF project funding ends. The evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends.

Four aspects of sustainability should be addressed: financial, socio-political, institutional frameworks and governance, and environmental (if applicable). The following questions provide guidance on the assessment of these aspects:

- *Financial resources.* To what extent are the outcomes of the project dependent on continued financial support? What is the likelihood that any required financial resources will be available to sustain the project outcomes/benefits once the GEF assistance ends (resources can be from multiple sources, such as the public and private sectors, income generating activities, and

market trends that support the project's objectives)? Was the project was successful in identifying and leveraging co-financing?

- *Socio-political*: To what extent are the outcomes of the project dependent on socio-political factors? What is the likelihood that the level of stakeholder ownership will allow for the project outcomes/benefits to be sustained? Is there sufficient public / stakeholder awareness in support of the long term objectives of the project?
- *Institutional framework and governance*. To what extent are the outcomes of the project dependent on issues relating to institutional frameworks and governance? What is the likelihood that institutional and technical achievements, legal frameworks, policies and governance structures and processes will allow for, the project outcomes/benefits to be sustained?
- *Environmental*. Are there any environmental risks that can undermine the future flow of project environmental benefits?

D. Efficiency

Assesses the achievement of the environmental and developmental objectives as well as the project's outputs in relation to the inputs, costs, and implementing time. Include an assessment of outcomes in relation to inputs, costs, and implementation times based on the following questions: Was the project cost-effective? Was the project the least cost option? Was the project implementation delayed and if it was then did that affect cost-effectiveness? The evaluation should assess the contribution of cash and in-kind co-financing to project implementation and to what extent the project leveraged additional resources.

E. Assessment of Monitoring and Evaluation Systems:

- **M&E design**. Does the project have a sound M&E plan to monitor results and track progress towards achieving project objectives? The Evaluation will assess whether the project met the minimum requirements for the application of the Project M&E plan (see Annex 4).
- **M&E implementation**. The evaluation shall include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. Are Annual project reports complete, accurate and with well justified ratings? Has the information provided by the M&E system been used during the project to improve project performance and to adapt to changing needs?
- **Budgeting and Funding for M&E activities**. Have adequate budget provisions been made for M&E made and have such resources made available in a timely fashion during implementation?

F. Assessment of processes that affected attainment of project results.

The evaluation will consider, but need not be limited to, consideration of the following issues that may have affected project implementation and attainment of project results:

- **Quality at entry and implementation approach**. Were the project's objectives and components clear, practicable and feasible within its timeframe? The evaluation should also assess whether outcomes specified in the project document and/or logical framework are actually outcomes and not outputs or activities.

Were capacities of the executing institutions and counterparts properly considered when the project was designed? Were lessons from other relevant projects properly incorporated in design? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to implementation? Was availability of counterpart resources (funding, staff, and facilities), passage of enabling legislation, and adequate project management arrangements in place at project entry?

Ascertain to what extent the project implementation mechanisms outlined in the project document have been closely followed. In particular, assess the role of the various committees established and whether the project document was clear and realistic to enable effective and efficient implementation, whether the project was executed according to the plan and how well the management was able to adapt to changes during the life of the project to enable the implementation of the project.

Evaluate the quality and adaptability of project management and the supervision of project activities / project execution arrangements. Did UNIDO staff identify problems in a timely fashion and accurately estimate their seriousness? Did UNIDO staff provide quality support and advice to the project, approved modifications in time and restructure the project when needed? Did UNIDO provide the right staffing levels, continuity, skill mix, frequency of field visits?

- **Stakeholder involvement.** Did the project involve the relevant stakeholders through information sharing, consultation and by seeking their participation in project's design, implementation, and monitoring and evaluation? For example, did the project implement appropriate outreach and public awareness campaigns? Did the project consult and make use of the skills, experience and knowledge of the appropriate government entities, NGOs, community groups, private sector, local governments and academic institutions in the design, implementation and evaluation of project activities? Were perspectives of those that would be affected by decisions, those that could affect the outcomes and those that could contribute information or other resources to the process taken into account while taking decisions? Were the relevant vulnerable groups and the powerful, the supporters and the opponents, of the processes properly involved? Specifically the evaluation will:
 - Assess the mechanisms put in place by the project for identification and engagement of stakeholders in each participating country and establish, in consultation with the stakeholders, whether this mechanism was successful, and identify its strengths and weaknesses.
 - Assess the degree and effectiveness of collaboration/interactions between the various project partners and institutions during the course of implementation of the project.
 - Assess the degree and effectiveness of any various public awareness activities that were undertaken during the course of implementation of the project.
- **Financial planning.** Did the project have the appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds. Specifically, the evaluation should:
 - Assess the strength and utility of financial controls, including reporting, and planning to allow the project management to make informed decisions regarding the budget and allow for a proper and timely flow of funds for the payment of satisfactory project deliverables throughout the project's lifetime.
 - Present the major findings from the financial audit if one has been conducted.
 - Did promised co-financing materialize? Identify and verify the sources of co-financing as well as leveraged and associated financing. If there was a difference in the level of expected co-financing and actual co-financing secured, then what are the reasons for this? Will the extent of materialization of co-financing affect the project's outcomes and/or sustainability, and if it might affect outcomes and sustainability then in what ways and through what causal linkages?
 - The evaluation should also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co-financing. This information will be prepared by the relevant UNIDO Project Manager for scrutiny by the evaluator (table attached in Annex 6 Co-financing and leveraged resources).
 - Assess whether the project has applied appropriate standards of due diligence in the management of funds and financial audits.

The *ratings will be presented in the form of a table* with each of the categories rated separately and with **brief justifications for the rating** based on the findings of the main analysis. An overall rating for the project should also be given. The rating system to be applied is specified in Annex 5.

Evaluation report format and review procedures

The report 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 the outline given in annex 1.

IV. Evaluation Team and Timing

The evaluation team will be composed of a one international evaluation consultant acting as team leader, one staff member of the UNIDO Evaluation Group and one national evaluation consultant (to be selected jointly by UNIDO and the Government of China.

The staff member of UNIDO evaluation group will act as a member of the evaluation team and will participate in the evaluation mission in order to ensure the usefulness of the evaluation for UNIDO organisational learning.

UNIDO evaluation group will be responsible for the quality control of the evaluation process and report. It will provide inputs regarding findings, lessons learned and recommendations from other UNIDO evaluations, ensuring that the evaluation report is useful for UNIDO in terms of organisational learning (recommendations and lessons learned) and its compliance with UNIDO evaluation policy and these terms of reference.

All consultants will be contracted by UNIDO. The tasks of each team member are specified in the job descriptions attached to these terms of reference.

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

UNIDO Field Office in China will support the evaluation team. Donor representatives from the bilateral donor representations will be briefed and debriefed.

Timing

The evaluation is scheduled to take place in the period May to August 2008. The field mission for the evaluation is scheduled for the first half of June 2008.

After the field mission, the evaluation team leader will come to UNIDO HQ for debriefing. The final version of the evaluation report will be submitted 6-8 weeks after the debriefing at the latest.

V. REPORTING

The evaluation report shall follow the structure given in annex 1. The reporting language will be English.

Review of the Draft Report: Draft reports submitted to UNIDO Evaluation Group are shared with the corresponding Programme or Project Officer for initial review and consultation. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. The evaluators will take the comments into consideration in preparing the final version of the report.

Quality Assessment of the Evaluation Report: All UNIDO evaluations are subject to quality assessments by UNIDO Evaluation Group. These apply evaluation quality assessment criteria and are used as a tool for providing structured feedback. The quality of the evaluation report will be assessed and rated against the criteria set forth in the Checklist on evaluation report quality (annex 2).

Annex 2: List of documents submitted by CIO/ FECO / UNIDO

No	Name of document
1	Project document
2	Implementation plan for Medical waste incineration pollution control standards and performance test specifications
3	Interim Report of the Study on Standard for Pollution Control for Incineration and Technical Specification of Performance Testing-8-2
4	Implementation plan of medical waste management project in health institutions
5	Work report on medical waste management project in health institutions
6	Implementation Plan for non-incineration standards and performance test specifications
7	Interim Report of the Study on Standard for Pollution Control for Non-incineration and Technical Specifications
8	Meeting minutes from the national and local steering committees
9	Implementation plan of technical specifications for the supervision and management on operation to centralized disposal facilities for medical waste
10	Interim Report of Technical Specifications for Supervision and Management on the Operation of Centralized Incineration and Non-incineration Facilities for Medical Waste Disposal
11	Implementation Plan of Study on Technical Guidelines for Medical Waste Disposal Engineering Construction Cost
12	Executive report of technical guidelines for medical waste disposal engineering construction cost
13	ToRs for the demonstration of BAT applications to medical waste incineration
14	Minutes of implementation plans for Changchun Municipality Medical Waste Disposal Center
15	BEP implementation plan for Changchun Municipality Medical Waste Disposal Center

16	ToRs for the demonstration of BAT applications to the continuous feeding pyrolytic process of medical waste disposal
17	ToRs for the demonstration of BAT applications to the by-batch feeding pyrolytic process of medical waste disposal
18	Minutes of implementation plans for Nanchang
19	BEP implementation plan for Nanchang Municipality Medical Waste Disposal Center
20	Minutes of implementation plans for Yiyang Municipality Medical Waste Disposal Center
21	BEP implementation plan for Yiyang Municipality Medical Waste Disposal Center
22	ToRs for the demonstration of BAT applications to medical waste autoclaving process
23	Minutes of implementation plans for Xiaogan Municipality Medical Waste Disposal Center
24	BEP implementation plan for Xiaogan Municipality Medical Waste Disposal Center
25	ToRs for the demonstration of BAT applications to medical waste microwaving process
26	ToRs for the demonstration of BAT applications to chemical disinfection process of medical waste
27	Minutes of implementation plans for Pingliang Municipality Medical Waste Disposal Center
28	BEP implementation plan for Pingliang Municipality Medical Waste Disposal Center
29	Minutes on BAT implementation plans for Xinxiang Municipality Medical Waste Disposal Center
30	BEP implementation plan for Xinxiang Municipality Medical Waste Disposal Center
31	TORs for the 6 municipalities

32	Implementation plan of BAT-BEP Guidelines
33	Interim Report of the Study on BATBEP Guidelines
34	Implementation plan for research on economic policy for medical wastes centralized disposal
35	Interim Report of the Study on Economic Policy for Medical Waste Management and Disposal
36	Work Plan for the Research and Development of the VOCs and Odors Control Technology
37	Implementation plan for Extensive Stakeholder Awareness Raising
38	Interim Report of Awareness Raising Activities
39	Minutes from the steering committee meetings
40	Inception report
41	Annual Work Plan 2008-2009
42	Final Reports of the 1st and 2nd Tripartite Meetings and the Relevant Reports for 2008 and 2009
43	Analysis and evaluation report on the supervision and management to the operation of facilities at medical waste disposal units by environmental protection departments
44	Enhancement of public awareness subproject progress (Subcontract no. cvs08554)
45	Final Report of the Study on BAT-BEP Guidelines
46	Final Report of the Study on Standard for Pollution Control for Incineration and Technical Specifications
47	Final Report of the Study on Standard for Pollution Control for non-incineration and Technical Specifications
48	R & D on Selective Catalytic Reduction Technology for the Dioxins Emission Destruction from Medical Wastes Incineration Disposal Facilities
49	R & D on Selective Catalytic Reduction Technology for the Dioxins Emission Destruction from Medical Wastes Incineration Disposal

	Facilities(Output 1)
50	R & D on Selective Catalytic Reduction Technology for the Dioxins Emission Destruction from Medical Wastes Incineration Disposal Facilities(Output 2)
51	Report 2 on the progresses and results of incentive programs for Integrated Medical Waste Management Cluster (IIMC)
52	Research on control technology for VOCs and odor in medical waste non-incineration disposal process(project progress report I)
53	Research on control technology for VOCs and odor in medical waste non-incineration disposal process(project progress report II)
54	Research on Economic Policies for Medical Wastes Centralized Disposal Research Report
55	Research Report of the Technical Guidelines for Medical Waste Disposal Engineering Construction Cost Sub-project
56	Solving suggestions and problem analysis for the supervision and management to the operation of centralized disposal facilities for medical wastes
57	Summary report of technical specifications for the supervision and management to the operation of centralized disposal facilities for medical wastes
58	Technical Guidelines for Medical Waste Disposal Engineering Construction Cost
59	Work Report on Medical Waste (MW) Management Project in Medical Institutions
60	Audit reports of project for year 2008 and 2009

Annex 3: List of persons met and consulted by the evaluation team; and agenda of field mission

List of persons met and consulted by the evaluation team

Name	Position	Institution
Yu Lifeng	Deputy Director-General	Foreign Economic Cooperation Office, China Ministry of Environmental Protection (FECO/MEP)
Ding Qiong	Director of Division V	FECO/MEP
Zhou Xiaofang	Director of Division III	FECO/MEP
Wang Kaixiang	Deputy Director of Division III	FECO/MEP
Han Wenyan	Senior Project Officer	FECO/MEP
Jiang Chen	Senior Project Officer	FECO/MEP
Li Xin	Project Officer	FECO/MEP
Chen Yu	Project Officer	FECO/MEP
Su Chang	Project Officer	FECO/MEP
Qu Yunhuan	Project Officer	FECO/MEP
Gao Xinhua	Project Officer	FECO/MEP
Ren Zhiyuan	Project Officer	FECO/MEP
Liang Minghui	Director	National Institute of Hospital Administration (NIHA)
Gong Yuxiu	Dean	NIHA
Wu Yinghong	Director	People's Hospital of Peking University, Beijing Municipal Center of Quality Control Improvement on the Management of Hospital Infection
Xiong Wei	Director	Affiliated Tongji Hospital of Huazhong University, Hospital Infection Control Center of Hubei Province
Wu Anhua	Director	Xiangya Hospital affiliated to Central South University, Hospital Infection Control Center of Hunan Province
Shan Shujuan	Deputy Director	National Institute for Health Administration (NIHA)
Zhao Shuo	Project Officer	NIHA

Guo Shen	Project Officer	NIHA
Wang Zijia	Project Officer	NIHA
Dong Yan	Interpreter	
Chen Yang	Associate Professor	Institute of High Energy Physics (IHEP), CAS
Xu Diandou	Associate Professor	Institute of High Energy Physics (IHEP), CAS
Zheng Hailiang		Institute of High Energy Physics (IHEP), CAS
Zhang Li		Institute of High Energy Physics (IHEP), CAS
Yang Xiaozhi		Institute of High Energy Physics (IHEP), CAS
Mr. Huang	Secretary-General	Xiaogan Municipal Government
Mr. Gang	Director	Xiaogan Environmental Protection Bureau (EPB)
Mr. Chen	Section Chief	Xiaogan Environmental Protection Bureau (EPB)
Mr. Lu	Section Chief	Xiaogan Department of Health
Mr. Xiong	Director	Xiaogan Department of Pricing
Mr. Wu	Section Chief	Xiaogan Department of Pricing
Ms. Wen	Director	Xiaogan Central Hospital
Ms. Yang	Director	Xiaogan City Rehabilitation Hospital
Ms. Fang	Director	Xiaogan Maternal and Child Care Hospital
Ms. Jian		Interpreter
Mr. Chen	Manager	Medical Waste Treatment Center of Xiaogan
Ma Qiang	Deputy Director-General	Children Hospital of Jiangxi Province
Tu Chonghua	Director	Children Hospital of Jiangxi Province
Gong Xiaomin	Division Director	Department of Health of Jiangxi Province
Luo Youwu	Director	Children Hospital of Jiangxi Province
Xu Shujuan	Director	Children Hospital of Jiangxi Province
Xu Shuixi	Deputy Director-General	Nanchang Environment Protection Bureau (EPB)
Li Yujun	Director	Nanchang Environmental Engineering Evaluation

		Center
Fang Pingping	Manager	Medical Waste Treatment Center of Nanchang
Liang Peng		Medical Waste Treatment Center of Nanchang
Li Tuo		Medical Waste Treatment Center of Nanchang
Du Junyi		Medical Waste Treatment Center of Nanchang
Zhou Pingsheng		Interpreter
Hu Jie	Deputy Director-General	Ningbo EPB
Fan Ruoliang	Division Director	Ningbo EPB
Xu Mengxia	Ph.D	Ningbo EPB
Wen Yangbo	Director	Ningbo EPB
Xu Nengbin	Deputy Director	Ningbo EPB
Chen Mo		Ningbo EPB
Wang Peng		Ningbo EPB
Xia Ning		Ningbo EPB
Dai Zhongshui	Division Director	Ningbo EPB
Fang Hongfeng		Environmental Inspection Branch of Ningbo EPB
Shi Xiuya	Deputy Director	Publicity and Education Center of Ningbo
Lin Bin	Deputy Director	Solid Waste Management Center of Ningbo
Zha Ping	Director	Solid Waste Management Center of Shanghai
Zhong Shenghao	Deputy Director	Solid Waste Management Center of Shanghai
Wu Jian		Shanghai EPB
Tang Jian		Shanghai EPB
Dr. Zhang		Solid Waste Management Center of Shanghai
Mr. Lu		Solid Waste Management Center of Shanghai
Li Xiewei	Professor	Research Institute of BaoSteel
Yu Yongmei	Ph.D	Research Institute of BaoSteel

Chen Xizu	Director	Energy & Environmental Department of BaoSteel
Shen Xinfeng		Energy & Environmental Department of BaoSteel
Chen Xianyong		Technical Department of BaoSteel
Ye Jiajun		Stainsteel Plant of BaoSteel
Zhou Yijuan		Stainsteel Plant of BaoSteel
Gu Lijuan		Stainsteel Plant of BaoSteel
Yu Gang	Professor/NTA	Tsinghua University
Wu Changming		Tsinghua University
Dr. Tian		Tsinghua University
Dr.Sheng		Tsinghua University

Agenda of field mission in China

Date	Time	Activity	Institution /location
13 January 2011			
	10:00 - 12:30	Initial meeting with UNIDO Beijing	UNIDO, Beijing country office
	14:00 - 15:00	Initial meeting with MOFCOM	MOFCOM, Beijing
	15:40	Initial meeting with CICETE/MOFCOM	CICETE/MOFCOM, Beijing
14 January 2011			
	9:30-10:15	Initial meeting with FECO/MEP	FECO/MEP, Beijing
	10:15-12:00	Technical meeting with POPs divisions (CIO) of FECO	CIO/FECO, Beijing
	13:00-15:00	Technical meeting with FECO Division V	CIO/FECO, Beijing
	15:30-16:30	Technical meeting with NIHA	NIHA, Beijing
	17:00-18:00	Technical meeting with Institute of High Energy Physics (IHEP), Chinese Academy of Sciences (CAS)	IHEP, CAS, Beijing
17 January 2011			
	9:00-10:30	Meeting with Xiaogan EPB	EPB, Xiaogan, Hubei Province

	10:30-12:00	Meeting and field visit, Xiaogan Central Hospital	Xiaogan Central Hospital
	14:00-16:30	Meeting and site visit with Medical Waste Treatment Center of Xiaogan	Medical Waste Treatment Center of Xiaogan
18 January 2011			
	9:00-10:30	Meeting with EPB of Jianxi Province	EPB, Jianxi Province
	10:45-12:30	Meeting and site visit at Children Hospital of Jiangxi Province	Children Hospital of Jiangxi Province
	15:00-17:00	Meeting and site visit at Medical Waste Treatment Center of Nanchang	Nanchang waste treatment centre
19 January 2011			
	9:30 – 11:30	Meeting with Guangzhou EPB	Guangzhou EPB
	13:30-14:30	Site visit of dioxin laboratories of in South China Institute of Environmental Science, MEP and Guangzhou Institute of Geochemistry, CAS	Guangzhou
20 January 2011			
	9:00-10:30	Meeting with Ningbo EPB	Guangzhou EPB
	11:00-12:00	Site visit of dioxin laboratory of Ningbo	Ningbo
21 January 2011			
	9:30-11:30	Meeting with Shanghai EPB	Shanghai EPB
	14:00-7:00	Meeting with Baosteel and visit of dioxin laboratory of Baosteel	Baosteel, Shanghai
24 January 2011	13:30-14:30	Site visit at pilot scale R&D plant at Shansteel	Jinan
26 January 2011	9:30 – 11:00	Presentation of preliminary findings to CIO/FECO	CIO/FECO, Beijing
27 January 2011	14:30 – 17:00	Presentation of preliminary findings at UNIDO country office	UNIDO country office, MEP / FECO, Beijing

Annex 4: List of subcontracts and value of subcontracts

No	Contract title	Contract Value (\$)	Procurement Method	Duration of Procurement	Starting Date	Bid Winner
1	Performance Testing Technical Specification of MW Incineration Facilities, and Revised Standard on Pollution Control for Hazardous Waste (including MW) Incineration	95,500	Restricted Local Competition	25 months	2008.9	Shenyang Environmental Science Academy
2	Pollution Control for Non-incineration Treatment of MW, and Technical Specification of Monitoring for Non-Incineration Disposal Facilities	90,500	Restricted Local Competition	25 months	2008.1	Institute of High Energy Physics, Chinese Academy of Sciences
3	Technical Specification of Supervision and Management of Dedicated MW Disposal Facilities Operations	80,000	Restricted Local Competition	25 months	2008.1	Beijing Normal University
4	BAT/BEP guidance for medical waste management and disposal	80,000	Restricted Local Competition	22 months	2008.11	Shenyang Environmental Science Academy
5	Economic Policy on MW Disposal and Treatment	50,000	Restricted Local Competition	36 months	2008.11	Chinese Academy for Environmental Planning
6	Construction Cost Guideline of MW Disposal Facilities	50,000	Restricted Local Competition	25 months	2008.11	Research Institute of Standards & Norms, Ministry of Housing and Urban-Rural Development
7	Stakeholder awareness raising year 1	90,000	Restricted Local Competition	12 months	2008.11	Tsinghua University
8	Research & Development on VOCs control and deodor Technologies for the non-	80,000	Restricted Local Competition	30 months	2009.2	Tianjin University

	Incineration Medical Waste Disposal Facilities					
9	Demonstrate the application of BAT for incineration process of medical waste	76,236	Open Local Competition	30 months	2008.8	Changchun MW Disposal Centre
10	Demonstrate the application of BAT in continuous pyrolysis process of medical waste	79,780	Open Local Competition	25 months	2008.8	Nanchang MW Disposal Centre
11	Demonstrate the application of BAT in interim pyrolysis process of medical waste	78,340	Open Local Competition	21 months	2008.8	Yiyang MW Disposal Centre
12	Demonstrate the application of BAT in autoclaving process of medical waste	79,580	Open Local Competition	30 months	2008.8	Xiaogan MW Disposal Centre
13	Demonstrate the application of BAT in microwave disinfection process of medical waste	80,000	Open Local Competition	24 months	2010.6	Pingliang MW Disposal Centre
14	Demonstrate the application of BAT in chemical disinfection process of medical waste	80,000	Open Local Competition	24 months	2010.1	Xingxiang MW Disposal Centre
15	Integrated Medical Waste Management for Demonstration Municipal City of Changchun	60,000	Restricted Local Competition	24 months	2010.12	Government of Changchun Municipality
16	Integrated Medical Waste Management for Demonstration Municipal City of Nanchang	60,000	Restricted Local Competition	24 months	2010.12	Government of Nanchang Municipality
17	Integrated Medical Waste Management for Demonstration Municipal City of Yiyang	60,000	Restricted Local Competition	24 months	2010.12	Government of Yiyang Municipality
18	Integrated Medical Waste Management for Demonstration Municipal City of Xiaogan	60,000	Restricted Local Competition	24 months	2010.12	Government of Xiaogan Municipality

19	Integrated Medical Waste Management for Demonstration Municipal City of Pingliang	60,000	Restricted Local Competition	24 months	2010.12	Government of Pingliang Municipality
20	Integrated Medical Waste Management for Demonstration Municipal City of Xinxiang	60,000	Restricted Local Competition	24 months	2010.12	Government of Xingxiang Municipality
21	Medical waste management project in health institutions	1,600,000	Direct Procurement	60 months	2001.1	National Institute of Hospital Administration, Ministry of Health
22	Technical guideline for the medical waste management and disposal in emergencies	23,400	Restricted Local Competition	8 months	2010.11	Tianjin Environmental Science Academy
23	Compiling textbooks for managerial and technical trainings	76,300	Restricted Local Competition	8 months	2010.11	Tianjin Veolia Environnement Service Corp.
24	Research & Development on Selective Catalytic Reduction Technology for the Dioxins Emission Destruction from Medical Wastes Incineration Disposal Facilities	150,000	Open International Competition	30 months	2010.8	Zhejiang University
25	National Policy Advisor For Year 1	21,500	Consultant's Qualifications	12 months	2008.5	Chen Yang
26	National Technical Expert For Year 1	15,050	Consultant's Qualifications	12 months	2008.5	Wu Shunze
27	International Coordination Expert For Year 1	11,610	Consultant's Qualifications	12 months	2008.5	Jiang Feng
28	Pyrolysis Expert For Year 1	14,000	Consultant's Qualifications	12 months	2008.1	Li Bingyu
29	Incineration Expert For Year 1	14,000	Consultant's Qualifications	12 months	2008.1	Li Xiaodong
30	Awareness Rising Expert For Year 1	8,600	Consultant's Qualifications	12 months	2008.9	Huang Jun
31	Chemical Disinfection Expert For Year 1	14,000	Consultant's Qualifications	12 months	2008.1	Zhang Liubo

32	Microwave Disinfection Expert For Year 1	14,000	Consultant's Qualifications	12 months	2009.2	Sun Ning
33	National Policy Advisor For Year 2	23,650	Consultant's Qualifications	12 months	2010.7	Chen Yang
34	National Technical Expert For Year 2	21,500	Consultant's Qualifications	12 months	2010.7	Wu Shunze
35	International Coordination Expert For Year 2	19,350	Consultant's Qualifications	12 months	2008.5	Jiang Feng
36	Autoclave Disinfection Expert For Year 2	14,000	Consultant's Qualifications	12 months	2010.8	Jin Dengchao

Annex 5: Summary of Financial statement submitted by FECO

No	Item	2008 (US\$)	2009 (US\$)	2010 (US\$)	Total in three years (US\$)
1	Payment received from UNIDO	2,146,647	2,082,200		4,228,847
2	Cumulative payment received from UNIDO		4,228,847		4,228,847
3	Total payment made by year	196,403	1,030,899	207,646	1,434,948
4	Cumulative total payment by FECO	196,403	1,227,302	1,434,948	1,434,948
Classification of payments by FECO	Payment to individual consultants	37,060	39,040	23,370	99,470
	Payment to sub-contractors	67,650	958,934	158,116	1,184,700
	Workshops and seminars	91,693	30,719	22,523	144,935
	Equipment	0	0	0	0
	Translation/printing	0	2,206	3,637	5,843
	Management fee of FECO / SEPA	64,399	62,466	0	126,865

Detailed UNIDO installment with date

Date	Project fund (US\$)	Management fee (US\$)	Total Received (US\$)
Mar. 12, 2008	1,646,647	49,399	1,696,046
Sep. 23, 2008	500,000	15,000	515,000
Dec. 30, 2009	2,082,200	62,466	2,144,666

Detailed financial statement by FECO

Output		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
Output 1.1 Strengthen the regulatory framework for medical waste management	17-50	National experts	8,600						8,600	0
	21-00	Subcontract (laws and regulations)	172,000	15,000		65,000			172,000	80,000
	51-00	Translation/printing	1,955						1,955	0
Output 1.2 Upgrade or establish performance levels for dedicated medical waste disposal facilities	17-01	National Technical Advisor	4,300		4,300		4,300		12,900	0
	17-50	National experts	4,300		4,300		4,300		12,900	0
	21-00	Subcontract (emission standards)	30,000	13,650	30,000	229,350	36,000		96,000	243,000
	51-00	Translation/printing	600		600		690		1,890	0
Output 2.1 Establish a long-term national coordination mechanism for integrated medical wastes management	17-50	National experts	8,600		0				8,600	0
	35-00	Workshops/meetings	30,000	21,330	26,000		26,000		82,000	21,330
	51-00	Translation/printing	200		0		200		400	0
Output 2.2 Strengthen supervision and inspection	17-01	National Technical Advisor	4,300		4,300		0		8,600	0

Output		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
on medical care institutions in MW management	17-50	National experts	4,000		4,000		0		8,000	0
	21-00	Subcontract (CP in BEP supervision)	105,000		105,000	105,000	112,000		322,000	105,000
	51-00	Translation/printing	500		500		0		1,000	0
Output 2.3 Strengthen monitoring and supervision capacity on MW treatment and disposal	17-50	National experts	8,600		3,000		0		11,600	0
	21-00	Subcontract (CP for BAT monitoring)	93,000	24,000	93,000	60,000	93,000	7,020	279,000	91,020
	51-00	Translation/printing	500		500		500		1,500	0
Output 2.4 Strengthen the environmental impact assessment on disposal facilities	17-01	National Technical Advisor	0				4,300		4,300	0
	17-50	National experts	0		0		19,350		19,350	0
	21-00	Subcontract (EIA)	0		34,000		10,000		44,000	0
	51-00	Translation/printing	0		300		300		600	0
Output 2.5 Strengthen the capacity to audit the operation of disposal facilities	17-50	National experts	0		8,600		0		8,600	0
	21-00	Subcontract (disposal facility auditing)	0		0		12,500		12,500	0
	51-00	Translation/printing	0		500		300		800	0

Output		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
Output 3.1 Demonstrate BEP in medical care institutions for the lifecycle management of MW	17-01	National Technical Advisor	4,300		3,200				7,500	0
	17-50	National experts	4,300		4,300				8,600	0
	21-00	Subcontract (BEP demo in MIs)	281,000		281,525	281,000			562,525	281,000
	51-00	Translation/printing	1,000		1,000				2,000	0
Output 4.1 Demonstrate the application of BAT in incineration process of MW	17-01	National Technical Advisor	4,300		4,300				8,600	0
	17-50	National experts	34,400	4,200	0	5,600	19,250	8,400	53,650	18,200
	21-00	Subcontract (incineration BAT demo)	50,000		53,500			15,250	103,500	15,250
	45-00	Equipment	1,037,500		500				1,038,000	0
	51-00	Translation/printing	500		500				1,000	0
Output 4.2 Demonstrate the application of BAT in pyrolysis process of MW	17-01	National Technical Advisor	4,300		4,300				8,600	0
	17-50	National experts		4,200	0		34,400		34,400	4,200
	21-00	Subcontract (pyrolysis BAT								
			80,000		70,000	15,668		15,956	150,000	31,624

Output		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
		demo)								
	45-00	Equipment	898,000		898,000				1,796,000	0
	51-00	Translation/printing	600		600		0		1,200	0
Output 5.1 Demonstrate the application of BAT in autoclaving process of MW	17-01	National Technical Advisor	4,300		4,300				8,600	0
	17-50	National experts	0		0		34,400		34,400	0
	21-00	Subcontract (autoclaving)	50,000		50,000	15,916			100,000	15,916
	45-00	Equipment	530,500						530,500	0
	51-00	Translation/printing	600		600				1,200	0
Output 5.2 Demonstrate the application of BAT in other non-incineration processes of medical waste	17-50	National experts	12,700		0	12,200	26,000		38,700	12,200
	21-00	Subcontract (other non-incineration BAT demo)	70,000		80,000			32,000	150,000	32,000
	45-00	Equipment	618,000		0				618,000	0
	51-00	Translation/printing	700		700	2,206	0		1,400	2,206
Output 5.3 Demonstrate	45-00	National experts	38,700		0			38,700	0	

Output		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
the application of BAT/BEP for treatment and disposal of MW in remote rural areas	21-00	Subcontract/s	62,000		51,000				113,000	0
	45-00	Equipment	143,750		0		0		143,750	0
	51-00	Translation/printing	500		600		0		1,100	0
Output 6.1 Demonstrate the application of intergrated MW mnagement among institution at the municipal level	17-01	National Technical Advisor	0		1,300		4,300		5,600	0
	17-50	National experts	0		1,300		4,300		5,600	0
	21-00	Subcontract (integrated medical waste management)	0		220,000		142,000		362,000	0
	51-00	Translation/printing	0		1,000		1,250		2,250	0
Output 6.2 Demonstrate the coordinatied MW treatment among the dedicated MW facilities at the provincial level	17-50	National experts	0		8,600		8,600		17,200	0
	21-00	Subcontract (coordinated medical waste treatment/ disposal)	0		280,000		170,000		450,000	0
	51-00	Translation/printing	0		1,000		1,150		2,150	0
Output 7.1 Formulate techno-economic policies that promote the adoption	17-01	National Technical Advisor	4,300		4,300				8,600	0
	17-50	National experts	4,300		4,300				8,600	0

Output		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
of BAT/BEP	21-00	Subcontract (techno-economic policies)	47,000	15,000	233,000	91,000		20,000	280,000	126,000
	51-00	Translation/printing	850		760				1,610	0
Output 7.2 Demonstrate and promote different commercial models for the construction and operation of MW treatment and disposal facilities	17-50	National experts	0		8,600		8,600		17,200	0
	21-00	Subcontract (commercialization of medical waste treatment / disposal)	0		214,000		213,000		427,000	0
	51-00	Translation/printing	0		800		660		1,460	0
Output 7.3 Strengthen national capacity to develop a new MW treatment technologies appropriate to China's socio-economic context	17-50	National experts	8,600		0		8,600		17,200	0
	21-00	Subcontract (technology introduction, transfer and development)	72,000		85,000	24,000	73,000	45,000	230,000	69,000
	51-00	Translation/printing	1,000		1,000		980		2,980	0
Output 7.4 Develop and implement a MW treatment equipment certification and labelling	17-50	National experts	0				8,600		8,600	0
	21-00	Subcontract (certification/ labeling program)	0				160,000		160,000	0

Output program		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
	51-00	Translation/printing	0				1,000		1,000	0
Output 7.5 Establish training and accreditation systems for lifecycle management of MW that support BAT/BEP	17-50	National experts	0				12,900		12,900	0
	21-00	Subcontract (personnel training system)	0				183,000	22,890	183,000	22,890
	51-00	Translation/printing	0				770		770	0
Output 7.6 Extensive stakeholder awareness raising, including a series of national and international workshop	17-01	National Technical Advisor	0				4,300		4,300	0
	17-50	National experts	8,600	5,160	8,600		4,300		21,500	5,160
	21-00	Subcontract (stakeholder awareness raising)	90,000		90,000	72,000	90,000		270,000	72,000
	35-00	Workshops/meetings					5,500		5,500	0
	51-00	Translation/printing	500		500		500		1,500	0
Output 8.1 Establish the project management	35-00	Workshops/meetings	22,000		22,000	30,719	22,000	12,010	66,000	42,729
	33-00	Short-term trainings	43,500	28,988	43,500		43,500	8,665	130,500	37,653

Output structure		Budget Description	2008		2009		2010		Total in three years	
			Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)	Approved (US\$)	Actual Spent (US\$)
	51-00	Translation/printing	3,000		3,000		3,000		9,000	0
Output 8.2 Design and implementation of M&E mechanism according to GEF M&E procedures	17-50	National experts	4,300	23,500	4,300	21,240	4,300	14,970	12,900	59,710
	35-00	Workshops/meetings	25,000	41,375	23,000		23,000	1,848	71,000	43,223
	51-00	Translation/printing	2,000		2,000		2,000	3,637	6,000	3,637